AMENDED RECORD OF DECISION

NM - Troy Water St. MGP
Troy, Rensselaer County
Site No. 442029
March 2011

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

DECLARATION STATEMENT – AMENDED RECORD OF DECISION

NM - Troy Water St. MGP
Troy, Rensselaer County
Site No. 442029
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Statement of Purpose and Basis

This Amended Record of Decision presents the remedy for the NM - Troy Water St. MGP site. The remedial program was chosen in accordance with the New York State Environmental Conservation Law, Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Part 375, and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the NM - Troy Water St. MGP site and the public's input to the Proposed Record of Decision presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B.

Description of Selected Remedy

The estimated present worth cost to implement the remedy is $37,000,000. The cost to construct the remedy is estimated to be $35,000,000 and the estimated average annual cost is $96,000.

The elements of the selected remedy are as follows:

The elements of the amended remedy along with the elements that are retained from the 2003 ROD are as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program.

2. Soil will be excavated to the horizontal limits identified on Figure 5. These excavation areas are defined by the presence of visual tar or non-aqueous phase liquid (NAPL) or soil containing PAHs greater than 500 ppm. Soil will be removed vertically within the excavation areas to depths ranging from eight to eleven feet with the following exceptions: a) at the mouth of the Wynants Kill channel the excavation depth will extend to 18 feet where the soil exceeds the removal criteria; and b) directly east of the By-Products Building the excavation will extend to the top of bedrock. The minimum excavation depth will be eight feet. The estimated volume of excavated soil to be removed is 27,000 cubic yards. Although some areas exist beyond these excavation limits where the removal criteria are exceeded, these peripheral areas are deep, sporadic, limited in volume and do not contribute to groundwater contamination. Soil with no

visual indication of NAPL or tar, and containing less than 500 ppm total PAHs that must be excavated to access soil requiring off-site disposal, may be stockpiled and backfilled within the excavation. Excavated soil will be disposed or thermally treated at a permitted disposal facility.

3. Deeper soil containing visual tar or NAPL will be treated by an in-situ solidification (ISS) process to the depths and limits shown on Figure 5. All soil within the solidification area that was not removed through excavation will be solidified, such that no zones of soil are left untreated. The estimated soil volume to be treated by ISS is 69,000 cubic yards. The remedial design will establish the type and proportions of mixing agents.

4. An estimated 3,000 cubic yards of tar, contaminated soil, debris and an estimated 5,000 gallons of liquid wastes will be removed from the following structures:
a. Sump number 1 at the north end of King Fuels' former office and garage;
b. Underground air plenums at the former coke ovens;
c. Underground concrete vault east of the south garage;
d. Sump number 4 at the north end of the warehouse building;
e. An underground tar liquor sump, west of the former water gas plant building; and
f. An above-ground, former oil/water separator tank along the east wall of the water gas plant building.

Following removal, the interior surfaces of the structures will be cleaned and inspected for structural integrity. If the inspection concludes that no contaminants were released from the structure(s), then the structure(s) will be backfilled with an appropriate material and left in place. If the inspection reveals that the structure(s) may have released contaminants or the inspection is inconclusive, then the structure(s) itself will be removed. Removed materials will be disposed off-site at a permitted disposal facility.

5. An estimated 400 cubic yards of purifier waste will be removed and disposed of off-site at a permitted disposal facility.

6. A site cover will be installed to allow for commercial or industrial use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the commercial use soil cleanup objectives (SCOs). Prior to the placement of the cover all excavated areas will be returned to the original grade. Where the soil cover is required it will be a minimum of one foot of soil, meeting the requirements for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer with the upper six inches of the soil of sufficient quality to maintain a vegetation layer.

7. A groundwater monitoring program will be established to review the concentrations of contaminants in the groundwater attenuating through naturally occurring biological processes. If monitoring demonstrates that the attenuation rate is not sufficient, additional remedial technologies such as air sparging or the addition of oxygen release compounds will be evaluated as part of the long term monitoring of the site.

8. Imposition of an institutional control in the form of an environmental easement that will require (a) limiting the use and development of the property to commercial use, which will also permit industrial use; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as source of potable or process water, without necessary water quality treatment as determined by the New York State Department of Health; and (d) National Grid to complete and submit to the Department a periodic certification of institutional and engineering controls.

9. Development of a site management plan which will include the following institutional and engineering controls: (a) management of the final cover system to restrict excavations below the soil cover's demarcation layer, pavement or buildings. Excavated soil will be tested, properly handled to protect the health and safety of workers and the nearby community, and will be properly managed in a manner acceptable to the Department; (b) evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions (e.g., mitigation or monitoring) recommended to address exposures related to soil vapor intrusion; (c) monitoring of groundwater; and (d) identification of all use restrictions on the site.

10. National Grid will provide periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies National Grid in writing that this certification is no longer needed. This submittal will: a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that will impair the ability of the control to protect the public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy for this site is protective of human health.

Declaration

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

MAR 18 2011

Date

Dale A. Desnoyers, Director
Division of Environmental Remediation

AMENDED RECORD OF DECISION
NIMO TROY – WATER STREET MGP SITE,
OPERABLE UNIT NO. 1, AREA 2 – FORMER PLANT SITE

City of Troy / Rensselaer County / Site No. 442029 March 2011

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

1.0 INTRODUCTION

On July 9, 2003, the New York State Department of Environmental Conservation (Department) signed a Record of Decision (ROD) which selected a remedy to clean up the NIMO Troy – Water Street MGP Site, Operable Unit No. 1, Area 2 – Former Plant Site. The ROD identified nine elements of the remedy, including contaminated soil excavation, treatment of deep contaminated soil using chemical oxidation, placement of a soil cover and implementation of institutional controls to address the contamination remaining following the completion of the other elements of the remedy.

Subsequent to the ROD, studies were conducted to develop detailed construction plans to implement the selected remedy. These studies revealed that certain components of the remedy would not be feasible to implement, and would not be effective in remediating contamination. Specifically, the volume of soil requiring excavation was found to be more than three times the ROD estimate for the same excavation depth, and the volume of soil requiring treatment was nearly three times the ROD estimate. Site-specific pilot testing also demonstrated that the treatment method, in-situ chemical oxidation (ISCO), would be unlikely to achieve the remedial goal of attaining groundwater quality standards.

The Department therefore proposed to amend the ROD, ("Proposed Record of Decision Amendment", January 2011), with respect to the soil excavation and treatment elements. The remaining seven elements of the site remedy would be implemented as set forth in the ROD. The soil removal element of the ROD would be amended to increase the estimated volume from 17,000 cubic yards (cy) to 27,000 cy, however the excavation would not be as deep. In addition, the requirement for treatment using in-situ chemical oxidation treatment of approximately of 23,000 cy of deeper contaminated soil in the original ROD would be replaced with in-situ solidification to the same depth of approximately 69,000 cy of soil. Further details regarding these modifications are presented in Section 3.

A public comment period was offered from January 25, 2011 to February 25, 2011 to provide an opportunity for the public to comment on the "Proposed Record of Decision Amendment". A public meeting was held during the comment period to enable the Department to further explain the proposed changes, and facilitate questions and comments from the public.

2.0 SITE INFORMATION

2.1 Site Description

Location Description: The NIMO - Troy Water Street - MGP, Former Plant Site (Area 2) is located in the City of Troy, Rensselaer County (see Figure 1). The site borders the Hudson River about 200 yards upstream of the State Route 378 bridge (Menands Bridge).

Site Features: The site is generally flat except along the bank of the Hudson River, where the elevation drops about twenty feet. The Wynants Kill flows along the northern boundary of the site. This stream also flows through a concrete channel for approximately 300 feet before its discharge to the Hudson River. Since the issuance of the Record of Decision, three large MGP-era buildings were razed, leaving much of the site a vacant lot. The Warehouse (referred to as the E-Lot Building in recent documents) is in use.

Lying northeast of Area 2 is a Voluntary Cleanup Program (VCP) site known as the Former Sperry Warehouse Site. The structures on the VCP site are buildings used for warehousing as part of the former Burden Iron Works.

Current Zoning and Use: The site is zoned industrial. An electronics recycling business occupies the E-Lot Building (Figure 2).

Surrounding Zoning and Uses: The surrounding parcels are currently used for combination of commercial, industrial and railroad uses. The nearest residence is approximately 200 feet from the site.

Historic Uses and Sources of Contamination: The site has over a 150-year history of industry which is described in Section 2.2. The practices of the historic industries and the materials they were handling resulted in the releases of contaminants into the environment.

Remedial Party and Program: The site remedial program is being performed by National Mohawk, a subsidiary of National Grid, as a responsible party in the Department's State Superfund Program. Niagara Mohawk entered into an Order on Consent (Index # A4-0473-0000) with the Department on November 7, 2003. The Order obligates Niagara Mohawk to implement a full remedial program for the site.

Operable Units: The site is currently being managed as a single operable unit. The operable unit has been broken down into three areas:

Area 1 is located on the west bank of the Hudson River in the Town of Colonie, across the Hudson River from Area 2. The area is approximately nine acres in size.
Area 2 is the location of the former manufactured gas plant in Troy and occupies approximately 16 acres; and,
Area 3 is the location of the seven acre former Chevron Asphalt terminal, adjacent to the southern boundary of Area 2.

Area 2 is the subject of this document. Areas 1 and 3 have been studied and will be addressed, if needed, separately.

Investigations/actions performed to date: A Preliminary Site Assessment was completed in 1995 and a Remedial Investigation was completed in 2003. As noted earlier, a Record of Decision was issued in 2003. Two interim remedial measures which targeted the removal of contaminant source material in structures were conducted during the Remedial Investigation.

2.2 Site History

The site was home to iron and steel producing industries as early as 1847. Manufactured gas production evolved at the site to support this industry. A notable expansion of the MGP operations occurred during the 1920s with the construction of the former water gas plant. During that decade the number of coke ovens were also approximately doubled and gas lines were extended from Troy to Amsterdam and Glens Falls.

Niagara Mohawk's involvement with this site began in 1929 when a Niagara Mohawk's predecessor company, Niagara Hudson Power Corporation, first acquired the operating MGP. Much of the MGP works was sold to Republic Steel in the 1950s. King Fuels began operating a bulk petroleum terminal and distribution center at the site in 1957 and, through a series of transactions during the 1960s and concluding in 1973, had acquired the entire site from Republic Steel except for a small gas regulator station retained by Niagara Mohawk. The site property, with the exception of the regulator station, was purchased by the Troy Local Development Corporation in 2006.

Environmental studies relating to the MGP began in 1994 following the 1992 Department consent order requiring the investigation and, where necessary, remediation of 21 Former Manufactured Gas Plant (MGP) Sites owned or operated by Niagara Mohawk, or its predecessor companies, including the Troy Water Street Site.

2.3 Summary of Post-ROD Investigations

2.3.1 Site Geology and Hydrogeology

Subsequent to the ROD, the site geology and hydrogeology were further investigated. Approximately 90 borings were drilled, generally to a greater depth than those placed prior to the ROD. Also, several piezometer clusters were installed for a better understanding of groundwater flow in discrete zones within the unconsolidated aquifer.

The majority of the soils at the site have been disturbed through filling, excavation and/or grading. The thickness of fill, which consists primarily of slag, cinders, ash, bricks and gravel, ranged from approximately 5 feet to 40 feet. Substantial filling of the former Wynants Kill occurred following the stream's redirection to the north in 1930 accounting for approximately 40 feet of fill in this area (See Figure 2). The Wynants Kill is a tributary to the Hudson River.

Underlying the fill material, glacial processes resulted in a range of interbedded soil from clay to coarse sand and gravel. A thin glacial till layer exists in some areas. The combined thickness of fill and overburden sediments range from 5 feet to approximately 70 feet. Generally, the thickness of the unconsolidated deposits increases from east to west and are underlain by shale bedrock. Depth to bedrock ranges from 5 feet to approximately 70 feet and generally slopes toward the Hudson River and the former Wynants Kill. Contamination, including dense NAPL, was found to be limited vertically to the overburden soils, there was

no indication that MGP contaminants had reached the bedrock.

Site groundwater within the overburden is present in the lower portions of the fill and within the glacial deposits. The depth to groundwater at the site varies from approximately 7 feet to 29 feet. Groundwater flow direction is generally west to northwest, toward the Hudson River. Tidal influence on the river at the site affects the groundwater gradient.

The post-ROD studies concluded that:

- although not fully distinct and continuous, the overburden materials are present as stratigraphic layers consisting of, from the ground surface down, fill, alluvial deposits, a lower sand and gravel unit, and bedrock. Occasional glacial till and lacustrine deposits are situated between the lower sand and gravel unit (LSG) and the bedrock. The alluvial deposits in the area of contamination are generally about 30 feet below the ground surface and about 10 feet thick. The alluvial deposits consist of silt, clay, fine sand and peat with lenses of coarser sand and gravel. The LSG is predominantly composed of coarse-grained sand and gravel with some cobbles;
- the fill is generally coarse-grained and includes sand, gravel, slag, cinders and demolition debris. The fill is relatively thicker where it occupies the former Wynants Kill channel.
- the fill and the LSG are the most permeable units;
- the fine-grained alluvial deposits are lower in permeability and form a semi-confining layer beneath the fill;
- groundwater is generally present in the lower fill in the area of contamination, below the majority of the contaminant mass; and
- tidal fluctuations in the Hudson River result in a high degree of groundwater level fluctuations in the LSG and upper bedrock. Thus, there is a high degree of hydraulic communication between the LSG and the Hudson River.

The post-ROD investigations also concluded that the alluvial deposits function as a semi-confining unit under the northern half of the site. However, the thickness of the layer is limited, and the underlying LSG unit is hydraulically transmissive and in good communication with the Hudson River. This means that if contaminants were to make their way through this semi-confining unit, migration to the Hudson River would be relatively rapid.

2.3.2 Nature and Extent of Site Contamination

As described in the 2003 ROD and other documents, the primary contaminants of concern include certain volatile organic compounds and semivolatile organic compounds associated with MGP operations. Specific volatile organic compounds of concern in soil and groundwater are benzene, toluene, ethylbenzene and xylenes. These are referred to collectively as BTEX in this document. Specific semivolatile organic compounds of concern in soil are the polycyclic aromatic hydrocarbons (PAHs):

acenaphthene	*chrysene*
acenaphthylene	fluoranthene
anthracene	fluorene
benzo(a)anthracene	*indeno(1,2,3-cd)pyrene*
benzo(a)pyrene	2-methylnaphthalene
benzo(b)fluoranthene	naphthalene

benzo(g,h,i)perylene
benzo(k)fluoranthene
pyrene
phenanthrene
dibenzo(a,h)anthracene

Total PAH concentrations as referred to in this plan are the summation of the individual PAHs listed above. The italicized PAHs are probable human carcinogens. The summation of the italicized PAHs is referred to in this document as total carcinogenic PAHs (cPAHs).

PCBs, pesticides, cyanide and metals were analyzed for in all media and determined not to be of concern.

Typical of former manufactured gas plant sites, two major types of waste materials are present at the site: tars and purifier waste. Tars contain high concentrations of BTEX and total PAHs.

Tars at the site are found in two forms. One form is a reddish brown, oily liquid which does not readily dissolve in water. Material such as this is commonly referred to as a non-aqueous phase liquid, or NAPL. Although most tars are slightly denser than water, the difference in density is slight. Consequently, they can either float or sink when in contact with water. Tars were disposed, or spilled or leaked from tanks, gas holders, and other structures at the site and have moved laterally away from these locations through the subsurface. The NAPL was found to saturate areas of unconsolidated deposits and/or exist in scattered, discontinuous globules. The other form of tar found was black and highly viscous, with plastic properties.

Investigations subsequent to the ROD found that a third form of tar was present in limited areas. This material was hard, and brittle, with well defined edges. Groundwater samples from the area of the hard tar did not contain tar constituents, indicating that leaching of contaminants from this form of tar is not occurring.

Purifier waste is a mixture of wood chips and iron filings which was used to remove sulfur and other compounds from the manufactured gas before the gas was distributed to the public. Purifier waste which no longer was capable of removing the impurities was often disposed on-site. It often contains high concentrations of sulfur and cyanide, has an unpleasant odor and has a characteristic blue color.

Purifier waste at the site was delineated to the satisfaction of the Department and removed in 2008. The removal is detailed in the "Construction Completion Report, Purifier Waste Deposits, Tar Liquor Sump and Oil/Water Separator, Troy Water Street Site – Area 2", May 2009.

The following conclusions were drawn from studies subsequent to the ROD regarding the extent of contamination:

- The extent of groundwater contamination is generally consistent with the ROD. Higher levels of BTEX contamination were found in three areas: the vicinity of the former water gas building, the former Wynants Kill alignment, and the southwest quadrant of the site at monitoring wells MW-29 and MW-31.

- The vertical extent of contamination in subsurface soil is consistent with the ROD. No soil exceeding SCGs or visibly contaminated soil was observed below 54 feet. No contamination was observed in the bedrock. The post-ROD studies also supported previous findings that much of the contaminant source areas, particularly in the northern portion of the site, exist at least six feet below ground

surface. (Figure 3) The significance of this is that active remedial measures for the source material, such as excavation or in-situ treatments, will require the handling of clean overburden soils or augering through clean soils to reach the contamination.

- The horizontal extent of subsurface soil contamination was found to be more widespread than reported in the ROD (Figure 4). Shallow (0 to 18 feet below ground) contamination was found to extend approximately 3 acres as compared to the ROD estimate of 1.6 acres. Deeper (greater than 18 feet) contamination was found to extend approximately 3.7 acres as compared to the ROD estimate of 1 acre. Much of the new-found extent of contamination is located at least 200 feet inland; relatively little additional contamination was found adjacent to surface water bodies.

- Following the removal of the air plenum structure contents (see Section 2.6.1 below), the structure was found to be intact, with only one penetration located high within the structure with no apparent migration of structure contents from this penetration. This supports the ROD conclusion that no significant groundwater contamination source exists in the central area of the site.

2.4 Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

Persons who dig below the ground surface may come into contact with contaminants in subsurface soil. Volatile organic compounds in the soil may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings is referred to as soil vapor intrusion. The potential exists for the inhalation of site contaminants due to soil vapor intrusion for any future on-site redevelopment and occupancy. People are not drinking contaminated groundwater because the area is served by a public water supply that is not affected by site-related contamination.

2.5 Summary of Environmental Assessment

The following environmental exposure pathways and ecological risks have been identified:

- Exposure of benthic organisms to elevated concentrations of contaminants which migrate from the site to the adjacent Hudson River sediments from storm erosion, NAPL migration and groundwater discharge

- Site contamination has also impacted the groundwater resource in the unconsolidated aquifer. This contamination has rendered the aquifer at the site unusable as a potable water supply.

- The presence of contaminants of concern in excess of their respective SCGs in groundwater in an otherwise usable aquifer threatens the resource of that aquifer. The uncontrolled discharge of this groundwater to the Hudson River threatens the quality of the river. Further, the potential exists for site contaminated soils to be transported to the river through manmade disturbances and runoff. These soils, if precipitated in the river as sediment, would exceed sediment SCGs.

- The migration of tar and/or NAPL from the site, particularly from the former Wynants Kill alignment, which has already impacted sediment quality in the Hudson River.

2.6 Original Remedy

The remedy specified in the 2003 ROD included the following elements:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved. These uncertainties include but are not limited to:

a) whether contaminants exist in pipes, tanks or other structures observed yet not investigated. These structures include but are not limited to:

1. pipes traversing the Wynants Kill;
2. tank existing in the former benzol building;
3. piping and structures present in the former water gas building;
4. "tar collecting and flushing liquor tanks" shown east of the 55 oven battery on "General Arrangement, Hudson Valley Fuel Corp & Republic Steel Corp. Plants" Initial Submittal Figure;

b) whether contamination exists adjacent to the lime sump;

c) the extent of PAH and BTEX contamination under the warehouse and former water gas buildings;

d) an evaluation of whether there is the potential for exposure to residual contamination, including air contaminants of MGP origin, that will remain at the site following the implementation of the remedy for building occupants; and,

e) a pilot study to determine the type and operating parameters of the in-situ chemical oxidation treatment.

2. Surface or subsurface soil containing total PAHs greater than 500ppm or visual tar or NAPL will be removed to a depth of 18 feet below the existing ground surface (bgs) in the areas shown on Figure 8 [Figure 8 of ROD]. Niagara Mohawk estimates 11,000 cy of soil will meet this removal requirement; the Department however, estimates 17,000 cy will meet this requirement. The limits of removal will be defined during a pre-design investigation. The former Water Gas Building will be demolished in order to determine the limit of removal. Soil under the Water Gas Building floor containing total PAHs greater than 500 ppm or visual tar or NAPL will be removed to a depth of 18 feet bgs. Surface weeps observed on the Wynants Kill channel will be considered surface tar.

Visual tar or NAPL will be soil found to be saturated with NAPL, or have visually observable separate phase product. Soils exhibiting odors, staining and/or sheens will not be considered for removal as visual tar or NAPL. Soils exhibiting odors, staining and/or sheens will however be removed if found to exceed the 500 ppm PAH criteria. Removed soil will be disposed off-site in accordance with applicable Department regulations. Soil with no visual indication of NAPL or tar and containing less than 500 ppm total PAHs, located above areas meeting the removal criteria, may be stripped, stockpiled and backfilled within the excavation.

3. The area of soil containing total PAHs greater than 500 ppm or visual tar or NAPL deeper than 18 feet bgs, estimated volume of 23,000 cy will be delineated and treated in place by a chemical oxidation process, using either ozone or Fentons Reagent. This treatment will occur in the areas of monitoring well MW-5, soil boring SB-28 and the former Wynants Kill alignment. The treatment will operate until groundwater concentrations achieve standards for benzene, ethylbenzene, toluene, and individual xylenes, or until the Department determines groundwater concentrations have achieved asymptotic levels for a sustained period of time and continued treatment would not result in significant mass removal of contaminants. A NAPL collection system will also be installed in the treatment areas.

4. The contents, an estimated 1,500 cubic yards of tar and contaminated soil and debris, and an estimated 5,000 gallons of liquid wastes, of the following structures will be removed:

a) Sump number 1 at the north end of King Fuels' former office and garage;
b) Underground air plenums at the former coke ovens;
c) Underground concrete vault east of the south garage;
d) Sump number 4 at the north end of the warehouse building;
e) An underground tar liquor sump, west of the former water gas plant building; and,
f) An above-ground, former oil/water separator tank along the east wall of the water gas plant building.

Following removal, the interior surfaces of the structures will be cleaned. The structures will then be inspected for structural integrity. If the inspection concludes that no contaminants were released from the structure(s), then the structure(s) will be backfilled with an appropriate material and left in place. If the inspection reveals that the structure(s) may have released contaminants or the inspection is inconclusive, then the structure(s) itself will be removed. Removed materials will be disposed off-site at a permitted disposal facility.

5. An estimated 1,200 cubic yards of purifier waste (including off-site purifier waste identified north of the Wynants Kill) will be removed and disposed of off-site at a permitted disposal facility.

6. An asphalt cap or permeable soil cover will be placed over the entire site. Building footprints will be excluded from this requirement. The permeable soil cover will be a minimum of two-feet thick and include a demarcation layer.

7. Monitored natural attenuation of groundwater consistent with the United States Environmental Protection Agency's April 21, 1999 Memorandum: Final OSWER Directive "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action and Underground Storage Tank Sites". Monitored natural attenuation in accordance with USEPA guidance will be applied at each of the three groundwater contaminated areas identified on Figure 5 [Figure 5 of ROD]. Performance of the natural attenuation processes will be evaluated by monitoring the relative difference of electron acceptor concentrations or metabolic by-products within and outside the contaminated groundwater areas. Groundwater quality parameters will include, but not necessarily limited to dissolved oxygen, nitrate, redox potential, pH, and individual BTEX and PAH compounds. Concentrations of contaminants in groundwater will be compared with the predicted decay rates and SCGs. If monitoring demonstrates that the attenuation rate is not sufficient, air sparging, and/or addition of oxygen and/or addition of another electron acceptor such as sulfate, will be implemented. The performance goals will include compliance with groundwater quality standards and guidance.

8. Institutional controls will be established to; (a) protect engineering controls which are part of the remedy; (b) restrict on-site groundwater use; (c) prohibit the site from being used for purposes other than appropriate recreational, industrial or commercial uses, as explained below, without the express written waiver of such prohibition by the Department and the NYSDOH; and (d) require an evaluation of potential soil vapor on indoor air quality in on-site buildings should changes from the current use occur in the future. Appropriate industrial or commercial uses of the property will have to be consistent with any applicable zoning ordinances, but will not include any enterprises that draw susceptible portions of the community to the properties for activities that may lead to exposures to residual site contamination (e.g. day care, child care). An annual certification will be required to ensure the effectiveness of the institutional and engineering controls.

9. Since the remedy results in untreated hazardous waste remaining at the site, a long term monitoring program will be instituted. This program will include groundwater quality monitoring to evaluate the effectiveness natural attenuation, and soil and/or asphalt cover monitoring to evaluate its integrity as an exposure and surface migration barrier. This program will be a component of the operation, maintenance, and monitoring for the site.

2.6.1 Elements of the Remedy Performed to Date

In addition to the in-situ chemical oxidation treatment pilot study, National Grid has completed the following elements of the ROD:

- Investigation of the "tar collecting and flushing liquor tanks" in 2004. No tanks were found.

- Investigation of the lime sump area in 2003. As a result of that investigation soil adjacent to the lime sump will be removed.

- Removal of contaminated material from the:
    - underground air plenums (2009)
    - underground concrete vault east of south garage (2009)
    - underground tar liquor sump (2008)
    - above-ground oil/water separator tank (2008)

- Purifier waste removal from an approximate 150 by 50 foot area adjacent to the gas regulator station in the northwest corner of the site and off-site disposal in 2008.

The details of these activities are documented in the post-ROD investigation and construction completion reports identified in Appendix B.

3.0 DESCRIPTION OF CHANGES

3.1 New Information

The volume of soil meeting the ROD criteria for removal expanded more than three-fold and the volume of soil meeting the ROD criteria identified for in-situ treatment also expanded nearly three-fold. In addition,

site-specific pilot testing demonstrated that it was unlikely that treatment of soil using in-situ chemical oxidation (ISCO) would achieve the remedial goal of attaining groundwater quality standards.

In 2009, following design investigations, National Grid concluded that 62,000 cy of soil met the ROD requirement for removal. To access this soil, an additional 54,000 cubic yards of soil not requiring off-site disposal would need to be excavated and stockpiled. The ROD estimate for soil removal was 17,000 cy. The investigations also concluded that 62,000 cy of deeper soil met the ROD requirement for in-situ treatment, as compared to the ROD estimate of 23,000 cy of soil requiring treatment.

From 2004 through 2005 an in-situ pilot test was conducted at the site to determine the quantity of chemical reagents required to effectively reduce BTEX concentrations in groundwater, and to determine the radius of influence of the ISCO process, among other objectives. Hydrogen peroxide and Fenton's Reagent were used as the oxidant based on site-specific bench scale testing. The pilot test results showed that in-situ chemical oxidation was occurring, but in a very limited area and with only temporary reductions in groundwater concentrations near the injection points. In addition, the radius of influence of the injections was limited, NAPL accumulated in several monitoring wells, and, where BTEX concentrations were reduced, the reduction was only temporary. The pilot test further concluded that ISCO could be effective in zones with residual NAPL, but the area would require a high oxidant dose administered over multiple injection events to address rebound. The presence of NAPL at quantities that exceed residual saturation in the pilot test area complicated the evaluation of results, as the NAPL represented a continuing and potentially increasing source of contamination. Twelve weeks following the completion of the pilot test, four out of eight wells showed an increase in BTEX concentration as compared to pre-pilot test sampling, suggesting that the ISCO application was not effective in reducing BTEX concentrations in groundwater.

Since the issuance of the ROD, the number of in-situ solidification (ISS) applications at MGP sites has increased significantly, and more information regarding the long-term performance of ISS is available. Solidification employs additives to soil, typically Portland cement and bentonite, to decrease permeability and increase compressive strength. In-situ refers to the additive being mixed within the ground, either through the use of augers or conventional excavation equipment. Since 2003, ISS has been successfully implemented at former New York State MGP sites in Nyack, White Plains and Poughkeepsie, and is the selected remedy for a number of other sites.

After the ROD was issued, regulations applicable to New York's remedial program were revised. Part 375-3.8(e)(4) requires that the top foot of all exposed surface soils not exceed the applicable contaminant-specific soil cleanup objectives for sites that are restricted to commercial or industrial uses. Department guidance document DER-10 subdivision 1.12(a) further articulates this same one-foot requirement for passive recreational uses.

3.2 Changes

The changes to the elements of the original ROD are as follows:

1. The remedial design will be revised to be consistent with the Amended Record of Decision. In addition, the former Water Gas Building was demolished in 2009, therefore, uncertainties relating to piping and

structures within the former building no longer apply.

2. Soil will be excavated to the horizontal limits identified on Figure 5. These excavation areas are defined by the presence of visual tar or NAPL or soil containing PAHs greater than 500 ppm. Soil will be removed vertically within the excavation areas to depths ranging from eight to eleven feet with the following exceptions: a) at the mouth of the Wynants Kill channel the excavation depth will extend to 18 feet where the soil exceeds the removal criteria and b) directly east of the By-Products Building the excavation will extend to the top of bedrock. The minimum excavation depth will be eight feet. The estimated volume of excavated soil to be removed is 27,000 cubic yards. Although some areas exist beyond these excavation limits where the removal criteria are exceeded, these peripheral areas are deep, sporadic, limited in volume and do not contribute to groundwater contamination. Soil with no visual indication of NAPL or tar and containing less than 500 ppm total PAHs that must be excavated to access soil requiring off-site disposal may be stockpiled and backfilled within the excavation. Excavated soil will be disposed or thermally treated off-site at a permitted disposal facility.

3. Deeper soil containing visual tar or NAPL will be treated by an in-situ solidification (ISS) process to the depths and horizontal limits shown on Figure 5. All soil within the solidification area that was not removed through excavation will be solidified, such that no zones of soil are left untreated. The estimated soil volume to be treated by ISS is 69,000 cubic yards. The remedial design will establish the type and proportions of mixing agents.

4. The structure removal remains unchanged from the ROD.

5. The removal and off-site disposal of purifier waste remains unchanged from the ROD.

6. A site cover will be installed to allow for commercial or industrial use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the commercial use soil cleanup objectives (SCOs). Prior to placement of the cover all excavated areas will be returned to the original grade. Where the soil cover is required it will be a minimum of one foot of soil, meeting the requirements for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. The modification from a two-foot thickness to a one-foot thickness is based on Part 375-3.8(e)(4)(iii)(b).

7. Attenuation of groundwater will be consistent with the ROD, but only for groundwater in the southwest quadrant of the site. Solidification is expected to create a monolith of soil with low groundwater yield, and thus natural attenuation of contaminants will no longer be applicable in the former water gas building, and former Wynants Kill alignment areas of groundwater contamination.

Elements 8 and 9 will be updated to reflect the changes to 6NYCRR Part 375 and recently-issued DER policy documents. These changes affect the certification of institutional and engineering controls and establish requirements for site management as the last phase of the remedial program.

8. Imposition of an institutional control in the form of an environmental easement that will require (a) limiting the use and development of the property to commercial use, which will also permit industrial use; (b)

compliance with the approved site management plan; (c) restricting the use of groundwater as source of potable or process water, without necessary water quality treatment as determined by the New York State Department of Health; and (d) National Grid to complete and submit to the Department a periodic certification of institutional and engineering controls.

9. Development of a site management plan which will include the following institutional and engineering controls: (a) management of the final cover system to restrict excavations below the soil cover, pavement or buildings. Excavated soil will be tested, properly handled to protect the health and safety of workers and the nearby community, and will be properly managed in a manner acceptable to the Department; (b) evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions (e.g., mitigation or monitoring) recommended to address exposures related to soil vapor intrusion; (c) monitoring of groundwater; (d) identification of all use restrictions on the site.

10. National Grid will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies National Grid in writing that this certification is no longer needed. This submittal will: (a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that will impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

4.0 EVALUATION OF AMENDED ROD

4.1 Remedial Goals

Goals for the cleanup of the site were established in the ROD.

4.2 Evaluation Criteria

The criteria used to compare the remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6 NYCRR Part 375). For each criterion, a brief description is provided. As presented above, six of the nine elements of this Amendment require no change or only minor modifications from the ROD. The following evaluation will therefore focus on the two elements which are being fundamentally modified: the reduction in excavation depth and the change from ISCO to ISS. A detailed analysis of the change in the soil cover thickness is not provided since this change was a result of a regulatory determination of an appropriate soil cover for a commercial use. A detailed discussion of the evaluation criteria and comparative analysis is contained in the Focused Feasibility Study.

The first two evaluation criteria are called 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 the alternative's ability to protect public health and the environment.

This Amendment will be protective of human health. Protection of human health will be achieved through:

- The removal of near-surface impacted soil and the removal of materials from underground structures;
- Installation of a soil cover to serve as a direct contact barrier; and,
- Institutional controls to protect engineering controls, restrict future site uses for purposes other than passive recreational, industrial, or commercial uses; restrict the use of site groundwater; require vapor intrusion evaluation and monitoring or mitigation (if necessary); and require that future work comply with a Site Management Plan.

This Amendment will also be protective of the environment. Protection of the environment will be achieved through the following:

- Excavation and ISS to eliminate sources of groundwater contamination and reduce the potential for the migration of contaminants to the Hudson River surface water and sediment;
- Installation of a site cover to provide a barrier to reduce contact by wildlife;
- Implementation of monitored natural attenuation to reduce groundwater contamination in the southwest area, where a groundwater contaminant source is not present.

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 SCGs that apply to this site are soil and groundwater SCGs. Implementation of this Amendment is expected to achieve groundwater SCGs for the contaminants of concern over time and will comply with soil SCGs to the extent practicable.

As described in Section 2.3, areas of higher groundwater contamination exist at the vicinity of the former water gas building, the former Wynants Kill channel, and the southwest quadrant of the site at monitoring wells MW-29 and MW-31. Through soil removal and ISS, the remedy will remove contaminant source areas or create a low permeability zone of groundwater beneath the former water gas building and stream channel. Natural attenuation, with a contingency for active measures, is expected to reduce groundwater contaminant concentrations to within SCGs over time.

This Amendment will meet the soil cleanup objectives (SCOs) for restricted commercial use for individual compounds in the top one foot of the site and the SCO for total semivolatiles (500 ppm) for restricted commercial use in source areas and generally throughout the site. The Amendment will remove through excavation approximately 27,000 cubic yards of soil and solidify approximately 69,000 cubic yards of soil, while the ROD will have removed an estimated 17,000 cy and treated by ISCO 23,000 cy of soil. In terms of scope, the Amendment is more protective of public health and the environment and more closely satisfies soil and groundwater SCGs at the site as compared to the ROD. In terms of action, both this Amended ROD and the 2003 ROD use the same criteria for the removal or treatment of contaminated soil. The Amendment will leave some sporadically identified NAPL/tar generally beyond the area of groundwater exceeding SCGs in deeper soil (greater than six feet below ground surface). Since the site-specific ISCO pilot test was not effective in reducing groundwater contamination, ISS is more protective of deeper soils and groundwater.

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

3. Short-term 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.

The more than three-fold increase in the volume of soils requiring excavation and off-site disposal under the 2003 ROD approach would have resulted in significantly greater short term impacts than originally anticipated. In addition, a substantial amount of clean soil would have to be excavated and stockpiled to access the contaminated soil. The Amendment will require a smaller increase (60%) in the amount of excavated soil as compared to the original ROD approach. The construction phase of remediation under the Amendment will likely be longer and involve more truck traffic compared to what was anticipated in the original ROD. However, the extensive use of ISS will keep much of the activity within the site, minimizing community impacts. Also, excavation will be reduced in certain areas where it will not be necessary to remove relatively clean soil to access less significant areas of tar or NAPL. The Amended ROD will minimize community impacts though specific truck routes, community air monitoring, and public participation.

4. 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.

The Amendment will be effective in the long term. Excavation and off-site disposal of the contaminant source areas will permanently remove the source of groundwater contamination and greatly reduce or eliminate any NAPL migration. ISS will also significantly reduce groundwater contamination by reducing groundwater flow through deeper source areas. Although the ROD anticipated that ISCO would permanently treat deep contamination, this was not demonstrated in the site-specific pilot test. ISS will be immediately effective upon completion, whereas ISCO would have required a lengthy period of time to satisfy the remedial goals, if at all.

5. 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.

The Amendment will reduce the volume and mobility of the site contamination primarily through the soil removal and ISS components. The soil removal targets mobile and potentially mobile tar and NAPL in the shallow subsurface as well as soil with higher concentrations (i.e., greater than 500 ppm) of total PAHs. For deeper soils the ISS will reduce mobility by creating a low permeability monolith, through which there will be minimal leaching and groundwater flow. Again, ISS will be immediately effective upon completion, whereas ISCO would have required a lengthy period of time to satisfy this criterion, if at all.

6. Implementability. The technical feasibility 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.

The Amendment will be more feasible to implement than the 2003 ROD approach for the revised extent of contamination. Excavations will not be as deep, and far less soil will be removed and stockpiled to access the contamination. Underground foundations and building remnants will add difficulty to the ISS

implementation; however this is an expected difficulty for excavation and ISCO as well. ISCO would require the installation and maintenance of a NAPL collection system. The ISS will not require this system, simplifying construction and long-term maintenance.

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.

Based on the revised understanding of the extent of contamination, the estimated cost to implement the original ROD for the greater volume is approximately $54 million. The estimated cost of the amended remedy is $35 million. The increased cost over the $9.5 million estimate in the original ROD is primarily due to the much larger volume and mass of contamination that was found during design-phase sampling.

A significant volume of soil which does not require removal or treatment (54,000 cy) overlies soil containing tar/NAPL or PAHs > 500ppm (62,000 cy). As a result, much of the $54 million cost of the 2003 ROD approach is associated with excavating and handling soil that does not require removal from the site. The revised approach is more cost effective because it will solidify the contaminated soil without excavating the soil above it, and will also solidify soil that is only marginally contaminated with sporadic NAPL which does not contribute significantly to an exceedance of the groundwater quality standard.

This final criterion is considered a modifying criterion and is considered after evaluating those above. It is focused upon after public comments on the proposed ROD amendment have been received.

8. Community Acceptance. Concerns of the community regarding the proposed changes have been evaluated. The responsiveness summary (Appendix A) presents the public comments received and the manner in which the Department addressed the concerns raised. No significant comments were received which expressed concern for the changes to the 2003 ROD. A desire was expressed by some to phase the remedial construction in order to advance a clean-up on a portion of the site.

5.0 SUMMARY OF CHANGES

Through this document the Department amends the ROD for the NIMO Troy – Water Street MGP Site, Operable Unit No. 1, Area 2 – Former Plant Site. The changes include:

- An increase in the volume of contaminated soil to be removed from approximately 17,000 cubic yards to 27,000 cubic yards. This will address the greater areal extent of source material found subsequent to the ROD by approximately one acre and facilitate future redevelopment of the site. However the depth of excavation will be less, ranging from 8 to 18 feet.
- In-situ solidification of deeper contaminated soil, generally, 10 to 32 feet below ground surface. Where removal by excavation becomes more difficult due to depth, in-place solidification will reduce contaminant migration and create less truck traffic than off-site disposal.
- Elimination of in-situ chemical oxidation of deeper soils. Contaminant concentrations in the aquifer were unable to be reduced in the site-specific pilot study, therefore the remedial goal of attaining Department groundwater quality standards to the extent practicable would likely not be achieved through a full-scale application of this treatment.
- Reduction in the soil cover thickness from two feet to one foot. Reducing the cover thickness to one foot is consistent with Part 375 standards for commercial and passive recreational use.

The estimated present worth cost to carry out the amended remedy is $37 million. The estimated present worth to complete the original remedy was $8.7 million. The cost to construct the amended remedy is estimated to be $35 million and the estimated average annual cost for 30 years is $ 96,000.

The elements of the amended remedy, along with the elements that are retained from the 2003 ROD, are as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program.

2. Soil will be excavated to the horizontal limits identified on Figure 5. These excavation areas are defined by the presence of visual tar or NAPL or soil containing PAHs greater than 500 ppm. Soil will be removed vertically within the excavation areas to depths ranging from eight to eleven feet with the following exceptions: a) at the mouth of the Wynants Kill channel the excavation depth will extend to 18 feet where the soil exceeds the removal criteria and b) directly east of the By-Products Building the excavation will extend to the top of bedrock. The minimum excavation depth will be eight feet. The estimated volume of excavated soil to be removed is 27,000 cubic yards. Although some areas exist beyond these excavation limits where the removal criteria are exceeded, these peripheral areas are deep, sporadic, limited in volume and do not contribute to groundwater contamination. Soil with no visual indication of NAPL or tar and containing less than 500 ppm total PAHs that must be excavated to access soil requiring off-site disposal may be stockpiled and backfilled within the excavation. Excavated soil will be disposed or thermally treated off-site at a permitted disposal facility.

3. Deeper soil containing visual tar or NAPL will be treated by an in-situ solidification (ISS) process to the depths and horizontal limits shown on Figure 5. All soil within the solidification area that was not removed through excavation will be solidified, such that no zones of soil are left untreated. The estimated soil volume to be treated by ISS is 69,000 cubic yards. The remedial design will establish the type and proportions of mixing agents.

4. An estimated 3,000 cubic yards of tar and contaminated soil and debris and an estimated 5,000 gallons of liquid wastes will be removed from the following structures:
    a. Sump number 1 at the north end of King Fuels' former office and garage;
    b. Underground air plenums at the former coke ovens;
    c. Underground concrete vault east of the south garage;
    d. Sump number 4 at the north end of the warehouse building;
    e. An underground tar liquor sump, west of the former water gas plant building; and
    f. An above-ground, former oil/water separator tank along the east wall of the water gas plant building.

    Following removal, the interior surfaces of the structures will be cleaned and inspected for structural integrity. If the inspection concludes that no contaminants were released from the structure(s), then the structure(s) will be backfilled with an appropriate material and left in place. If the inspection reveals that the structure(s) may have released contaminants or the inspection is inconclusive, then the structure(s) itself will be removed. Removed materials will be disposed off-site at a permitted disposal facility.

5. An estimated 400 cubic yards of purifier waste will be removed and disposed of off-site at a permitted disposal facility.

6. A site cover will be installed to allow for commercial or industrial use of the site. The cover will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the commercial use soil cleanup objectives (SCOs). Prior to placement of the cover all excavated areas will be returned to the original grade. Where the soil cover is required it will be a minimum of one foot of soil, meeting the requirements for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer with the upper six inches of the soil of sufficient quality to maintain a vegetation layer.

7. A groundwater monitoring program will be established to review the concentrations of contaminants in the groundwater attenuating through naturally occurring biological processes. If monitoring demonstrates that the attenuation rate is not sufficient, additional remedial technologies such as air sparging or the addition of oxygen release compounds will be evaluated as part of the long term monitoring of the site.

8. Imposition of an institutional control in the form of an environmental easement that will require (a) limiting the use and development of the property to commercial use, which will also permit industrial use; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as source of potable or process water, without necessary water quality treatment as determined by the New York State Department of Health; and (d) National Grid to complete and submit to the Department a periodic certification of institutional and engineering controls.

9. Development of a site management plan which will include the following institutional and engineering controls: (a) management of the final cover system to restrict excavations below the soil cover, pavement or buildings. Excavated soil will be tested, properly handled to protect the health and safety of workers and the nearby community, and will be properly managed in a manner acceptable to the Department; (b) evaluation of the potential for soil vapor intrusion for any buildings developed on the site, including provision for implementing actions (e.g., mitigation or monitoring) recommended to address exposures related to soil vapor intrusion; (c) monitoring of groundwater; (d) identification of all use restrictions on the site.

10. National Grid will provide periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies National Grid in writing that this certification is no longer needed. This submittal will: a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that will impair the ability of the control to protect the public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

APPENDIX A

Responsiveness Summary

NIMO Troy – Water Street MGP Site, Area 2
Troy, New York
Site No. 442029

The proposed amended Record of Decision for the NIMO Troy – Water Street MGP Site, Area 2, was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was issued to the document repositories on January 21, 2011. The proposed amended Record of Decision detailed proposed changes to the remedial measures previously selected for the contaminated soil and groundwater at the NIMO Troy – Water Street MGP Site, Area 2.

The release of the proposed amended Record of Decision was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed changes in the remedy. In addition, the announcement was delivered by email on the Rensselaer County listserv.

A public meeting was held on February 7, 2011, which included a presentation of the 2003 Record of Decision, a summary of site information obtained since the Record of Decision, as well as a discussion of the proposed amendment to the remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed amended remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on February 25, 2011.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the Department's responses:

COMMENT 1: What do the color representations in the figure represent?

RESPONSE 1: During the public meeting a figure similar to Figure 4 was presented which used two color shades. One color was used to illustrate the general area of tar/NAPL or PAHs greater than 500 ppm identified at the time of the 2003 Record of Decision and the other color showed the additional area of tar/NAPL or PAHs greater than 500 ppm that was identified after the 2003 decision.

COMMENT 2: How deep can ISS be implemented?

RESPONSE 2: Literature from the ISS industry reports that depths to 110 feet can be achieved. ISS was a component of the remedy for an MGP site in White Plains where it was constructed to a depth of 50 feet.

COMMENT 3: How long will the construction take?

RESPONSE 3: The amended remedy is estimated to require a construction period of two years. This does not include approximately one year to complete the remedial design prior to construction.

COMMENT 4: Do you know what section or portion of the site the construction work will begin?

RESPONSE 4: No. This is a detail that will be determined during the remedial design.

COMMENT 5: The City of Troy would prefer the work to begin this year in phases with the excavation in the area where ISS will not be performed to be done first.

RESPONSE 5: The remedial components of the amended ROD could be developed as separate contracts and advanced on separate time schedule. The Department shares your eagerness to see tangible remedial construction as soon as possible. However, the general schedule assembled by National Grid for its 92 MGP sites targets a 2012 construction start for the Troy Water Street Site.

COMMENT 6: Is it reasonable to assume that construction work will begin later this year (2011)?

RESPONSE 6: Please refer to response 5.

COMMENT 7: What month of the year will construction begin?

RESPONSE 7: The schedule has not been developed to a month-by-month level of detail at this time. However, to the extent feasible, we generally prefer construction to begin during the fall or winter months.

COMMENT 8: How much impact will the proposed remedy have on traffic?

RESPONSE 8: The remedy is expected to have no significant impact on traffic volume as the anticipated maximum number of trucks per day arriving or leaving the site (50 trucks) is much less than the average traffic flow (13,000 vehicles) in the vicinity of the site. However, the remedial construction will need to consider the rush-hour volume and the narrow southern entrance to the site.

COMMENT 9: Where will the materials be disposed of?

RESPONSE 9: This will be determined during the remedial design. It is noted that the Department does not require the disposal of contaminated soil and other material to be at a particular facility. The facility must however, be permitted to accept the waste.

COMMENT 10: Can this remedy be built due to hydraulic pressure?

RESPONSE 10: In the area of the site that will be solidified, it is expected an increase in the hydraulic pressure will initially occur on the upgradient side of the solidified mass. The pressure should not be significant and is expected to be relieved as groundwater diverts around the mass through the more permeable native soil. Unlike a subsurface barrier wall, in which no leakage of contaminated groundwater is critical, some movement of groundwater into the solidified mass due to hydraulic pressure can be tolerated because the groundwater is not contaminated, and the groundwater yield within the mass is still greatly reduced. Also, similar to the Troy Water Street MGP Site, the Nyack MGP Site is located along the Hudson River in a tidal zone. Hydraulic pressure was not an issue with the solidification of soil at Nyack. Further, soil solidification is routinely conducted below the water table and hydraulic head or pressure differences created by the solidified mass are not an implementability concern.

COMMENT 11: What can be built on the land after remediation?

RESPONSE 11: The Department is not aware of any restrictions on the type of structures that could be provided at the site and the remedy is expected to accommodate all typical foundation types. Consistent with the 2003 ROD, the amended ROD requires that the land use be restricted to commercial uses, which includes industrial uses. Passive recreational uses (i.e., bike path, park) could also take place.

COMMENT 12: Is a permit required for passive recreational use of the site? I notice there was a statement to that effect in the fact sheet.

RESPONSE 12: A Department-issued permit would not be required for passive recreational use of the site.

COMMENT 13: Park space will be a good use of the land given that the property is owned by the City.

RESPONSE 13: The specific end-use of the site following remediation such as a park, office building or manufacturing facility, is to be made by the property owner(s) and is beyond the scope of this amended remedy.

COMMENT 14: It looks like the City will benefit from the cleanup.

RESPONSE 14: Comment noted.

COMMENT 15: Will Chevron property be cleaned-up as well?

RESPONSE 15: The Chevron property is not part of Area 2 and thus is beyond the scope of this amended ROD, however this property will be addressed at some future date.

APPENDIX B

Administrative Record

Administrative Record

NIMO Troy – Water Street MGP Site, Area 2
Troy, New York
Site No. 442029

Record of Decision, NIMO Troy – Water Street MGP Site, Operable Unit No. 1, Area 2 – Former Plant Site, July 2003

"Pre-Design Investigation Report, Troy (Water Street) Site", Brown and Caldwell, February 2004

"In-Situ Chemical Oxidation Pilot Test Report, Troy (Water Street) Site", Brown and Caldwell, January 2006

"In-Situ Chemical Oxidation Post-Pilot Test Sampling Report, Troy (Water Street) Site Area 2", Brown and Caldwell, May 2006

"Supplemental Pre-Design Investigation Activities, Troy (Water Street) Site Area 2", Brown and Caldwell, May 2006

"Supplemental Investigation Report, Troy (Water Street) Site Area 2", Brown and Caldwell, February 2008

"Groundwater Model Report, Troy (Water Street) Site Area 2", Brown and Caldwell, February 2008

Technical Memorandum, Preliminary Feasibility Assessment of Subsurface Barrier Walls as a Component of Remedy, Brown and Caldwell, May 2, 2008

Letter, dated August 20, 2008 from John Spellman (Department) to M. Cathy Geraci (National Grid) regarding feasibility assessment of subsurface barrier walls

"Construction Completion Report, Air Plenum and Underground Vault Remedial Action, Troy (Water Street) Site Area 2", Brown and Caldwell, April 2009

"Construction Completion Report, Purifier Waste Deposits, Tar Liquor Sump and Oil Water Separator, Troy (Water Street) Site Area 2", Brown and Caldwell, May 2009

"Focused Feasibility Study, Troy (Water Street) Site Area 2", Brown and Caldwell, July 2010

Proposed Record of Decision Amendment, NIMO Troy Water Street MGP Site, Operable Unit No. 1, Area 2 – Former Plant Site", January 2011

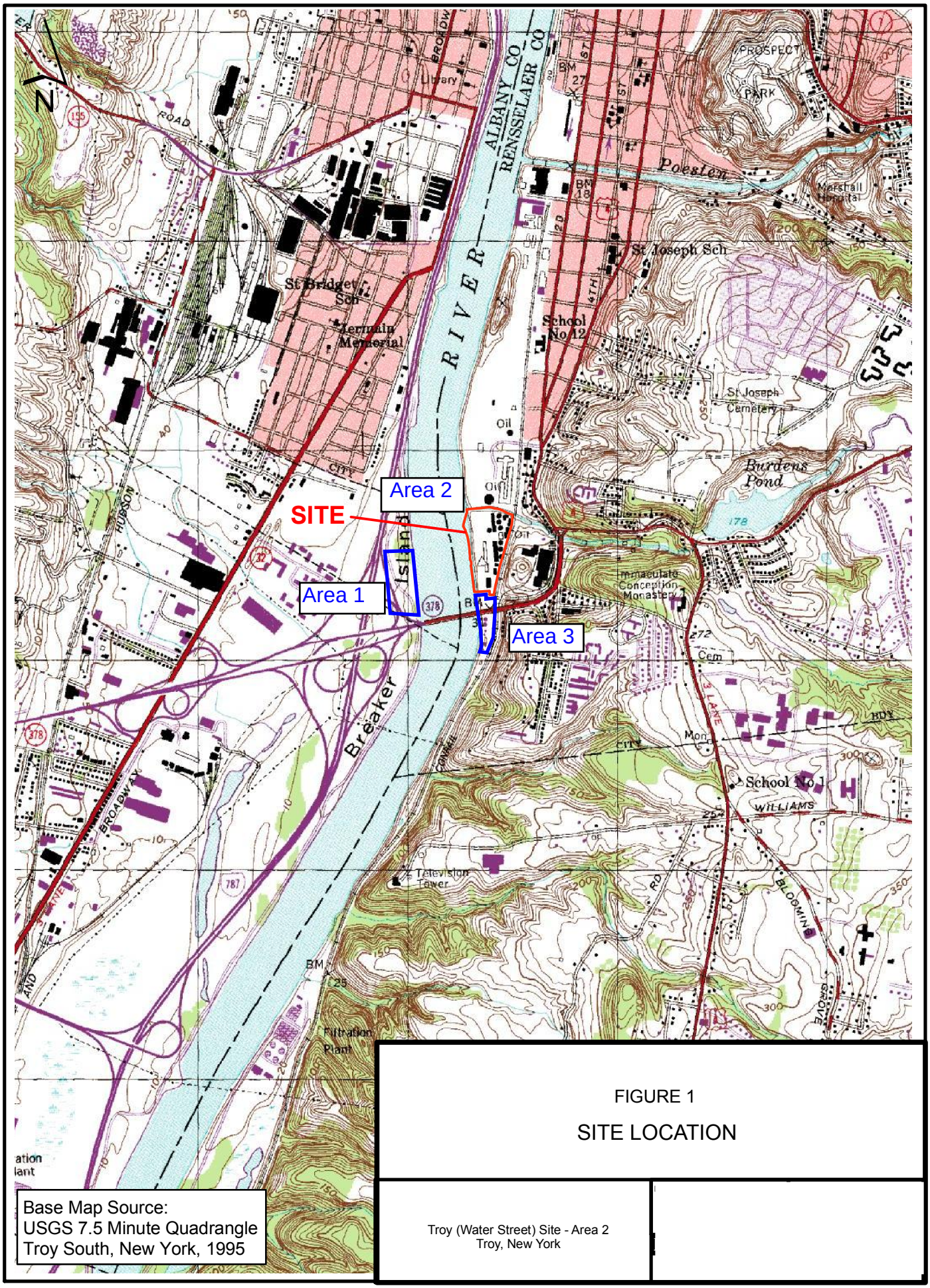

FIGURE 1

SITE LOCATION

Troy (Water Street) Site - Area 2
Troy, New York

P:/GIS/National_Grid/Troy/Troy_Site_Location.mxd

HUDSON RIVER

PURIFIER WASTE DEPOSIT EXCAVATION AREA (COMPLETED IN 2008)

ACTIVE GAS REGULATION STATION

COKE SILOS

E-LOT BUILDING (FORMERLY VELOCITY EXPRESS)

FORMER SUMP 4

FORMER AIR PLENUM TUNNELS (COMPLETED CONTENTS REMOVAL IN 2009)

FORMER HEATER BUILDING

SOUTH GARAGE

FORMER UNDERGROUND VAULT (COMPLETED CONTENTS REMOVAL IN 2009)

FORMER FUEL ISLAND

PRIMARY COOLERS

FORMER SUMP 1

FORMER MACHINE SHOP

FORMER OUTDOOR SUBSTATION

FORMER SUBSTATION

FORMER BY-PRODUCTS BUILDING

FORMER CREOSOTE PAD

FORMER ACID STORAGE PAD

FORMER AMMONIA LIQUOR STORAGE PAD

FORMER TAR TANK PAD

FORMER LIME HOUSE

FORMER CREOSOTE TANK PAD

FORMER OXIDE PURIFIER PADS

FORMER LIME SUMP

FORMER LOCKEROOM BUILDING

FORMER OFFICE/LAB/CAFETERIA BUILDING

FORMER TAR LIQUOR SUMP (COMPLETED CONTENTS REMOVAL IN 2008)

LOCATION OF FORMER DILUTE OXIDE BOXES

FORMER OIL/WATER SEPARATOR (COMPLETED CONTENTS REMOVAL IN 2008)

FORMER WATER GAS BUILDING

FORMER 200,000 CF GASHOLDER PAD

FORMER 200,000 CF GASHOLDER PAD

FORMER 300,000 CF GASHOLDER PAD

FORMER BENZOL TANK PAD

FORMER BENZOL BUILDING

FORMER PHENOL BUILDING

FORMER ALIGNMENT OF WYNANTSKILL CREEK

WYNANTSKILL CREEK

FORMER 2,000,000 CF GASHOLDER PAD

GATE REGIONAL

LEGEND:

- BELOW-GRADE STRUCTURE/PAD
- FORMER ABOVE-GRADE BUILDING
- EXSITING ABOVE-GRADE STRUCTURE/BUILDING
- PROPERTY LINE
- PZ-3 PIEZOMETER LOCATION
- MW-23 MONITORING WELL LOCATION

MAP SOURCE DATA:

1. BASE MAP INFORMATION OBTAINED FROM DRAWING PREPARED BY NIAGARA MOHAWK ENTITLED "TROY, WATER STREET - TOPOGRAPHIC MAP", DRAWING D-31454-E, DATED 10/3/94.

2. PROPERTY LINE BASED ON DRAWING PREPARED BY VAN DUSEN & STEVES LAND SURVEYORS, DATED DECEMBER 1, 2004.

3. AIR PLENUM AND UNDERGROUND VAULT LOCATIONS BASED ON SURVEY COMPLETED BY CLARK ENGINEERING AND SURVEYING, P.C. (CES) ON 2/3/09. SURVEY DEPICTED ON CES DRAWING ENTITLED "TUNNEL LOCATION SURVEY", DATED 3/4/09.

4. LIMITS OF PURIFIER WASTE DEPOSIT EXCAVATION, TAR LIQUOR SUMP (TLS), AND OIL/WATER SEPARATOR (OWS) OBTAINED FROM SURVEY DRAWING BY VAN DUSEN AND STEVES LAND SURVEYORS, DATED MAY 1, 2008. EXCAVATION OF PURIFIER WASTE AND CONTENTS OF TLS AND OWS WAS COMPLETED IN APRIL TO MAY 2008.

5. LOCATION OF REMAINING UNDERGROUND STRUCTURES SHALL BE CONSIDERED APPROXIMATE.

0 50 100

SCALE IN FEET

Figure 2

NATIONAL GRID
TROY (WATER STREET) SITE-AREA 2
TROY, NEW YORK

North

FORMER TAR LIQUOR SUMP

FORMER OIL/WATER SEPERATOR

FORMER SUMP 4

FORMER SUMP 1

FORMER AIR PLENUM TUNNELS

FORMER UNDERGROUND VAULT

TAR DEPOSIT BB

TAR DEPOSIT AA

TAR DEPOSIT DD

Generalized NAPL-impacted soil and/ or PAHs>500ppm in 0-6' BGS interval, not including structures or hard tar

Legend

- Sample with Total PAHs Greater than 500 ppm
- Sample with Total PAHs Less than 500 ppm
- Soil Boring/Test Pit NAPL/Coal Tar Observed
- Soil Boring/Test Pit NAPL/Coal Tar Not Observed
- Shoreline Tar Deposit From BBL Phase II Hudson River Sediment Investigation Figure 3.
- # - NAPL/coal tar present within a structure
- Generalized Areas with NAPL-Impacted Soil And/Or PAHs >500 PPM In 0-18' BGS Interval
- Generalized Areas with NAPL-Impacted Soil And/Or PAHs >500 PPM In >18' BGS Interval

0 25 50 100 Feet

Figure 3

Troy (Water Street) Site - Area 2
Troy, New York

P:/GIS/National_Grid/Troy/PMSR/Troy_NAPL_PAH_1-09.mxd

North

FORMER TAR LIQUOR SUMP

FORMER OIL/WATER SEPERATOR

FORMER SUMP 4

FORMER SUMP 1

FORMER AIR PLENUM TUNNELS

FORMER UNDERGROUND VAULT

TAR DEPOSIT DD

TAR DEPOSIT BB

TAR DEPOSIT AA

Generalized Areas of Tar/NAPL or PAHs > 500 ppm known at time of ROD

Legend

- Sample with Total PAHs Greater than 500 ppm
- Sample with Total PAHs Less than 500 ppm
- Soil Boring/Test Pit NAPL/Coal Tar Observed
- Soil Boring/Test Pit NAPL/Coal Tar Not Observed
- Shoreline Tar Deposit From BBL Phase II Hudson River Sediment Investigation Figure 3.
- # - NAPL/coal tar present within a structure
- Generalized Areas with NAPL-Impacted Soil And/Or PAHs >500 PPM In 0-18' BGS Interval
- Generalized Areas with NAPL-Impacted Soil And/Or PAHs >500 PPM In >18' BGS Interval

0 25 50 100 Feet

Figure 4

Troy (Water Street) Site - Area 2
Troy, New York

P:/GIS/National_Grid/Troy/PMSR/Troy_NAPL_PAH_1-09.mxd

HUDSON RIVER

0-1' DISPOSAL

0-2' DISPOSAL

0-10' (AVG.) DISPOSAL (TOTAL DEPTH RANGES FROM 1' TO 18')

PURIFIER WASTE DEPOSIT EXCAVATION AREA (COMPLETE)

REMOVAL OF FORMER AIR PLENUM STRUCTURE CONTENTS (COMPLETE)

REMOVAL OF FORMER SUMP 4 CONTENTS

E-LOT BUILDING (FORMERLY VELOCITY EXPRESS)

8-32'

8-30'

0-6' STOCKPILE
6-8' DISPOSAL

0-6' (AVG.) STOCKPILE
6-10' (AVG.) DISPOSAL (TOTAL DEPTH RANGES FROM 8-12')

FORMER ALIGNMENT OF WYNANTSKILL CREEK

SOUTH GARAGE

REMOVAL OF FORMER TAR LIQUOR SUMP CONTENTS (COMPLETE)

8-24'

0-1.5' STOCKPILE
1.5-10' DISPOSAL

REMOVAL OF FORMER SUMP 1 CONTENTS

FORMER WATER GAS BUILDING

REMOVAL OF FORMER UNDERGROUND VAULT CONTENTS (COMPLETE)

FORMER MACHINE SHOP

FORMER OUTDOOR SUBSTATION

FORMER SUBSTATION

FORMER BY-PRODUCTS BUILDING

0-4' STOCKPILE
4-8' DISPOSAL

0-8' STOCKPILE
8-10' DISPOSAL

REMOVAL OF FORMER OIL/WATER SEPARATOR CONTENTS (COMPLETE)

0-11' (AVG.) DISPOSAL

PURIFIER WASTE DEPOSIT AREA IDENTIFIED IN JULY 2003 ROD (SEE NOTE 3)

FORMER LOCKEROOM BUILDING

FORMER OFFICE/LAB/CAFETERIA BUILDING

FORMER BENZOL BUILDING

WYNANTSKILL CREEK

REMEDY COMPONENTS:

- STRUCTURE MITIGATION
- REMOVAL AND OFF-SITE DISPOSAL OF PURIFIER WASTE
- 0-11' — CONCEPTUAL EXCAVATION (WITH ANTICIPATED STOCKPILE AND DISPOSAL INTERVALS)
- 8-30' — CONCEPTUAL IN SITU SOLIDIFICATION/ STABILIZATION (ISS) (WITH TARGET INTERVALS); 0-8' INTERVAL TO BE EXCAVATED PRIOR TO ISS

NOTES

1. THE EXCAVATION AREAS AND DEPTHS SHOWN HEREON ARE APPROXIMATE, BASED ON AVAILABLE DATA AND FIELD OBSERVATIONS. THE ACTUAL EXTENT OF EXCAVATION WOULD BE DETERMINED DURING THE RD/RA PROCESS.
2. THE CONCEPTUAL ISS AREAS AND DEPTHS SHOWN HEREON ARE APPROXIMATE AND MAY BE REFINED DURING RD/RA PROCESS.
3. IN AUGUST 2007, TEST PITS WERE COMPLETED IN THIS AREA AND NO INDICATIONS OF PURIFIER WASTE OR OTHER MGP-RELATED WASTE WERE ENCOUNTERED. BASED ON THE RESULTS OF THE INVESTIGATION, THIS AREA WAS REMOVED FROM THE PLANNED REMEDIAL ACTION ACTIVITIES (REFER TO E-MAIL DATED AUGUST 23, 2007 FROM NYSDEC TO NATIONAL GRID).

REMEDY COMPONENTS:

- SITE-WIDE SOIL OR ASPHALT COVER
- MONITORED NATURAL ATTENUATION (MNA) OF GROUNDWATER
- NAPL MONITORING AND RECOVERY (AS NECESSARY)
- INSTITUTIONAL CONTROLS TO: (A) PROTECT ENGINEERING CONTROLS; (B) RESTRICT ON-SITE GROUNDWATER USE; (C) PROHIBIT SITE USE FOR RESIDENTIAL PURPOSE; (D) REQUIRE VAPOR INTRUSION EVALUATION FOR ON-SITE BUILDINGS IF BUILDING USE CHANGES FROM CURRENT USE.
- LONG-TERM MONITORING PROGRAM

LEGEND:

- BELOW-GRADE STRUCTURE/PAD
- FORMER ABOVE-GRADE BUILDING
- EXSITING ABOVE-GRADE STRUCTURE/BUILDING
- PROPERTY LINE
- PZ-3 — PIEZOMETER LOCATION
- MW-23 — MONITORING WELL LOCATION
- TP-3 — TEST PIT LOCATION
- SB-55 — SOIL BORING LOCATION

0 50 100
SCALE IN FEET

MAP SOURCE DATA:
REFER TO FIGURE 1-2 "SITE PLAN"

Figure 5

NATIONAL GRID
TROY (WATER STREET) SITE-AREA 2
TROY, NEW YORK