

DECISION DOCUMENT

CH - Water St. - Poughkeepsie MGP
Brownfield Cleanup Program
Poughkeepsie, Dutchess County
Site No. C314070
March 2016



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

DECLARATION STATEMENT - DECISION DOCUMENT

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Statement of Purpose and Basis

This document presents the remedy for the CH - Water St. - Poughkeepsie MGP site, a brownfield cleanup site. The remedial program was chosen in accordance with the 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 decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the CH - Water St. - Poughkeepsie MGP site and the public's input to the proposed remedy presented by the Department.

Description of Selected Remedy

The elements of the selected remedy are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Excavation and off-site disposal of upland contaminant source areas, located in the northern portion of the lower terrace area, to include:

- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- removal of all underground MGP structures and underground piping; and
- soil containing visual coal tar or non-aqueous phase liquid;

3. Barrier Wall:

A subsurface barrier wall will be installed along the east bank of the Hudson River to prevent the migration of coal tar to the river. The wall will be constructed along the eastern bank of the river from the gas utility crossing immediately south of Dutchess Ave to a point approximately 450 feet to the south, where the walkway over the Hudson extends above the site. The wall will extend to a sufficient depth to prevent further movement of coal tar into the river. The final wall configuration, including the need for hydraulic relief and associated treatment, will be determined during the design phase of this project.

4. Coal Tar Recovery:

A series of coal tar recovery wells will be constructed behind the barrier wall to collect coal tar that accumulates behind the wall. The number, depth, type and spacing of the recovery wells will be determined during the design phase of the remedy. Coal tar will be collected periodically from each well; however, if wells are determined by the Department to accumulate large quantities of coal tar over extended time periods, they can be converted to automated collection.

5. In-situ Solidification:

In the area where the natural gas pipeline enters the upland portion of the site, which precludes the safe construction of the barrier wall, focused solidification (ISS) of soil horizons containing coal tar will be performed to prevent migration of coal tar toward the river

ISS is a process that binds the soil particles in place creating a low permeability mass. The contaminated soil will be mixed in place together with solidifying agents (typically Portland cement) or other binding agents using an excavator or augers. The soil and binding agents are mixed to produce a solidified mass resulting in a low permeability monolith. The solidified mass will then be covered with a cover system as described in element 8 to prevent direct exposure to the solidified mass. The resulting solid matrix will reduce or eliminate mobility of contamination and also reduce or eliminate the matrix as a source of groundwater contamination.

6. Hudson River Dredging and Capping:

Dredging of coal tar contaminated sediments from the Hudson River channel where feasible, as described below. Contaminated dredge material will be dewatered and shipped off-site for proper treatment and disposal. A suitable benthic habitat will be established on the river bottom following dredging.

In areas near and above utility crossings, where dredging of contaminated sediment cannot be performed due to the possibility of damaging the utilities, coal tar contaminated sediment will be

capped in place to prevent the migration of tar into the water column and to provide a clean habitat for benthic organisms.

Similarly, along the steep river bank immediately adjacent to the site, where dredging would create significant safety concerns due to the potential for slope instability, contaminated sediments will be capped in place to prevent tar migration into the water column, and to provide a clean benthic habitat. Because of the steep slopes involved in this area, it is anticipated that this cap will be installed as overlapping panels, which will be anchored in place to prevent downslope slumping of the cap. Similar panels were successfully tested during the site investigation.

7. Cover System:

A site cover will be required to allow for industrial use of the site, except as noted below. 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 applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of one foot of soil placed over a demarcation layer. In the lower terrace area outside of the fenced regulator and transformer stations, the soil cover will meet commercial SCOs to allow for passive recreational use such as a riverfront walkway. Removal of shallow soil prior to the placement of the cover may be required in some areas in order to maintain the appropriate finished grade. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d).

Where the soil cover is required over the ISS treatment area, it will consist of a minimum of four feet of soil, in order to protect the underlying ISS mass from repeated freeze/thaw action. The uppermost foot of this soil cover must meet the SCOs for commercial use, due to the potential for this area along the riverfront to be included in future passive recreational facilities such as a riverfront walkway. For areas where solidified material underlies the cover, no demarcation layer is required. The solidified material itself will serve as the demarcation layer due to the obviously different nature of the material.

7. River and Riverbank Restoration:

The existing riverbank, made up largely of rip rap stone and a collapsing concrete crib wall, will be extensively disturbed during remediation. Existing gas and electric infrastructure along the riverbank must be protected as the site is remediated and restored. The remedial design will include a riverbank restoration plan which will incorporate measures to maximize wildlife habitat while protecting energy infrastructure and allowing for future development of a public access walkway along the river bank. Natural stream bank techniques will be employed to the extent practicable. All remedial and restoration work will comply with the substantive requirements of ECL Article 15 and 6 NYCRR Part 608.

8. Institutional Controls:

Imposition of institutional controls in the form of environmental easements for the controlled

properties that:

- require 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);
- allow the use and development of the controlled property for industrial use, except for areas where public access will be provided, which will be commercial use, as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or Dutchess County DOH; and
- require compliance with the Department approved Site Management Plan.

9. Site Management Plan

A Site Management Plan is required, which includes the following:

1. 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 ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls:

The Environmental Easement discussed in Paragraph 8 above.

Engineering Controls:

- The cover system discussed in Paragraph 7 above;
- The solidified soils discussed in Paragraph 5 above;
- The sediment cap discussed in Paragraph 6 above; and
- The coal tar recovery system discussed in Paragraph 4 above.

This plan includes, but may not be limited to:

- o an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
- o descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
- o a provision for evaluation of the potential for soil vapor intrusion if the current building becomes occupied or if new buildings are developed on the site in the future, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
- o provisions for the management and inspection of the identified engineering controls;
- o maintaining site access controls and Department notification; and
- o the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

2. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:

- o monitoring of groundwater to assess the performance and effectiveness of the remedy;
- o a schedule of monitoring and frequency of submittals to the Department;

o monitoring for vapor intrusion for any occupied existing or future buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

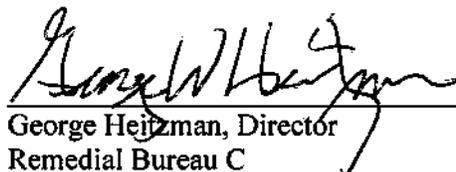
3. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:

- o procedures for operating and maintaining the remedy;
- o compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
- o maintaining site access controls and Department notification; and
- o providing the Department access to the site and O&M records.

Declaration

The remedy conforms with promulgated standards and criteria that are directly applicable, or that are relevant and appropriate and takes into consideration Department guidance, as appropriate. The remedy is protective of public health and the environment.

March 30, 2016
Date


George Heitzman, Director
Remedial Bureau C

DECISION DOCUMENT

CH - Water St. - Poughkeepsie MGP
Poughkeepsie, Dutchess County
Site No. C314070
March 2016

SECTION 1: SUMMARY AND PURPOSE

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the above referenced site. The disposal of contaminants at the site has resulted in threats to public health and the environment that would be addressed by the remedy. The disposal or release of contaminants at this site, as more fully described in this document, has contaminated various environmental media. Contaminants include hazardous waste and/or petroleum.

The New York State Brownfield Cleanup Program (BCP) is a voluntary program. The goal of the BCP is to enhance private-sector cleanups of brownfields and to reduce development pressure on "greenfields." A brownfield site is real property, the redevelopment or reuse of which may be complicated by the presence or potential presence of a contaminant.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and 6 NYCRR Part 375. This document is a summary of the information that can be found in the site-related reports and documents.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held, during which the public was encouraged to submit comment on the proposed remedy. All comments on the remedy received during the comment period were considered by the Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repository:

Adriance Memorial Library
93 Market Street
Poughkeepsie, NY 12601
Phone: (845) - 485 – 3445

Receive Site Citizen Participation Information By Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email

listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at <http://www.dec.ny.gov/chemical/61092.html>

SECTION 3: SITE DESCRIPTION AND HISTORY

Location:

The site is located on the eastern bank of the Hudson River at the end of Dutchess Avenue, in the north end of the City of Poughkeepsie. The site is approximately 13 acres in size and is bounded by: the Hudson River to the west, Dutchess Avenue to the north, North Water Street to the east and the Fallkill Creek to the south. An abandoned lumber treatment facility (AC Dutton Lumber), remediated under a Brownfield Cleanup Agreement and currently under redevelopment, forms the remainder of the northern site boundary. To the east, beyond Water Street, lies a Metro North railroad yard.

Site Features:

The upland portion of the site consists of two relatively flat terraces, separated by steep, rocky slopes with very thin soil cover. The lower terrace lies on the banks of the Hudson River, roughly 5-10 feet above sea level. The upper terrace is roughly 50 feet higher, bordering Water Street. The only structure located at the site is an unoccupied cinder block valve house associated with the gas regulator station.

Important energy infrastructure is located on the site. Gas and electric lines cross beneath the Hudson River at this location, and connect with gas and electrical lines which serve much wider areas surrounding Poughkeepsie. An electrical transformer station is located on the lower terrace at the southwestern portion of the site, where the electrical transmission line meets the shoreline and a natural gas regulator station occupies the northwestern corner of the lower terrace of the site where the gas transmission line meets the shoreline. The transformer station and regulator station are each enclosed within a fence.

Current Zoning and Land Use:

The site is zoned for industrial use. Surrounding land uses are predominantly, but not exclusively, industrial. Immediately north and south of the site, riverfront access provides for recreational use of the waterfront. Immediately across Dutchess Avenue to the north of the site, a large scale restricted residential redevelopment is underway. Two residences are situated directly across Dutchess Avenue at the northeast corner of the site.

The City of Poughkeepsie has supported efforts to construct a continuous pedestrian walkway along the river bank, and to connect this walkway with the Walkway Over the Hudson, which occupies a former railroad bridge that spans the site and the Hudson River. It is anticipated that the riverfront walkway may be extended to include riverfront portions of this MGP site at some point in the future.

Past Uses of the Site:

The site housed a large manufactured gas plant (MGP) from 1911 to the mid-1950s. Coal tar from the gas manufacturing process leaked from storage vessels and piping, and is still present in the subsurface. Some of these tars still discharge sporadically into the Hudson River.

Previous investigations at the site include: Phase 1 Investigation (1986), Phase 2 Investigation (1990), Supplemental RCRA Testing (1991), Supplemental Preliminary Site Assessment (2000), Supplemental Land Investigation (2003), Supplemental Land and River Investigations (2004), Supplemental River and Land Investigations (2005).

Site Geology and Hydrogeology:

The upper tier of the site consists of highly deformed slate and limestone bedrock, with a very thin fill cover. The lower tier consists of fill containing broken rock derived from the blasting of the cliff face and silty sand. Bedrock on the lower tier ranges from 0 to 15' below grade, deepening toward the river.

Groundwater levels on the upper tier range from 10 to 19 feet below ground surface (bgs) and from 0 to 14 feet bgs on the lower tier. Flow in both the overburden and bedrock aquifers is to the west, toward the river. The Hudson River in this area is a tidal stream and tidal influences to near shore groundwater levels on the lower tier is pronounced.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. For this site, alternatives (or an alternative) that restrict(s) the use of the site to industrial use as described in Part 375-1.8(g) were/was evaluated in addition to an alternative which would allow for unrestricted use of the site.

A comparison of the results of the Remedial Investigation (RI) to the appropriate standards, criteria and guidance values (SCGs) for the identified land use and the unrestricted use SCGs for the site contaminants is available in the RI Report.

SECTION 5: ENFORCEMENT STATUS

The Applicant under the Brownfield Cleanup Agreement is a Participant. The Applicant has an obligation to address on-site and off-site contamination. Accordingly, no enforcement actions are necessary.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation

A remedial investigation (RI) serves as the mechanism for collecting data to:

- characterize site conditions;
- determine the nature of the contamination; and
- assess risk to human health and the environment.

The RI is intended to identify the nature (or type) of contamination which may be present at a site and the extent of that contamination in the environment on the site, or leaving the site. The RI reports on data gathered to determine if the soil, groundwater, soil vapor, indoor air, surface water or sediments may have been contaminated. Monitoring wells are installed to assess groundwater and soil borings or test pits are installed to sample soil and/or waste(s) identified. If other natural resources are present, such as surface water bodies or wetlands, the water and sediment may be sampled as well. Based on the presence of contaminants in soil and groundwater, soil vapor will also be sampled for the presence of contamination. Data collected in the RI influence the development of remedial alternatives. The RI report is available for review in the site document repository and the results are summarized in section 6.3.

The analytical data collected on this site includes data for:

- groundwater
- surface water
- soil
- sediment
- soil vapor

6.1.1: 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 soil. The NYSDOH has developed SCGs for drinking water and soil vapor intrusion. For a full listing of all SCGs see: <http://www.dec.ny.gov/regulations/61794.html>

6.1.2: RI Results

The data have identified contaminants of concern. A "contaminant of concern" is a contaminant that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The nature and extent of contamination and environmental media requiring action are summarized below. Additionally, the RI Report contains a full discussion of the data. The contaminant(s) of concern identified at this site is/are:

coal tar

benzene, toluene, ethylbenzene and
xylenes (BTEX)

polycyclic aromatic hydrocarbons (PAHS),
total

The contaminant(s) of concern exceed the applicable SCGs for:

- groundwater
- soil
- sediment

6.2: 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 Decision Document.

The following IRM(s) has/have been completed at this site based on conditions observed during the RI.

Shallow soil removal for construction of elevator to the Walkway Over the Hudson

A soil removal IRM was conducted in 2012 by Central Hudson Gas and Electric, to allow for construction of an elevator to the Walkway Over the Hudson (WOTH) New York State Park and a pedestrian walkway to reach the elevator.

The IRM for the elevator to the WOTH included the removal and off-site disposal of the uppermost 2 feet of soil located on the southern portion of the site adjacent to a proposed new walking pathway and elevator. Clean soil meeting restricted residential SCOs was then placed above a demarcation layer as backfill in the excavated area. The walking pathway and elevator associated with the WOTH, were constructed by others and were not part of the IRM. They are separated from the rest of the site by a fence.

6.3: 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 RI report presents a detailed discussion of any existing and potential impacts from the site to fish and wildlife receptors.

Contaminants of Concern:

The principal waste disposed on the site was MGP tar, which is a brown, oily liquid that is slightly denser than water. Large amounts of this tar escaped into the subsurface from plant structures located on the lower terrace near the river bank. This tar can still be found in soils and bedrock beneath the site. Tar was also discharged directly to the Hudson River, where it is found in sediments on the river bottom.

The tar contains high levels of benzene, toluene, ethylbenzene and xylenes, collectively known as BTEX, and polycyclic aromatic hydrocarbon (PAH) compounds. Both groups of compounds have been found in site groundwater.

Impacted Media:

The soil and bedrock aquifers beneath the western portion of the site, along the banks of the Hudson River, are contaminated with separate phase MGP tar and with dissolved BTEX and PAH compounds derived from the tar. MGP tar is being collected on a bi-annual basis from two wells along the western boundary of the site. Over 500 gallons have been collected from one overburden well along the riverfront. Hudson River sediments contain MGP tar and PAH contamination derived from the tar.

Subsurface Soil and Bedrock:

On the upper tier of the site, tar was observed in bedrock fractures in 3 of 32 soil borings. On the lower tier of the site, tar was observed in subsurface soil in 54 of 68 sample locations. BTEX was detected in 15 of the 20 samples analyzed. PAH constituents were detected in 19 of 20 samples. Total BTEX concentrations ranged from 0.001 to 916 parts per million (ppm) and total PAH concentrations ranged from 0.17 ppm to 16,300 ppm. Twelve of the 20 samples analyzed contained concentrations of the following individual constituents above the industrial use SCOs: benzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, naphthalene, phenanthrene, and pyrene.

Six subsurface soil samples were collected and analyzed for target analyte list (TAL) metals. One or more metals were detected at each location. Arsenic was detected at concentrations exceeding industrial use SCOs at one location that is co-located with visible non-aqueous phase liquid (NAPL) and industrial use SCO exceedances for PAHs.

Surface Soil:

Twenty-two surface soil samples were collected and analyzed for BTEX and PAHs. BTEX constituents were detected in 7 of the 22 samples with total BTEX concentrations ranging from 0.00061 ppm to 151 ppm. No samples exhibited concentrations of individual BTEX constituents above industrial use SCOs. PAH constituents were detected in 21 of the 22 samples, with detected total PAH concentrations ranging from 0.55 ppm to 5,200 ppm. Thirteen of the twenty-two samples exhibited concentrations of one or more of the following individual PAH constituents exceeding industrial use SCOs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3,c-d)pyrene, naphthalene.

Twenty surface soil samples were analyzed for TAL metals. Measurable concentrations of metals were detected in 14 of the 20 samples. None of the concentrations exceeded industrial use SCOs.

Groundwater:

In three overburden wells sampled, BTEX concentrations ranged from non-detect to 9,744 parts per billion (ppb) and total PAH concentrations ranged from non-detect to 691 ppb. Trace thicknesses of NAPL were observed in all three overburden wells. In four bedrock wells sampled, total BTEX concentrations ranged from non-detect to 138 ppb and total PAH

concentrations ranged from non-detect to 462 ppb. In three bedrock wells sampled for TAL metals, cadmium was detected at concentrations ranging from 5 to 8 ppb and cyanide was detected at concentrations ranging from 80 to 460 ppb. Trace thicknesses of NAPL were observed in three of the four bedrock wells sampled.

Groundwater samples exceeded Ambient Water Quality Standards for the following individual constituents: benzene, ethylbenzene, m/p-Xylene, o-Xylene and toluene; acenaphthene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene, cadmium and cyanide.

Sediment:

Tar impacted sediments extend approximately 300 feet from the shoreline, and from approximately 350 feet north of the gas transmission line to approximately 350 feet south of the electrical transmission line. BTEX was observed in each of the nine sediment samples analyzed for volatile organic compounds (VOCs), with total BTEX concentrations ranging from 0.0091 ppm to 1,310 ppm. PAHs were detected in 239 of 249 samples analyzed for semi-volatile organic compounds (SVOCs), with concentrations ranging from non-detect to 21,200 ppm. 207 of the 239 samples collected for SVOC analysis exceeded the Class A sediment screening value of 4 ppm total PAH.

Surface Water:

Three surface water samples were collected from the Hudson River for analysis. Although none of the analytical results exceeded ambient water quality standards, the gas ebullition within tar-impacted river sediments routinely results in sheens and slicks on the river surface near the site.

Soil Vapor:

Two of the twenty four soil vapor samples collected on the site exhibited detectable levels of benzene ranging from 32 ug/m³ to 64 ug/m³ respectively .

Special Resources impacted.

The Hudson River is impacted by coal tar in the area near the MGP site, with both sediments and the overlying water column affected. Tar continues to move into the Hudson River by subsurface migration from upland source areas, but the principal impact of tar to the water column is the result of releases of tar from the tar contaminated on the river bottom which causes frequent slicks and sheens on the water surface, primarily during the warm weather months.

The site is within the Kingston-Poughkeepsie Deepwater Significant Coastal Fish and Wildlife Habitat area, a stretch of the Hudson River that is ecologically important to the life history of two endangered species, the Atlantic and Shortnose Sturgeon

6.4: 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*.

Access to the site is restricted and measures are in place to control the potential for coming in contact with subsurface soil and groundwater contamination remaining on the site. Contaminated groundwater at the site is not used for drinking or other purposes, and the site is served by a public water supply that obtains water from a different source not affected by this contamination. Volatile organic compounds in the soil or groundwater 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 movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. Because there are no occupied buildings on the site, the inhalation of site-related contaminants due to soil vapor intrusion does not represent a current concern. People using the Hudson River for recreational purposes such as boating may come into contact with site-related contaminants associated with sheens present on the water's surface.

6.5: 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 action objectives for this site are:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Surface Water

RAOs for Public Health Protection

- Prevent contact or inhalation of contaminants from impacted water bodies.
- Prevent surface water contamination which may result in fish advisories.

RAOs for Environmental Protection

- Prevent impacts to biota from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through the marine or aquatic food chain.

Sediment

RAOs for Public Health Protection

- Prevent direct contact with contaminated sediments.
- Prevent surface water contamination which may result in fish advisories.

RAOs for Environmental Protection

- Prevent releases of contaminant(s) from sediments that would result in surface water levels in excess of (ambient water quality criteria).
- Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain.
- Restore sediments to pre-release/background conditions to the extent feasible.

Soil Vapor

RAOs for Public Health Protection

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

SECTION 7: ELEMENTS OF THE SELECTED REMEDY

The alternatives developed for the site and the evaluation of the remedial criteria are presented in the Alternative Analysis. The remedy is selected pursuant to the remedy selection criteria set forth in DER-10, Technical Guidance for Site Investigation and Remediation and 6 NYCRR Part 375.

The selected remedy is a Track 2: Restricted use with generic soil cleanup objectives remedy.

The selected remedy is referred to as the Source Excavation, Barrier Wall with Tar Collection, and Sediment Removal with L remedy.

The elements of the selected remedy, as shown in Figure 2, are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the remedial program. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows;

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;

- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible;
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals; and
- Integrating the remedy with the end use where possible and encouraging green and sustainable re-development.

2. Excavation and off-site disposal of upland contaminant source areas, located in the northern portion of the lower terrace area, to include:

- grossly contaminated soil, as defined in 6 NYCRR Part 375-1.2(u);
- removal of all underground MGP structures and underground piping; and
- soil containing visual coal tar or non-aqueous phase liquid;

3. Barrier Wall:

A subsurface barrier wall will be installed along the east bank of the Hudson River to prevent the migration of coal tar to the river. The wall will be constructed along the eastern bank of the river from the gas utility crossing immediately south of Dutchess Ave to a point approximately 450 feet to the south, where the walkway over the Hudson extends above the site. The wall will extend to a sufficient depth to prevent further movement of coal tar into the river. The final wall configuration, including the need for hydraulic relief and associated treatment, will be determined during the design phase of this project.

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A series of coal tar recovery wells will be constructed behind the barrier wall to collect coal tar that accumulates behind the wall. The number, depth, type and spacing of the recovery wells will be determined during the design phase of the remedy. Coal tar will be collected periodically from each well; however, if wells are determined by the Department to accumulate large quantities of coal tar over extended time periods, they can be converted to automated collection.

5. In-situ Solidification:

In the area where the natural gas pipeline enters the upland portion of the site, which precludes the safe construction of the barrier wall, focused solidification (ISS) of soil horizons containing coal tar will be performed to prevent migration of coal tar toward the river

ISS is a process that binds the soil particles in place creating a low permeability mass. The contaminated soil will be mixed in place together with solidifying agents (typically Portland cement) or other binding agents using an excavator or augers. The soil and binding agents are mixed to produce a solidified mass resulting in a low permeability monolith. The solidified mass

will then be covered with a cover system as described in element 8 to prevent direct exposure to the solidified mass. The resulting solid matrix will reduce or eliminate mobility of contamination and also reduce or eliminate the matrix as a source of groundwater contamination.

6. Hudson River Dredging and Capping:

Dredging of coal tar contaminated sediments from the Hudson River channel where feasible, as described below. Contaminated dredge material will be dewatered and shipped off-site for proper treatment and disposal. A suitable benthic habitat will be established on the river bottom following dredging.

In areas near and above utility crossings, where dredging of contaminated sediment cannot be performed due to the possibility of damaging the utilities, coal tar contaminated sediment will be capped in place to prevent the migration of tar into the water column and to provide a clean habitat for benthic organisms.

Similarly, along the steep river bank immediately adjacent to the site, where dredging would create significant safety concerns due to the potential for slope instability, contaminated sediments will be capped in place to prevent tar migration into the water column, and to provide a clean benthic habitat. Because of the steep slopes involved in this area, it is anticipated that this cap will be installed as overlapping panels, which will be anchored in place to prevent downslope slumping of the cap. Similar panels were successfully tested during the site investigation.

7. Cover System:

A site cover will be required to allow for industrial use of the site, except as noted below. 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 applicable soil cleanup objectives (SCOs). Where the soil cover is required it will be a minimum of one foot of soil placed over a demarcation layer. In the lower terrace area outside of the fenced regulator and transformer stations, the soil cover will meet commercial SCOs to allow for passive recreational use such as a riverfront walkway. Removal of shallow soil prior to the placement of the cover may be required in some areas in order to maintain the appropriate finished grade. Soil cover material, including any fill material brought to the site, will meet the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d).

Where the soil cover is required over the ISS treatment area, it will consist of a minimum of four feet of soil, in order to protect the underlying ISS mass from repeated freeze/thaw action. The uppermost foot of this soil cover must meet the SCOs for commercial use, due to the potential for this area along the riverfront to be included in future passive recreational facilities such as a riverfront walkway. For areas where solidified material underlies the cover, no demarcation layer is required. The solidified material itself will serve as the demarcation layer due to the obviously different nature of the material.

7. River and Riverbank Restoration:

The existing riverbank, made up largely of rip rap stone and a collapsing concrete crib wall, will be extensively disturbed during remediation. Existing gas and electric infrastructure along the riverbank must be protected as the site is remediated and restored. The remedial design will include a riverbank restoration plan which will incorporate measures to maximize wildlife habitat while protecting energy infrastructure and allowing for future development of a public access walkway along the river bank. Natural stream bank techniques will be employed to the extent practicable. All remedial and restoration work will comply with the substantive requirements of ECL Article 15 and 6 NYCRR Part 608.

8. Institutional Controls:

Imposition of institutional controls in the form of environmental easements for the controlled properties that:

- require 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);
- allow the use and development of the controlled property for industrial use, except for areas where public access will be provided, which will be commercial use, as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or Dutchess County DOH; and
- require compliance with the Department approved Site Management Plan.

9. Site Management Plan

A Site Management Plan is required, which includes the following:

1. 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 ensure the following institutional and/or engineering controls remain in place and effective:

Institutional Controls:

The Environmental Easement discussed in Paragraph 8 above.

Engineering Controls:

- The cover system discussed in Paragraph 7 above;
- The solidified soils discussed in Paragraph 5 above;
- The sediment cap discussed in Paragraph 6 above; and
- The coal tar recovery system discussed in Paragraph 4 above.

This plan includes, but may not be limited to:

- o an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;

- o descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
 - o a provision for evaluation of the potential for soil vapor intrusion if the current building becomes occupied or if new buildings are developed on the site in the future, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
 - o provisions for the management and inspection of the identified engineering controls;
 - o maintaining site access controls and Department notification; and
 - o the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.
2. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
- o monitoring of groundwater to assess the performance and effectiveness of the remedy;
 - o a schedule of monitoring and frequency of submittals to the Department;
 - o monitoring for vapor intrusion for any occupied existing or future buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.
3. an Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy. The plan includes, but is not limited to:
- o procedures for operating and maintaining the remedy;
 - o compliance monitoring of treatment systems to ensure proper O&M as well as providing the data for any necessary permit or permit equivalent reporting;
 - o maintaining site access controls and Department notification; and
 - o providing the Department access to the site and O&M records.



— Site Boundary

