AKRF
Environmental and Planning Consultants

440 Park Avenue South
New York, NY 10016
tel: 212 696-0670
fax: 212 213-3191
www.akrf.com

January 28, 2008

Mr. Sadique Ahmed
Remedial Bureau B – Section C
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233-7010

Re: Chemical Oxidation Work Plan
Home Depot Woodhaven Blvd., Rego Park, NY
Site #V00095

Dear Mr. Ahmed:

Thank you for your letter of November 21, 2007 commenting on the Chemical Oxidation Work Plan submitted for the Home Depot Woodhaven Boulevard site in Queens. The individual comments in the letter are addressed below. The numbers refer to the numbered comments in the attached copy of DEC's comment letter.

1. The sparging wells were designed with the screens just below the level of most of the contaminant plume. The pumping of the solutions into the well creates a mixing zone around the well screen. Regenesis, the supplier of the oxidant, estimates that this zone is at least 10 feet in radius. This should provide oxidant in the top ten feet of the groundwater where most of the dissolved contaminant is located.
2. Mass destruction will be calculated from the post-treatment concentrations in groundwater samples from the monitoring wells using the same model used to calculate pre-treatment contaminant mass.
3. Figure 1 shows the estimated horizontal extent of the plume and the target area for the chemical oxidation. It is important to note that the target area is not a source area and we therefore do not expect the presence of NAPL. Based on both the site history and the results of several site investigations, the two source areas were both below the old ADI building that was located along the western side of the site on Woodhaven Boulevard.
4. 550 gallons will be injected in each well in the first two rounds of sampling, and 350 gallons will be injected in each well in the final round. 550 gallons is about 74 cubic feet. If the soil porosity is 0.4, this corresponds to displacing the groundwater from about 185 cubic feet of soil, which is the volume within a three-foot radius from the well screen. This volume is sufficient to produce mixing in the area directly around the well without any large-scale displacement of the plume.

5. Reaction of the oxidant with organic matter in the soil is an important concern in the use of chemical oxidation for groundwater treatment. Because the groundwater is deep at this location, we believe that the organic content of the soil is low and this should not be a major issue. We've conservatively assumed an f_{oc} of 0.003 in calculating the oxidant dosage.
6. Prior studies have found that groundwater movement on the site is very slow. In particular, the contaminant plume in the downgradient area under the Home Depot building has shown little movement over the years. As noted in response #4 above, the volume of material being injected is too low to displace the plume significantly. Any unreacted PCE or intermediates would be expected to remain in place. The oxidant is unstable in the environment and would decompose. The activator is a ferrous salt which is intended to remain in place for repeated oxidant applications.
7. See attached Figure 1.
8. Health and Safety and QA/QC Plans for the work on this site were prepared at the time of the original investigation. Updated plans are attached (Attachments A and B).
9. The product to be used, RegenOx, is a proprietary product of Regenesis, Inc. A complete description of the product and its use is presented in the product manual, which can be be downloaded at http://www.regenesis.com/products/chemOx/manualReg.aspx.
10. The Chemetrics test kit is described on the attached instruction sheet (Attachment D).
11. No site-specific data on percent carbon is available, but the assumed value is considered conservative for the soil type at this depth. The percent void space is based on the soil type observed in borings – medium to coarse sand with some gravel.
12. The RegenOx oxidant releases hydrogen peroxide gradually over a period of one to three weeks. Although field monitoring instruments are being used as part of the monitoring plan, the reactions are not rapid enough to require real-time monitoring. The monitoring events will only occur at the intervals shown in the monitoring plan: baseline prior to injection, two weeks after each injection, and four weeks after the final injection.
13. See response 14 below.
14. The use of chemical oxidation is intended as part of the remedial action work plan. However, this can be considered a pilot test in the sense that plans for future remedial actions may be modified based on the degree of success achieved. The proposed application of chemical oxidant utilizing existing wells is a relatively low-cost procedure that can be implemented in a short period of time. If the procedure can reduce the mass of contaminant in the target area it could be repeated and extended to other portions of the site, such as the source area in the southwest corner.
15. For the reason stated in response #14 above, it is preferable to perform the chemical oxidation first. The expansion of the AS/SVE system will take many months to implement (pilot test, design, construction, testing, etc.). In contrast, the proposed chemical oxidation plan can be started in a matter of weeks and completed within two months. The results will then influence the final design for the upgrade. If the use of chemical oxidant is successful, additional wells designed for oxidant injection may be added. If the PCE mass under the building cannot be significantly reduced, the system extension may be redesigned to treat additional areas.

Please call me at 646-388-9526 or e-mail at arudko@akrf.com if you have any questions or comments.

Sincerely,
AKRF, Inc.

Andrew D. Rudko
Senior Vice President

cc: Sadique Ahmed, NYSDEC
Kevin Carpenter, NYSDEC
John Patton, Greg Beesch, Home Depot
James Scott, Home Depot
Mark Chertok, Jennifer Coghlan, Sive Paget & Riesel
Michael Lesser, Esq., NYSDEC

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau B, Section C
628 Broadway, Albany, New York 12233-7016
Phone: (518) 402-9768 • **FAX:** (518) 402-9020
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

November 21, 2007

Andrew D. Rudko, PE. D.
Senior Vice President, AKRF
440 Park Avenue South
New York, NY 10016

Re: Chemical Oxidation Work Plan dated September 16, 2007
Home Depot Woodhaven Blvd., Rego Park, NY
VCP Site ID: V00095.

Dear Dr. Rudko:

The New York State Departments of Environmental Conservation and Health have completed review of the September 16, 2007 proposed chemical oxidation work plan to reduce the mass of contaminants under the western portion of the main Home Depot building. The work plan is unacceptable until the comments below are addressed.

Comments

1. The work plan states that most of the contamination is in the top 10 feet of the water column, yet the sparge wells that you propose using are screened 10 feet below the water table. It is unclear how you will get the oxidant in contact with the residual contamination. For ISCO (In Situ Chemical Oxidation) to be successful, the oxidant must contact the contamination.

2. The work plan does not describe how mass destruction will be calculated.

3. The work plan must do a better job of describing the target contamination (e.g. NAPL, residual NAPL). It must also more clearly describe where the target contamination is located vertically and areally.

4. The work plan must describe the impact of displacing the dissolved plume. By injecting close to 1000 gallons of water, you will displace an equivalent volume of contaminated groundwater. It would be better if you consider implementing the ISCO project after enhancing the sparge curtain in the down gradient direction.

5. Because ISCO is non-selective in regard to organic material, it can cause mobilization of the NAPL due to the loss of natural organic carbon to which the NAPL may presently be sorbed. This potential should be addressed in the work plan.

6. The work plan does not describe any contingencies for unreacted PCE and intermediate products and does not describe the fate of unreacted oxidant and activator. There is no contingency for a mobilization of the dissolved plume.

7. The work plan should include a figure showing the location of the target contamination and the expected distribution of the oxidant.

8. The work plan should include a health and safety and should include or reference a QA/QC Plan.

9. The work plan should include product specific information on the proposed oxidant.

10. There is no detailed information on the field test kit for the oxidant. The work plan should include product specific information on the test kit, including its use and any associated QA/QC.

11. If you have site specific information on the site soils, (e.g. % organic carbon, % void space), you should use that to calculate dosage instead of estimates. Alternatively, if you are installing any additional wells on the site, you should collect site-specific data.

12. The monitoring plan is not detailed enough. There is no frequency indicated for the real-time data.

13. The Department is not convinced that you do not need a bench or pilot-scale test, particularly in light of the assumptions used to calculate dosage.

14. It is unclear from the document whether this being conducted as a pilot-test of chemical oxidation efficacy or if this is a remedial action work plan.

15. As a volunteer Home Depot needs to prevent contamination from migrating off-site. Therefore, it would be better to consider the implementation of SVE/AS system expansion project before considering the use of chemical oxidation under the main building.

Please revise the work plan to address these comments and resubmit by December 31, 2007. Feel free to contact me at (518) 402 9775 if you have any questions or require further information.

Sincerely,

Sadique Ahmed
Environmental Engineer 1
Remedial Bureau B, Section C
Division of Environmental Remediation

cc: Jack A. Aversa, NYS DEC
Kevin Carpenter, NYS DEC
Geoff Lacotti, NYS DOH
Bridget K. Kallaghan, NYS DOH
Michael Lesser, Esq., NYS DEE
John Patton/Greg Beesch, Home Depot
Mark Chertok, Esq., Sive, Paget & Riesel

WOODHAVEN BOULEVARD

LAND NOW OR FORMERLY OF
THE LONG ISLAND RAILROAD

NURSERY

1 STORY CONCRETE BLOCK BUILDING
(HOME DEPOT)

AMW-1
AMW-2
AMW-3
AMW-4
AMW-5
AMW-6
P-1
P-2
P-3
P-4
P-5

SVE-2F
SVE-2E
AS-2 I
AS 2J
AS 2H
AS 2G
SVE 2D
SVE 2C
AS 2F
AS 2E
AS 2D
AS 2C
SVE 2B
SVE 2A
AS 2B
AS 2A
AS 5F
SVE 5E
AS 5E
SVE 5D
AS 5D
AS 5C
SVE 5C
SVE 5B
AS 5A
AS 1G
SVE 1D
SVE 1E
AS 1F
AS 1E
AS 1D
AS 1C
SVE 1B
SVE 1A
AS 1A
AS 3A
SVE 3B
AS 3B
AS 3C
SVE 3C
AS 3E
SVE 4A
AS 4B
AS 4C
SVE 4C
AS 4D
AS 4E
AS 8A
AS 8B
AS 8C
SVE 8A
AS 8E
SVE 8B
AS 5B
SVE 1C

0' 10' 20' 40'
SCALE IN FEET

N

LEGEND:

- PROPERTY BOUNDARY
- P-3 SHALLOW MONITORING WELL
- AS 5C AIR SPARGING SYSTEM
- OXIDATION TREATMENT AREA
- PCE PLUME
- PCE SOURCE AREAS

AKRF
Environmental Consultants
440 Park Avenue South, New York, NY 10016

HOME DEPOT - REGO PARK
REGO PARK, NEW YORK

PCE PLUME

DATE
2.08.08

PROJECT NO.
03399

SCALE
1"=50'

FIGURE
1

ATTACHMENT A

HEALTH AND SAFETY PLAN

Home Depot – Rego Park

Site #V00095

REGO PARK, NEW YORK

Health and Safety Plan

AKRF Project Number: 03399

Prepared for:

The Home Depot
3096 Hamilton Boulevard
South Plainfield, NJ 07080

Prepared by:

AKRF, Inc.
440 Park Avenue South, 7th Floor
New York, NY 10016
212-696-0670

JANUARY 2008

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION

The Voluntary Cleanup site is located at 75-09 Woodhaven Boulevard in the Rego Park – Glendale section of Queens, NY. The site is bounded by an abandoned former railroad embankment to the east, Long Island Railroad tracks to the south, Woodhaven Boulevard to the west, and a parking lot to the north. (See Figure 1 for the project site location.) The site is occupied by the one-story Home Depot building, a slab-on-grade structure with public access on the north side, a loading dock near the southwest corner, and a garden center on the west side. The equipment for the existing air sparging / soil vapor extraction (AS/SVE) system is in a shed near the southwest corner of the property, and the system extends to the north and east under the garden center, the southwest corner of the building, and along the southern boundary of the site.

The site was historically occupied by two parcels occupied by warehouses. PCE contamination in soil and groundwater was discovered during due diligence studies prior to acquisition of the property by Home Depot, and confirmed by supplemental groundwater sampling in 2003 – 2005. Two areas of elevated PCE in groundwater were detected in the southwestern corner of the site, and the present air sparging / soil vapor extraction system was subsequently installed in this location.

This environmental Health and Safety Plan (HASP) has been developed for implementation of pilot testing prior to extending the existing AS/SVE system, as well as for chemical oxidation treatment of the PCE contamination. The AS/SVE extension pilot tests would involve the installation of one vapor extraction well, three pressure monitoring wells, and one air sparging well along the southern edge of the site, extraction of soil gas from one of the SVE wells, injection of air into an AS well, and the collection of relevant measurements. The chemical oxidation treatment would involve the injection of RegenOx™, an oxidizing agent, into the subsurface using five existing sparging wells in the southwestern corner of the on-site building.

This HASP applies to site investigation and remediation activities conducted by all personnel on-site, both AKRF employees and others. This HASP does not discuss other routine health and safety issues common to general construction/excavation, including but not limited to slips, trips, falls, shoring, and other physical hazards.

All AKRF employees are directed that all work must be performed in accordance with the Company's Generic HASP and all OSHA applicable regulations for the work activities required for the project. All project personnel are furthermore directed that they are not permitted to enter Permit Required Confined Spaces (as defined by OSHA). For issues unrelated to contaminated materials, all non-AKRF employees are to be bound by all applicable OSHA regulations as well as any more stringent requirements specified by their employer in their corporate HASP or otherwise. AKRF is not responsible for providing oversight for issues unrelated to contaminated materials for non-employees. This oversight shall be the responsibility of the employer of that worker or other official designated by that employer.

2.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES

2.1 Hazard Evaluation

2.1.1 Hazards of Concern

Check all that apply		
(X) Organic Chemicals	( ) Inorganic Chemicals	( ) Radiological
( ) Biological	( ) Explosive/Flammable	( ) Oxygen Deficient Atm
( ) Heat Stress	( ) Cold Stress	( ) Carbon Monoxide
Comments: No personnel are permitted to enter permit confined spaces.		

2.1.2 Physical Characteristics

Check all that apply		
(X) Liquid	( ) Solid	( ) Sludge
(X) Vapors	( ) Unknown	( ) Other
Comments:		

2.1.3 Hazardous Materials

Check all that apply					
Chemicals	**Solids**	**Sludges**	**Solvents**	**Oils**	**Other**
( ) Acids	( ) Ash	( ) Paints	( ) Halogens	( ) Transformer	( ) Lab
( ) Caustics	( ) Asbestos	( ) Metals	( ) Petroleum	( ) Other DF	( ) Pharm
( ) Pesticides	( ) Tailings	( ) POTW	( ) Other	( ) Motor or Hydraulic Oil	( ) Hospital
( ) Petroleum	( ) Other	( ) Other		( ) Gasoline	( ) Rad
( ) Inks				( ) Fuel Oil	( ) MGP
( ) PCBs					( ) Mold
( ) Metals					( ) Cyanide
(X)Other: VOCs & SVOCs					

2.1.4 Chemicals of Concern

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Tetrachloroethene	PEL = 100 ppm Ceiling = 200 ppm Five minute max peak in any 3 hours = 300 ppm	High concentrations of tetrachloroethylene (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.
Trichloroethene	PEL = 100 ppm Ceiling = 200 ppm Five minute max peak in any 3 hours = 300 ppm	Breathing small amounts may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating. Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage. Drinking large amounts of trichloroethylene may cause nausea, liver damage, unconsciousness, impaired heart function, or death. Drinking small amounts of trichloroethylene for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear. Skin contact with trichloroethylene for short periods may cause skin rashes.
Comments: REL = NIOSH Recommended Exposure Limit PEL = OSHA Permissible Exposure Limit STEL = OSHA Short Term Exposure Limit		

2.2 Designated Personnel

AKRF will appoint one of its on-site personnel as the Site Safety Officer (SSO). This individual will be responsible for the implementation of the HASP. The SSO will have a 4-year college degree in occupational safety or a related science/engineering field, and experience in implementation of air monitoring and hazardous materials sampling programs. Health and safety training required for the SSO and all field personnel is outlined in Section 2.3 of this HASP.

2.3 Training

All personnel who enter the work area while intrusive activities are being performed will have completed a 40-hour training course that meets OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. In addition, all personnel will have up-to-date 8-hour refresher training. The training will allow personnel to recognize and understand the potential hazards to health and safety. All field personnel must attend a training program, whose purpose is to:

- Make them aware of the potential hazards they may encounter;
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety; Make them aware of the purpose and limitations of safety equipment; and
- Ensure that they can safely avoid or escape from emergencies.

Each member of the field crew will be instructed in these objectives before he/she goes onto the site. A site safety meeting will be conducted at the start of the project. Additional meetings shall be conducted, as necessary, for new personnel working at the site.

2.4 Medical Surveillance Program

All AKRF and subcontractor personnel performing field work involving subsurface disturbance at the site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). A physician's medical release for work will be confirmed by the SSO before an employee can begin site activities. The medical release shall consider the type of work to be performed and the required PPE. The medical examination will, at a minimum, be provided annually and upon termination of hazardous waste site work.

2.5 Site Work Zones

During any activities involving subsurface disturbance, the work area must be divided into various zones to prevent the spread of contamination, ensure that proper protective equipment is donned, and provide an area for decontamination.

The Exclusion Zone is defined as the area where exposure to impacted media could be encountered. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place and is located next to the Exclusion Zone. The Support is the zone area where support facilities such as vehicles, fire extinguisher, and first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all workers on-site would assemble in the event of an emergency. A summary of these areas is provided below. These zones may changed by SSO, depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

Task	Exclusion Zone	CRZ	Support Zone
Well Drilling	**10 ft from Drill Rig**	**25 ft from Drill Rig**	**As Needed**
Comments: Control measures such as "caution tape" and/or traffic cones will be placed around the perimeter of the work area when work is being done in a public area.			

2.6 Air Monitoring

The purpose of the air monitoring program is to identify any exposure of the field personnel to potential environmental hazards in the soil and groundwater. Results of the air monitoring will be used to determine the appropriate response action, if needed.

2.6.1 Volatile Organic Compounds

An organic vapor meter (OVM) will be used to perform air monitoring during soil disturbance activities to determine airborne levels of total VOCs. The OVM will be calibrated daily with a 100 ppm isobutylene standard.

2.6.2 Work Zone Air Monitoring

Real time air monitoring will be performed as necessary with a photoionization detector (PID) during sampling and drilling work at areas where volatile organic compounds are detected. Measurements would be taken prior to commencement of work and continuously during the work as outlined in the table below. Measurements will be made as close to the workers as practical and at the breathing height of the workers. The SSO will set up the equipment and confirm that it is working properly. His/her designee may

oversee the air measurements during the day. The initial measurement for the day will be performed before the start of work and will establish the background level for that day. The final measurement for the day will be performed after the end of work. The action levels and required responses are listed in the following table.

Instrument	Task to be Monitored	Action Level	Response Action
PID (OVM 580B or equivalent)	Well drilling, soil gas extraction	Less than 10 ppm in breathing zone.	Level D or D-Modified
		Between 10 and 500 ppm	Level C
		More than 500 ppm	Stop work. Resume work when readings are less than 500 ppm.

2.7 Personal Protection Equipment

The personal protection equipment required for various kinds of site investigation tasks are based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response, Appendix B, "General Description and Discussion of the Levels of Protection and Protective Gear."

AKRF field personnel and other site personnel shall wear, at a minimum, Level D personal protective equipment. The protection will be based on the air monitoring described in Section 2.6.

LEVEL OF PROTECTION & PPE		Well Drilling / Soil Gas Sampling
Level D (X) Steel Toe Shoes (X) Hard Hat (within 25 ft of drill rig/excavator) (X) Work Gloves	(X) Safety Glasses ( ) Face Shield (X) Ear Plugs (within 25 ft of drill rig/excavator) (X) Nitrile Gloves ( ) Tyvek for drill operator if NAPL present	Yes
Level C *(in addition to Level D)* (X) Half-Face Respirator OR (X) Full Face Respirator ( ) Full-Face PAPR	( ) Particulate Cartridge ( ) Organic Cartridge (X) Dual Organic/ Particulate Cartridge	If PID > 10 ppm (breathing zone)
Comments: Cartridges to be changed out at least once per shift unless warranted beforehand (e.g., more difficult to breath or any odors detected).		

2.8 Chemical Handling

Personnel working with or in areas of potential contact with RegenOx™ during the application of the chemical oxidation treatment shall observe chemical handling guidelines and use modified Level D personal protective equipment, including eye protection, a NIOSH-approved dust respirator, neoprene gloves, steel toe shoes with chemical-resistant soles or neoprene boots, and clothing with long sleeves and pant legs.

2.9 General Work Practices

To protect the health and safety of the field personnel, field personnel will adhere to the guidelines listed below during activities involving subsurface disturbance:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the site. These areas will be designated by the SSO.
- Workers must wash their hands thoroughly on leaving the work area and before eating, drinking, or any other such activity.
- The workers should shower as soon as possible after leaving the site. Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat/cold stress.

3.0 EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the SSO will determine the nature of the emergency and he/she will have someone call for an ambulance, if needed. If the nature of the injury is not serious, i.e., the person can be moved without expert emergency medical personnel, he/she should be driven to a hospital by on-site personnel. Directions to the hospital are provided below, and a hospital route map is attached.

3.1 HOSPITAL DIRECTIONS

Hospital Name:	North Shore University Hospital – Forest Hills
Phone Number:	(718) 830-4200
Address/Location:	102-01 66th Road, Forest Hills, NY (66th Road between 102nd Street and 103rd Street)
Directions:	Go WEST on *73rd Avenue* toward *Woodhaven Boulevard* RIGHT onto *Woodhaven Boulevard* SLIGHT RIGHT onto *Yellowstone Boulevard* LEFT onto *66th Road* The hospital will be on the right.

3.2 EMERGENCY CONTACTS

Company	Individual Name	Title	Contact Number
AKRF	Andy Rudko	Project Director	646-388-9526 (office)
	TBD	SSO	TBD
The Home Depot	James Scott	Client Representative	732-926-3657
Ambulance, Fire Department & Police Department	-	-	911
NYSDEC Spill Hotline	-	-	800-457-7362

HOME DEPOT—REGO PARK
REGO PARK, NEW YORK

HOSPITAL LOCATION MAP

AKRF
Environmental Consultants
440 Park Avenue South, New York, N.Y. 10016

DATE 02.02.08
PROJECT No. 03399
SCALE AS SHOWN
FIGURE

APPROVAL & ACKNOWLEDGMENTS OF HASP

APPROVAL

Signed: _____ Date: _____

AKRF Project Manager

Signed: _____ Date: _____

AKRF Health and Safety Officer

Below is an affidavit that must be signed by all workers who enter the site. A copy of the HASP must be on-site at all times and will be kept by the SSO.

AFFIDAVIT

I,_____(name), of_____(company name), have read the Health and Safety Plan (HASP) for the 2350 Fifth Avenue site. I agree to conduct all on-site work in accordance with the requirements set forth in this HASP and understand that failure to comply with this HASP could lead to my removal from the site.

Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____
Signed:	_____	Company:	_____	Date:	_____

APPENDIX A

POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

TETRACHLOROETHYLENE
CAS # 127-18-4

Agency for Toxic Substances and Disease Registry ToxFAQs September 1997

This fact sheet answers the most frequently asked health questions (FAQs) about tetrachloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Tetrachloroethylene is a manufactured chemical used for dry cleaning and metal degreasing. Exposure to very high concentrations of tetrachloroethylene can cause dizziness, headaches, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death. Tetrachloroethylene has been found in at least 771 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is tetrachloroethylene?

(Pronounced tĕt′rə-klôr′ ō-ĕth′ə-lēn′)

Tetrachloroethylene is a manufactured chemical that is widely used for dry cleaning of fabrics and for metal-degreasing. It is also used to make other chemicals and is used in some consumer products.

Other names for tetrachloroethylene include perchloroethylene, PCE, and tetrachloroethene. It is a nonflammable liquid at room temperature. It evaporates easily into the air and has a sharp, sweet odor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part tetrachloroethylene per million parts of air (1 ppm) or more, although some can smell it at even lower levels.

What happens to tetrachloroethylene when it enters the environment?

- Much of the tetrachloroethylene that gets into water or soil evaporates into the air.
- Microorganisms can break down some of the tetrachloroethylene in soil or underground water.
- In the air, it is broken down by sunlight into other chemicals or brought back to the soil and water by rain.
- It does not appear to collect in fish or other animals that live in water.

How might I be exposed to tetrachloroethylene?

- When you bring clothes from the dry cleaners, they will release small amounts of tetrachloroethylene into the air.
- When you drink water containing tetrachloroethylene, you are exposed to it.

How can tetrachloroethylene affect my health?

High concentrations of tetrachloroethylene (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.

Irritation may result from repeated or extended skin contact with it. These symptoms occur almost entirely in work (or hobby) environments when people have been accidentally exposed to high concentrations or have intentionally used tetrachloroethylene to get a "high."

In industry, most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of tetrachloroethylene are not known.

Results from some studies suggest that women who work in dry cleaning industries where exposures to tetrachloroethyl-

ene can be quite high may have more menstrual problems and spontaneous abortions than women who are not exposed. However, it is not known if tetrachloroethylene was responsible for these problems because other possible causes were not considered.

Results of animal studies, conducted with amounts much higher than those that most people are exposed to, show that tetrachloroethylene can cause liver and kidney damage. Exposure to very high levels of tetrachloroethylene can be toxic to the unborn pups of pregnant rats and mice. Changes in behavior were observed in the offspring of rats that breathed high levels of the chemical while they were pregnant.

How likely is tetrachloroethylene to cause cancer?

The Department of Health and Human Services (DHHS) has determined that tetrachloroethylene may reasonably be anticipated to be a carcinogen. Tetrachloroethylene has been shown to cause liver tumors in mice and kidney tumors in male rats.

Is there a medical test to show whether I've been exposed to tetrachloroethylene?

One way of testing for tetrachloroethylene exposure is to measure the amount of the chemical in the breath, much the same way breath-alcohol measurements are used to determine the amount of alcohol in the blood.

Because it is stored in the body's fat and slowly released into the bloodstream, tetrachloroethylene can be detected in the breath for weeks following a heavy exposure.

Tetrachloroethylene and trichloroacetic acid (TCA), a breakdown product of tetrachloroethylene, can be detected in the blood. These tests are relatively simple to perform. These tests aren't available at most doctors' offices, but can be performed at special laboratories that have the right equipment.

Because exposure to other chemicals can produce the same breakdown products in the urine and blood, the tests for breakdown products cannot determine if you have been exposed to tetrachloroethylene or the other chemicals.

Has the federal government made recommendations to protect human health?

The EPA maximum contaminant level for the amount of tetrachloroethylene that can be in drinking water is 0.005 milligrams tetrachloroethylene per liter of water (0.005 mg/L).

The Occupational Safety and Health Administration (OSHA) has set a limit of 100 ppm for an 8-hour workday over a 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that tetrachloroethylene be handled as a potential carcinogen and recommends that levels in workplace air should be as low as possible.

Glossary

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Milligram (mg): One thousandth of a gram.

Nonflammable: Will not burn.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Tetrachloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone:1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is http://www.atsdr.cdc.gov/toxfaq.html ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

TRICHLOROETHYLENE

CAS # 79-01-6

Division of Toxicology ToxFAQs™ July 2003

This fact sheet answers the most frequently asked health questions (FAQs) about trichloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Trichloroethylene is a colorless liquid which is used as a solvent for cleaning metal parts. Drinking or breathing high levels of trichloroethylene may cause nervous system effects, liver and lung damage, abnormal heartbeat, coma, and possibly death. Trichloroethylene has been found in at least 852 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is trichloroethylene?

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.

Trichloroethylene is not thought to occur naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

What happens to trichloroethylene when it enters the environment?

- Trichloroethylene dissolves a little in water, but it can remain in ground water for a long time.
- Trichloroethylene quickly evaporates from surface water, so it is commonly found as a vapor in the air.
- Trichloroethylene evaporates less easily from the soil than from surface water. It may stick to particles and remain for a long time.
- Trichloroethylene may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- Trichloroethylene does not build up significantly in plants and animals.

How might I be exposed to trichloroethylene?

- Breathing air in and around the home which has been contaminated with trichloroethylene vapors from shower water or household products such as spot removers and typewriter correction fluid.
- Drinking, swimming, or showering in water that has been contaminated with trichloroethylene.
- Contact with soil contaminated with trichloroethylene, such as near a hazardous waste site.
- Contact with the skin or breathing contaminated air while manufacturing trichloroethylene or using it at work to wash paint or grease from skin or equipment.

How can trichloroethylene affect my health?

Breathing small amounts may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating.

Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage.

Drinking large amounts of trichloroethylene may cause nausea, liver damage, unconsciousness, impaired heart function, or death.

Drinking small amounts of trichloroethylene for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear.

Skin contact with trichloroethylene for short periods may cause skin rashes.

How likely is trichloroethylene to cause cancer?

Some studies with mice and rats have suggested that high levels of trichloroethylene may cause liver, kidney, or lung cancer. Some studies of people exposed over long periods to high levels of trichloroethylene in drinking water or in workplace air have found evidence of increased cancer. Although, there are some concerns about the studies of people who were exposed to trichloroethylene, some of the effects found in people were similar to effects in animals.

In its 9th Report on Carcinogens, the National Toxicology Program (NTP) determined that trichloroethylene is "reasonably anticipated to be a human carcinogen." The International Agency for Research on Cancer (IARC) has determined that trichloroethylene is "probably carcinogenic to humans."

Is there a medical test to show whether I've been exposed to trichloroethylene?

If you have recently been exposed to trichloroethylene, it can be detected in your breath, blood, or urine. The breath test, if it is performed soon after exposure, can tell if you have been exposed to even a small amount of trichloroethylene.

Exposure to larger amounts is assessed by blood and urine tests, which can detect trichloroethylene and many of its breakdown products for up to a week after exposure. However, exposure to other similar chemicals can produce the same breakdown products, so their detection is not absolute proof of exposure to trichloroethylene. This test isn't available at most doctors' offices, but can be done at special laboratories that have the right equipment.

Has the federal government made recommendations to protect human health?

The EPA has set a maximum contaminant level for trichloroethylene in drinking water at 0.005 milligrams per liter (0.005 mg/L) or 5 parts of TCE per billion parts water.

The EPA has also developed regulations for the handling and disposal of trichloroethylene.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 100 parts of trichloroethylene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

Glossary

Carcinogenicity: The ability of a substance to cause cancer.
CAS: Chemical Abstracts Service.
Evaporate: To change into a vapor or gas.
Milligram (mg): One thousandth of a gram.
Nonflammable: Will not burn.
ppm: Parts per million.
Sediment: Mud and debris that have settled to the bottom of a body of water.
Solvent: A chemical that dissolves other substances.

References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Trichloroethylene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

Where can I get more information? For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs™ Internet address is http://www.atsdr.cdc.gov/toxfaq.html . ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

APPENDIX B

REPORT FORMS

WEEKLY SAFETY REPORT FORM

Week Ending: _____ Project Name/Number: _____

Report Date: _____ Project Manager Name: _____

Summary of any violations of procedures occurring that week:

_____

_____

_____

Summary of any job related injuries, illnesses, or near misses that week:

_____

_____

_____

_____

Summary of air monitoring data that week (include and sample analyses, action levels exceeded, and actions taken):

_____

_____

_____

Comments:

_____

_____

_____

Name: _____ Company: _____

Signature: _____ Title: _____

INCIDENT REPORT FORM

Date of Report: _____

Injured: _____

Employer: _____

Site: _____ Site Location: _____

Report Prepared By: _____ _____
Signature Title

ACCIDENT/INCIDENT CATEGORY (check all that applies)

___Injury	___ Illness	___ Near Miss
__ Property Damage	___ Fire	___ Chemical Exposure
__ On-site Equipment	___ Motor Vehicle	___ Electrical
__ Mechanical	___ Spill	___ Other

DATE AND TIME OF ACCIDENT/INCIDENT: Narrative report of Accident/Incident: Identify: 1) actions leading to or contributing to the accident/incident; 2) the accident/incident occurrence; and 3) actions following the accident/incident.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

WITNESS TO ACCIDENT/INCIDENT:

Name:	_____	Company:	_____
Address:	_____	Address:	_____
Phone No.:	_____	Phone No.:	_____
Name:	_____	Company:	_____
Address:	_____	Address:	_____
Phone No.:	_____	Phone No.:	_____

INJURED - ILL:

Name: _____ SSN: _____

Address: _____ Age: _____

Length of Service: _____ Time on Present Job: _____

Time/Classification: _____

SEVERITY OF INJURY OR ILLNESS:

____ Disabling ___ Non-disabling ___ Fatality

____ Medical Treatment ___ First Aid Only

ESTIMATED NUMBER OF DAYS AWAY FROM JOB: _____

NATURE OF INJURY OR ILLNESS: _____

_____

_____

_____

CLASSIFICATION OF INJURY:

__ Abrasions
__ Bites
__ Blisters
__ Bruises
__ Chemical Burns
__ Cold Exposure
__ Concussion
__ Lacerations
_____ Dislocations
_____ Faint/Dizziness
_____ Fractures
_____ Frostbite
_____ Heat Burns
_____ Heat Exhaustion
_____ Heat Stroke
____ Punctures
____ Radiation Burns
____ Respiratory Allergy
____ Sprains
____ Toxic Resp. Exposure
____ Toxic Ingestion
____ Dermal Allergy

Part of Body Affected: _____

Degree of Disability: _____

Date Medical Care was Received: _____

Where Medical Care was Received: _____

Address (if off-site): _____

(If two or more injuries, record on separate sheets)

PROPERTY DAMAGE:

Description of Damage: _____

_____

Cost of Damage: $ _____

ACCIDENT/INCIDENT LOCATION: _____

ACCIDENT/INCIDENT ANALYSIS: Causative agent most directly related to accident/incident (Object, substance, material, machinery, equipment, conditions)

_____

_____

_____

_____

Was weather a factor?: _____

_____

Unsafe mechanical/physical/environmental condition at time of accident/incident (Be specific):

_____

_____

_____

Personal factors (Attitude, knowledge or skill, reaction time, fatigue):

_____

_____

ON-SITE ACCIDENTS/INCIDENTS:

Level of personal protection equipment required in Site Safety Plan:

_____

_____

Modifications:

_____

Was injured using required equipment?:

_____

_____

If not, how did actual equipment use differ from plan?:

_____

_____

ACTION TAKEN TO PREVENT RECURRENCE: (Be specific. What has or will be done? When will it be done? Who is the responsible party to insure that the correction is made?

_____

_____

_____

_____

_____

ACCIDENT/INCIDENT REPORT REVIEWED BY:

_____ _____

SSO Name Printed SSO Signature

OTHERS PARTICIPATING IN INVESTIGATION:

_____ _____

Signature Title

_____ _____

Signature Title

_____ _____

Signature Title

ACCIDENT/INCIDENT FOLLOW-UP: Date: _____

Outcome of accident/incident: _____

_____

_____

_____

Physician's recommendations: _____

_____

_____

_____

Date injured returned to work: _____

Follow-up performed by:

_____ _____

Signature Title

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

APPENDIX C

EMERGENCY HAND SIGNALS

EMERGENCY SIGNALS

In most cases, field personnel will carry portable radios for communication. If this is the case, a transmission that indicates an emergency will take priority over all other transmissions. All other site radios will yield the frequency to the emergency transmissions.

Where radio communications is not available, the following air-horn and/or hand signals will be used:

EMERGENCY HAND SIGNALS

OUT OF AIR, CAN'T BREATH!

Hand gripping throat

LEAVE AREA IMMEDIATELY, NO DEBATE!

(No Picture) Grip partner's wrist or place both hands around waist

NEED ASSISTANCE!

Hands on top of head

OKAY! – I'M ALL RIGHT!

- I UNDERSTAND!

Thumbs up

NO! - NEGATIVE!

Thumbs down

ATTACHMENT B

QUALITY ASSURANCE/QUALTY CONTROL PLAN

Home Depot – Rego Park

Site #V00095

REGO PARK, NEW YORK

Quality Assurance Project Plan

AKRF Project Number: 03399

Prepared for:

The Home Depot
3096 Hamilton Boulevard
South Plainfield, NJ 07080

Prepared by:

AKRF, Inc.
440 Park Avenue South
New York, NY 10016
212-696-0670

JANUARY 2007

TABLE OF CONTENTS

TABLES

ATTACHMENTS

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the protocols and procedures that will be followed during pilot testing of an extension of the existing air sparging / soil vapor extraction (AS/SVE) system, as well as during chemical oxidation treatment of the PCE contamination, at the Home Depot – Rego Park site in the Rego Park – Glendale section of Queens, NY. The objective of the QAPP is to provide for Quality Assurance (QA) and maintain Quality Control (QC) of environmental investigative, sampling and remedial activities conducted under the Pilot Testing Plan and the Oxidant Work Plan. Adherence to the QAPP will ensure that defensible data will be obtained during the investigation and remediation.

2.0 PROJECT TEAM

The project team will be drawn from AKRF professional and technical personnel and AKRF's subcontractors. All field personnel and subcontractors will have completed a 40-hour training course and updated 8-hour refresher course that meet the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR Part 1910. The following sections describe the key project personnel and their responsibilities.

2.1 Project Director

The project director will be responsible for the general oversight of all aspects of the project, including scheduling, budgeting, data management and decision-making regarding the field program. The project director will communicate regularly with all members of the AKRF project team, the New York State Department of Environmental Conservation (NYSDEC), and Home Depot to ensure a smooth flow of information between involved parties. Andrew Rudko, Ph.D., will serve as the project director for the project. Dr. Rudko's resume is included in Attachment A.

2.2 Project Manager

The project manager will be responsible for directing and coordinating all elements of the Pilot Testing Plan and the Oxidant Work Plan. The project manager will prepare reports and participate in meetings with Home Depot and/or the NYSDEC. Greg Cellamare will serve as the project manager for the Pilot Test and Oxidant Treatment. Mr. Cellamare's' resume is included in Attachment A.

2.3 Field Team Leader

The field team leader will be responsible for supervising the daily sampling and health and safety activities in the field and will ensure adherence to the work plans and HASP. He/She will report to the Project Manager on a regular basis regarding daily progress and any deviations from the work plan. The field team leader will be a qualified, responsible person, able to act professionally and promptly during soil disturbing activities.

2.4 Project Quality Assurance/Quality Control Officer

The Quality Assurance/Quality Control (QA/QC) Officer will be responsible for adherence to the QAPP. The QA/QC Officer will review the procedures with all personnel prior to commencing any fieldwork and will conduct periodic site visits to assess implementation of the procedures. The QA/QC officer will also be responsible for preparing a Data Usability Summary Report (DUSR) for analytical results, as described in Section 5.0 of this QAPP. Marcus Simons will serve as the QA/QC officer for the RIWP. Mr. Simons's resume is included in Attachment A.

2.5 Laboratory Quality Assurance/Quality Control Officer

The laboratory QA/QC officer will be responsible for quality control procedures and checks in the laboratory and ensuring adherence to laboratory protocols. He/she will track the movement of samples from the time they are checked in at the laboratory to the time that analytical results are issued. He/she will conduct a final check on the analytical calculations and sign off on the laboratory reports. The laboratory QA/QC officer will be determined upon selection of a contract laboratory or laboratories for the Oxidant Work Plan.

3.0 STANDARD OPERATING PROCEDURES

The following sections describe the standard operating procedures (SOPs) for the investigative activities included in the Pilot Testing Plan, and the remedial activities included in the Oxidant Work Plan. During these operations, safety monitoring will be performed as described in the project Health and Safety Plan (HASP) and all field personnel will wear appropriate personal protective equipment.

3.1 Soil Vapor Extraction / Pressure Monitoring Well Installation

One vapor extraction well and three pressure monitoring wells will be installed along the southern edge of the site in the locations specified by the Pilot Testing Plan, for the vapor extraction pilot test. Since the design of the vapor extraction and pressure monitoring wells is identical, different wells can be used as the vapor extraction well during the testing, permitting several tests measuring effects at different distances and in different directions. The wells will be installed according to the following procedure:

1. Advance borings using a hollow-stem auger truck-mounted rotary rig with 6.25-inch outside diameter augers.
2. Use the HSA rig to core through any existing asphalt or concrete surface.
3. Measure the depth to water in the open hole using a Solinst® Water Table Meter – Model 101 or equivalent.
4. Install a two-inch diameter Schedule 40 PVC pipe, with a five-foot length of 0.010-inch slotted screen at the bottom, into the borehole through the hollow-stem auger. Place the bottom of the screen 15 feet above the groundwater surface, or approximately 40 feet below grade.
5. Install No. 1 sand filter pack around the well screen to a depth of two feet above the top of the screen.
6. Install a bentonite seal to a depth of four feet above the filter pack.
7. Backfill the remainder of the annular space using a bentonite-cement grout.
8. Complete the well with a locking cap flush-with-grade curb box set in concrete. Provide a concrete apron around the curb box to direct run-off away from the well.
9. Decontaminate the augers prior to and following installation of each well as described in Section 3.4 of this QAPP.
10. Document well installation data (location, depth, construction details, water level measurements) in the field logbook or on field data sheets.

Soil vapor pilot testing procedures are described in Section 4.1 of this QAPP.

3.2 Air Sparging Well Installation

One air sparging well and one monitoring well will be installed in the southern portion of the site in the locations specified by the Pilot Testing Plan, for the air sparging pilot test. In addition, two existing monitoring wells will be used during the pilot testing. The new wells will be installed according to the following procedure:

1. Advance borings using a hollow-stem auger truck-mounted rotary rig with 6.25-inch outside diameter augers.

2. Use the HSA rig to core through any existing asphalt or concrete surface.

3. Measure the depth to water in the open hole using a Solinst® Water Table Meter – Model 101 or equivalent.

4. For the air sparging well, install a two-inch diameter Schedule 40 PVC pipe, with a five-foot length of 0.010-inch slotted screen at the bottom, into the borehole through the hollow-stem auger. Place the bottom of the screen 20 feet below the groundwater surface, or approximately 75 feet below grade. For the monitoring well, install a similar well casing with the bottom of the screen placed 8 feet below the groundwater surface.

5. Install No. 1 sand filter pack around the well screen to a depth of two feet above the top of the screen.

6. Install a bentonite seal to a depth of four feet above the filter pack.

7. Backfill the remainder of the annular space using a bentonite-cement grout.

8. Complete the well with a locking cap flush-with-grade curb box set in concrete. Provide a concrete apron around the curb box to direct run-off away from the well.

9. Decontaminate the augers prior to and following installation of each well as described in Section 3.4 of this QAPP.

10. Document well installation data (location, depth, construction details, water level measurements) in the field logbook or on field data sheets

11. Following well installation, the ten new wells will be developed according to the following procedure:

12. Measure the depth to water using a Solinst® Water Table Meter – Model 101 or equivalent, and the total depth of the well using a weighted tape. Use these measurements to calculate the length of the water column. Calculate the volume of water in the well using the following conversion factors:

Well Diameter (inches)	Volume per Foot of Water Column (gallons)
2	0.163
4	0.653
6	1.469

13. For the first five minutes of well development, develop the well using a submersible pump and re-circulate the water back into the well to create maximum agitation. This method is intended to remove fines from the sand pack, the adjacent formation and from the well.

14. After the first five minutes of well development, connect dedicated tubing to the submersible pump and connect the discharge end of the tubing to the flow-through cell of a Hydrolab Quanta multi-parameter (or equivalent) meter. Connect tubing to the output of the

cell and place the discharge end of the tubing in a five-gallon bucket. Transfer water from the buckets to 55-gallon drums designated for well development water.

15. During development, collect periodic samples and analyze for turbidity and water quality indicators (pH, alkalinity, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity) with measurements collected approximately every five minutes.

16. Continue developing the well until turbidity is less than 50 nephelometric turbidity units (NTUs) for three successive readings and until water quality indicators have stabilized to within 10% for pH, temperature and specific conductivity for three successive readings, or until three well volumes have been purged from the well.

17. Document the volume of water removed and any other observations made during well development in the field logbook or on field data sheets.

18. Decontaminate all equipment prior to and following development at each well location as described in Section 3.4 of this QAPP.

19. Containerize and handle all well development water, decontamination, and purge water as described in the Section 3.5 of this QAPP.

Air sparging pilot testing procedures are described in Section 4.2 of this QAPP.

3.3 Chemical Oxidation Treatment Application

RegenOx™, an oxidative agent, will be injected into the subsurface using five existing air sparging wells under the on-site building in the locations specified by the Oxidant Work Plan. The oxidant will gradually release hydrogen peroxide into the groundwater beneath the site, resulting in the oxidation and destruction of PCE. The RegenOx™ application procedure will be as follows:

1. Inject 195 pound of RegenOx™ activator complex, 39 pounds in each of the five sparging wells. The activator will be injected as 150 gallons of a 3% solution in each well. All injections will utilize a double-diaphragm pump capable of 150 to 200 pounds per square inch (psi). A pressure gauge will be used to monitor the actual injection pressure. The desired injection rate is about 6 gallons per minute.

2. Flush each well with 50 gallons of water.

3. Inject 390 pounds of RegenOx™ oxidant complex, 78 pounds in each of the five sparging wells. The oxidant will be injected as 300 gallons of a 3% oxidant solution.

4. Flush each well with 50 gallons of water.

5. Repeat steps 1 – 4 two weeks after the initial application.

6. Repeat steps 3 and 4 two weeks after the second application.

Groundwater sampling procedures are described in Section 5.1 of this QAPP.

3.4 Decontamination of Sampling Equipment

All sampling equipment will be either dedicated or decontaminated between sampling locations. The decontamination procedure will be as follows:

1. Scrub using tap water/Simple Green® mixture and bristle brush.
2. Rinse with tap water.
3. Scrub again with tap water/ Simple Green® and bristle brush.

4. Rinse with tap water.
5. Rinse with distilled water.
6. Air-dry the equipment, if possible.

Decontamination will be conducted on plastic sheeting (or equivalent) that is bermed to prevent discharge to the ground and will be handled as described in Section 3.5.

3.5 Management of Investigation Derived Waste

All investigation-derived waste (IDW) will be containerized in Department of Transportation (DOT)-approved 55-gallon drums. The drums will be sealed at the end of each work day and labeled with the date, the well or boring number(s), the type of waste (i.e., drill cuttings; development water or purge water) and the name of an AKRF point-of-contact. Soil samples collected from well installation activities will be used for waste characterization of soils, since such data would be biased towards areas which are expected to be most contaminated. Notwithstanding, additional waste characterization soil samples will be collected, if warranted. All drums will be labeled "pending analysis" until laboratory data is available. All IDW will be disposed of or treated according to applicable local, state and federal regulations.

4.0 FIELD TESTING PROCEDURES

4.1 Vapor Extraction Pilot Test

The SVE pilot testing will consist of extracting vapor from an SVE well, and measuring the resulting vacuum response at monitoring points at varying distances and directions, as specified by the Pilot Testing Plan. Testing will be conducted according to the following procedure:

1. Connect a skid-mounted regenerative blower equipped with a 55-gallon moisture separator, a flow meter, and a vacuum gauge to the SVE well, using a two-inch diameter vacuum hose. A 55-gallon activated carbon vessel will be used to control VOC emissions to the atmosphere during the test.

2. Attach a magnahelic gauge to each of the three monitoring points specified in the Testing Plan.

3. Adjust the applied vacuum at the SVE well to 2 inches Hg by bleeding in ambient air through a bypass valve.

4. Measure the vacuum, flow rate, and effluent (PCE) concentration at the vapor extraction well, and measure the pressure response at each monitoring point.

5. Continue the test until a steady state has been reached.

6. Repeat steps 1 – 4 with pressure monitoring well PM-3 used as the SVE well and the SVE well used as a pressure monitoring well.

7. Repeat steps 1 – 4 with pressure monitoring well PM-2 used as the SVE well and the SVE well used as a pressure monitoring well.

8. Repeat steps 1 – 6 at an applied vacuum pressure of 1 inch Hg.

4.2 Air Sparging Pilot Test

The air sparging pilot testing will consist of injecting air into an AS well and measuring dissolved oxygen (DO) levels in existing monitoring wells P-4 and M-6, and new monitoring well PM-4. Testing will be conducted according to the following procedure:

1. Measure water levels in the monitoring wells, and measure DO levels in the monitoring wells using in-situ DO meters.
2. Attach a magnahelic gauge to each of the monitoring wells.
3. Connect a skid-mounted regenerative blower to the air sparging well to supply air to the well at a pressure of 6 psig.
4. During the test, continuously measure DO levels in each monitoring well using the DO meters. Note any pressure response as well.
5. Run the test until DO levels in the monitoring wells stabilize, or for at least two hours.

5.0 SAMPLING AND LABORATORY PROCEDURES

5.1 Chemical Oxidation Monitoring

Groundwater samples will be collected from monitoring wells AMW-3 and AMW-4 prior to the application of RegenOx^{TM}, two weeks after each of the three oxidant applications, and four weeks after the final oxidant injection. In addition, long-term monitoring will be conducted by quarterly sampling of monitoring wells P-2 and P-3. The locations of these existing wells are indicated in the Oxidant Work Plan. Low flow sampling techniques will be used, as described in U.S. EPA's Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers [EPA 542-S-02-001, May 2002]. Sampling will be conducted according to the following procedure:

- Prepare the sampling area by placing plastic sheeting over the well. Cut a hole in the sheeting to provide access to the well cover.
- Remove the locking cap and measure the vapor concentrations in the well with a PID.
- Measure the depth to water and total well depth.
- Use the water level and total well depth measurements to calculate the length of the mid-point of the water column within the screened interval. For example, for a shallow well where the total depth is 15 feet, screened interval is 5 to 15 feet, and depth to water is 7 feet, the mid-point of the water column within the screened interval would be 11 feet. Similarly for a deep well where the total depth is 40 feet, screened interval is 30 to 40 feet, and depth to water is 15 feet, the mid-point of the water column within the screened interval would be 35 feet.
- Connect dedicated tubing to either a submersible or bladder pump and lower the pump such that the intake of the pump is set at the mid-point of the water column within the screened interval of the well. Connect the discharge end of the tubing to the flow-through cell of a Hydrolab Quanta multi-parameter (or equivalent) meter. Connect tubing to the output of the cell and place the discharge end of the tubing in a five-gallon bucket.
- Activate the pump at the lowest flow rate setting of the pump.
- Measure the depth to water within the well. The pump flow rate may be increased such that the water level measurements do not change by more than 0.3 feet as compared to the initial static reading. The well-purging rate should be adjusted so as to produce a smooth, constant

(laminar) flow rate and so as not to produce excessive turbulence in the well. The expected targeted purge rate will be around 500 mil/minute and will be no greater than 3.8 liters/minute.

- Transfer discharged water from the 5-gallon buckets to 55-gallons drums designated for well-purge water.
- During purging, collect periodic samples and analyze for water quality indicators (e.g., turbidity, pH, alkalinity, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity) with measurements collected approximately every five minutes.
- Continue purging the well until turbidity is less than 50 NTU and water quality indicators have stabilized to the extent practicable. The criteria for stabilization will be three successive readings for the following parameters and criteria:

Table 1
Stabilization Criteria

Parameter	Stabilization Criteria
PH	+/- 0.1 pH units
Specific Conductance	+/- 3% mS/cm
ORP/Eh	+/- 10mV
Turbidity	<50 NTU
Dissolved Oxygen	+/- 0.3 mg/l

Notes: mS/cm = millisievert per centimeter
mV = millivolts
NTU = nephthalometric turbidity units
mg/l = milligrams per liter

- If the water quality parameters do not stabilize and/or turbidity is greater than 50 NTU within two hours, purging may be discontinued. Efforts to stabilize the water quality for the well must be recorded in the field book, and samples may then be collected as described herein.
- After purging, disconnect the tubing to the inlet of the flow-through cell. Collect groundwater samples directly from the discharge end of the tubing. Measure oxidant levels (as hydrogen peroxide) using the Chemetrics test kit. For sampling conducted prior to the first oxidant injection, and sampling conducted four weeks after the final (third) RegenOx™ application, also collect groundwater samples for laboratory analysis for VOCs, and place these samples into the required sample containers as described in Section 5.2 of this QAPP. Label the containers as described in Section 5.4 of this QAPP and place in a chilled cooler.
- Collect one final field sample and analyze for turbidity and water quality parameters (pH, alkalinity, temperature, dissolved oxygen, reduction-oxidation potential, and specific conductivity).
- Once sampling is complete, remove the pump and tubing from the well. Disconnect the tubing and place it back in the well for reuse during the next sampling event. Dispose of the sample filter in a 55-gallon drum designated for disposable sampling materials and PPE.
- Decontaminate the pump, flow-through cell, and plastic filter chamber as described in Section 3.4 of this QAPP.
- Record all measurements (depth to water, water quality parameters, turbidity), calculations (well volume) and observations in the project logbook and field data sheet, if applicable.

5.2 Laboratory Methods

A New York State certified laboratory will perform all analytical work. The laboratory will operate a Quality Assurance/Quality Control (QA/QC) program that will consist of proper laboratory practices (including the required chain-of-custody), an internal quality control program, and external quality control audits by New York State.

Table 2 summarizes the laboratory methods that will be used to analyze field samples as well as the sample container type, preservation, and applicable holding times. An Environmental Laboratory Approval Program (ELAP)-certified laboratory will be used for all chemical analyses in accordance with DER-10 2.1(b) and 2.1(f), i.e., Category B Deliverables and CLP ELAP Certification will be required for confirmatory (post remediation) samples and final delineation samples.

Table 2
Laboratory Analytical Methods

ANALYSIS GROUP	MATRIX	PARAMETER	EPA METHOD	SAMPLE CONTAINERS	PRESERVATION	HOLDING TIMES
GROUNDWATER ANALYSIS PARAMETERS	liquid/sludge	TCL VOCs	8260	(2) 40 ml clear glass vial	HCl, 4°C	14 days

Notes: VOCs = volatile organic compounds
HCL = Hydrochloric Acid

5.3 Quality Control Sampling

In addition to the laboratory analysis of the investigative and remedial groundwater samples, additional analysis will be included for quality control measures, as required by the Category B sampling techniques. These samples may include equipment rinsate blanks, trip blanks, matrix spike/matrix spike duplicates (MS/MSD) and of duplicate/blind duplicate samples. Equipment blank, MS/MSD and duplicate samples will be analyzed for the same parameter set for which the samples will be analyzed. A trip blank will be analyzed for volatile organic compounds only. Quality control samples will be collected at a frequency of one sample for every 20 field samples. Quality control sampling in accordance with the disposal facility requirements will be performed when collecting samples for disposal characterization.

5.4 Sample Handling

5.4.1 Sample Identification

All samples will be consistently identified in all field documentation, chain-of-custody documents and laboratory reports using an alpha-numeric code. Groundwater samples will be identified by the monitoring well number. For example, a groundwater sample collected from deep monitoring well M-5 will be identified as M-5d. Waste characterization samples collected from 55-gallon drums will be identified by the drum number (e.g., D-1 or D-2) followed by a sample type designation (LQ for liquid and SD for solid).

The field duplicate samples will be labeled with a dummy sample location to ensure that they are submitted as blind samples to the laboratory. The dummy identification will consist of the sample type followed by a letter. For duplicate soil boring samples, the sample depth will be the actual sample depth interval. Trip blanks and field blanks will be identified with "TB" and "FB", respectively.

5.4.2 Sample Labeling and Shipping

All sample containers will be provided with labels containing the following information:

- Project identification
- Sample identification
- Date and time of collection
- Analysis(es) to be performed
- Sampler's initials

Once the samples are collected and labeled, they will be placed in chilled coolers and stored in a cool area away from direct sunlight to await shipment to the laboratory. Soil and groundwater samples will be shipped to the laboratory once to twice per week. At the start and end of each workday, field personnel will add ice to the coolers as needed.

The samples will be prepared for shipment by placing each sample in a sealable plastic bag, then wrapping each container in bubble wrap to prevent breakage, adding freezer packs and/or fresh ice in sealable plastic bags and the chain-of-custody form. Samples will be shipped overnight (e.g., Federal Express) or transported by a laboratory courier. All coolers shipped to the laboratory will be sealed with mailing tape and a chain-of-custody (COC) seal to ensure that the coolers remain sealed during delivery.

5.4.3 Sample Custody

Field personnel will be responsible for maintaining the sample coolers in a secured location until they are picked up and/or sent to the laboratory. The record of possession of samples from the time they are obtained in the field to the time they are delivered to the laboratory or shipped off-site will be documented on chain-of-custody (COC) forms. The COC forms will contain the following information: project name; names of sampling personnel; sample number; date and time of collection and matrix; and signatures of individuals involved in sample transfer, and the dates and times of transfers. Laboratory personnel will note the condition of the custody seal and sample containers at sample check-in.

5.5 Field Instrumentation

Field personnel will be trained in the proper operation of all field instruments at the start of the field program. Instruction manuals for the equipment will be on file at the site for referencing proper operation, maintenance and calibration procedures. The equipment will be calibrated according to manufacturer specifications at the start of each day of fieldwork, if applicable. If an instrument fails calibration, the project manager or QA/QC officer will be contacted immediately to obtain a replacement instrument. A calibration log will be maintained to record the date of each calibration, any failure to calibrate and corrective actions taken. The PID will be calibrated each day using 100 parts per million (ppm) isobutylene standard gas.

6.0 DATA REVIEW

The QA/QC officer will conduct a review of all analytical data and prepare a Data Usability Summary Report (DUSR) to assess the quality of the data and determine its usability. To assess the data, the QA/QC officer will:

- Ensure the data package is complete as defined under the requirements for the NYSDEC Analytical Services Protocol (ASP) Category B deliverables and that all data were generated using established and agreed upon protocols.
- Check that all holding times were met.
- Check that all QC data (blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data) fall within the protocol required limits and specifications.
- Compare raw data with results provided in the data summary sheets and quality control verification forms.
- Check that correct data qualifiers were used.
- Evaluate the raw data and confirm the results provided in the data summary sheets and quality control verification forms.

Any Quality Control exceedances will be specified in the DUSR, and the corresponding data package QC summary sheet identifying the exceedances will be attached. The DUSR will identify any data deficiencies, analytical protocol deviations and quality control problems and discuss their effect on the data. Recommendations for resampling and/or reanalysis will be made.

ATTACHMENT A

RESUME OF PROJECT QA/QC OFFICER, PROJECT DIRECTOR, AND PROJECT MANAGER

ANDREW D. RUDKO, PH.D.

SENIOR VICE PRESIDENT

Andrew D. Rudko, Ph.D., is a senior vice president of AKRF, with more than 25 years of experience in environmental analysis and management, with particular emphasis on hazardous materials, environmental site assessments and audits, and soil and groundwater remediation. Dr. Rudko's current and recent experience includes management of several projects involving Voluntary Cleanup Agreements and Brownfields Cleanup Agreements for assessment and remediation of soil and groundwater contamination problems on major development sites. These include the Queens West Development site, a New York State-sponsored development which extends for three quarters of a mile along the East River waterfront in Queens, New York. The site, which formerly contained an oil refinery, gas plant, paint and varnish factories, and railroad yards, is being redeveloped for residential and commercial uses. Dr. Rudko is also managing the assessment of soil and groundwater on the site of Brooklyn Bridge Park, which is being developed on a stretch of Brooklyn waterfront with a long history or industrial uses.

Dr. Rudko has managed cleanups of many **petroleum and solvent spills.** He is managing ongoing remediation work for chlorinated solvent releases to the groundwater for sites in Harlem, Rego Park, and Springfield Gardens. Some recent spill cleanup sites include a former gasoline station in Downtown Brooklyn, a portion of the Fordham University campus in the Bronx, the Tribeca Hotel site developed by Hartz Mountain Industries in Lower Manhattan, retail sites in Maspeth and Long Island City developed by Forest City Ratner Companies, a site in the Bronx developed by Triangle Equities for the Department of Motor Vehicles, the Rivergate Apartments on East 34th Street in Manhattan, the Tate apartment building on West 23rd Street in Manhattan, and a residential development on Sixth Avenue and 26th Street in Manhattan.

He has been responsible for assessing **impacts on public health** for a number of projects involving the use of hazardous chemicals, biohazards, and radioactive materials. These projects include an engineering and physics research center on the campus of Columbia University, a new laboratory building for biomedical research at Rockefeller University, a new research center for Memorial Sloan Kettering Medical Center and the Audubon Research Park in upper Manhattan.

Dr. Rudko has managed a number of site assessments for New York City Department of Environmental Protection sewer improvement projects. These include the installation of new sewers in the Meadowmere and Warnerville sections of southeastern Queens, the Avenue V Pump Station and associated force mains in Brooklyn, new facilities at the 26th Ward wastewater treatment plant in Brooklyn, and combined sewer outfall abatement projects in Queens and Staten Island.

Dr. Rudko was project director for the site assessment work the firm performed for the New York City School Construction Authority, directing assessments on school sites in the Bronx, Brooklyn, and Queens. Sites included a former gas station, a truck salvage yard, and a former plastics factory. Testing programs were recommended, developed, and implemented for these sites, and remedial actions were recommended where necessary. At the former plastics factory site, the testing program included soil and groundwater sampling, testing of building floors for PCB contamination, and location and removal of old underground gasoline and oil tanks, with screening of surrounding soil for possible petroleum contamination.

BACKGROUND

Education

B.S., Biochemistry, Cornell University

Ph.D., Biochemistry, Columbia University

AKRF

RELEVANT EXPERIENCE

Gowanus Canal, Brooklyn, NY
Dr. Rudko managed the investigation and remedial design of a former manufactured gas plant site on the Gowanus Canal in Brooklyn. The subsurface remains of three large gasholders filled with coal tar-contaminated soil and debris were cleaned up prior to development of the property.

Queens West Development Project, Queens, NY

Dr. Rudko directed the site assessment work on the 90-acre site of the proposed Queens West development project being sponsored by the Empire State Development Corporation, the New York City Public Development Corporation, and the Port Authority of New York and New Jersey. This site comprises more than 10 blocks of industrial property along the East River in Queens. Former uses on the site include oil refineries, paint manufacturers, and railyards. AKRF developed and implemented extensive soil and groundwater testing programs, and developed remediation plans which have been incorporated into four separate Voluntary Cleanup Agreements.

Brooklyn Bridge Park, Brooklyn, NY

Dr. Rudko is responsible for the site assessment work being performed on this waterfront site which is being developed as a park by New York State and New York City. The site, which stretches from Brooklyn Heights under the Brooklyn Bridge to the Manhattan Bridge, has a long history of industrial uses.

Stadium Site, Flushing, NY

Dr. Rudko is directing the site assessment work being performed on the proposed site of a new stadium adjacent to the existing Shea Stadium in Flushing, Queens. The area was formerly used as a landfill for the disposal of ash and other wastes. Dr. Rudko previously directed the soil and groundwater testing on the site of the adjacent National Tennis Center.

Home Depot, New Rochelle, NY
Dr. Rudko directed the assessment and remediation work on a 14-acre parcel in New Rochelle, New York that was being developed by Home Depot USA. After extensive review and discussions with the New York State Department of Environmental Conservation (DEC), a remediation agreement was developed and approved that became the model for New York State=s Voluntary Cleanup Program. AKRF supervised the implementation of the remediation measures, which included removal of underground storage tanks and associated contaminated soil, and construction of an impermeable cap with a gas venting system for areas with lead contamination.

Home Depot, Rego Park, NY
On another retail site, serious solvent contamination was unexpectedly encountered on a property being developed in Queens, New York. Dr. Rudko managed the design and execution of a testing program, planned a remediation program that would permit development of the site, and assisted in the negotiation of a Voluntary Cleanup Agreement with DEC. Development of the property is now continuing while a groundwater remediation system designed by AKRF's Engineering division is installed as part of the building construction.

PCB-Contaminated Site, College Point, NY
Dr. Rudko directed a Voluntary Cleanup involving the delineation and removal of PCB-contaminated soil from a site in College Point. DEC issued a release letter following the successful completion of this project.

Laundry/Dry Cleaning Plant, New York, NY

Dr. Rudko has been managing the assessment and cleanup of the only listed hazardous waste site in Manhattan, a former laundry/dry cleaning plant on Fifth Avenue in Harlem. Remediation has included the removal of

contaminated building materials and operation of an innovative sub-slab vapor extraction system. Installation of this system required the development of special techniques for horizontal drilling under the floor of the building.

Jamaica Water Company, Queens, NY

For the New York City Department of Environmental Protection, Dr. Rudko directed fast-track site assessments of 17 properties acquired from the Jamaica Water Company. The assessments, all of which were completed within 2 months, included soil and groundwater testing, asbestos and lead paint surveys, and testing of buildings for mercury contamination.

Columbia University Properties, New York, NY

Dr. Rudko has directed site assessments on many properties being acquired by Columbia University. He managed Phase I, Phase II and remediation work on an old garage at a location on Broadway where Columbia developed a new dormitory. He has managed Phase I site assessments on over twenty properties in the area of Manhattanville where the University is developing a new campus.

Home Depot, Various Locations, NY

Dr. Rudko has been providing environmental consulting services to Home Depot, Inc. in connection with their development of major retail facilities at locations throughout the New York metropolitan area. Many of these locations are former industrial properties that have required remedial actions prior to redevelopment.

New York Times, New York, NY

He directed Phase I and Phase II assessments for the New York Times in preparation for the development of its major new printing facility in New York City. Assessments were prepared for three alternative sites: a former railyard in the Bronx later used as an illegal landfill for demolition debris; a site in Queens comprising six industrial properties, several with multiple tenants; and a large city-owned site in Queens.

GREGORY M. CELLAMARE

SENIOR HYDROGEOLOGIST

Gregory Cellamare's experience includes a combination of groundwater supply and groundwater contamination investigations where he has been involved as a field professional, office analyst and project manager. His groundwater supply experience includes constant rate pumping tests, borehole geophysical logging methods, aquifer parameters delineation and the development and calibration of numerous numerical groundwater flow models. Mr. Cellamare's pumping test experience includes supervision of bedrock and stratified-drift well installation using air-rotary, mud-rotary, or hollow-stem auger techniques, pumping test plan determination, and data analysis to determine aquifer transmissivity, storativity, well specific capacity, and optimal pumping capacities. His experience in borehole geophysical logging methods includes the application of electrical resistivity and gamma radiation technologies to determine optimal well construction. Mr. Cellamare's experience with groundwater modeling includes the development and calibration of finite-difference (MODFLOW) models that have particle tracking capabilities.

Mr. Cellamare's contamination experience includes the completion of an environmental compliance audit and participation in and supervision of numerous soil and groundwater contamination investigations for sites governed by CERCLA, RCRA, NYCDEP, NYSDEC and Connecticut's Remediation Standard Regulations. These investigations included the delineation of soil and/or groundwater impacted by the release of petroleum products, chlorinated solvents, and metal hydroxides. Mr. Cellamare also has a strong background in drilling supervision and coordination in both bedrock and overburden wells. The different drilling methods he has supervised for contamination investigations have included Geoprobe direct-push and hollow-stem auger. He has also utilized soil-vapor techniques to help delineate subsurface organic vapor plumes. Mr. Cellamare's experience also has involved the supervision of UST removal/closure and associated reporting; the supervision of the installation, operation and maintenance of various types of remedial systems (groundwater multi-phase extraction, soil-vapor extraction).

Most Recently, Mr. Cellamare has assumed the role of project manager with AKRF, working on larger scale construction and remediation projects and smaller subsurface investigations. Mr. Cellamare has also worked on term contracts with the New York City Department of Design and Construction and the New York City School Construction Authority. His role included writing proposals and work plans, conducting and overseeing Phase I and Phase II environmental assessments and investigations and all associated reporting and billing.

BACKGROUND

Education

B.S., Earth Sciences, The Pennsylvania State University, 1998

Columbia University Field School, 1996, Oracle, AZ

Classes towards M.S., Environmental Engineering, Manhattan College

Certifications

40 Hour HAZWOPER and Annual Refresher Training

NJDEP Underground Storage Tank Certification; Closure No. 22376

OSHA 29 CFR 1910.146 Confined Space Entry Certification

Professional Memberships

American Institute of Professional Geologists Professional Member No. Mem-0910

The Geologic Society of America

AKRF

Seminars, Lectures & Publications

North American Environmental Field Conference, Tampa, Florida, 2006
NYS Department of Health Soil Vapor Intrusion Training, 2005
Regulatory Training in Underground Storage Tanks, 2004
EPOC Remediation Standard Regulations Course, 2002
Environmental Simulations International, Groundwater Flow & Contaminant Transport Modeling Course, Washington D.C, 2001

Years of Experience

Year started in company: 2006
Year started in industry: 1999

RELEVANT EXPERIENCE

Peter Cooper Village & Stuyvesant Town

Mr. Cellamare performed environmental due diligence work prior to the purchase of the Peter Cooper Village and Stuyvesant Town residential properties in Manhattan, New York. He provided project management for a large scale water valve replacement project at the site, which is situated on a former manufactured gas plant site and enrolled in DEC's Voluntary Cleanup Program.

2350 Fifth Avenue

Mr. Cellamare is project manager for an investigation and remediation project at a former commercial dry cleaning facility. The project has included multiple subsurface investigations to determine the extent of solvent and contamination at the site. All phases of remediation at the site is being completed under review of the NYSDEC Inactive Hazardous Waste Program. Tasks include completion and state approval of a Site Investigation Work Plan, Quality Assurance Project Plan, Health and Safety Plan, Community Participation Plan, Remedial Action Plan, and Final Remediation Report.

Fashion Institute of Technology

Mr. Cellamare provided oversight for closure of a 15,000-gallon heating oil above ground storage tank, from the basement of a proposed Fashion Institute of Technology Dormitory. Responsibilities included verifying that all tank closure procedures and specifications were followed and that the closure was completed in accordance with all local, state and federal guidelines.

MARCUS SIMONS

SENIOR VICE PRESIDENT

Short Introduction

Marcus Simons is a senior vice president of AKRF with more than 18 years of environmental consulting experience. Mr. Simons manages much of the environmental due diligence activity at AKRF (most recently managing environmental due diligence on Tishman/Blackrock's Peter Cooper/Stuyvesant Town acquisition, reportedly the largest real estate transaction in US history), including supervising the preparation of Phase I and Phase II environmental site assessments, as well as more complex multi-site and litigation-related projects. Mr. Simons also manages the preparation of the hazardous materials portions of AKRF's environmental impact studies. His specialty is the assessment and cleanup of contaminated sites, including federal and state superfund sites, brownfield sites, Resource Conservation and Recovery Act (RCRA) and Toxic Substances Control Act (TSCA) sites, and petroleum spill sites. His expertise includes health risk and exposure assessment, development of sampling plans, economic evaluations of remedial alternatives, and regulatory analysis. He also has extensive experience in statistics, selection of sites for controversial facilities, and federal and state wetland regulations and waterfront permitting. In addition to analytical work, Mr. Simons has considerable experience presenting results to regulatory agencies and the general public.

General Introduction

Marcus Simons is a senior vice president of AKRF with more than 18 years of experience in environmental consulting. He specializes in the assessment and cleanup of contaminated sites, including federal and state superfund, RCRA, TSCA, brownfield, voluntary cleanup and spill sites. His expertise includes health risk assessment, development of sampling plans, economic evaluations of remedial alternatives, and regulatory analysis. He also has extensive experience in statistics, selection of sites for controversial facilities, and federal and state wetland regulations and waterfront permitting. In addition to analytical work, Mr. Simons has considerable experience in presenting results to regulatory agencies and the general public.

Mr. Simons manages much of the environmental due diligence activity at AKRF (most recently managing environmental due diligence on Tishman/Blackrock's Peter Cooper/Stuyvesant Town acquisition, reportedly the largest real estate transaction in US history), including supervising preparation of numerous Phase I and Phase II Environmental Site Assessments, as well as more complex multi-site and litigation-related projects. Mr. Simons also manages preparation of the contaminated-materials portions of AKRF's Environmental Impact Statements and Environmental Assessments. He also has extensive experience in statistics, selection of sites for controversial facilities, and federal and state wetland regulations and waterfront permitting. In addition to analytical work, Mr. Simons has considerable experience in presenting results to regulatory agencies and the general public.

Mr. Simons has managed some of the most complex cleanup sites in New York State including: the recently completed cleanup of a 12-acre PCB-contaminated former utility property in Flushing, Queens where a 3 million square foot retail/residential building will be constructed; cleanup of the nation's largest former dental factory in Staten Island for reuse as single family housing; the investigation of several former manufactured gas plants; and the investigation and remediation associated with the reconstruction of the West Side Highway and Hudson River Park in Manhattan (from the Battery to 59th Street). These projects involved extensive multi-year negotiations with federal, state and city regulatory agencies. Mr. Simons has experience with federal and state superfund programs, state brownfield and voluntary cleanup programs, spill programs and investigation/cleanup under New York SEQRA/CEQR and NYCDEP E-designation programs.

Mr. Simons also has extensive experience in the evaluation of contaminated materials issues for environmental assessments (EAs) and environmental impact statements (EISs) under NEPA, SEQRA and CEQR, including transportation projects (Second Avenue Subway, MTA/LIRR East Side Access, Cross Harbor Freight Movement

Study, Route 9A Reconstruction), large-scale rezoning projects (Long Island City, Downtown Brooklyn, Jamaica) and public and private redevelopment work (Times Square, School Construction Authority, Queens West)

Before joining AKRF, Mr. Simons worked for Woodward Clyde Consultants (now URS Corporation) in Wayne, New Jersey, where he was responsible for risk assessment, environmental impact analysis, and regulatory analysis for both public and private clients. His responsibilities included projects primarily located in New York and New Jersey. His risk assessment work included a study for the decommissioning and cleanup of a Canadian elemental phosphorus production facility (the first such plant in the world to be systematically decommissioned).

BACKGROUND

Education

M.A. and B.A. (Honors), Engineering/Management Science, Cambridge University, England, 1986

M.S., Engineering and Public Policy, Carnegie-Mellon University, 1988

Years of Experience

Year started in company: 1995

Year started in industry: 1988

RELEVANT EXPERIENCE

CE Flushing Site, Flushing, NY

Mr. Simons directed the remediation of a former industrial site in Flushing, Queens, NY prior to redevelopment of the property as a 3 million square foot retail/residential complex. The property was cleaned up under the NYS Department of Environmental Conservation Brownfield Cleanup Program. The remedial measures included the removal of aboveground and underground storage tanks, excavation and off-site disposal of TSCA, RCRA and non-hazardous wastes, NAPL removal, and removal and investigation of on-site drainage structures.

Peter Cooper Village/Stuyvesant Town, New York, NY

Mr. Simons directed the purchaser's environmental due diligence efforts for the bidding and subsequent acquisition of this 80-acre property in Manhattan. Much of the 110-building complex is underlain by former manufactured gas plants and Con Edison entered the site into NYSDEC's Voluntary Cleanup Program. Going forward Mr. Simons will manage oversight of activities that involve disturbance of MGP-contaminated soils, as well as future testing and potentially remediation.

MTA New York City Transit Manhattan East Side Transit Alternative (MESA)/Second Avenue Subway, New York, NY

Mr. Simons directed the contaminated material assessment for this multi-billion dollar transit initiative that would provide subway service to Manhattan's East Side. The assessment identified several hundred facilities along the alignment that could have impacted soil and/or groundwater and could require special materials handling and enhanced health and safety procedures. Additional evaluation of these sites is underway.

Ferry Point Park, Bronx, NY

Mr. Simons developed the material acceptance criteria (soil standards for capping materials) for the development of Ferry Point Park (including a golf course) in the Bronx. The New York City Department of Environmental Protection DEP and the New York State Departments of Health (DOH) and Environmental Conservation (DEC)

agreed for the first time to relax their strict (TAGM 4046) criteria for clean soil, based on statistical analyses of background conditions and risk-based modeling.

Prince's Point, Staten Island, NY

Mr. Simons managed the complex cleanup (including the relocation of a contaminated tidal creek) of the nation's largest former dental factory site on Staten Island's waterfront. The site was on the State Superfund list. The future use of the site as single-family residential property entailed extensive negotiations with DEC and DOH.

Flushing Waterfront Development, Queens, NY

Mr. Simons managed the investigation and remediation of a 12-acre parcel of former utility property on the Flushing River which is PCB-contaminated from former transformer repair facilities. The site was remediated under the State Brownfield Cleanup Program. Construction is now underway for a large shopping center with residential towers.

Route 9A Reconstruction, New York, NY

AKRF directed extensive studies for the reconstruction in Lower Manhattan proposed by the New York State Department of Transportation (NYSDOT) in cooperation with the Federal Highway Administration (FHWA). The project is arguably the most complex environmental analyses performed for a federally funded transportation project in New York City in the last 10 years. The firm was responsible for all environmental tasks as well as the preparation for the Draft, Supplementary, and Final Environmental Impact Statements (EISs) and Section 4(f) Evaluation for this 5-mile $250 million reconstruction of Route 9A as part of the recovery effort following the events of September 11th, 2001. Mr. Simons managed the extensive hazardous materials investigations and prepared the contract specifications for contaminated soil and tank removal, including Health and Safety oversight.

Hudson River Park, New York, NY

Mr. Simons is managing hazardous materials issues for the ongoing Hudson River Park construction, located adjacent to the Route 9A roadway. Construction is ongoing and Mr. Simons directs health and safety oversight and remediation during construction.

Long Island City Rezoning, Queens, NY

As part of the preparation of an Environmental Impact Statement for NYC Department of City Planning, Mr. Simons managed the hazardous materials assessment of a multi-block industrial area. In addition to conducting the assessment Mr. Simons made recommendation as to the properties where "E-Designations" (city-recorded institutional controls on future development) should be placed.

Outlet City, Long Island City, Queens, NY

In Long Island City, Mr. Simons is managing the investigation and remediation of an old factory complex where large volumes of creosote were spilled. The investigations and interim remedial measures (IRMs) are taking place under the state's Voluntary Cleanup Program (VCP).

MTA/LIRR East Side Access Project, New York, NY

Mr. Simons managed the hazardous materials investigations for multiple sites in the Bronx, Manhattan, and Queens associated with the Environmental Impact Statement (EIS) for the Long Island Rail Road connection to Grand Central Terminal.

Pelham Plaza Shopping Center, Pelham Manor, Bronx, NY

Mr. Simons was responsible for the investigation of a former Con Edison manufactured gas facility on the Hutchinson River on the border between Westchester County and the Bronx. He oversaw the complex investigation of the existing shopping center at the site, and proposed a remediation approach to allow the expansion of the shopping center.

New York City Department of Transportation, Lead Paint Removal and Disposal on Bridges Project, New York, NY

Mr. Simons conducted a regulatory analysis of related to the removal of lead paint from nearly 800 bridges. This analysis included an evaluation of the regulatory compliance of various proposed procedures with federal and state hazardous and solid waste management requirements.

American Felt and Filter Company, New Windsor, NY

Mr. Simons prepared a Remedial Investigation (including exposure assessment) and Feasibility Study for the country's oldest active felt manufacturing facility, located in Orange County. This solvent-contaminated site is on the State Superfund List.

Yonkers Waterfront Revitalization Project, Yonkers, NY

Mr. Simons prepared an exposure assessment for the multi-use Yonkers Waterfront Redevelopment project, which is being funded through the State's Brownfields initiative.

ATTACHMENT C

CHEMETRICS TEST KIT INSTRUCTIONS

Peroxide CHEMets®
0 - 0.50 ppm

Test Procedure

1. Fill the sample cup to the 25 mL mark with the sample (fig 1).
2. Add 5 drops of A-2500 Activator Solution and 5 drops of A-5500 Activator Solution (fig 2). Stir briefly with the tip of the ampoule to mix the contents of the sample cup. Wait **6 minutes**.
3. Place the CHEMet ampoule in the sample cup. Snap the tip by pressing the ampoule against the side of the cup. The ampoule will fill leaving a small bubble to facilitate mixing (fig 3).
4. Mix the contents of the ampoule by inverting it several times, allowing the bubble to travel from end to end each time. Wipe all liquid from the exterior of the ampoule. Wait **1 minute** for color development.
5. Place the CHEMet ampoule, flat end downward into the center tube of the comparator. Direct the top of the comparator up toward a source of bright light while viewing from the bottom. Rotate the comparator until the color standard below the CHEMet ampoule shows the closest match (fig 4). If the color of the CHEMet ampoule is between two color standards, a concentration estimate can be made.

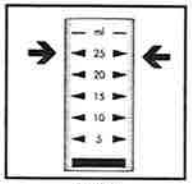
Figure 1

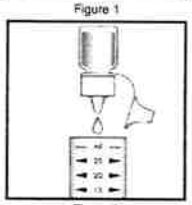
Figure 2

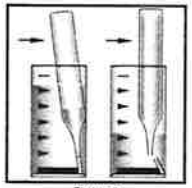
Figure 3


Figure 4

Test Method

The Peroxide CHEMets®[1] test method employs the DDPD chemistry.[2] The sample is treated with an excess of potassium iodide. In the presence of a molybdate catalyst, hydrogen peroxide oxidizes the iodide to iodine. The iodine then oxidizes DDPD, a methyl-substituted form of DPD (N,N-diethyl-p-phenylenediamine), to form a purple colored species in direct proportion to the hydrogen peroxide concentration. Results are expressed in ppm (mg/Liter) H_2O_2.

Various oxidizing agents such as halogens and ozone will produce high test results.

1. CHEMets is a registered trademark of CHEMetrics, Inc. U.S. Patent No. 3,634,038
2. The DDPD methodology was developed by CHEMetrics, Inc.

Safety Information

Read MSDS before performing this test procedure. Wear safety glasses.

Reorder Information	Cat. No.
***Test Kit**, complete*	*K-5504*
***Refill**, 30 CHEMet ampoules*	*R-5504*
***Activator Solution**, six 10 mL bottles*	*A-2500*
***Activator Solution**, six 10 mL bottles*	*A-5500*
***Sample Cup**, 25 mL, package of six*	*A-0013*
***Comparator**, 0-0.5 ppm*	*C-5504*

CHEMetrics
Water Analysis Systems

CHEMetrics, Inc., 4295 Catlett Road, Calverton, VA 20138-0214 U.S.A.
Phone: (800) 356-3072; Fax: (540) 788-4856; E-Mail: orders@chemetrics.com
www.chemetrics.com
July 07, Rev. 4