FEASIBILITY STUDY REPORT

WORK ASSIGNMENT D004433-17

CAMPAGNOLO PROPERTY
CITY OF ITHACA (C)

SITE NO. 7-55-013
TOMPKINS COUNTY, NY

Prepared for:
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 Broadway, Albany, New York

Alexander B. Grannis, Commissioner

DIVISION OF ENVIRONMENTAL REMEDIATION

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Final
June 2009

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CPC	chemicals of potential concern
DER	Division of Environmental Remediation
DCE	dichloroethene
FS	Feasibility Study
HHEA	Human Health Exposure Assessment
mg/L	milligrams per liter
NYCRR	New York Code Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OM&M	operation, maintenance and monitoring
PCE	tetrachloroethene
RAO	remedial action objectives
RI	Remedial Investigation
SCG	standards, criteria, and guidance
SCO	soil cleanup objectives
Site	Campagnolo Property Site
SMP	Site Management Plan
SSD	sub-slab depressurization
TCE	trichloroethene
TMV	toxicity, mobility or volume
URS	URS Corporation
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
VC	vinyl chloride
VOC	volatile organic compounds

EXECUTIVE SUMMARY

This Feasibility Study (FS) report was prepared by URS Corporation (URS) for the Campagnolo Property ("the site"), located in the City of Ithaca, Tompkins County, New York. The site was used for a dry cleaning service from the late 1960s through 1977. Results of the Remedial Investigation (RI) prepared by URS (June 2008) and previous investigations indicated the presence of a commonly used dry cleaning solvent, tetrachloroethene (PCE), in soil vapor and groundwater at the site. The horizontal extent of volatile organic compounds (VOCs) in soil has been delineated. The area of impact is primarily the western and southwestern corner of the site building. However, no VOCs were detected in soil at concentrations exceeding NYSDEC Part 375 unrestricted use soil cleanup objectives.

Based on investigations performed to date, the horizontal extent of groundwater contamination in the upper portion of the water table aquifer has been delineated. PCE and its breakdown products (e.g., trichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride) have migrated off-site via groundwater; however, dissolved phase concentrations are for the most part very low and limited in horizontal and vertical extent. There is strong evidence that reductive dechlorination is occurring at the site.

The remedial goal for the site is as follows:

- The remedy will eliminate or mitigate all significant threats to public health and the environment presented by the contaminants disposed at the site.

The numerical cleanup goals for the site, based on Subpart 375-6, are for unrestricted future use. Maximum detected contaminant concentrations in soil are below soil cleanup objectives (SCOs) for unrestricted use, and SCOs are met for all levels of protection including human health, ecological resources and groundwater in all soil samples collected. Since maximum detected concentrations are all below SCOs, there are no remedial action objectives (RAOs) developed for soil. To meet the remedial goal for the site, the following RAOs were established for groundwater and air:

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.

- Prevent contact with VOCs from contaminated groundwater during future construction activities.
- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Reduce the potential for soil vapor intrusion to occur in buildings.

In order to meet the remedial goal and remedial action objectives for the site, the following remedial alternatives were developed:

- Alternative 1 - No Further Action.
- Alternative 2 – Long-term Monitoring.

These alternatives were evaluated against the NYSDEC criteria: Overall Protection of Public Health and the Environment; Compliance with Standards; Criteria and Guidance; Long-term Effectiveness and Permanence; Reduction of Toxicity, Mobility and Volume with Treatment; Short-term Effectiveness; Implementability; Land Use; and Cost. Based on the evaluation, Alternative 2, Site Management Plan with Long-term Groundwater Monitoring is the recommended remedy for the site with a total present worth cost of $60,000. It includes:

- A groundwater management plan within a Site Management Plan (SMP) requiring long-term groundwater monitoring to assess the degree to which natural processes are effective. Three existing groundwater monitoring wells shown on Figure 2-4 (CP-MW-01S, CP-MW-03S, CP-MW-05S) will be sampled annually and analyzed for VOCs and indicator parameters.
- The SMP will identify procedures for characterization, handling, health and safety of workers and the community who come into contact with the low levels of contaminated groundwater in the event of intrusive subsurface activity at the site and/or off-site locations where contamination has migrated.
- An institutional control in the form of an environmental easement will require compliance with the approved site management plan and groundwater management plan and restrict groundwater use as a source of potable or process water at the site.
- The installed sub-slab depressurization (SSD) systems and analytical results from air monitoring to-date show that measures already implemented are effective in minimizing the

potential for soil vapor intrusion to occur in buildings. In order to provide continued compliance with State Guidance, the SSD systems installed by the State will be inspected and maintained annually.

1.0 INTRODUCTION

1.1 Contract Authority

URS Corporation (URS) prepared this Feasibility Study (FS) report for the Campagnolo Property site located in the City of Ithaca, Tompkins County, New York. The report was prepared for the New York State Department of Environmental Conservation (NYSDEC) under the State Superfund Standby Contract, Work Assignment D004433-17.

1.2 Scope of Feasibility Study

This FS report evaluates the remedial action for the contaminants found to be present at and in the vicinity of the site. This FS was developed to meet the requirements set forth in the New York State Code Rules and Regulations (NYCRR) 6 NYCRR 375, and NYSDEC Department of Environmental Remediation (DER) Draft DER-10 Technical Guidance for Site Investigation and Remediation. This FS specifies the remedial goal and remedial action objectives, identifies potential remedial technologies feasible for use at this site, and develops remedial alternatives that meet the remedial action objectives. Remedial alternatives will be evaluated in sufficient detail such that the NYSDEC can prepare a Proposed Remedial Action Plan and issue a Record of Decision.

1.3 Report Organization

This document has been organized consistent with NYSDEC Draft DER-10 and includes the following sections:

- Executive Summary;
- Introduction;
- Site Description and History;
- Remedial Goal and Remedial Action Objectives;
- Identification and Screening of Remedial Technologies;
- Development and Description of Alternatives; and
- Detailed Analysis of Alternative and Recommended Remedy.

2.0 SITE DESCRIPTION AND HISTORY

This section presents a site description and a summary of site conditions and site history.

2.1 Site Description

The Campagnolo Property site (#7-55-013) is located near the intersection of N. Meadow Street and Esty Street in the City of Ithaca, Tompkins County, New York (Figure 2-1). Currently there is a two-story concrete building on the site. The building is a slab-on-grade structure approximately 3,200 square feet in size. The building is currently leased for various commercial services. Asphalt and/or concrete paved parking surfaces surround the building on all sides. Surrounding land uses include commercial (banking, restaurants, offices), parking and housing. The north flowing Cayuga Inlet, a NYSDEC Class C (T) stream, is approximately 1,000 feet west of the site. The best usage of the Cayuga Inlet is for fishing (the T designates it as trout water). The grade at the site is generally flat with an elevation of approximately 386 feet above mean sea level.

2.2 Site History

The site was used for a dry cleaning service from the late 1960s through 1977. An approximately 18 pound dry cleaning machine was located in the building, and an aboveground solvent tank was formerly located outside on the east side of the building. Tetrachloroethene (PCE) had previously been used in dry cleaning operations as a cleaning solvent but is not currently used at the site. No other facilities or businesses situated immediately adjacent to the site are known to have used PCE.

Potable water is supplied to all properties in the immediate vicinity of the site by the City of Ithaca. An ice cream manufacturer is located approximately 300 feet northwest and has two on-site wells. The depth of these wells is unknown; no information is available from the NYSDEC Water Well Database or Tompkins County Health Department. These wells have been tested by the Tompkins County Health Department and found to be non-detect for volatile organic compounds (VOCs). However, the County advised the company to use any well water for non-contact cooling purposes only if necessary. This business is also served by municipal water.

2.3 Site Geology and Hydrogeology

Information from the RI and previously installed borings and monitoring wells was used to develop localized site geology and hydrogeology. Site information identifies a surficial fill layer ranging from 2 to 4 feet thick across the area. The fill material consists primarily of clayey silt mixed with some ash, wood, cinder, and gravel. Fill overlies an 11 to 12-foot clayey silt to silty clay unit containing thin and discontinuous sand and silt layers. Groundwater at the site was first encountered within sand and silt layers of the clayey silt to silty clay unit. The clayey silt to silty clay unit overlies a silty fine sand unit ranging in thickness from 11.5 to 12.5 feet. The top of this sand unit is approximately 15 to 20 feet below ground surface (bgs). The silty fine sand overlies a clayey silt unit present at approximately 28 feet bgs. A cross section depicting site geology is included as Figure 2-2. The location of the cross section is presented on Figure 2-3.

Figure 2-3 shows the groundwater elevation contours for water levels measured in the shallow monitoring wells on September 17, 2007. The data show the groundwater flow direction to be generally to the west-northwest with a gradient of approximately 0.0095 ft/ft. (Elevation data measured in January 2008 indicated a westerly groundwater flow direction.) Depth to the water table surface in five shallow monitoring wells, screened to intercept the silty sand layers within the silty clay to clayey silt unit, measured on September 17, 2007, ranged from approximately 4 to 8.5 feet bgs. Two deep wells were screened in the silty sand underlying the clayey silt to silty clay. Measured water levels indicated an upward gradient in one area and a slight downward gradient in the second pair.

Stratigraphically, the silty clay unit contains discontinuous seams of silty sand and sand lenses that most likely raise the vertical hydraulic conductivity throughout the unit. Based on the water level information and stratigraphy, the units monitored by the S and D wells appear to be hydraulically connected and the upper 28 feet of overburden, up to the clayey silt unit, most likely represents one hydrostratigraphic unit.

A large diameter (20 inch) sewer main runs south to north beneath N. Meadow Street. The sewer line is located at approximately the same depth as the shallow groundwater table. High permeability bedding along the sewer line may provide a preferential flow pathway for groundwater, inducing a northerly component to the groundwater flow direction.

There appears to be a localized high groundwater elevation in the vicinity of CP-MW-02S. The higher water level in the vicinity of CP-MW-02S may reflect a localized phenomenon, possibly due to an absence of the discontinuous sand layers at this location. There appears to be a very flat groundwater gradient present south of the site and north of Esty Street.

Since there are so few data points, a groundwater contour map for the deep groundwater wells was not generated. It is likely the deeper groundwater flows in a similar direction to the shallow groundwater (i.e., west-northwest).

2.4 Previous Investigations

Several investigations were performed prior to the RI and are summarized below.

2.4.1 2001 Subsurface Investigation

A subsurface investigation performed by Buck Engineering, L.L.C., in November 2001, identified chlorinated solvents in the groundwater samples collected using direct-push sampling equipment at six locations on the Campagnolo Property.

The investigation indicated elevated levels of volatile organic compounds (VOCs) consisting of tetrachlorethene (PCE) and its breakdown products trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride (VC) in the groundwater on the property. No soil samples were retained for analysis. PCE was detected at all six groundwater sample locations at concentrations ranging from 2.1 to 1,400 micrograms per liter (µg/L). TCE was detected in five of the six groundwater samples at concentrations ranging from 1 to 420 µg/L. The highest concentration of VOCs was detected in the groundwater sample obtained immediately west of the building, where concentrations for detected compounds were one to two orders of magnitude higher than other sampling locations. All six samples had at least two VOCs present at concentrations above their respective class GA groundwater quality criteria as listed in NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1, April 2000. In addition, barium was detected at a concentration (5,830 µg/L) over five times its groundwater criterion (1,000 µg/L) at a location immediately east of the building.

2.4.2 2002 Structure Sampling

In March and April 2002 the RETEC Group, Inc. reportedly collected a sub-slab soil gas sample, two indoor air samples and an outdoor air sample for analysis of VOCs. Based on results from these samples, a sub-slab depressurization (SSD) system was installed in the dry cleaner building in early 2003.

2.4.3 2005 Structure Sampling

On behalf of NYSDEC, URS conducted an investigation in July-August 2005 to assess soil vapor, indoor air, sub-slab vapor, and outdoor air at the site and in five neighboring residences and one restaurant near the site. URS additionally checked the pressure field extension of the SSD system at the site to confirm that an adequate negative pressure was maintained beneath the building slab. Results were presented in a URS Field Investigation Letter Report dated September 2005. Results indicated that chlorinated solvents were present in the soil vapor samples collected from the west of the site. Chlorinated solvents included tetrachloroethene, tricholorethene, and their respective breakdown products (e.g. cis-1,2-dichloroethene and vinyl chloride). These same VOCs were identified at various concentrations in samples of sub-slab vapor and indoor air that were collected from several structures surrounding the site. The highest reported concentration of tetrachloroethene was in a sub-slab sample collected south of the site at 53,000 micrograms per cubic meter ($\mu g/m^3$). Based on the air sampling results, URS, on behalf of NYSDEC, installed SSD systems at two structures.

2.4.4 2006 Structure Sampling

Based upon the results of the July-August 2005 testing, NYSDEC elected to perform additional structure sampling in the site vicinity. On behalf of NYSDEC, URS conducted the additional investigations in March-April 2006 and presented the results in a Field Investigation Letter Report dated July 2006. First, structures that were sampled in summer 2005 (except for those which were mitigated) were re-sampled during the heating season months to measure indoor air VOC concentrations under conditions when VOCs are most likely to accumulate within buildings. Secondly, NYSDEC and the New York State Department of Health (NYSDOH) (collectively referred to as "the State") selected additional structures located one or two structures beyond the initial "inner ring" of houses originally sampled because they were within two lots of the site. Four of the six structures sampled in 2005 were re-sampled as part of

this investigation. The other two structures sampled in 2005 were not re-sampled as they had received SSD systems as a result of the 2005 sampling. In addition to these four structures, seven structures were sampled for the first time. Sampling at an additional seven structures was pursued, but not conducted either because the owner declined or did not respond to sampling requests. Results indicated that chlorinated solvents were either present in the sub-slab vapor, basement air, or first floor air of some structures. The majority of the detected concentrations were low and were typical of levels usually found in the indoor air of buildings. The highest reported concentrations of chlorinated solvents were detected in basement sub-slab samples collected south and west of the site. Soil and groundwater samples were not collected or analyzed.

2.4.5 2007 Structure Sampling

In 2007, URS sampled nine structures, which included four new structures, three that had been sampled previously, and two that had received SSD systems. The air results of the two structures with SSD systems indicated the SSD systems were properly operating as designed. Re-sampling of air was recommended at three structures. One of the new structures had an elevated indoor TCE level, but no subslab air samples were allowed by the owner, leaving the possibility open that TCE was originating from indoor sources. The air results of the remaining structures were typical of levels usually found in the indoor air of buildings and no additional sampling was recommended.

2.4.6 2008 Structure Sampling

In 2008, URS sampled six structures, which included one new structure and five that were sampled previously. Based on the results of one residential structure, additional air sampling was recommended. Overall, the results of the air sampling indicated that no further sampling of additional structures surrounding the Campagnolo site was needed to assist with the completion of the RI investigation.

2.5 Potentially Applicable Standards, Criteria, and Guidance

Potentially applicable standards, criteria, and guidance (SCGs) for the site consist of Subpart 375-6: Remedial Program Soil Cleanup Objectives (SCOs) that were used as the basis for evaluating remedial alternatives in this FS. There are seven categories of SCOs in Subpart 375-6. These categories include the following: unrestricted use, residential use, restricted

residential use, commercial use, industrial use, protection of ecological resources, and protection of groundwater. Unrestricted use criteria are considered the most appropriate for the site and these SCOs were used to develop and evaluate alternatives in this FS. Soil contaminant levels met unrestricted use criteria.

Groundwater standards are set by the Class GA standards presented in NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1, April 2000.

There are no applicable regulatory criteria for soil vapor contamination. However, because PCE and TCE are common soil and groundwater contaminants, the NYSDOH has established air guidelines for indoor air concentrations of these compounds to assist in determining whether actions should be taken to reduce potential exposures to contaminants through soil vapor intrusion.

2.6 Nature and Extent of Contamination

2.6.1 Subsurface Soil

Chlorinated VOC concentrations were primarily detected in soil samples collected from locations west and southwest of the site building. Lower concentrations of PCE, its breakdown products (TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, and VC), and/or other VOCs were detected in other locations during the RI; however, no VOCs were detected in any soil sample collected at concentrations in exceedance of unrestricted use criteria.

2.6.2 Groundwater

The overall horizontal and vertical extent of dissolved phase chlorinated solvents in groundwater has been delineated as part of the RI, and has been found to be very low in concentration and limited both vertically and laterally. The distribution of PCE and its daughter products is shown on Figure 2-4. SCG exceedances of Class GA groundwater standards are limited to the groundwater sampling points adjacent to the site. Analytical groundwater data indicate that site-related contaminants are generally migrating in the direction of groundwater flow (west-northwest), but also dispersing laterally due to a flat groundwater gradient. The overall horizontal extent of PCE presence in groundwater appears to be along the west side of the site building towards the northwest corner of the property and south towards Esty Street. Based

upon detected concentrations of PCE, the horizontal extent of PCE has not migrated at significant concentrations beyond the west side of N. Meadow Street.

Most of the soil at the site is located under a relatively impervious cover (either pavement or building) and soil contamination is limited to low concentrations. Therefore, infiltration-induced migration of contaminants from soil is considered to be a relatively small source of contamination to groundwater. Based on observed dissolved phase concentrations, there does not appear to be significant vertical migration of groundwater contamination. No chlorinated VOCs were detected at either deep groundwater monitoring well. The dissolved phase chlorinated solvents do not appear to be migrating into the deeper portions of the upper water table aquifer. PCE was not present in the deeper portions of the upper water table aquifer west of the site.

In general, significant degradation of chlorinated solvents is marked by a shift in the relative concentrations of various compounds. As the degradation progresses, the original compound released into the environment breaks down into the daughter product, where successively more chloride atoms are removed from the compound molecule and replaced with hydrogen. For this site, PCE would shift to TCE, then to DCE, then to VC and finally to ethane. Vinyl chloride is difficult to dechlorinate to ethane, but is readily oxidized under aerobic conditions. There is strong evidence that anaerobic reductive dechlorination is occurring at this site. The evidence includes: 1) as determined during the RI, geochemical conditions are favorable – low or no dissolved oxygen and low oxidation reduction potential; and, 2) the presence of breakdown products of PCE including TCE, cis-1,2-DCE, trans-1,2-DCE, and VC. DCE is present in several groundwater samples and VC is present at elevated levels downgradient and southeast of the site. In summary, the RI found that the distribution of concentrations of various chlorinated hydrocarbons indicated that reductive dechlorination was taking place in the saturated overburden.

2.6.3 Soil Vapor and Air

From 2005 to 2008, air samples were collected from 16 residential and/or commercial buildings surrounding the Campagnolo site in order to determine whether actions were necessary to address potential soil vapor intrusion from occurring in buildings. Buildings were selected by the State to complement and expand upon environmental testing that was being completed as part of the Campagnolo site investigation. Figure 2-5 shows the general locations of the buildings sampled. Based on the air sampling results, the State installed SSD systems at two commercial

buildings. Subsequent inspections of the SSD systems indicated they are properly operating as designed. Overall, the results of the State's air sampling effort indicated that no sampling of additional buildings was needed to assist with the completion of the RI. Based on the results of groundwater investigations, which did not identify VOCs migrating to areas east of the site, the presence of some low concentrations of VOCs in sub-slab soil vapor samples east of the site may indicate that soil vapors have migrated in the vadose zone, presumably by diffusion in high permeability soils.

2.7 Summary of Qualitative Human Health Exposure Assessment

A Qualitative Human Health Exposure Assessment (HHEA) was presented in the RI. The HHEA provides a summary of potential exposure pathways and a summary of potentially toxicological effects that may result from exposure to contaminants attributable to former site activities under current and potential future site conditions. The HHEA used data and information collected from the RI, together with data collected as part of previous investigations, to assess human health exposure in the immediate and surrounding areas. The HHEA identified six chemicals of potential concern (CPCs) for the medium of potential concern at this site. A medium of potential concern is identified when one or more contaminants were detected at concentrations exceeding SCGs. (CPCs include chlorinated VOCs that were present in groundwater samples at concentrations above SCGs. Petroleum-related VOCs (benzene and isopropylbenzene) were detected at concentrations below SCGs, and are not considered to be site related.) Results indicated that:

- Concentrations of site-related contaminants exceeded SCGs in groundwater samples collected during the RI and/or previous site investigations. Consequently, groundwater is considered a medium of concern.

- Concentrations of site-related contaminants in subsurface soil did not exceed SCGs in samples collected during the RI. Consequently, subsurface soil is not considered a medium of concern.

- Concentrations of site-related contaminants in sub-slab vapor and indoor air resulted in mitigation activity in accordance with State Guidance. Consequently, soil vapor and indoor air are considered to be mediums of concern.

- Concentrations of site-related contaminants in outdoor air samples were generally consistent with levels commonly found in outdoor air, with the exception of one of ten samples collected during the RI at the site (TCE detected at 13 $\mu g/m^3$). Consequently, outdoor air was not considered to be a medium of concern at the time of the RI.

In summary, CPCs for the medium of concern are:

1,1-Dichloroethene	groundwater
1,2-Dichloroethene (trans)	groundwater
1,2-Dichloroethene (cis)	groundwater
Tetrachloroethene	groundwater, soil vapor, indoor air
Vinyl Chloride	groundwater.

2.7.1 Potentially Exposed Receptors

The previous and current use of the site is commercial. The area immediately surrounding the site is mixed-use commercial/residential. Most of the soil at the site (including off-site investigation locations) is located under relatively impervious cover (either pavement or buildings). Other than residential fencing on the adjacent properties to the east of the site, access to the site is not restricted. The future use of the site and the surrounding area is anticipated to be the same as the current (commercial) use.

Currently, there are no known potable wells within the immediate vicinity of the site. The City of Ithaca supplies potable water to residences in this area from a reservoir in Six Mile Creek, approximately 3.5 miles southeast of the site. An ice cream manufacturer is located approximately 300 feet away and has on-site wells for non-potable uses. This business is served by municipal water. An attempt was made to determine the depth of these wells by reviewing the NYSDEC water well database, and by contacting the ice cream manufacturer and the Tompkins County Health Department. The depth of the wells is undetermined; however, they have been tested by the Tompkins County Health Department and found to be non-detect for VOCs. The ice cream manufacturer has been advised to use this water, if necessary, for non-contact cooling purposes only.

Under both the current and future use scenarios, potentially exposed receptors include commercial workers in the buildings located at and near the site, nearby residents, other workers (e.g., construction) at and in the vicinity of the site, and trespassers. Residents or site workers

could be exposed through groundwater ingestion if wells were installed near the site and used as a potable water supply.

2.7.2 Exposure Pathways

Under the current use scenario, exposure to site-related contaminants via indoor air was identified as a completed exposure pathway for some receptors. While direct exposure to contaminated soil or groundwater is not considered to be a completed exposure pathway under the current use scenario, these media contribute to the contaminated soil vapor.

Under the future use scenario, exposure to site-related contaminants via groundwater, subsurface soil, indoor air, and outdoor air are identified as potentially completed exposure pathways for some potential receptors. Groundwater may be used for either non-potable or potable purposes, assuming there are no restrictions on the installation of private wells. Exposure may also occur during potential commercial or residential construction efforts on the site or at nearby residences. Ingestion, dermal absorption, and inhalation of VOCs are potential exposure pathways if contaminated media are exposed. Indoor air contamination, directly caused by soil and groundwater contamination, would continue to pose an inhalation exposure threat in the absence of continued operation of the mitigation systems currently in place in structures north and south of the site.

3.0 REMEDIAL GOAL AND REMEDIAL ACTION OBJECTIVES

3.1 Remedial Goal

In accordance with Draft DER-10, the remedial goal for site remediation is as follows:

- The remedy will eliminate or mitigate all significant threats to public health and the environment presented by the contaminants disposed at the site.

3.2 Remedial Action Objectives

In order to meet the remedial goal, remedial action objectives (RAOs) were developed to protect public health and the environment and provide the basis for selecting technologies and developing alternatives. In order to develop site-specific RAOs, the generic RAOs presented in Draft DER-10 were considered for the potential medium of concern (soil, air, groundwater). Table 3-1 presents a summary of the generic RAOs and the rationale for site-specific RAO selection.

Soil

Numerical soil cleanup goals for the site, based on Subpart 375-6, are for unrestricted future use. As shown on Table 1-1, maximum detected soil contaminant concentrations are below SCOs for unrestricted use. SCOs are met for all levels of protection including human health, ecological resources and groundwater in all soil samples collected. Since maximum detected concentrations are all below SCOs, no RAOs are developed for soil.

Groundwater

As shown on Figure 2-4, some groundwater samples exhibited VOC contamination above Class GA standards. The RAOs for groundwater are:

- prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- prevent contact with volatiles from contaminated groundwater during future construction activities.
- restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.

Air

Structure sampling has identified some structures that contained VOC vapors in or below the structure at levels that resulted in actions being taken to reduce potential exposures to contaminants through soil vapor intrusion. The RAO for air is:

- reduce the potential for soil vapor intrusion to occur in buildings.

4.0 IDENTIFICATION AND SCREENING OF REMEDIAL TECHNOLOGIES

This section consists of identifying specific remedial technologies for groundwater and air and evaluating them with respect to their technical implementability in meeting the remedial action objectives. Appropriate technologies will be carried forward into the development of alternatives for the site.

4.1 Identification of Remedies for Groundwater

This section identifies the remedial technologies for groundwater at the site. Because groundwater contamination is low and limited in extent, active remediation technologies are not considered.

4.1.1 Natural Processes

As discussed in Section 2.6.2, there is strong evidence that anaerobic reductive dechlorination is occurring at this site which is effective in degrading the site-related chlorinated VOCs into its daughter products. Natural processes are therefore considered suitable as a remedy for groundwater restoration at the site. Natural processes would be a practical and effective remedy in meeting the remedial action objective of restoring the groundwater aquifer to pre-release conditions over the long term.

Effectiveness: Natural processes at the site, reductive dechlorination in particular, have been shown to be effectively reducing the concentrations of PCE into its daughter products.

Implementability: As natural processes have shown to be effective, no implementation of man-made technologies are necessary.

Cost: There is no cost associated with natural processes.

Conclusion: Natural processes will be retained as a remedy for the site.

4.1.2 Site Management Plan

Groundwater on-site and near the site is not utilized for potable purposes. Potable water is provided to all residents and commercial establishments in the area by the City of Ithaca. However, private wells may be installed in the future. A Site Management Plan (SMP) would:

- Include implementation of a groundwater management plan requiring long-term groundwater monitoring.

- Identify procedures for characterization, handling, health and safety of workers and the community who come into contact with the low levels of contaminated groundwater in the event of intrusive subsurface activity at the site and/or off-site locations where contamination has migrated.

- Impose an institutional control in the form of an environmental easement that would require compliance with the approved site management plan and groundwater management plan and restrict groundwater use as a source of potable or process water at the site.

- Require future assessment of contamination in soils below the building should the building be demolished in the future.

Effectiveness: An SMP with a groundwater management plan and an environmental easement would be effective in meeting the remedial action objectives of preventing ingestion of groundwater with contaminant levels exceeding drinking water standards, and preventing contact with groundwater contaminated with low levels of VOCs.

Implementablity: An SMP would not be difficult to implement considering that analytical results indicate that potable water is provided by the City of Ithaca.

Cost: The cost for an SMP would be relatively low.

Conclusion: An SMP with a groundwater management plan and an environmental easement is retained for use at the site.

4.2 Identification of Remedies for Air

This section identifies the remedial technologies for air at the site.

4.2.1 No Further Action

Sub-slab depressurization (SSD) systems have been installed at the on-site building and the structures immediately north and south of the site. The 2008 air sampling resulted in no additional actions being completed on structures located near the Campagnolo site.

Effectiveness: The installation of SSD systems and analytical results from air monitoring to-date show that measures already implemented are effective in meeting the remedial action objective of reducing the potential for soil vapor intrusion to occur in buildings.

Implementablity: SSD systems were installed at the building and the structures located immediately north and south of the site. Air monitoring has been conducted and analytical results evaluated in accordance with State Guidance

Cost: There is no cost associated with No Further Action.

Conclusion: No Further Action is retained for use at the site.

4.2.2 SSD System Inspection and Maintenance

In accordance with State Guidance, long-term inspection and maintenance of the existing SSD systems could be conducted. The existing SSD systems installed on the structures immediately north and south of the site would be included. The requirements for continued inspection and maintenance would be outlined in a Site Management Plan (SMP). The SMP would require annual recertification of the operation of the SSD systems.

Effectiveness: The installation of SSD systems and analytical results from air monitoring to-date show that measures already implemented are effective in meeting the remedial action objective of reducing the potential for soil vapor intrusion to occur in buildings.

Implementablity: SSD systems have already been installed at the on-site building and the structures immediately north and south of the site. Continued inspection and maintenance in structures where existing access agreements are in place would be implementable.

Cost: The cost for inspection and maintenance would be low.

Conclusion: SSD inspection and maintenance is retained for use at the site.

5.0 DEVELOPMENT AND DESCRIPTION OF ALTERNATIVES

This section combines the remedial technologies considered feasible into remedial alternatives for the site. The alternatives are then described.

5.1 Development of Alternatives

In order to meet the remedial goal and remedial action objectives for the site, the following remedial alternatives were developed:

- Alternative 1 - No Further Action.
- Alternative 2 – Site Management Plan with Long-term Groundwater Monitoring.

5.2 Description of Alternatives

5.2.1 Alternative 1 - No Further Action

Under this alternative, soil cleanup objectives are met for unrestricted use and the low levels of contaminants present in groundwater and soil would attenuate over time by natural processes which have shown to be effective on site contaminants. The installed SSD systems and analytical results from air monitoring to-date show that measures already implemented are effective in reducing the potential for soil vapor intrusion to occur in buildings.

Size and Configuration

- No remedial construction would take place.

Time for Remediation

- The low levels of contaminants present in soil meet the soil cleanup objectives for unrestricted future use.
- Analytical results from structures installed with SSD systems indicate that measures are effective in reducing the potential for soil vapor intrusion to occur in buildings.

Spatial Requirements

- There are no spatial requirements.

Options for Disposal

- There are no materials requiring disposal.

Permit Requirements

- No permits will be required for this alternative.

Limitations

- This alternative meets soil cleanup objectives for unrestricted use but does not comply with SCGs for groundwater in the short term.

Ecological Impacts

- This alternative is not anticipated to have any negative impacts on fish and wildlife resources.

5.2.2 Alternative 2 – Site Management Plan with Long-term Groundwater Monitoring

Under this alternative, soil cleanup objectives are met for unrestricted use and the low levels of contaminants present in groundwater and soil would attenuate over time by natural processes. The Site Management Plan, and groundwater management plan within, would require long-term groundwater monitoring to assess the degree to which natural processes were effective. During this time period, an environmental easement restricting groundwater use as a source of potable or process water at the site would be enforced.

The installed SSD systems and analytical results from air monitoring to-date show that measures already implemented are effective in reducing the potential for soil vapor intrusion to occur in buildings. In order to provide continued compliance with State Guidance, long-term inspection and maintenance of existing SSD systems could be conducted. The existing SSD systems installed on the the structures immediately north and south of the site would be included.

Based on air sampling results, one structure located near the site would be monitored on a periodic basis.

Size and Configuration

- No remedial construction would take place.

- Three existing groundwater monitoring wells shown on Figure 2-4 (CP-MW-01S, CP-MW-03S, CP-MW-05S) would be sampled annually and analyzed for VOCs and indicator parameters.
- The three existing SSD systems installed at the on-site building and the structures immediately north and south of the site would be included in the annual inspection and maintenance program.
- One nearby structure would be sampled periodically.

Time for Remediation

- Monitoring and provisions of the Site Management Plan will be in place over the long term while natural processes continue to reduce contaminant concentrations.

Spatial Requirements

- There are no spatial requirements.

Options for Disposal

- There are no materials requiring disposal.

Permit Requirements

- No permits will be required for this alternative; however, a continuance of the access agreements would be required for inspection and maintenance purposes.

Limitations

- This alternative meets soil cleanup objectives for unrestricted use but does not comply with SCGs for groundwater in the short term. Groundwater use restrictions are included.

Ecological Impacts

- This alternative is not anticipated to have any negative impacts on fish and wildlife resources.

6.0 DETAILED ANALYSIS OF ALTERNATIVES AND RECOMMENDED REMEDY

6.1 Description of Evaluation Criteria

Each of the alternatives is subjected to a detailed evaluation with respect to the criteria outlined in 6 NYCRR Part 375. A description of each of the evaluation criteria is provided below. This evaluation aids in the selection process for remedial actions in New York State.

Overall Protection of Public Health and the Environment

This criterion is an assessment of whether the alternative meets requirements that are protective of human health and the environment. The overall assessment is based on a composite of factors assessed under other evaluation criteria, particularly long-term effectiveness and permanence, short-term effectiveness, and compliance with SCGs. This evaluation focuses on how a specific alternative achieves protection over time and how site risks are reduced. The analysis includes how the source of contamination is to be eliminated, reduced, or controlled.

Compliance with Standards, Criteria, and Guidance

This criterion determines whether or not each alternative and the proposed remedial technologies comply with applicable environmental laws and SCGs pertaining to the chemicals detected in contaminated media and the location of the site.

Long-term Effectiveness and Permanence

This criterion addresses the performance of a remedial action in terms of its permanence and the quantity/nature of waste or residuals remaining at the site after implementation. An evaluation is made on the extent and effectiveness of controls required to manage residuals remaining at the site and the operation and maintenance systems necessary for the remedy to remain effective. The factors that are evaluated include permanence of the remedial alternative, magnitude of the remaining risk, adequacy and reliability of controls used to manage residual contamination.

Reduction of Toxicity, Mobility or Volume with Treatment

This criterion assesses the remedial alternative's use of technologies that permanently and significantly reduce toxicity, mobility, or volume (TMV) of the contamination as their principal element. Preference is given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site.

Short-term Effectiveness

This criterion assesses the effects of the alternative during the construction and implementation phase with respect to the effect on human health and the environment. The factors that are assessed include protection of the workers and the community during remedial action, environmental impacts that result from the remedial action, and the time required until the remedial action objectives are achieved.

Implementability

This criterion addresses the technical and administrative feasibility of implementing the alternative and the availability of various services and materials required during implementation. The evaluation includes the feasibility of construction and operation, the reliability of the technology, the ease of undertaking additional remedial action, monitoring considerations, activities needed to coordinate with regulatory agencies, availability of adequate equipment, services and materials, off-site treatment, and storage and disposal services.

Land Use

This criterion addresses the current, intended, and reasonably anticipated future land use of the site and surroundings. The use of the site shall be either unrestricted or restricted. Unrestricted use is a use without imposed restrictions, such as environmental easements, following remediation to Part 375-6 Remedial Program Soil Cleanup Objectives for unrestricted use. Restricted uses include imposed controls and restrictions, such as institutional and engineering controls and environmental easements following remediation to Part 375 SCOs for restricted use such as restricted residential, commercial, or industrial use.

Cost

Capital costs and operation, maintenance, and monitoring costs (OM&M) are estimated for each alternative and presented as present worth using a 5% discount rate for a 30 year time period.

Community and State Acceptance

Concerns of the State and the Community will be addressed separately in accordance with the public participation program developed for this site.

6.2 Alternative 1 – No Further Action

Under this alternative, soil cleanup objectives are met for unrestricted use and the low levels of contaminants present in groundwater and soil would attenuate over time by natural processes. The installed SSD systems and analytical results from air monitoring to-date show that measures already implemented are effective in reducing the potential for soil vapor intrusion to occur in buildings. No construction would be required.

6.2.1 Overall Protection of Public Health and the Environment

This alternative is protective of public health and the environment through natural processes which are effectively reducing contaminant concentration in groundwater, and the existing SSD systems in the on-site and nearby structures.

6.2.2 Compliance with SCGs

Contaminant concentrations in soil are currently below soil cleanup objectives for unrestricted use and soil cleanup objectives are met for all levels of protection including human health, ecological resources and groundwater in all soil samples collected.

Natural processes at the site, reductive dechlorination in particular, have been shown to be effectively reducing the concentrations of PCE into its daughter products. Natural processes provide a practical and effective remedy to restore the groundwater aquifer to below SCGs over the long term.

Existing installed SSD systems and air monitoring analytical results indicate that air SCGs in affected buildings have been met.

6.2.3 Long-Term Effectiveness and Permanence

Natural processes and existing SSD systems are effective and permanent in the long term. However, there is no program to limit potential future exposures through, for example, new construction on the property.

6.2.4 Reduction of Toxicity, Mobility and Volume with Treatment

Natural processes which are currently active in subsurface soil and groundwater would continue to reduce contaminant levels. SSD systems reduce the exposure pathway. There is no

treatment technology included in this alternative to permanently or significantly reduce contaminant toxicity, mobility or volume.

6.2.5 Short-Term Effectiveness

As there is no construction associated with this alternative, there would be no short-term impacts to workers or the community. Remedial action objectives would be met through natural processes and continued operation of the SSD systems.

6.2.6 Implementability

This alternative would not be difficult to implement considering the site meets the SCOs for unrestricted use, natural processes have shown to be effective within the groundwater system, and potable water is provided by the City of Ithaca. Installed SSD systems are operating effectively as designed.

6.2.7 Land Use

This alternative meets unrestricted use soil cleanup objectives for the site.

6.2.8 Cost

There are no remediation costs associated with this alternative.

6.3 Alternative 2 – Site Management Plan with Long-term Groundwater Monitoring

Under this alternative, soil cleanup objectives are met for unrestricted use and the low levels of contaminants present in groundwater and soil would attenuate over time by natural processes. The groundwater management plan within the Site Management Plan would require long-term groundwater monitoring and during this time period, an environmental easement restricting groundwater use as a source of potable or process water would be enforced. These controls along with long-term inspection and maintenance of the existing SSD systems would provide protection to public health. No construction would be required.

6.3.1 Overall Protection of Public Health and the Environment

This alternative is protective of public health and the environment through natural processes which are effectively reducing contaminant concentration in groundwater, restrictions

on potable water use, and inspection and maintenance of existing SSD systems. Long-term monitoring of groundwater will evaluate the effectiveness of this alternative in providing continued protection to public health and the environment. Indoor and subslab air monitoring of a nearby structure will continue on a periodic basis until it is confirmed that no further actions are necessary.

6.3.2 Compliance with SCGs

Concentrations of contaminants in soil are currently below soil cleanup objectives for unrestricted use and soil cleanup objectives are met for all levels of protection including human health, ecological resources and groundwater in all soil samples collected.

Natural processes at the site, reductive dechlorination in particular, have been shown to be effectively reducing the concentrations of PCE into its daughter products. Natural processes would be a practical and effective remedy to restore the groundwater aquifer to below SCGs over the long term. Monitoring will assess the degree to which natural processes are effective in meeting SCGs.

Existing installed SSD systems and air monitoring analytical results indicate that air SCGs in potentially impacted buildings have been met. Long-term inspection and maintenance of the SSD systems will ensure that the systems will continue to operate as designed.

6.3.3 Long-Term Effectiveness and Permanence

Natural processes, existing SSD systems, and the provisions of the SMP would be effective and permanent in the long term. The environmental easement would limit potential impacts from future activities (for example, new subsurface construction) on the site.

6.3.4 Reduction of Toxicity, Mobility and Volume with Treatment

Natural processes which are currently active at the site would continue to reduce the levels of contaminants at the site. SSD systems reduce the exposure pathway. There is no treatment technology included in this alternative to permanently or significantly reduce contaminant toxicity, mobility or volume.

6.3.5 Short-Term Effectiveness

As there is no construction associated with this alternative, there would be no short-term impacts to workers or the community. Remedial action objectives would be met through natural processes and the SMP.

6.3.6 Implementability

An SMP would not be difficult to implement considering the site meets the SCOs for unrestricted use, processes have shown to be effective within the groundwater system, and potable water is provided by the City of Ithaca. Effective SSD systems are already installed. A continuance of the access agreements would be required for inspection and maintenance.

6.3.7 Land Use

This alternative meets unrestricted use soil cleanup objectives at the site and includes an environmental easement restricting groundwater use as a source of potable or process water at the site.

6.3.8 Cost

The capitol cost for this alternative includes an estimated $8,000 cost for the Site Management Plan and $15,000 for an estimated three future VI structure sampling events. Annual operation, maintenance and monitoring (OM&M) costs for groundwater monitoring and SSD inspection and maintenance are $10,500. The total present worth of Alternative 2 over a thirty year time period is $183,500.

6.4 Comparative Analysis of Alternatives

6.4.1 Overall Protection of Public Health and the Environment

Both Alternatives 1 and 2 are protective of public health and the environment through natural processes which are effectively reducing contaminant concentration in groundwater, and the existing SSD systems operating effectively as designed. Alternative 2 provides addition protection through long-term monitoring of groundwater, indoor air (at one structure), SSD inspection and maintenance, and controls of the SMP including an environmental easement requiring groundwater use restrictions.

6.4.2 Compliance with SCGs

For both Alternatives 1 and 2, concentrations of contaminants in soil are currently below soil cleanup objectives for unrestricted use, and soil cleanup objectives are met for all levels of protection including human health, ecological resources and groundwater in all soil samples collected.

Natural processes at the site, reductive dechlorination in particular, have been shown to be effectively reducing the concentrations of PCE into its daughter products. Natural processes would be a practical and effective remedy to restore the groundwater aquifer to below SCGs over the long term. Groundwater monitoring in Alternative 2 would assess the degree to which natural processes are effective in meeting SCGs.

Long-term inspection and maintenance of existing SSD systems will ensure that the systems are operating effectively as designed.

6.4.3 Long-Term Effectiveness and Permanence

Both Alternatives 1 and 2 would be effective and permanent in the long term. However, under Alternative 2, the environmental easement would limit potential impacts from future activities (for example, new subsurface construction) on the site.

6.4.4 Reduction of Toxicity, Mobility and Volume with Treatment

Natural processes which are currently active at the site would continue to reduce the levels of contaminants at the site. SSD systems reduce the exposure pathway. There are no treatment technologies included in these alternatives to permanently or significantly reduce contaminant toxicity, mobility or volume.

6.4.5 Short-Term Effectiveness

There is no construction associated with these alternatives, so there would be no short-term impact to workers or the community. Remedial action objectives would be met through natural processes for both alternatives.

6.4.6 Implementability

There would be minimal implementation issues for Alternative 2 requiring a continuance of the access agreements would be required for inspection and maintenance purposes.

6.4.7 Land Use

These alternatives meet unrestricted use soil cleanup objectives at the site. Alternative 2 includes an environmental easement restricting groundwater use as a source of potable or process water at the site.

6.4.8 Cost

There is no cost associated with Alternative 1. The total present worth of Alternative 2 is $183,500.

6.5 Recommended Remedy

Alternatives 1 and 2 are protective of public health and the environment, and comply with SCGs, and meet the remedial goal and remedial action objectives for the site. Since neither alternative includes construction of a remedial alternative, they are similar in short-term effectiveness. For Alternative 2, there are minimal implementation issues involving a continuance of access agreements, and relatively low level of costs associated with long-term sampling and analysis of groundwater and air, and SSD inspection and maintenance. Groundwater sampling and analysis would assess the degree to which natural processes are effective in meeting SCGs. Long-term inspection and maintenance of existing SSD systems and sampling of one nearby structure will assist in maintaining compliance with State Guidance.

Due to the increased benefit of Alternative 2 over Alternative 1, and due to its relatively low cost, Alternative 2, Site Management Plan with Long-term Groundwater Monitoring, is considered the recommended remedy for the site. The components of the recommended remedy include the following.

The groundwater management plan within the Site Management Plan will require long-term groundwater monitoring to assess the degree to which natural processes are effective. Three existing groundwater monitoring wells shown on Figure 2-4 (CP-MW-01S, CP-MW-03S, CP-MW-05S) will be sampled annually and analyzed for VOCs and indicator parameters.

The SMP will identify procedures for characterization, handling, health and safety of workers and the community who come into contact with the low levels of contaminated groundwater in the event of intrusive subsurface activity at the site.

An institutional control in the form of an environmental easement will require compliance with the approved site management plan and groundwater management plan and restrict groundwater use as a source of potable or process water at the site and/or off-site locations where contamination has migrated.

The installed SSD systems and analytical results from air monitoring to-date show that measures already implemented are effective in reducing the potential for soil vapor intrusion to occur in buildings. In order to provide continued compliance with State Guidance, these SSD systems will be inspected and maintained annually. One nearby house will be sampled on a periodic basis until it is confirmed that no additional actions are necessary.

7.0 REFERENCES

New York State Department of Environmental Conservation. 2002. Draft DER-10, Technical Guidance for Site Investigation and Remediation. December.

URS Corporation, Final Remedial Investigation Report for Campagnolo Property, City of Ithaca, Tompkins County, NY. July 2008.

TABLES

TABLE 1-1
MAXIMUM DECTECTED CONTAMINANT CONCENTRATIONS AS COMPARED TO SOIL CLEANUP OBJECTIVES

			Protection of Public Health				Protection of Ecological Resources	Protection of Groundwater
Contaminant	Maximum Detected Soil Conc.	Unrestricted Use	Residential	Restricted-Residential	Commercial	Industrial		
1,2-Dichlorobenzene	0.0017	1.1	100	100	500	1,000	NS	1.1
cis-1,2-Dichloroethene	0.043	250	59	100	500	1,000	NS	250
trans-1,2-Dichloroethene	0.0016	0.19	100	100	500	1,000	NS	0.19
Benzene	0.0021	0.06	2.9	4.8	44	89	70	0.06
Tetrachloroethene	0.80	1.3	5.5	19	150	300	2	1.3
Trichloroethene	0.061	0.47	10	21	200	400	2	0.47
Toluene	0.006	0.7	100	100	500	1,000	36	0.7
Vinyl Chloride	0.0021	0.02	0.21	0.9	13	27	NS	0.02
Total Xylene	0.00092	0.26	100	100	500	1,000	0.26	1.6

Notes:
All concentrations are reported in parts per million.
NS-SCOs were not developed by NYSDEC.

TABLE 3-1

DEVELOPMENT OF SITE-SPECIFIC REMEDIAL ACTION OBJECTIVES

MEDIUM	REMEDIAL ACTION OBJECTIVE	RATIONALE	SITE RAO
Groundwater	Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.	Potable water is provided to all residents and commercial establishments in the area by the City of Ithaca. However, private wells may be installed in the future.	Yes
Groundwater	Prevent contact with, or inhalation of, volatiles from contaminated groundwater.	Dermal contact with contaminated groundwater is a potential completed pathway in the event of intrusive subsurface activity at the site and/or off-site locations where contamination has migrated.	Yes, dermal contact.
Groundwater	Restore groundwater aquifer to pre-disposal / pre-release conditions, to the extent practicable.	A plume of dissolved contamination consisting of chlorinated hydrocarbons and limited in horizontal and vertical extent is present at the site.	Yes
Groundwater	Prevent the discharge of contaminants to surface water.	Limits of dissolved phase groundwater plume are limited horizontally and vertically and do not extend to nearest surface water body.	No
Groundwater	Remove the source of ground or surface water contamination.	Dry cleaning site use discontinued in 1977 and former sources (dry cleaning machine and aboveground solvent tank) have been removed. Soil contamination is low and is not expected to be a significant source of future groundwater contamination as indicated by: 1) the relationship between the maximum RI dissolved concentration (0.0319 mg/L) and the solubility of PCE (150 mg/L); and 2) detected concentrations in soil are below soil cleanup objectives that provide for the protection of groundwater.	No
MEDIUM	**REMEDIAL ACTION OBJECTIVE**	**RATIONALE**	**SITE RAO**
Soil	Prevent ingestion/direct contact with contaminated soil.	Concentrations are below soil cleanup objectives for unrestricted use and soil cleanup objectives for protection of human health in all soil samples collected.	No

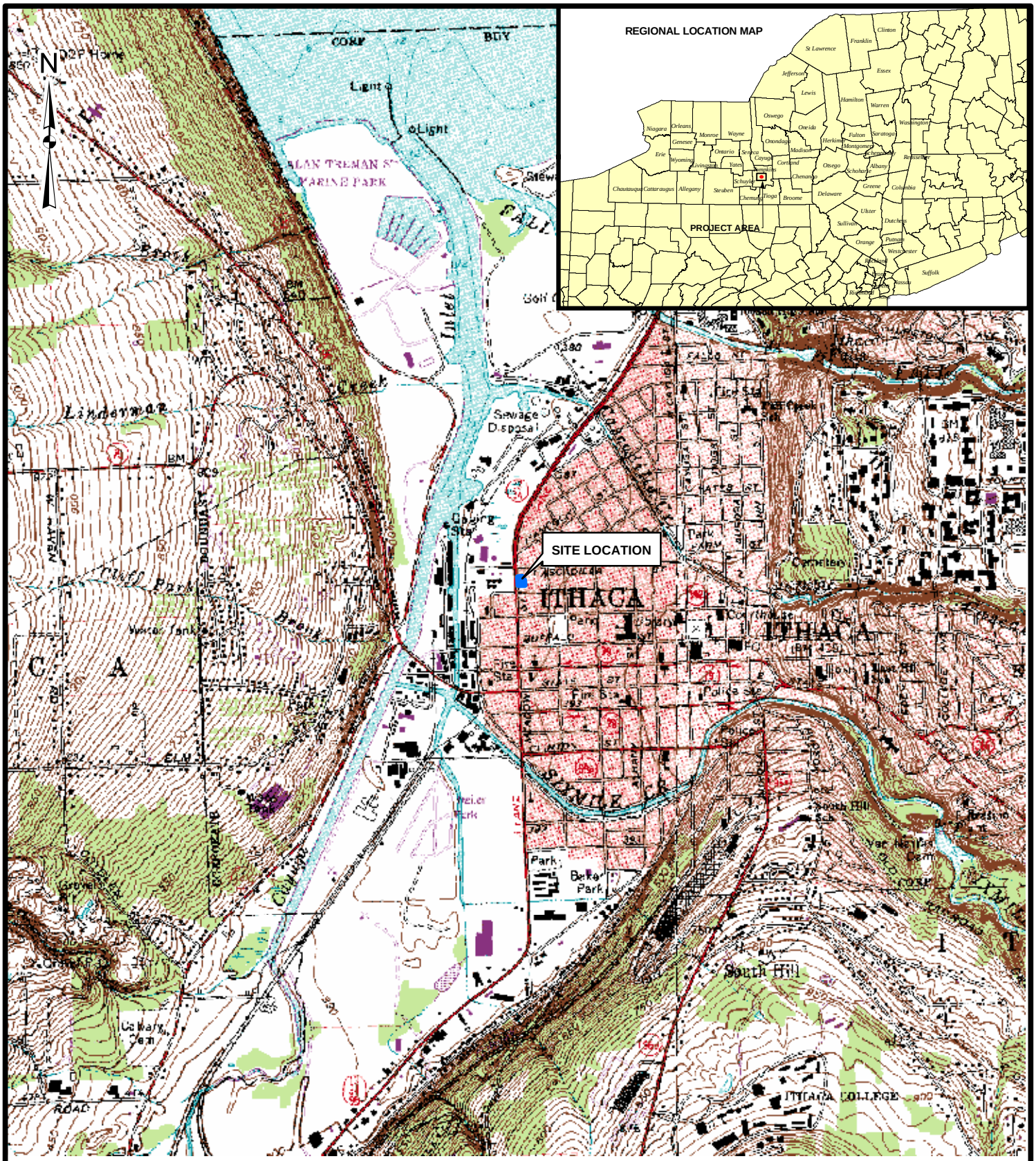
Soil	Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.	Concentrations are below soil cleanup objectives for unrestricted use and soil cleanup objectives for protection of human health in all soil samples collected.	No
Soil	Prevent migration of contaminants that would result in groundwater or surface water contamination.	Concentrations are below soil cleanup objectives for unrestricted use and soil cleanup objectives for protection of groundwater in all soil samples collected.	No
Soil	Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through terrestrial food chain.	At this site the majority of the property and adjacent areas are covered by pavement and buildings. Concentrations are below soil cleanup objectives for unrestricted use and soil cleanup objectives for protection of ecological resources in all soil samples collected.	No
Air	Mitigate impacts to public health resulting from the potential for soil vapor intrusion into buildings.	PCE, TCE, and other chlorinated VOCs have been detected in off-site indoor air samples at concentrations above NYSDOH guideline values.	Yes

TABLE 6-1

REMEDIAL ALTERNATIVE COST ESTIMATES

	ALTERNATIVE 1	**ALTERNATIVE 2**
Capital Cost		
Site Management Plan		$8,000
Three Structure VI Sampling Events		$15,000
Total Capital Cost	**$0**	**$23,000**
Operation, Maintenance and Monitoring Costs:		
Annual Groundwater Sampling 3 wells		
16 manhrs @ $50/hr		$800
Annual VOC analysis 3 groundwater samples		
$120/sample * 3 samples plus blanks		$600
Annual inspection & maintenance 2 SSD systems		
16 manhrs @ $50/hr		$800
Annual Structure Sampling – 1 structure		
32 manhrs @ $50/hr		$1,600
Annual VOC analysis – 1 structure		
$275/sample * 3 samples plus duplicate		$1,100
Annual Reporting		$3,000
Equipment Rental		$500
Travel		$500
Contingency		$1,600
Total Annual OM&M Costs	**$0**	**$10,500**
Present Worth OM&M (30 year period**)**	**$0**	**$160,500**
Total Present Worth	**$0**	**$183,500**

FIGURES



CAMPAGNOLO PROPERTY
SITE LOCATION MAP

FIGURE 2-1

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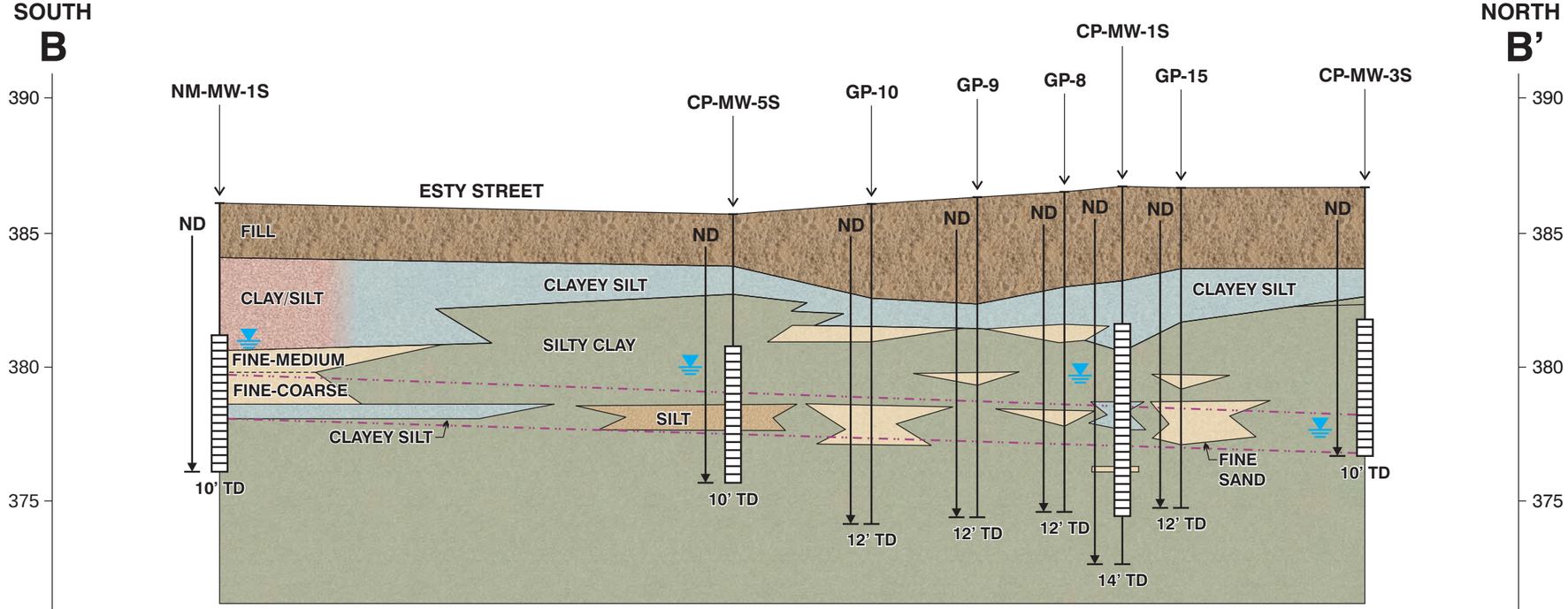
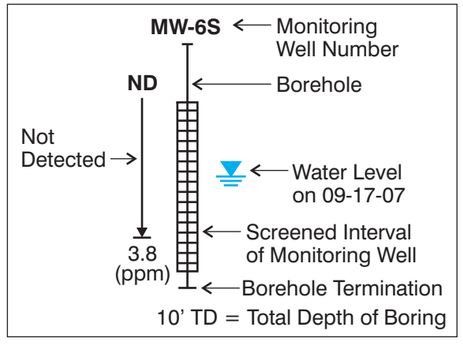
SOUTH
B

NORTH
B’



Silt
Sand
Sandy Silt
Silty Sand
Clay
Silty Clay
Clayey Silt
Clay/Silt
Clayey Sand
Topsoil
Fill

NOTES:
1. Geologic conditions shown are representative of conditions encountered at each boring location to the depth drilled. Extrapolations between borings have been interpreted using standardly accepted geologic practices and principles. Actual conditions may vary between borings from those shown.
2. Elevations based on North American Vertical Datum, 1988.



Approximate depth of 20” sewer line present beneath North Meadow Street (projected)

Horizontal Scale: 1” = 50’
Vertical Scale: 1” = 5’
10x Vertical Exaggeration

Section location shown on Figure 2-3

CAMPAGNOLO PROPERTY
ITHACA, NEW YORK
DECEMBER 13, 2007
GEOLOGIC CROSS SECTION B - B’

URS

FIGURE 2-2

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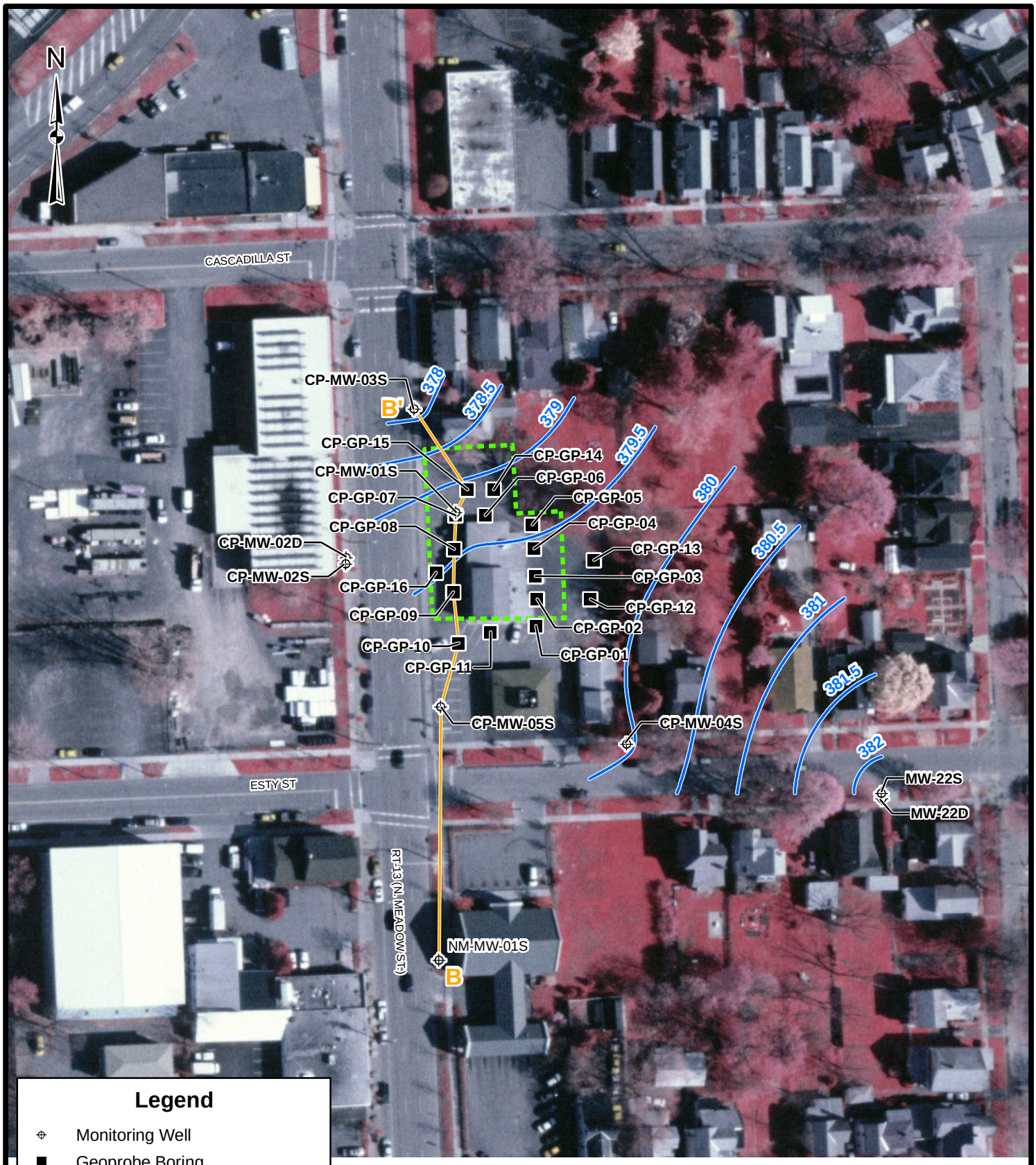

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CAMPAGNOLO PROPERTY
GROUNDWATER CONTOUR MAP

FIGURE 2-3

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N

CP-GS-17	SCGs	8/07
VOCs:		
1,2-Dichloroethene (cis)	5	ND
Tetrachloroethene	5	0.12
Trichloroethene	5	ND
Vinyl chloride	2	ND

CP-GS-18	SCGs	8/07
VOCs:		
1,2-Dichloroethene (cis)	5	ND
Tetrachloroethene	5	0.2
Trichloroethene	5	ND
Vinyl chloride	2	ND

CP-MW-03S	SCGs	9/07	1/08
VOCs:			
1,2-Dichloroethene (cis)	5	ND	ND
Tetrachloroethene	5	1.71	1.04
Trichloroethene	5	ND	ND
Vinyl chloride	2	ND	ND

CP-MW-01S	SCGs	9/07	1/08
VOCs:			
1,2-Dichloroethene (cis)	5	39	25.1
Tetrachloroethene	5	5.45	9.23
Trichloroethene	5	2.44	3.75
Vinyl chloride	2	6.06	0.88

CP-GS-15	SCGs	8/07
VOCs:		
1,2-Dichloroethene (cis)	5	ND
Tetrachloroethene	5	0.27
Trichloroethene	5	ND
Vinyl chloride	2	ND

CP-GS-13	SCGs	8/07
VOCs:		
1,2-Dichloroethene (cis)	5	1.59
Tetrachloroethene	5	ND
Trichloroethene	5	ND
Vinyl chloride	2	1.06

CP-GS-12	SCGs	8/07
VOCs:		
1,2-Dichloroethene (cis)	5	64.3
Tetrachloroethene	5	1.04
Trichloroethene	5	0.36
Vinyl chloride	2	37.3

CP-GS-10	SCGs	8/07
VOCs:		
1,2-Dichloroethene (cis)	5	1.56
Tetrachloroethene	5	ND
Trichloroethene	5	ND
Vinyl chloride	2	28.9

CP-GS-09	SCGs	8/07
VOCs:		
1,2-Dichloroethene (cis)	5	16.6
Tetrachloroethene	5	31.9
Trichloroethene	5	6.56
Vinyl chloride	2	0.63

CP-GS-06	SCGs	8/07
VOCs:		
1,2-Dichloroethene (cis)	5	2.02
Tetrachloroethene	5	ND
Trichloroethene	5	ND
Vinyl chloride	2	6.53

CP-MW-05S	SCGs	9/07	1/08
VOCs:			
1,2-Dichloroethene (cis)	5	207	95.7
Tetrachloroethene	5	6.01	10.1
Trichloroethene	5	2.96	3.85
Vinyl chloride	2	15.8	7.85

CP-GS-01	SCGs	8/07
VOCs:		
1,2-Dichloroethene (cis)	5	0.6
Tetrachloroethene	5	ND
Trichloroethene	5	ND
Vinyl chloride	2	ND

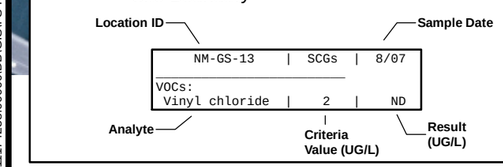
OLD TAUGHANNOCK BLVD
CASCADILLA ST
ESTY ST
W COURT ST
N MEADOW ST
WASHINGTON ST
PARK PL
N PLAIN ST
MORRIS AVE
3RD ST
5TH ST
MONROE ST

CP-GS-16
CP-GS-11
CP-MW-02D
CP-MW-02S
CP-GS-08
CP-GS-05
CP-GS-02
CP-GS-03
CP-GS-04
CP-MW-04S
CP-GS-07
CP-GS-14
MW-22S
MW-22D

Legend

PCE and Breakdown Product Total:

- No Compounds Detected
- Compounds Detected > SCGs
- Compounds Exceed SCGs
- Site Boundary



Criteria: NYSDEC TOGS (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, June 1998 (including April 2000 and June 2004 addenda), Class GA.

200 100 0 200
Feet

CAMPAGNOLO PROPERTY
GROUNDWATER ANALYTICAL RESULTS

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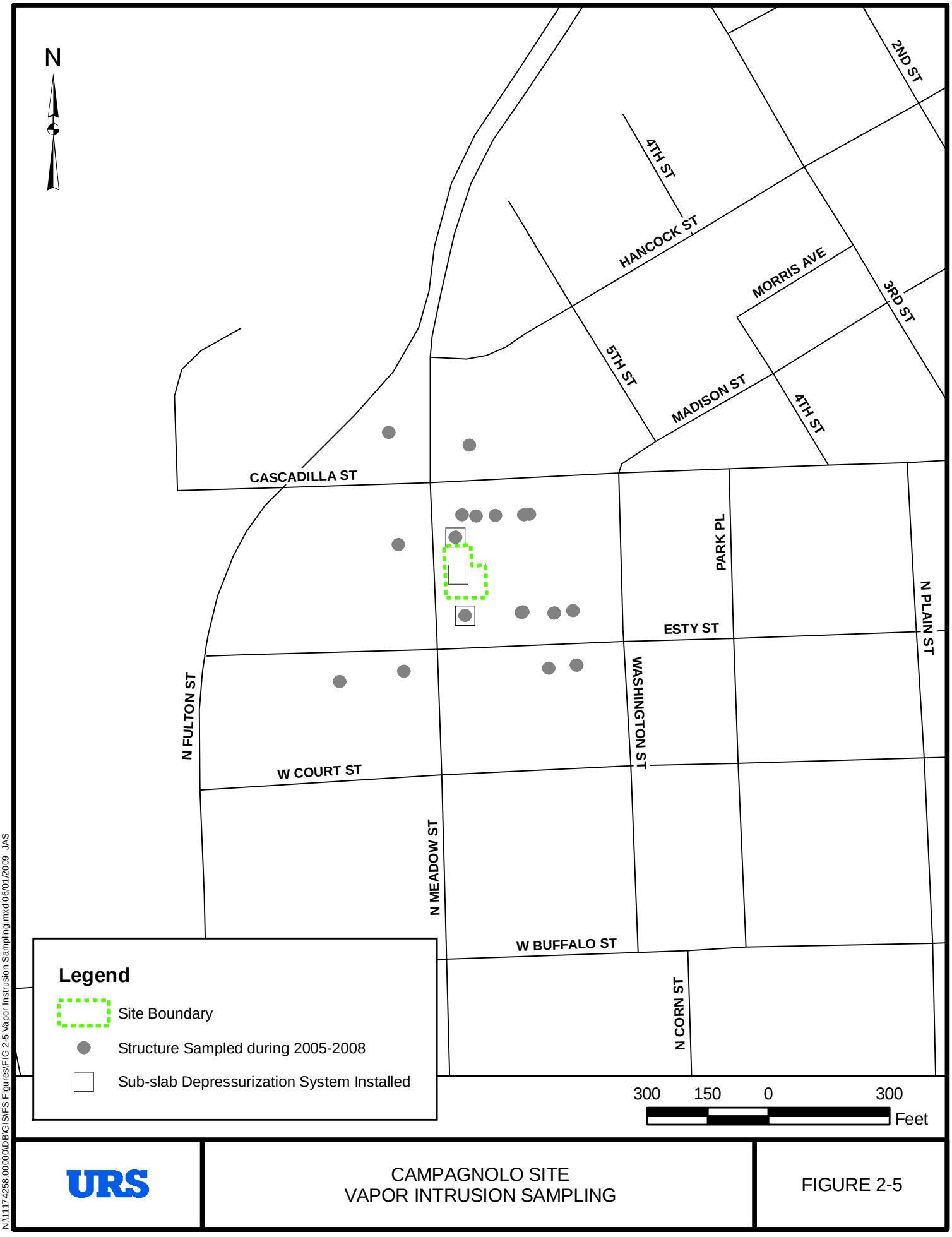
FIGURE 2-4

N:\11174258.00000\DB\GIS\FS Figures\FIG 2-4 GW Analytical Results.mxd 12/9/2008 B. Farster



N:\11174258.00000\DBIGIS\FS Figures\FIG 2-5 Vapor Instrusion Sampling.mxd 06/01/2009 JAS

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CAMPAGNOLO SITE
VAPOR INTRUSION SAMPLING

FIGURE 2-5