INVESTIGATION WORK PLAN
KIOP FOREST AVENUE, L.P.
FORMER CHARLTON CLEANERS
FOREST AVENUE SHOPPERS TOWN
STATEN ISLAND, NEW YORK

Prepared For

KIOP Forest Avenue

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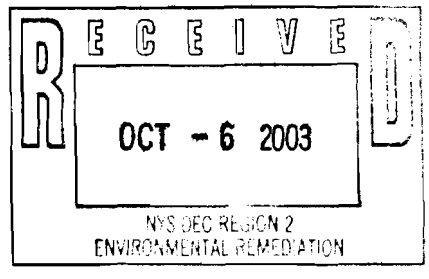

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INTRODUCTION

KIOP Forest Avenue, L.P. (KFA) is an innocent owner volunteer associated with New York State Department of Environmental Conservation (NYSDEC) Voluntary Cleanup Program (VCP) Index Number W3-0891-01-06. Leggette, Brashears & Graham, Inc. (LBG) has prepared this Investigation Work Plan on behalf of KFA. This Investigation Work Plan is a Supplemental Investigation to a Remedial Investigation prepared and submitted to NYSDEC by LBG in March 2002. A summary of the Remedial Investigation is presented in the History and Background section of this Investigation Work Plan. The purpose of this Investigation Work Plan is to outline the methodology and investigative procedures proposed to begin the vertical and horizontal delineation of chlorinated solvents beneath the Site (former Charlton Cleaners) and beneath the Forest Avenue Shoppers Town (FAST) in the vicinity of the Site. The off property investigation work plan would be prepared if required after the FAST investigation is completed and evaluated. This Investigation Work Plan includes a site specific Health and Safety Plan (HASP), a Community Air Monitoring Plan (CAMP), and a Quality Assurance/Quality Control (QA/QC) Plan.

HISTORY AND BACKGROUND

The FAST borders are Barrett Avenue to the east, Forest Avenue to the south and west and Decker Avenue to the north. There are various out parcels which are not affiliated with the FAST also bounded by this Area. The FAST was used as a golf range until 1951 prior to the development of the shopping center. The former Charlton Cleaners (Site) occupied a 2,000 square foot space in the northern corner of one of the buildings at the FAST (currently named Michael's Stores) sometime prior to 1994. An area map depicting the locations of the Site and the FAST is shown on figure 1. There is a basement beneath the northern third of the

Michael's building. The Site occupied a portion of the building as shown on figure 2 and the exact basement location is shown on figure 2. The remainder of the Michael's building does not have a basement. KIOP has owned the FAST since December 1, 2000. Currently, the FAST is covered entirely by asphalt and commercial buildings with the exception of small landscaped parking islands. The surrounding properties to the north, south, east and west are a mix of residential and commercial buildings. It is expected that the future use at the Site is the same as the present use (Michael's Store).

The Site utilized perchloroethylene (PCE) in the dry cleaning process during its operation prior to 1994. No spills or releases of PCE were reported or documented at the Site. A soil and ground-water investigation conducted in 1994 by Apex Environmental, Inc. included a preliminary Phase I Environmental Site Assessment and drilling of 4 soil borings and installation of four monitor wells in the vicinity of the former Charlton Cleaners. The 1994 investigation indicated the presence of 5 ug/l (micrograms per liter) of PCE in one of the monitor wells located in the vicinity of the Charlton Cleaners. A separate investigation of the Paul Miller, Inc. dry cleaning facility located at 1465 Forest Avenue (currently a Boston Market), which is an outparcel within the same boundary as the FAST, indicated that ground-water samples collected from the vicinity of Paul Miller, Inc. contained several chlorinated solvents including PCE at 99 ug/l.

Dvirka and Bartilucci completed a preliminary site assessment report at Charlton Cleaners in June 1997. Six soil borings drilled during this preliminary site assessment indicated the presence of PCE and TCE in soil and ground water in the vicinity of the former Charlton Cleaners.

LBG completed a preliminary remedial investigation at the Site, within the property and off property. In summary, the concentration of PCE, TCE and vinyl chloride detected in the soil were greatest at Boring Location HA-1 beneath the Site. The concentration of these compounds were 5,000 ug/kg (micrograms per kilogram), 860 ug/kg and 250 ug/kg, respectively. The dissolved PCE, TCE and vinyl chloride concentrations of water samples collected from the monitor wells were as high as 6,200 ug/l, 81 ug/l and 3,300 ug/l, respectively. All of the details of this investigation are summarized in the LBG report titled: "Remedial Subsurface Investigation, Forest Avenue Shoppers Town, Former Charlton Cleaners Facility,

Forest Avenue, Staten Island, New York" dated March 2002. There were eight (8) wells installed as part of this preliminary remedial investigation, 4 shallow wells (MW-5S, MW-6S, MW-7S and MW-8S) and 4 deep wells (MW-5D, MW-6D, MW-7D and MW-8D).

The wells have been renamed for clarification purposes in this Investigation Work Plan; Monitor Wells MW-5S, MW-6S, MW-7S and MW-8S will be renamed MW-5A, MW-6A, MW-7A and MW-8A, and Monitor Wells MW-5D, MW-6D, MW-7D and MW-8D will be renamed MW-5B, MW-6B, MW-7B and MW-8B. All of the renamed monitor well locations are shown on figure 2. The location of these wells are referenced in figure 2 as Cluster Wells WC-5, WC-6, WC-7 and WC-8.

The depth to ground water in the vicinity of the Site has been generally encountered at 7 ft bg (feet below grade). On November 3, 2000 the ground-water flow direction is toward the north beneath and in the vicinity of the Site at an average hydraulic gradient of 0.0031.

FIELD ACTIVITIES

Vertical Profiling/Delineation

In order to continue the delineation of dissolved chlorinated solvents beneath the FAST and in the vicinity of the Site, a total of twenty-three (23) monitor wells will be installed. The locations of these wells are as follows: one (1) well will be installed at existing Well Cluster WC-2; two (2) wells will be installed at each existing Well Cluster location (WC-5, WC-6, WC-7 and WC-8); four (4) wells will be installed at each of two new Well Cluster locations (WC-9 and WC-10); and two (2) wells will be installed at each of three more Monitor Well Cluster locations (WC-11, WC-12 and WC-13). All twenty-three (23) of these wells and their respective cluster identifications are shown on figure 3.

All of the wells will be constructed of 2-inch diameter PVC well casing and a 10-foot length of 0.20-slot PVC well screen set as follows:

1. Location/Well Cluster WC-2

   Monitor Well MW-2B at 40 to 50 ft bg

2. Location/Well Cluster WC-5

   Monitor Well MW-5C at 60 to 70 ft bg

   Monitor Well MW-5D at 80 to 90 ft bg

3. Location/Well Cluster WC-6

   Monitor Well MW-6C at 60 to 70 ft bg

   Monitor Well MW-6D at 80 to 90 ft bg

4. Location/Well Cluster WC-7

   Monitor Well MW-7C at 60 to 70 ft bg

   Monitor Well MW-7D at 80 to 90 ft bg

5. Location/Well Cluster WC-8

   Monitor Well MW-8C at 60 to 70 ft bg

   Monitor Well MW-8D at 80 to 90 ft bg

6. Location/Well Cluster WC-9

   Monitor Well MW-9A at 5 to 20 ft bg

   Monitor Well MW-9B at 40 to 50 ft bg

   Monitor Well MW-9C at 60 to 70 ft bg

   Monitor Well MW-9D at 80 to 90 ft bg

7. Location/Well Cluster WC-10

   Monitor Well MW-10A at 5 to 20 ft bg

   Monitor Well MW-10B at 40 to 50 ft bg

   Monitor Well MW-10C at 60 to 70 ft bg

   Monitor Well MW-10D at 80 to 90 ft bg

8. Location/Well Cluster WC-11

   Monitor Well MW-11C at 60 to 70 ft bg

   Monitor Well MW-11D at 80 to 90 ft bg

   (There will be no well screen set at 5 to 20 ft bg because data at this Cluster location has already been collected during a Geoprobe investigation; also there will be no well screen set at 40 to 50 ft bg at this Cluster location because of the close proximity of Well Cluster WC-7 which already has a monitor well screen set at 40 to 50 ft bg.)

9. Location/Well Cluster WC-12

   Monitor Well MW-12C at 60 to 70 ft bg

   Monitor Well MW-12D at 80 to 90 ft bg

   (There will be no well screen set at 5 to 20 ft bg because data at this Cluster location has already been collected during a Geoprobe investigation; also there will be no well screen set at 40 to 50 ft bg at this Cluster location because of the close proximity of Well Cluster WC-6 which already has a monitor well screen set at 40 to 50 ft bg.)

10. Location/Well Cluster WC-13

    Monitor Well MW-13A at 5 to 20 ft bg

    Monitor Well MW-13B at 40 to 50 ft bg

Each of the above twenty-three (23) wells will be installed within a soil boring which will be drilled using the hollow-stem auger drilling technique. During the drilling, soil samples will be collected every 5 feet using a 2-foot long stainless steel split-spoon sampler. Each sample will be described by an LBG hydrogeologist and screened in the field for the presence of volatile organic compounds (VOCs) using a photoionization detector (PID). The sample from each boring which exhibits the highest PID reading will be submitted to a New York State Department of Health (NYSDOH) ELAP certified laboratory for analysis by EPA Method 8260. All of the sampling tools and equipment will be decontaminated with Alconox and water between sampling locations.

The annular space surrounding each well screen will be filled with a Number 2 grade sand from the bottom of the well screen to one foot above the top of the well screen. A two-foot thickness of bentonite will be placed on top of the sand pack and the remaining annular space surrounding the solid PVC well casing will be filled with a bentonite/cement grout. Each well will be completed with a flush grade 8-inch diameter streetbox encased in a 1 foot by 1 foot by 0.5 foot thick concrete pad and fitted with a watertight locking well cap. This well construction ensures that surface water cannot enter the aquifer beneath the Site via these wells.

Additionally, during the drilling, LBG personnel will adhere to and conduct a CAMP as described in Section 3.1 in the HASP for the Site. The HASP is included as Appendix A.

Monitor Well Development

Within one week of the installation of the last monitor well as described above, LBG will supervise the development of each of the twenty (23) newly installed wells. A minimum of five standing volumes of water within each well will be evacuated using a centrifugal pump. Additionally, the well will continue to be purged until the turbidity of the evacuated ground water is at or below 50 NTU (nephelometric turbidity units) and that the conductivity, pH and temperature readings have stabilized (plus or minus ten percent). The evacuated water will be transferred to 55-gallon drums and temporarily staged at the Site for later disposal.

Fluid-Level Measurements

One week after the well development activities, the depth to water and total depth of each of the twenty-three (23) newly installed wells and the twelve (12) existing wells will be measured with an interface probe and weighted steel tape, respectively. The depth to water will be measured to 0.01 foot precision and each well will also be checked for the presence of Non Aqueous Phase Liquids (NAPL) or free-phase solvent using the interface probe. All of the measuring equipment will be decontaminated between wells with Alconox and water. The water-level measurements will be used to construct a ground-water elevation contour map.

Ground-Water Sampling

Ground-water samples will be collected from each of the 35 monitor wells at the property using the low-flow sampling technique. Dedicated Tygon tubing will be set in each well at the approximate midpoint of each well screen and connected to a variable speed peristaltic pump. The peristaltic pump will be operated at a discharge rate of one quarter gallon per minute and will discharge to a Flow-Through Cell. Geochemical parameters of the evacuated ground water such as pH, conductivity, dissolved oxygen and temperature will be continually monitored inside the Flow-Through Cell using a Horiba multi-parameter meter. Once all of the above geochemical parameters stabilize ($\pm$5%), a ground-water sample will be

collected from the dedicated Tygon tubing through an inline sampling port prior to the Flow-Through Cell. All of the ground-water samples which are collected will be submitted to a NYSDOH ELAP certified laboratory for analysis by EPA Method 8260. The data reporting level will be the Method Detection Limit of the analysis and the QA/QC Plan which includes the Standard Operating Procedures for the collection of ground-water samples is included as Appendix B.

Top of Casing Elevation Survey

A top of casing (TOC) elevation survey will be conducted for each monitor well associated with the Site. The TOC elevation survey will be conducted by a New York State licensed surveyor.

Soil-Gas Investigation

A soil-gas investigation will be completed in the vicinity of the Michael's Store and the Coconuts building. The purpose of the investigation is to determine whether soil gas containing VOCs exists adjacent to the Michael's Building and the Coconuts building.

The proposed soil-gas sampling locations are shown on figure 4. In order to collect each soil-gas sample a hollow, 0.75-inch diameter stainless steel probe will be driven into the exposed soil approximately one foot which is consistent with the depth of concrete slabs that the buildings rest on. The exception to this will be the two soil-gas sampling locations directly adjacent to the portion of the Michael's building with a basement. In that area, the stainless steel probe will be driven down to a depth of 1 foot below the basement level of the Michael's Store. The probe contains small diameter openings or perforations just above its tip which will permit the flow of soil gas into the hollow tube assembly. At least one volume of soil gas will be evacuated from the borehole using dedicated Tygon tubing and a peristaltic pump. Once at least one volume of soil gas has been removed, a soil-gas sample from each location will be collected within a 1 liter Summa canister at a flow rate of 0.1 L/min (liter per minute) and submitted to a NYSDOH ELAP certified laboratory for analysis by EPA Method TO-14.

In addition, a sample of the ambient air inside the Michael's Building, inside the Coconuts building and outside in the open air will be collected. The samples will be collected

at each location over an 8-hour period using Summa Canisters. The samples will be submitted to a NYSDOH ELAP certified laboratory for analysis by EPA Method TO-14.

Source Zone Characterization

In order to characterize the soil and ground-water quality directly beneath the former Charlton Cleaners, a total of six hand-auger borings will be drilled in the basement beneath the Site. Soil samples will be collected continuously from the basement floor to 6 feet below the basement floor at each hand-auger boring location and screened for the presence of VOCs using a PID. All of the soil samples from each boring location will be submitted to a NYSDOH ELAP certified laboratory for analysis by EPA Method 8260.

In addition, a polyethylene bailer will be used to collect a ground-water sample from each boring location. The samples will be submitted to a NYSDOH ELAP certified laboratory for analysis by EPA Method 8260.

Information regarding the use of PCE at the new Charlton Cleaners locations will be obtained and documented in the Investigation Report. The information will help to determine whether the new location could be a continuing source of PCE contamination. Information regarding intermediate floor drains, plumbing, ducts, vents, heating, ventilation and air condition systems, dry wells, storm and sanitary sewer drains and catch basins will also be obtained and documented in the Investigation Report.

Exposure Assessment

A qualitative onsite and offsite Exposure Assessment will be conducted as a component of the investigation. The exposure assessment will characterize all actual or potential public health and environmental exposures due to any site contamination. The exposure assessment will also include local ground-water use and the locations of any nearby water-supply wells.

INVESTIGATION REPORT

A comprehensive investigation report will be prepared and submitted to NYSDEC. The report will include detailed descriptions of the methodologies and procedures used during

all components of the investigation. The report will also include piezometric maps, evaluation of the local hydrogeologic setting, soil and ground-water quality presented in tabular and map form, well construction diagrams, geologic logs, laboratory analytical protocols, copies of all laboratory deliverables, conclusions and recommendations for additional delineation activities downgradient of the property across Barrett Avenue. If the findings of this investigation indicate that the vertical and horizontal extent of chlorinated solvents has not been delineated within the FAST boundaries, additional soil borings and monitor well locations will be proposed within the FAST.

Once the vertical and horizontal extent of chlorinated solvents have been fully delineated beneath the FAST, a Supplemental Investigation Work Plan will be developed if appropriate for the delineation activities off property and across Barrett Avenue to the east. The plan will be based upon the findings of this investigation. In addition, a Remedial Action Plan (RAP) will be submitted to the NYSDEC to recommend alternative remediation scenarios for contaminants discovered in the course of these Remedial and Supplemental Investigations.

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dmd
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