AKRF, Inc.
440 Park Avenue South
New York, NY 10016
Phone: 212-696-0670
Fax: 212-726-0942

July 12, 2006

Mr. Nicholas S. Bollers
Region 2 Division of Environmental Remediation
NYS Department of Environmental Conservation
47-40 21st Street
Long Island City, NY 11101

Re: Response to Comments
Supplemental Groundwater Investigation Report
Home Depot Woodhaven Blvd., Rego Park, NY
Site #V00095

Dear Mr. Bollers:

I am writing in response to your May 3, 2006 letter providing the New York State Department of Environmental Conservation's (DEC) comments on the Supplemental Groundwater Investigation Report for the above-referenced site, dated May 2005. (A copy of the May 3, 2006 comment letter is attached.) The following are the Volunteer's responses to the DEC's comments, numbered in same order in which the comments appear in the May 3 letter:

1. We are currently developing a design for a proposed expansion and replacement of the existing remedial system. We do not believe that pumping groundwater is necessary to contain the plume. Although some mounding of groundwater results from the operation of the air sparging/soil vapor extraction (AS/SVE) system raises the surface of the groundwater, it does not produce an increased pressure gradient that would accelerate groundwater flow. The pressure increase caused by the rise in the groundwater surface simply balances the decrease in air pressure above the groundwater resulting from the operation of the AS/SVE system.

2. The Home Depot store was built with a vapor barrier below the floor slab, and we understand that it has not been altered since construction. (The groundwater monitoring wells were installed in the building before the floor slab was constructed.) In any case, measurement of the pressure directly below the slab would not be indicative of the efficacy of the AS/SVE system in preventing intrusion of vapors into the building, as the system was designed and intended to collect vapors in the area just above the groundwater. Since the groundwater under the building is located approximately 55 feet below grade, the SVE well screens are set 35 to 45 feet below grade. The vapor extraction system pulls out several times as much air as the sparging system injects. This results in reduced pressure at the level just above the groundwater surface where the vapor extraction wells are screened. The reduced pressure at that depth creates a downward pressure gradient under the building that inhibits vapor intrusion. However, it is unlikely that this would result in a measurable decrease in the pressure directly under the floor slab, 35 feet above the well screens.

3. A Qualitative Human Health Exposure Assessment is attached hereto as Attachment A.

4. One of the aims of the Supplemental Groundwater Investigation was to identify any areas where the existing remediation system was not intercepting the entire plume. Two such areas were identified: the area to the east of the easternmost well along the southern boundary, and the deeper groundwater in the source area near the southwestern corner of the site. The proposed modification of the AS/SVE system is designed to complete the interception of the plume by addressing these two areas. The modification would extend the AS/SVE system 120 feet further to the east along the southern boundary of the site. The modification would also include the installation of two new air sparging wells and one additional SVE well in the source area in the southwestern corner of the site. The Supplemental Groundwater Investigation Report concluded that although the groundwater contamination in this area is primarily near the groundwater surface, some contamination is present at greater depths, up to 50 feet below the groundwater surface. The new sparging wells would be screened between 105 and 110 feet below grade (50 to 55 feet below the groundwater surface). This would treat this source area, including the deeper groundwater contamination..

The proposed extension to the AS/SVE system along the southern boundary of the site, as set forth in the Supplemental Groundwater Investigation Report, is intended to intercept the plume under the Home Depot building before the contamination migrates off-site. The addition would also extend the AS/SVE system 120 feet further to the east to intercept the eastern end of the plume.

As an additional measure to address the groundwater contamination in the area under the Home Depot building, the Volunteer is proposing to use chemical oxidation to reduce the mass of contaminant in this portion of the plume. RegenOxTM, a proprietary oxidizing agent, would be injected into the subsurface using the six existing air sparging wells under the building. RegenOxTM is an alkaline oxidant that employs a sodium percarbonate complex with a multi-part catalytic formula. Its action is similar to Fenton's reagent, but without the danger of a violent exothermic reaction. The active oxidizing agent, hydrogen peroxide, is released gradually from the carbonate ion over a period of one to three weeks. This permits both an initial oxidation and the continued oxidation of contaminant desorbing from the soil matrix. The design calculations (set forth in Attachment B) indicate that three injections of a relatively dilute oxidant solution at two week intervals would be sufficient to significantly reduce the mass of contaminant in the groundwater under the building.

Please contact me at 646-388-9526 or at andy_rudko@akrf.com if you have any further comments or questions.

Sincerely,
AKRF, Inc.

Andrew D. Rudko
Senior Vice President

cc: Daniel Walsh, NYSDEC
Jack Aversa, NYSDEC
Julia Guastella, NYSDOH
John Patton, Greg Beesch, Home Depot
Mark Chertok, Sive Paget & Riesel

m:\akrf project files\03399 & 08009 - home depot - rego park\supplemental investigation\response to dec comments.doc

ATTACHMENT A
QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

1.0 CHEMICALS OF POTENTIAL CONCERN

The only contaminant identified on the site is tetrachloroethene (PCE).

2.0 ENVIRONMENTAL MEDIA

PCE has been detected in on-site and off-site groundwater and in on-site subsurface soil. PCE contamination is present at concentrations of up to 5.2 mg/L in groundwater under the southern and western portions of the site. PCE has also been detected in off-site groundwater in the area to the south of the site. The groundwater surface is approximately 55 feet below the surface on the site, and approximately 65 feet below the surface in the area to the south of the site. Groundwater flow on the site is to the southeast.

Soil contamination was originally present in two source areas on the western side of the site: one in the southwest corner of the site and one about 250 feet further to the north, where Home Depot nursery building is now located. In 1998, after the building formerly located on this part of the site was demolished, all soil exceeding the Department's recommended soil cleanup objective (RSCO) of 1400 µg/kg, as set forth in Technical and Administrative Guidance Memorandum (TAGM) 4046, was removed to a depth of 6 feet below grade. Post excavation samples showed no soil concentrations exceeding 630 µg/kg, with most samples exhibiting concentrations well below 100 µg/kg. The excavated areas were backfilled with clean material.

3.0 EXPOSURE SETTING

Much of the site is covered by a Home Depot store, with the building housing the nursery department on the west side of the site, and the main store building to the east. On the south side of the building is the loading dock and areas used for storage. There is no public access to this portion of the site.

The area to the west of the site is primarily residential, except for a commercial area along 76th Avenue. The Home Depot parking lot and other commercial/retail buildings with associated parking areas are located o the north of the site. The site is bounded on the east by an embankment containing an abandoned railroad right-of-way. Further east of the embankment is a vacant parcel under development by the New York City School Construction Authority. The site is bounded on the south by an active Long Island Railroad right-of-way. On the south side of the railroad tracks is a baseball field with a small structure used as a refreshment stand. Further south of the baseball field is a row of detached single-family homes along Woodhaven Boulevard and some large commercial buildings fronting on Union Turnpike.

Groundwater is used as a public water supply in limited areas of southeastern Queens. In 2004, the last year for which data is available, only seven wells were in operation, and about 25 others were inactive, but available as emergency reserves. All the wells in the water supply system are well to the east of the site. The westernmost well, which was active in 2004, is at 118th Street and Hillside Avenue in Richmond Hill, about 1.57 miles east southeast of the site.

4.0 IDENTIFICATION OF POTENTIALLY EXPOSED POPULATIONS

Current on-site populations considered in this qualitative exposure assessment are Home Depot workers (adults) and Home Depot customers and visitors (adults and children). Current off-site populations considered are users of the playing fields to the south of the site (adults and children), residents in the homes to the south of the site (adults and children), and workers in the businesses to the south of the site (adults). Future uses of both on-site and off-site areas are not expected to change substantially. Future

on-site populations considered are construction workers performing subsurface utility repairs or building modifications.

5.0 IDENTIFICATION AND ASSESSMENT OF EXPOSURE PATHWAYS

The table below summarizes the qualitative evaluation of potential exposure pathways. Under current conditions, the only potentially complete pathway is the exposure of residents and workers in buildings to the south of the site to vapors from the groundwater contamination beneath those structures.

Potential Exposure		Subsurface Soil		Groundwater		
		Ingestion	Dermal Contact	Ingestion	Dermal Contact	Vapor Inhalation
On-site	Adult Workers	I	I	I	I	I
	Adult & Child Visitors	I	I	I	I	I
	Adult Construction Workers (Future)	P	P	I	I	I
Off-site	Adult & Child Residents	NA	NA	I	I	P
	Adult & Child Playing Field Users	NA	NA	I	I	I
	Adult Workers	NA	NA	I	I	P

I = Incomplete pathway
P = Potentially complete pathway
NA = Not applicable, subsurface soil contamination not present off-site

The assessments of the exposure pathways are discussed below.

5.1 Current On-Site Workers and Visitors

As all contaminated subsurface soil is located over six feet below the surface and is covered by buildings and pavement, no complete exposure pathways for ingestion or dermal contact exist. Groundwater is located approximately 55 feet below the surface and there is no potable or non-potable groundwater use on the site. Accordingly, the ingestion and dermal contact pathways are incomplete. The vapor intrusion pathway is incomplete because the Home Depot building is constructed with a vapor barrier and the AS/SVE system is present beneath the building.

5.2 Future On-Site Construction Workers

Contaminated subsurface soil is limited to two locations on the site and is located over six feet below the surface. Therefore, it is unlikely that it would be encountered during any future construction work. However, for deep excavations at locations where subsurface contamination is present, the exposure pathways are complete. Any potential exposure would be minimal, however because the residual concentrations are less than the TAGM 4046 RSCOs, which account for potential effects of direct exposure to the soil.

5.3 Off-Site Residents and Workers

Groundwater is located approximately 65 feet below the surface and there is no potable or non-potable groundwater use in the area downgradient of the site. The nearest public water supply well is over 1.5 miles to the east southeast of the site. Although local groundwater flow on the site is towards the southeast, regional flow in this area is to the south (USGS Fact Sheet FS 134-97, November 1997). Thus,

all public water supply wells in the New York City Department of Enviromental Protection system are cross-gradient from the site. The ingestion and dermal contact pathways of exposure are therefore incomplete.

The vapor intrusion pathway for the residences and businesses in the area to the south of the site is potentially complete and cannot be qualitatively ruled out. DEC performed an investigation of this potential pathway in 2003 (URS Corporation, Immediate Investigation Work Assignment, Field Investigation Letter Report, Work Assignment D003825-47, August 2003). Concentrations of volatile organic compounds (VOCs) in soil gas samples were measured in two rounds of sampling performed at twelve locations on the playing field and in the residential area south of the site. PCE concentrations did not exceed 9.6 parts per billion in the first round of sampling and did not exceed 8 parts per billion in the second round of sampling. The New York State Department of Health guideline for PCE in residences is 15 parts per billion. Any potential exposure is therefore expected to be minimal.

5.4 Off-Site Users of the Playing Field

As discussed above, there is no potential for direct contact with groundwater. The vapor intrusion pathway applies only to buildings, as vapors cannot accumulate in open areas. The only structure in this area is a small, slab-on-grade structure used for storage and as a refreshment stand during games. No complete exposure pathways exist.

6.0 CONCLUSION

Currently, the only potentially complete exposure pathway is the exposure of residents and workers in buildings to the south of the site to vapors from the groundwater contamination beneath those structures. A qualitative investigation of this potential pathway was performed by DEC in 2003. In addition, there is a potentially complete exposure pathway for construction workers if deep excavations are required in the future in the limited on-site areas of subsurface soil contamination. However, because of the low residual soil concentrations, any such exposure would be minimal.

ATTACHMENT B
CHEMICAL OXIDATION CALCULATIONS

Chemical oxidation is proposed as a method to reduce the mass of contaminant in the area under the western portion of the main Home Depot building. Monitored levels of PCE in the two monitoring wells in this area, AMW-3 and AMW-4, have been variable, but it has not been possible to reduce them below the 1-4 parts per million range.

RegenOx^{TM}, a proprietary oxidizing agent, would be injected into the subsurface using the existing sparging wells under the building. RegenOx is an alkaline oxidant that employs a sodium percarbonate complex with a multi-part catalytic formula. Its action is similar to Fenton's reagent, but without the danger of a violent exothermic reaction. The active oxidizing agent, hydrogen peroxide, is released gradually from the carbonate ion over a period of one to three weeks. This permits both an initial oxidation and the continued oxidation of contaminant desorbing from the soil matrix.

There are five sparging wells in this area. The sparging wells are 2-inch diameter schedule 40 PVC with 5-foot screens (0.010-inch slot) set 10 feet below the groundwater surface. The piping for the wells is accessible at a manifold on the walkway between the loading dock and the south wall of the building. The check valves at this location can be unscrewed to permit the oxidant solution to be pumped directly into each well.

Quantity of Contaminant

The area to be treated is about 160 feet long (north-south) by about 80 feet wide (east-west). Based on the downgradient sampling performed as part of the Supplemental Groundwater Study, PCE contamination is concentrated in the top 10 feet of the groundwater. The volume to be treated is therefore 80 feet by 160 feet by 10 feet, or 128,000 cubic feet (3,625,000 L).

To estimate the quantity of PCE present, we have made the following assumptions:

Soil porosity = 0.4
Average PCE concentration in groundwater = 4 mg/L
Soil bulk density = 1.76 g/cm^3 (110 lb/ft^3)
Soil organic carbon fraction (f_{oc}) = 0.003
Soil partition coefficient for PCE (K_{oc}) = 371 L/kg

For the PCE mass in the dissolved phase, this gives:

Pore volume = 128,000 ft^3 X 0.4 = 51,200 ft^3 or 1,450,000 L
Total PCE mass in the dissolved phase = 4 mg/L X 1,450,000 L = 5800 g or 12.8 lbs.

For the PCE mass in the sorbed phase, this gives:

Sorbed PCE concentration in soil = 4 mg/L X 0.003 X 371 L/kg = 4.45 mg/kg
Total PCE mass in the sorbed phase = 4.45 mg/kg X 1.76 kg/L X 3,625,000 L = 28,400 g or 62.6 lbs

The total mass of PCE in the treatment area is thus about 75 pounds.

Amount of Oxidant to be Injected

The theoretical stoichiometric oxidant demand is 1.3 pounds of oxidant per pound of PCE. A factor of 1.7 is used to account for potential product impurities. This gives a total oxidant requirement of about 130 pounds. As a safety factor, three times this dosage, or 390 pounds, is used. This accounts for oxidant consumed by reaction with natural organic matter in the soil, and oxidant which does not make contact with the contaminant. In the initial application, 65 pounds of oxidant, along with 65 pounds of the RegenOx activator, will be injected in each of the six sparging wells. This will be injected as 250 gallons of a 3% oxidant solution. The injection will be followed with 50 gallons of water to clear the piping and increase dispersion.

Monitoring of Oxidation

The progress of the chemical oxidation will be monitored by sampling groundwater from monitoring wells AMW-3 and AMW-4. AMW-3 is about 30 feet to the west of the nearest sparging well. AMW-4 is downgradient about 150 feet to the southeast. Groundwater testing is summarized in the table below:

	Analyte	Method	Baseline	After Injection	24 Hours	1 Week	2 Week
Field	pH dissolved oxygen (DO), oxidation/reduction potential (ORP) temperature conductivity alkalinity	Meter reading in flow-through cell	X	X	X	X	X
Field	Chemical oxidant	"Dip-stick" test for peroxide	X	X	X	X	X
Laboratory	Volatile organic compounds (VOCs)	8260	X				X
Laboratory	Alkalinity as $CaCO_3$	310.1	X				X
Laboratory	Major Anions	9056	X				X
Laboratory	Major Cations	6010	X				X
Laboratory	Hexavalent Chromium	3500crd	X				X

Timing and quantities of oxidant injected following the initial injections may be adjusted based on the results of the groundwater analyses.