PROPOSED REMEDIAL ACTION PLAN
315 North Meadow Street
State Superfund Project
City of Ithaca, Tompkins County, New York
Site No. 755014

August 2010

Prepared by:
Division of Environmental Remediation
New York State Department of Environmental Conservation

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the above referenced site. The disposal of hazardous waste at the site has resulted in threats to public health and the environment that would be addressed by the remedy proposed by this Proposed Remedial Action Plan (PRAP). The disposal of hazardous wastes at this site, as more fully described in Sections 5 of this document, have contaminated various environmental media. The proposed remedy, discussed in detail in Section 8, is intended to attain the remedial action objectives identified for this site in Section 6 for the protection of public health and the environment. This PRAP identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for the preferred remedy. The Department will select a final remedy for the site only after careful consideration of all comments received during the public comment period.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this PRAP in accordance with the requirements of New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York, 6 NYCRR Part 375. This document is a summary of the information that can be found in the site related reports and documents which are available for review at the document repositories. The public is encouraged to review the reports and documents, which are available at the following repositories:

Tompkins County Library
101 East Green Street
Ithaca, New York 14850
(607) 272-4557

Hours:
Monday – Thursday 10:00am to 8:15pm
Friday – Saturday 10:00am to 5:00pm
Sunday – 1:00pm to 5:00pm

By appointment only:

Gary Priscott, Project Manager
NYSDEC Region 7 – Kirkwood Sub-office
1679 NY Route 11
Kirkwood, New York 13795-1602
(607) 775-2545

Diane Carlton, Citizen Participation Specialist
NYSDEC Region 7 Office
615 Erie Boulevard West
Syracuse, New York 13204-2400
(315) 426-7413

The Department seeks input from the community on all PRAPs. A public comment period has been set from September 6, 2010 through October 5, 2010 to provide an opportunity for public participation in the remedy selection process. A public meeting is scheduled for September 22, 2010 at the City of Ithaca, City Hall beginning at 5:30 pm.

At the meeting, the findings of the remedial investigation (RI) and the feasibility study (FS) will be presented along with a summary of the proposed remedy. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP. Written comments may also be sent to Mr. Priscott at the above address through October 5, 2010.

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP, based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified here. Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site.

SECTION 2: SITE DESCRIPTION AND HISTORY

2.1: Location and Description

The 315 North Meadow Street property (the site) is located near the intersection of North Meadow Street and West Court Street in the City of Ithaca, Tompkins County (Figure 1). The site is approximately 0.2 acres in size and includes a single-story commercial building. The building is a slab-on-grade structure with approximately 2,700 square feet of the space used for dry cleaning service activities. A small single-story addition (approximately 400 square feet) on the north end of the building is currently a barber shop. Asphalt and/or concrete paved parking surfaces surround the building on the north and west. A gravel parking area is located south of the building. Surrounding land uses include a combination of residential, commercial, and parking. The grade at the site is generally flat with an elevation of approximately 386 feet above mean sea level. The north-flowing Cayuga Inlet, a NYSDEC Class C(T) stream, is approximately 1,000 feet west of the site. The Campagnolo Property inactive hazardous waste site (Site No. 755013) is located two blocks to the north.

The generalized site geology indicates a layered system characterized at the surface with a fill layer ranging from two to four feet thick across the area. The fill material consists primarily of clay and silt mixed with some ash, wood, cinder, and gravel.

The fill overlies an approximately seven- to nineteen-foot thick clay and silt unit containing thin and discontinuous sand and silt layers. The clay and silt unit overlies layers of sand that range in texture, but become finer and contain higher portions of silt with increased depth. The fine, silty sands transition to a unit of silt with some clay that appears uniform beneath the area of investigation and is encountered at approximately 26 feet below ground surface (bgs).

Groundwater at the site was first encountered within the discontinuous sand and silt layers of the silt and clay unit. The depth to groundwater measured in shallow monitoring wells has ranged from approximately four to five feet bgs. The general direction of regional groundwater flow is to the west-northwest.

2.2: Operational/Disposal History

The site is an active dry cleaning business and has historically been used for dry cleaning services. Tetrachloroethene (PCE) had been used in dry cleaning operations as a cleaning solvent until 1999. Presently, PCE is not used at the site; the current operation uses hydrocarbon solvents for dry cleaning. Releases of PCE appear to have occurred during instances of leaks or spills in the building or directly to the ground surface at the southeast corner of the building.

2.3: Remedial History

1. Remedial Parties and Program.

The site remedial program is being performed by the Department through the State Superfund Program.

In October 2005, the Department first identified the site as a Potential (P) site. A P site is a temporary classification assigned to a site that had inadequate and/or insufficient data for inclusion in any of the other classifications in the Registry of Inactive Hazardous Waste Disposal Sites in New York. As a result of identified hazardous waste disposal, the Department listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York in March 2006. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required.

2. Investigation/Actions.

- Environmental Site Assessment conducted in connection with a potential property transaction for an adjacent property completed in 2005.
- Preliminary Site Assessment completed in 2005.
- Off-site soil vapor intrusion investigation completed in 2006.
- Remedial Investigation/Feasibility Study (RI/FS) completed in April 2010.

SECTION 3: LAND USE

The Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings when assessing the nature and extent of contamination. For this site alternatives that may restrict the use of the site to commercial criteria as described in Part 375-1.8 (g) are being evaluated in addition to unrestricted SCGs because the property is zoned commercial and it is consistent with the contemplated future use of the site.

A comparison of the appropriate SCGs for the identified land use against the unrestricted use SCGs for the site contaminants is included in the Tables for the media being evaluated in section 5.1.2.

SECTION 4: ENFORCEMENT STATUS

Potentially Responsible parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include the following:

- Knuppenburg Realty, Inc. (current owner)
- Mr. Jim Kellogg (current operator)

The PRPs for the site declined to implement a remedial program when requested by the Department. After the remedy is selected, the PRPs will again be contacted to assume responsibility for the remedial program. If an agreement cannot be reached with the PRPs, the Department will evaluate the site for further action under the State Superfund. The PRPs are subject to legal actions by the state for recovery of all response costs the state has incurred.

SECTION 5: SITE CONTAMINATION

A remedial investigation has been conducted to determine the nature and extent of contamination and to evaluate the alternatives for addressing the significant threats to human health and the environment.

5.1: Summary of the Remedial Investigation

The purpose of the Remedial Investigation (RI) was to define the nature and extent of any contamination resulting from previous activities at the site. The RI was conducted between March 2007 and January 2008. The field activities and findings of the investigation are described in the RI Report.

The following general activities are conducted during an RI:

- Research of historical information,
- Soil borings, and monitoring well installations,
- Sampling of surface and subsurface soils, groundwater and soil vapor
- Ecological and Human Health Exposure Assessments.

5.1.1: Standards, Criteria, and Guidance (SCGs)

The remedy must conform to promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

To determine whether the contaminants identified in various media are present at levels of concern, the data from the RI were compared to media specific SCGs. The Department has developed SCGs for groundwater, surface water, sediments, and surface and subsurface soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. The tables found in the following Sections list the applicable SCG in the footnotes. For a full listing of all SCGs see: http://www.dec.ny.gov/regulations/61794.html.

Based on the RI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized in Section 5.1.2. More complete information can be found in the RI Report.

5.1.2: Nature and Extent of Contamination

This section describes the findings of the Remedial investigation. As described in the RI report, waste/source materials were identified at the site and are impacting groundwater, soil, and/or soil vapor.

Groundwater

Groundwater samples were collected from the overburden using temporary sampling points and monitoring wells. The samples were collected to assess groundwater conditions on- and off-site. Based on historic use of the site, groundwater was analyzed for volatile organic compounds (VOCs) only, and the results indicate that contamination in the groundwater at the site exceeds the SCGs for VOCs. Table 1 includes all contaminants that exceed the groundwater and drinking water SCGs.

Table 1 - Groundwater			
Detected Constituents	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)	Frequency Exceeding SCG
1,1-Dichloroethene	0.380 – 23.75	5	5 of 93
1,2,4-Trichlorobenzene	7.60	5	1 of 93
1,2-Dichloroethene (cis)	0.100 – 13,700	5	28 of 93
1,2-Dichloroethene (trans)	0.100 – 77.50	5	14 of 93
Benzene	0.130 – 153.5	1	8 of 93
Ethylbenzene	0.315 – 380.0	5	4 of 93
Isopropylbenzene	0.250 – 145.0	5	6 of 93
Tetrachloroethene	0.100 – 20,800	5	24 of 93
Trichloroethene	0.100 – 2,790	5	20 of 93
Vinyl chloride	0.170 – 2,110	2	17 of 93
Xylene (total)	0.100 – 234.0	5	5 of 93

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standards, Criteria, or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface Water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).

The primary contaminants of concern at the site are tetrachloroethene (PCE) and its breakdown products including cis-1,2-dichloroethene (cis-1,2-DCE), trichloroethene (TCE), and/or vinyl chloride. PCE and its breakdown products are associated with the former on-site dry cleaning operation. The concentrations and distribution of the contaminants of concern are shown on Figure 2. The other VOCs listed in Table 1 (e.g. benzene) were detected at the greatest concentration in the area of the site property north of the building and are indicative of a petroleum spill that may have occurred on-site.

Based on the findings of the RI, the disposal of hazardous waste has resulted in the contamination of groundwater. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the remedy selection process are: PCE, cis-1,2-DCE, TCE, and vinyl chloride.

Soil

Subsurface soil samples were collected at the site during the RI. Subsurface soil samples were collected from a depth of one to eight feet below ground surface to assess soil contamination impacts to groundwater. Based on historic uses of the site, samples were analyzed for VOCs only. The results indicate that soils at the site exceed the unrestricted SCGs for VOCs. Table 2 includes all contaminants that exceed the unrestricted use SCGs.

Table 2 - Soil					
Detected Constituents	Concentration Range Detected (ppm)[a]	Unrestricted SCG[b] (ppm)	Frequency Exceeding Unrestricted SCG	Restricted SCG[c] (ppm)	Frequency Exceeding Restricted SCG
Acetone	0.07	0.05	1 of 18	500	0 of 18
Ethylbenzene	0.00068 – 5.20	1.00	1 of 18	1.00	1 of 18
Tetrachloroethene	0.0012 – 220.0	1.30	4 of 18	1.3	4 of 18
Xylene	0.00089 – 9.4	0.26	2 of 18	1.6	1 of 18

a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Use Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Lower of: 1) Restricted Commercial Soil Cleanup Objectives, or 2) Protection of Groundwater Soil Cleanup Objectives for contaminants in groundwater exceeding SCGs as listed in Table1.

The tetrachloroethene (PCE) contamination in soil is associated with the former on-site dry cleaning operation and is present in the subsurface from near ground surface to approximately six feet below ground surface where groundwater is encountered. Greater concentrations of PCE were found at the southeast corner of the on-site building. The concentrations and distribution of soil contaminants are shown on Figure 3.

The other VOCs listed in Table 2 (e.g., ethylbenzene and xylene) are indicative of a petroleum spill that may have occurred on-site. During sampling of soils an Underground Storage Tank (UST) was encountered in the area of soil contamination near the southeast corner of the building. The UST appeared to be a standard 275 gallon fuel oil tank that was closed in-place and filled with clean sand. The UST will be addressed by the remedy selection process.

Based on the findings of the Remedial Investigation, the disposal of hazardous waste has resulted in the contamination of soil. The site contaminant identified in soil which is considered to be the primary contaminantof concern to be addressed by the remedy selection process is PCE.

Soil Vapor Intrusion

The evaluation of the potential for soil vapor intrusion resulting from the presence of site related soil or groundwater contamination was evaluated by the sampling of sub-slab soil vapor under structures, and indoor air inside structures. At this site, due to the presence of buildings in the impacted area a full suite of samples were collected to evaluate whether soil vapor intrusion was occurring.

Soil vapor intrusion samples (a combined sample set including sub-slab, indoor, and outdoor air) were collected in 2007 and 2008 to complement the air sampling investigation that began in 2005. From 2005 to 2008, soil vapor intrusion samples were collected from 19 residential and/or commercial buildings surrounding the 315 North Meadow Street site. Figure 4 shows the general locations of the buildings sampled. Based on the air sampling results, the Department installed sub-slab depressurization (SSD) systems at three off-site buildings. The property owner installed a SSD system at the on-site building. Subsequent inspections of the SSD systems, including post-mitigation air sampling, indicated that the systems are properly operating. Overall, the results of the air sampling effort indicated that no sampling of additional buildings was needed to assist with the completion of the RI.

The primary soil vapor contaminants are tetrachloroethene (PCE) and trichloroethene (TCE), which are associated with historical on-site dry cleaning operations.

Based on the findings of the Remedial Investigation, the disposal of hazardous waste has resulted in the contamination of soil vapor. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of soil vapor to be addressed by the remedy selection process are, PCE and TCE.

5.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

Mitigation measures were taken at the on-site building and three adjacent off-site buildings to address current and/or potential indoor air contamination of volatile organic compounds associated with soil vapor intrusion. As discussed above, this involved the installation of SSD systems beneath each of the buildings.

5.3: Summary of Human Exposure Pathways:

This section describes the current or potential human exposures (the way people may come in contact with contamination) that may result from the site contamination. A more detailed discussion of the human exposure pathways can be found in the RI report available at the document repository. An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g., ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

Currently, there are no completed exposure pathways associated with the site. Exposure to site-related contaminants via inhalation of indoor air was previously identified as a completed exposure pathway for some buildings surrounding the site. As a result, sub-slab depressurization systems were installed and continue to operate to ensure that site-related sub-slab contaminants do not affect the indoor air of buildings near the site. Consumption of contaminated groundwater is not expected because the site and surrounding area are serviced by a municipal drinking water supply. Human contact with soil contamination identified at the site is also not expected because the entire site is covered by the building footprint and asphalt-paved surfaces.

Potential exposure pathways that exist for the site include dermal contact with contaminated soil and groundwater in the event that future subsurface excavation occurs at the site, and inhalation of contaminated air in any future constructed buildings through soil vapor intrusion.

5.4: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

The 315 North Meadow Street site is located in an urban area, with nearly the entire site covered by a building and paved parking lot. Significant portions of the land surrounding the site are also covered by either pavement and/or buildings. Based on the location of the site and the conditions summarized above and in Section 2.1, a Fish and Wildlife Impact Analysis (FWIA) was not included in the RI.

Surface water resources at or near the site include Cayuga Inlet, a NYSDEC Class "C" trout stream, located approximately 1,000 feet west of the site. No current or potential site-related surface water impacts have been identified.

Groundwater resources at the site include an overburden groundwater unit. The generalized hydrogeologic characteristics of the overburden groundwater unit are presented in Section 2.1. Site related contamination is impacting groundwater. The groundwater is not used as a source of potable water. Protection of the groundwater resource will be addressed in the remedy selection process.

SECTION 6: SUMMARY OF THE REMEDIATION OBJECTIVES

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

The remedial objectives for this site are:

Public Health Protection

Groundwater

- Prevent people from drinking groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with contaminated groundwater.
- Prevent inhalation of contaminants from groundwater.

Soil

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of contaminants volatilizing from the soil.

Soil Vapor

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into the indoor air of buildings at or near a site.

Environmental Protection

Groundwater

- Restore the groundwater aquifer to meet ambient groundwater quality criteria, to the extent feasible.

Soil

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

To be selected the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Site were identified, screened and evaluated in the feasibility study which is available at the document repositories established for this site.

A summary of the remedial alternatives that were considered for this site is presented below. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for alternatives with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

The following alternatives were considered to address the contaminated media identified at the site as describe in Section 5:

Alternative 1: No Further Action

The No Further Action Alternative recognizes the remediation of the site completed by the IRM(s) described in Section 5.2. This alternative leaves the site in its present condition and does not provide any additional protection of the environment.

Alternative 2: No Further Action with Site Management

The No Further Action with Site Management Alternative recognizes the remediation of the site completed by the IRM(s) described in Section 5.2 and Site Management and Engineering Controls and Institutional Control is necessary to confirm the effectiveness of the IRM. This alternative maintains engineering controls which were part of the IRM and includes institutional controls, in the form of an environmental easement and site management plan, necessary to protect public health and the environment from contamination remaining at the site after the IRMs.

Present Worth:.....$289,000
Capital Cost:.....$13,000
Annual Costs:.....$17,900

Alternative 3: Enhanced Anaerobic Bioremediation and Limited Soil Excavation

Enhanced anaerobic bioremediation involves the addition of an electron donor to the subsurface for use by local microorganisms capable of degrading volatile organic compounds found in soil and/or groundwater. The electron donor is introduced into the subsurface via injection points. The microorganisms (i.e., dechlorinating bacteria) use the electron donor, ultimately replacing chlorine atoms with hydrogen atoms in a process known as reductive dechlorination. Reductive dechlorination results in the step-by-step biological degradation of chlorinated contaminants such as tetrachloroethene (PCE) and its breakdown products. Several reductive dechlorination reagents are commercially available. For the purposes of this discussion, emulsified vegetable oil (EVO) will be the electron donor evaluated. At this site, the electron donor would be introduced to the subsurface through a grid network of injection wells to target the following primary contaminants of concern: PCE, cis-1,2-DCE, TCE, and vinyl chloride.

Prior to the full implementation of this technology, pre-design investigations and on-site pilot testing would be conducted to more clearly define design parameters. For full-scale implementation of this technology, it is estimated that approximately 21 injection points would be installed. It is anticipated that a second EVO treatment would be required.

Under this alternative, soils located in the vadose zone (above the water table) near the southeast corner of the building which exceed commercial use SCGs would be excavated and transported off-site for disposal. Approximately 370 cubic yards of soil would be removed. Clean fill would then be brought in to replace the excavated soil and establish the designed grades at the site. Additionally, the UST found in the contaminated soil area would be removed and transported off-site for disposal.

A sampling and analysis program would be performed during the estimated two-year implementation period. Monitoring would be conducted periodically to assess the effectiveness of remediation. Based on periodic groundwater monitoring, injection of an oxygen release compound (ORC) or a specific species of natural Dehalococcoides (Dhc) bacteria may be performed.

Figure 5 shows the conceptual layout for this alternative.

Present Worth:.....*$675,000*
Capital Cost:.....*$630,000*
Annual Costs:.....*$14,900*

Alternative 4: In-situ Chemical Oxidation and Limited Soil Excavation

In-situ chemical oxidation is a technology used to treat chlorinated ethene compounds (a type of volatile organic compound) in the soil and groundwater. The process injects a chemical oxidant into the subsurface via injection wells or an infiltration gallery. The method of injection and depth of injection is determined by location of the contamination. As the chemical oxidant comes into contact with the contaminant, an oxidation reaction occurs that breaks down the contaminant into relatively benign compounds such as carbon dioxide and water. Several chemical oxidants are commercially available. For the purpose of this discussion, sodium permanganate will be the chemical oxidant evaluated. At this site, the chemical oxidant would be applied through a grid network of injection wells to target the following primary contaminants of concern: PCE, cis-1,2-DCE, TCE, and vinyl chloride.

Prior to the full implementation of this technology, pre-design investigations and on-site pilot testing would be conducted to more clearly define design parameters. For full-scale implementation of this technology, it is estimated that approximately 21 injection points would be installed. It is estimated that the chemical oxidant would be injected during three separate phases over approximately one year.

Under this alternative, soils located in the vadose zone near the southeast corner of the building which exceed SCGs would be excavated and transported off-site for disposal. Approximately 370 cubic yards of soil would be removed. Clean fill would then be brought in to replace the excavated soil and establish the designed grades at the site. Additionally, the UST found in the contaminated soil area would be removed and transported off-site for disposal.

A sampling and analysis program would be performed during the estimated one-year implementation period. Monitoring would be conducted periodically to assess the effectiveness of remediation.

Present Worth:.....*$663,000*
Capital Cost:.....*$626,000*
Annual Costs:.....*$14,900*

Alternative 5: Air Sparging/Soil Vapor Extraction

Air sparging is an in-situ technology used to treat groundwater contaminated with volatile organic compounds (VOCs). The process physically removes contaminants from both the saturated and vadose zones by injecting air into a well that has been installed into the groundwater. As the injected air rises through the groundwater it volatilizes the VOCs from the groundwater into the injected air. The VOCs are carried with the injected air into the vadose zone (the area below the ground surface but above the water table) where a soil vapor extraction (SVE) system is used to remove the injected air. The SVE system pulls a vacuum on wells that have been installed into the vadose zone to remove the VOCs along with the air introduced by the sparging process.

The air extracted from the SVE wells is then run through activated carbon which removes VOCs from the air before it is discharged to the atmosphere.

At this site, air injection wells would be installed in the portion of the site to be treated. It is estimated that approximately 30 air injection wells would be installed. To capture the volatilized contaminants, horizontal SVE wells would be installed in the vadose zone at a depth of approximately two to three feet below ground surface and with a spacing of approximately 15 feet. The air containing VOCs extracted from the SVE wells would be treated with activated carbon.

The UST found in the contaminated soil area near the southeast corner of the building would be removed and transported off-site for disposal.

A sampling and analysis program would be performed during the estimated two-year implementation period. Monitoring would be conducted periodically to assess the effectiveness of remediation.

Present Worth:.....*$836,000*
Capital Cost:.....*$771,000*
Annual Costs:.....*$14,900*

Alternative 6: Partial Building Demolition, Soil Excavation, and Groundwater Extraction (Restoration to Unrestricted Conditions)

This alternative would achieve all of the SCGs discussed in Section 5.1.1 and the soil would meet the unrestricted use soil cleanup objectives listed in Part 375-6.8 (a). This alternative would include demolition of the southern portion of the on-site building, excavation of contaminated soil, and extraction and treatment of contaminated groundwater.

Under this alternative all on-site soils located in the vadose zone which exceed unrestricted use soil cleanup objectives would be excavated and transported off-site for disposal. Clean fill would then be brought in to replace the excavated soil and establish the designed grades at the site. Additionally, the UST found in the contaminated soil area would be removed and transported off-site for disposal.

Groundwater extraction and treatment is an ex-situ treatment technology that creates a depression of the water table so that contaminated groundwater is directed toward pumping wells within the area of contamination. The groundwater extraction system is designed so that the capture zone is sufficient to cover the lateral extent of the area of concern. It is estimated that two extraction wells would be installed. Extracted groundwater would be treated on-site through air stripping.

It is estimated that the groundwater extraction system would operate for ten years, during which time monitoring would be conducted periodically to assess the effectiveness of remediation.

Present Worth:.....*$1,250,000*
Capital Cost:.....*$715,000*
Annual Costs:.....*$69,400*

7.2 Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which sets forth the requirements for the remediation of inactive hazardous waste disposal sites in New York. A detailed discussion of the evaluation criteria and comparative analysis is included in the feasibility study.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

4. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

5. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision. The costs for each alternative are presented in the Remedial Alternatives Cost Table 3.

Table 3
Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
No Further Action (Alternative 1)	0	0	0
Alternative 2	13,000	17,900	289,000
Alternative 3	630,000	14,900	675,000
Alternative 4	626,000	14,900	663,000
Alternative 5	771,000	14,900	836,000
Alternative 6	715,000	69,400	1,250,000

8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

SECTION 8: SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Alternative 3, Enhanced Anaerobic Bioremediation and Limited Soil Excavation as the remedy for this site. The elements of this remedy are described at the end of this section.

8.1 Basis for Selection

The proposed remedy is based on the results of the RI and the evaluation of alternatives. Alternative 3 is being proposed because, as described below, it satisfies the threshold criteria and provides the best balance of the balancing criterion described in Section 7.2.

Natural processes currently active at the site would continue to reduce the levels of contaminants for all alternatives including Alternatives 1 and 2; however, Alternative 1 is not protective of human health or the environment. Alternative 2, which does not provide active remedial measures, fully relies on institutional controls for protection.

Alternatives 3 and 4 are protective of public health and the environment through removal (excavation and off-site disposal/treatment) of contaminants in the accessible portions of the vadose zone soil, and through in-situ treatment of VOC contamination in the saturated zone (Alternative 3) and the remaining vadose and saturated zones (Alternative 4). Alternative 5 does not include soil excavation but is protective through air sparging in both the vadose and saturated zones. Alternative 6 includes the greatest amount of contaminated vadose zone excavation, providing a greater measure of protectiveness. Alternatives 3, 4, 5, and 6 are similar in their removal of the UST and any contents. Alternatives 3, 4, 5, and 6 all include technologies that treat groundwater.

The presence of active businesses presents implementability issues during mobilization and treatment included in Alternatives 3, 4, 5, and especially 6. The proposed locations of the injection points and/or the collection pipes are within the more inaccessible portions of the site. Measures would have to be taken to reduce the disruption of business operations both on-site and in the surrounding areas. Alternative 5 presents more implementation issues, due to the greater number of injection wells and collection piping required, than Alternatives 3 and 4. The severe implementability issues posed by Alternative 6 (demolition, which would severely impact the business operation), keep this alternative from being preferred.

Existing SSD systems and air monitoring results indicate that air SCGs in affected buildings have been met equally for all alternatives. Soil SCGs over the majority of the site would be met for Alternatives 3, 4, and 6 following excavation in the presumed original spill source area in the southeastern portion of the site. Groundwater SCGs would be met to a greater degree following treatment included in Alternatives 3, 4, 5, and 6. Of these three alternatives, Alternative 3 is expected to provide the largest zone of groundwater meeting SCGs. This is because the biological activity inherent in in-situ reduction technologies continues for a longer duration as the bacteria continue to grow compared to in-situ oxidation (Alternative 4). Also, the effects of in-situ reduction can extend farther into low permeability zones during this extended period of operation than would be expected with chemical oxidation.

Alternative 3 is protective of human health and the environment and is cost-effective. Alternative 3 meets SCGs for soil vapor/indoor air and for soil over the majority of the site, and would likely meet groundwater SCGs over the greatest portion of the plume compared to the other alternatives. Alternative 3 will effectively reduce the volume of contaminants in soil and will reduce the toxicity of contaminants in groundwater via treatment. Alternative 3 is implementable at the site and the existing site uses should not be disturbed by the installation and operation of the injection system nor the continued operation of the existing SSD systems.

The estimated present worth cost to implement the remedy is $675,000. The cost to construct the remedy is estimated to be $630,000 and the estimated average annual costs for five years is $14,900.

8.2 **Elements of the Proposed Remedy**

The elements of the proposed restricted use remedy are as follows:

1. A remedial design program would be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program.

2. Operation, maintenance and monitoring of existing sub-slab depressurization systems.

3. Enhanced anaerobic bioremediation applied by direct injection of emulsified vegetable oil for the reductive dechlorination of primary contaminants of concern in groundwater.

4. Excavation and off-site disposal of contaminated vadose zone soils in the southeast portion of the site.

5. Removal and off-site disposal of the UST present within the area of contaminated vadose zone soils near the southeast corner of the on-site building.

6. A site cover will be installed and maintained to allow for commercial use of the site. The cover will consist either of the structures such as buildings, pavement, concrete, or a soil cover. Where the soil cover is required, it will be a minimum of one foot in thickness and will meet the commercial SCOs for cover material as set forth in 6 NYCRR Part 375-6.8(b). The soil cover will be placed over a demarcation layer. The upper six inches of soil will be of sufficient quality to maintain a vegetation layer. Non-vegetated areas (roadways, parking lots, etc.) will be covered by a paving system or concrete at least 6-inches in thickness.

7. The operation of the components of the remedy would continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible

8. Imposition of an institutional control in the form of an environmental easement for the controlled property that:

   (a) requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);

   (b) allows the use and development of the controlled property for commercial use consistent with City of Ithaca zoning laws;

   (c) restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or County DOH;

   (d) requires compliance with the Department approved Site Management Plan.

9. Since the remedy results in contamination remaining at the site that does not allow for unrestricted use, a Site Management Plan is required, which includes the following:

   (a) an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to assure the following institutional and/or engineering controls remain in place and effective:

      Institutional Controls: The Environmental Easement discussed in Paragraph 7 above.

      Engineering Controls: The sub-slab depressurization and cover systems discussed in Paragraphs 2 and 6 above.

This plan includes, but is not limited to:

(i) descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions;
(ii) provisions for the management and inspection of the identified engineering controls;
(iii) maintaining site access controls and Department notification; and
(iv) the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls;

(b) a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but is not limited to:

(i) monitoring of groundwater to assess the performance and effectiveness of the remedy;
(ii) a schedule of monitoring and frequency of submittals to the Department;
(iii) provision to evaluate the potential for vapor intrusion for any buildings developed on the site, including provision for mitigation of any impacts identified;
(iv) provision to evaluate the potential for soil vapor intrusion for existing buildings if building use changes significantly or if a vacant building become occupied.

(c) an Operation and Maintenance Plan to assure continued operation, maintenance, monitoring, inspection, and reporting of for any mechanical or physical components of the remedy. The plan includes, but is not limited to:

(i) compliance monitoring of treatment systems to assure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
(ii) site cover system maintenance;
(iii) maintaining site access controls and Department notification; and
(iv) providing the Department access to the site and O&M records.

(d) an Excavation Management Plan which details the provisions for management of soil and other media in the event of future excavations in potentially contaminated portions of the site.

10. Green remediation and sustainability efforts are considered in the design and implementation of the remedy to the extent practicable, including:

- using renewable energy sources
- reducing green house gas emissions
- conservation of natural resources

Legend

Site Boundary

100 0 100

Feet

URS

315 NORTH MEADOW STREET
SITE PLAN

FIGURE 1

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N

NM-MW-08S (5'-10') | 9/07 | 1/08 | 3/09

VOCs:			
1,2-Dichloroethene (cis)	ND	ND	0.13
Tetrachloroethene	ND	ND	0.22
Trichloroethene	ND	ND	ND
Vinyl chloride	ND	ND	ND

NM-MW-04D (14'-19') | 3/09

VOCs:	
1,2-Dichloroethene (cis)	6510
Tetrachloroethene	1570
Trichloroethene	1360
Vinyl chloride	550

NM-MW-01S (5'-10') | 9/07 | 1/08 | 3/09

VOCs:			
1,2-Dichloroethene (cis)	ND	ND	ND
Tetrachloroethene	ND	0.2	0.17
Trichloroethene	0.1	ND	ND
Vinyl chloride	ND	ND	ND

NM-GS-04 (12'-16') | 8/07

VOCs:	
1,2-Dichloroethene (cis)	1750
Tetrachloroethene	0.15
Trichloroethene	0.13
Vinyl chloride	516

GS-08-09 (24'-28') | 11/08

VOCs:	
1,2-Dichloroethene (cis)	0.46
Tetrachloroethene	0.11
Trichloroethene	ND
Vinyl chloride	0.33

GS-08-09 (16'-20') | 11/08

VOCs:	
1,2-Dichloroethene (cis)	8520
Tetrachloroethene	2350
Trichloroethene	2240
Vinyl chloride	880

NM-MW-12D (12'-17') | 3/09

VOCs:	
1,2-Dichloroethene (cis)	0.67
Tetrachloroethene	ND
Trichloroethene	ND
Vinyl chloride	4.54

GS-08-09 (28'-32') | 11/08

VOCs:	
1,2-Dichloroethene (cis)	15.6
Tetrachloroethene	0.34
Trichloroethene	0.75
Vinyl chloride	1.72

NM-GS-07 (10'-14') | 8/07

VOCs:	
1,2-Dichloroethene (cis)	5.18
Tetrachloroethene	ND
Trichloroethene	ND
Vinyl chloride	0.74

NM-MW-11D (15'-20') | 3/09

VOCs:	
1,2-Dichloroethene (cis)	1.51
Tetrachloroethene	0.20
Trichloroethene	0.15
Vinyl chloride	ND

NM-GS-06 (10'-14') | 8/07

VOCs:	
1,2-Dichloroethene (cis)	5730
Tetrachloroethene	430
Trichloroethene	350
Vinyl chloride	1660

NM-MW-11S (10'-15') | 3/09

VOCs:	
1,2-Dichloroethene (cis)	1770
Tetrachloroethene	41
Trichloroethene	27.5
Vinyl chloride	ND

NM-MW-04S (9'-14') | 9/07 | 1/08 | 3/09

VOCs:			
1,2-Dichloroethene (cis)	4300	6780	13700
Tetrachloroethene	1670	295	2120
Trichloroethene	1180	310	1760
Vinyl chloride	885	2160	1670

NM-MW-02S (3'-8') | 9/07 | 1/08 | 3/09

VOCs:			
1,2-Dichloroethene (cis)	25.4	28	23.5
Tetrachloroethene	54.6	47	6.5
Trichloroethene	4.49	3.5	13
Vinyl chloride	0.67	3	ND

NM-GS-05 (6'-10') | 8/07

VOCs:	
1,2-Dichloroethene (cis)	0.34
Tetrachloroethene	0.79
Trichloroethene	0.33
Vinyl chloride	ND

NM-GS-02 (12'-16') | 8/07

VOCs:	
1,2-Dichloroethene (cis)	0.66
Tetrachloroethene	ND
Trichloroethene	0.14
Vinyl chloride	ND

NM-MW-03S (5'-10') | 9/07 | 1/08 | 3/09

VOCs:			
1,2-Dichloroethene (cis)	0.21	ND	0.1
Tetrachloroethene	ND	ND	ND
Trichloroethene	0.11	ND	ND
Vinyl chloride	ND	ND	ND

GS-08-11 (28'-32') | 11/08

VOCs:	
1,2-Dichloroethene (cis)	1.92
Tetrachloroethene	11.6
Trichloroethene	1.14
Vinyl chloride	ND

NM-MW-02D (12'-20') | 9/07 | 1/08 | 3/09

VOCs:			
1,2-Dichloroethene (cis)	2560	3280	2410
Tetrachloroethene	2620	5240	2260
Trichloroethene	1140	2790	1280
Vinyl chloride	26.4	ND	ND

NM-GS-09 (15'-19') | 8/07

VOCs:	
1,2-Dichloroethene (cis)	303
Tetrachloroethene	8.93
Trichloroethene	3.23
Vinyl chloride	3.25

NM-MW-09D(14'-19') | 3/09

VOCs:	
1,2-Dichloroethene (cis)	2060
Tetrachloroethene	ND
Trichloroethene	ND
Vinyl chloride	46

GS-08-11 (24'-28') | 11/08

VOCs:	
1,2-Dichloroethene (cis)	0.13
Tetrachloroethene	6.99
Trichloroethene	0.51
Vinyl chloride	ND

GS-08-11 (16'-20') | 11/08

VOCs:	
1,2-Dichloroethene (cis)	572
Tetrachloroethene	430
Trichloroethene	192
Vinyl chloride	ND

NM-MW-06S (5'-10') | 9/07 | 1/08 | 3/09

VOCs:			
1,2-Dichloroethene (cis)	437	470	584
Tetrachloroethene	387	396	271
Trichloroethene	27.9	34	33.2
Vinyl chloride	6.35	21	ND

NM-MW-05S (6'-11') | 9/07 | 1/08 | 3/09

VOCs:			
1,2-Dichloroethene (cis)	280	840	200
Tetrachloroethene	20800	14800	18800
Trichloroethene	530	460	420
Vinyl chloride	0.17	ND	ND

NM-MW-07S (5'-10') | 9/07 | 1/08 | 3/09

VOCs:			
1,2-Dichloroethene (cis)	ND	0.4	ND
Tetrachloroethene	ND	0.1	0.14
Trichloroethene	ND	ND	ND
Vinyl chloride	ND	ND	ND

NM-MW-10D (14'-19') | 3/09

VOCs:	
1,2-Dichloroethene (cis)	41.8
Tetrachloroethene	1.0
Trichloroethene	12.6
Vinyl chloride	ND

NM-GS-11 (15'-19') | 8/07

VOCs:	
1,2-Dichloroethene (cis)	6.9
Tetrachloroethene	3.95
Trichloroethene	ND
Vinyl chloride	0.94

NM-GS-12 (8'-12') | 8/07

VOCs:	
1,2-Dichloroethene (cis)	5.88
Tetrachloroethene	91.4
Trichloroethene	63.2
Vinyl chloride	ND

NM-GS-13 (15'-19') | 8/07

VOCs:	
1,2-Dichloroethene (cis)	0.58
Tetrachloroethene	0.12
Trichloroethene	ND
Vinyl chloride	ND

GS-08-04
GS-08-03
GS-08-05
GS-08-06
GS-08-10
GS-08-08
NM-GS-03
GS-08-07
GS-08-01
GS-08-02
NM-MW-03D
NM-GS-08
NM-GS-01
NM-GS-10
NM-GS-20
NM-GS-14
NM-GS-15
NM-GS-16
NM-GS-17
NM-GS-19
MW-21S
MW-21D
NM-GS-18

Legend

PCE and Breakdown Product Total:

- No Compounds Detected
- < 100
- 100 - 500
- 500 - 1000
- > 1000
- Site Boundary

Location ID — Depth — Sample Date

NM-GS-13 (15-19') | 8/07

VOCs:
Vinyl chloride | ND

Analyte — Result (UG/L)

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.

150 75 0 150
Feet

315 NORTH MEADOW STREET
REMEDIAL INVESTIGATION GROUNDWATER SCREENING AND MONITORING WELL
ANALYTICAL RESULTS FOR CHLORINATED COMPOUNDS
(AUGUST 2007 - MARCH 2009)

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FIGURE 2

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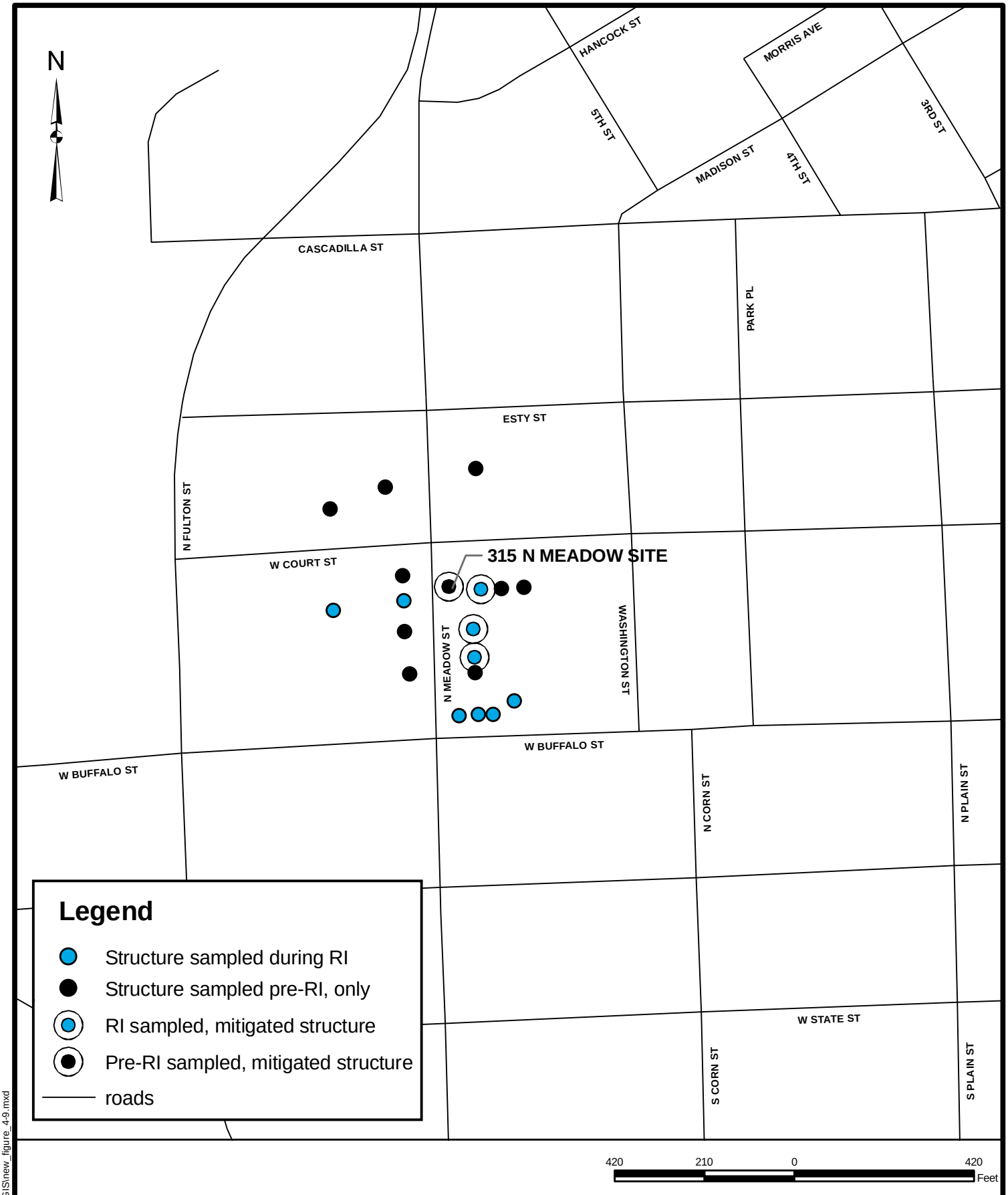
315 NORTH MEADOW STREET
REMEDIAL INVESTIGATION SOIL ANALYTICAL RESULTS - EXCEEDING SOIL CRITERIA
(AUGUST 2007 - SEPTEMBER 2007)

FIGURE 3



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315 NORTH MEADOW STREET
LOCATIONS OF STRUCTURES SAMPLED AND THOSE MITIGATED BY SSD

FIGURE 4

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315 NORTH MEADOW STREET
CONCEPTUAL LAYOUT FOR ALTERNATIVE 3

FIGURE 5