Superfund Proposed Plan

Meeker Avenue Plume Superfund Site

Brooklyn, Kings County, New York

Superfund Proposed Plan *April 2024*

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes the remedial alternatives that the United States Environmental Protection Agency (EPA) considered to address vapor intrusion impacts at residential and non-residential properties at the Meeker Avenue Plume Superfund site (Site) located in Brooklyn, New York. This Proposed Plan also identifies EPA's preferred remedial alternative and provides the rationale for this preference.

The Site is being addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as the Superfund Law), as amended. A broad, comprehensive remedial investigation and feasibility study (RI/FS) for the Site is currently ongoing, which is referred to as Operable Unit 1 (OU1) of the Site. The OU1 RI/FS includes sampling at properties potentially impacted by subsurface vapors caused by Site-related contamination that can migrate under structures and up into an overlying structure (called "vapor intrusion"). This Proposed Plan has a narrower focus that is referred to as Operable Unit 2 (OU2) of the Site, which is to address mitigating the effects of unacceptable levels of vapor intrusion at residential and non-residential properties that are identified at the Site.

EPA's preferred alternative for OU2 calls for the installation of sub-slab depressurization systems at residential and non-residential properties where multiple lines of evidence indicate that subsurface vapor intrusion resulting from Site-related contamination is occurring at concentrations that represent a threat or potential threat to human health, as well as additional preventative measures, where necessary, such as the sealing of cracks and gaps in the lowest level of a structure. To use multiple lines of evidence means that EPA will evaluate multiple pieces of information and data to support a conclusion.

This Proposed Plan was developed by EPA, the lead agency, in consultation with the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH), the support agencies. EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of

MARK YOUR CALENDARS

Public Comment Period:
April 5, 2024 to May 10, 2024
EPA will accept written comments on the Proposed Plan during the public comment period. Written comments should be addressed to:

Rupika Ketu
Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 18th Floor
New York, NY 10007
Email: ketu.rupika@epa.gov

Written comments must be postmarked no later than May 10, 2024. To request an extension, send a request in writing to Rupika Ketu by 5:00 pm on May 10, 2024.

Public Meeting
April 16, 2024
6:00 to 8:00 pm
St. Stanislaus Kostka Church
607 Humboldt Street
Brooklyn, New York 11222

EPA will hold a public meeting to explain the Proposed Plan. Oral and written comments will also be accepted at the meeting.

In addition, documents from the administrative record are available online at:
https://www.epa.gov/superfund/meeker-avenue-plume

CERCLA, as amended, and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Release of this Proposed Plan initiates a 30-day public comment period. EPA, in consultation with NYSDEC and NYSDOH, will select a final remedy for OU2 after reviewing and considering all information submitted during the public comment period. EPA, in consultation with NYSDEC, may modify the preferred alternative or select another alternative presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives presented in this Proposed Plan.

This Proposed Plan summarizes information that can be found in greater detail in the focused feasibility study (FFS) report prepared for OU2, which can be found in the administrative record for this remedial decision. The dates for the public comment period, the public meeting described below, and the location of the administrative record can be found in the "Mark Your Calendars" text box on Page 1 and in the "For Further Information" text box on Page 12. EPA and NYSDEC encourage the public to review these documents to gain a more comprehensive understanding of activities for the Site.

COMMUNITY ROLE IN SELECTION PROCESS

This Proposed Plan is being issued to inform the public of EPA's preferred alternative to address vapor intrusion impacts at the Site and to solicit public comments pertaining to all of the remedial alternatives evaluated, including the preferred alternative. Changes to the preferred alternative, or a change to another alternative, may be made if public comments or additional data indicate that such a change would result in a more appropriate remedial action. The final decision regarding a selected remedy will be made after EPA has taken into consideration all public comments. EPA is soliciting public comments on all of the alternatives considered in the Proposed Plan because EPA may select a remedy other than the preferred alternative.

This Proposed Plan has been made available to the public for a public comment period that concludes on May 10, 2024.

A public meeting will be held during the public comment period to present the conclusions of the FFS, to elaborate further on the reasons for proposing the preferred alternative, and to receive public comments. The public meeting will include a presentation by EPA of the preferred alternative and other cleanup options.

Comments received at the public meeting, as well as written comments received during the public comment period, will be documented in a Responsiveness Summary section of a Record of Decision (ROD), along with EPA's responses. A ROD is a document that memorializes the selection of a remedy and the basis for the selection.

SCOPE AND ROLE OF THE ACTION

As with many Superfund sites, the contamination at this Site is complex, and the cleanup is being managed through more than one operable unit.

As described above, OU1 currently is broader and more comprehensive than the more focused OU2. A comprehensive RI/FS for OU1 was initiated in 2023 and is ongoing. That RI/FS includes the investigation of all media at the Site, including soil, soil gas, groundwater, surface water, sediment, and air.

This Proposed Plan identifies an interim remedy for OU2, which is to address unacceptable risks in indoor air resulting from Site-related contamination. The RI/FS for OU1 is still in its early stages. As such, the OU2 alternatives are being considered interim while EPA's overall conceptual site model of the Site is being developed. Any selected remedy for OU2 will be reviewed on an ongoing basis to determine if any changes to the selected alternative are needed.

The ongoing performance of vapor intrusion sampling to identify additional properties where the potential for vapor intrusion of Site-related contamination poses unacceptable risks will continue as part of OU1 of the Site. EPA's goal is to conduct vapor intrusion sampling at as many properties as possible at the Site.

SITE DESCRIPTION

The Site is located in Brooklyn, Kings County, New York and spans approximately 191 acres across several city blocks in the Greenpoint and East Williamsburg area of Brooklyn. The Brooklyn-Queens Expressway (BQE) roughly bisects the Site in a west-southwest to

east-northeast direction. The Site includes a mixture of residential, commercial, and industrial uses. These land use designations are not anticipated to change in the future. The total population within the Greenpoint and Williamsburg neighborhoods of Brooklyn where the Site is located is approximately 160,000 people.

Figure 1 at the end of this document shows the Site and the interim Study Area boundary, where Study Area is defined as the area where the OU1 RI/FS activities are currently focused. The interim Study Area boundary will be refined as the OU1 RI/FS continues and more data are obtained.

SITE BACKGROUND

The Site is located in a region of historic petroleum refining and storage operations that have occupied a significant portion of the Greenpoint area since approximately 1866. Currently, bulk oil storage terminals exist north of the Site and include the former British Petroleum Terminal (now Kinder Morgan) and the ExxonMobil Brooklyn Terminal. The former Paragon Oil facility was located along the northeastern portion of the Site along Newtown Creek, north of Bridgewater Street, between Meeker Avenue and Apollo Street. The contamination associated with the Site was discovered by NYSDEC during investigation and remediation of an adjacent and overlapping petroleum groundwater contamination area, which had resulted from historical petroleum refining and storage operations along the banks of Newtown Creek. During several rounds of investigation, chlorinated volatile organic compounds (CVOCs), including but not limited to trichlorethylene (TCE) and tetrachlorethylene (PCE), were found in subsurface soil and groundwater outside the petroleum spill area. Upon discovery of the CVOC contamination, NYSDEC initiated investigations in the area to determine the extent and sources of CVOC contamination, as well as the potential impacts of this contamination on the community.

Since 2007, NYSDEC in conjunction with NYSDOH, has conducted multiple investigations related to the Site. These investigations have consisted of soil, groundwater, soil gas, and soil vapor intrusion sampling. NYSDEC completed nine separate Site characterization investigations between 2007 and 2016 and ten soil vapor intrusion investigations between 2007 and 2023. In total, NYSDEC sampled more than 166 properties and installed 29 sub-slab depressurization mitigation systems to address vapor intrusion throughout the course of their investigations.

On March 17, 2022, the Site was added to EPA's National Priorities List pursuant to CERCLA and officially became a Superfund site. As mentioned above, EPA is currently conducting the OU1 RI/FS for the Site.

Site Geology and Hydrogeology

Based on soil borings performed at and near the Site by NYSDEC and other investigators, the Site is underlain from the ground surface down by the Upper Glacial aquifer, the Raritan Formation, and crystalline bedrock. The primary hydrogeologic unit is the Upper Glacial aquifer, which consists of a terminal moraine, a ground moraine, and glacial outwash deposits, and it is characterized by the United States Geological Survey (USGS) as an unsorted and unstratified mixture of clay, sand, gravel, and boulders. Textural units identified by NYSDEC in the Upper Glacial aquifer at the Site include fill material, silty sand, sandy silt, sand, and localized clayey silt / silt. Based on slug test results from several Meeker Avenue Plume Site monitoring wells, the hydraulic conductivity of the Upper Glacial aquifer ranges from 8.32×10^{-5} centimeters per second (cm/s) to 2.91×10^{-2} cm/s.

At and near the Site, the Upper Glacial aquifer is underlain by the Raritan Formation unit at an approximate depth of 100 to 140 feet below ground surface. The Raritan Formation, which consists of clay, silty clay, and clayey to silty fine sand, exhibits hydraulic conductivity less than 10^{-6} cm/s and is recognized as a confining unit. The water table surface occurs in the Upper Glacial aquifer from approximately 10 to 60 feet below ground surface.

In general, natural groundwater flow in the aquifer is to the east and northeast. However, the large, off-site groundwater pump and treat system that has been operated since the mid-1990s as part of an effort to cleanup an overlapping petroleum groundwater contamination area has produced localized cones of depression.

The overall Site hydrogeology is being further explored through the OU1 RI/FS process.

SUMMARY OF ONGOING INVESTIGATIONS

Vapor Intrusion Description

The soil, soil gas, and groundwater at the Site are contaminated with CVOCs. CVOCs are a subset of volatile organic compounds (VOCs), which are substances that typically evaporate at room temperature. They can affect the indoor air of properties located in close proximity to contaminated areas by entering the indoor air of structures through small cracks, pipes or other points of entry. Soil vapor intrusion inside residential and commercial buildings is a major concern at the Site. VOCs are also commonly found in household products such as cleaning supplies, building products like paints and air fresheners. Therefore, sampling indoor air for the presence of Site-related contamination is a complicated process that involves sampling both the indoor air and the air beneath the structure over time. Common household sources of VOCs also need to be removed during testing so that the results can reliably reflect what may be entering the structure from the contaminated material beneath it, as opposed to from materials in the building.

The soil vapor intrusion sampling being conducted by EPA as part of the OU1 RI/FS is typically a three-day process, which can generally be described as follows, though slight modifications to this approach can be made on an as-needed basis:

- Day 1: EPA inspects the property for any potential sources of VOCs and temporarily stores any that are found. EPA then installs a sub-slab soil gas port, which involves drilling an approximately quarter-sized hole through the lowest level floor of a structure. Day 1 activities typically takes EPA between 1 and 1.5 hours to complete.
- Day 2: EPA returns to make sure the port is functioning properly and, assuming it is, places sampling devices throughout the lowest one or two levels of the property (typically, basement and first floor). These sampling devices need to be left in place to collect air passively for 24 hours for residential properties and at least 8 hours for non-residential properties. Day 2 activities typically take EPA about 1 hour to complete.
- Day 3: EPA returns to collect the air samplers, which typically takes less than 1 hour to complete.

WHAT IS NEEDED TO HAVE A COMPLETE VAPOR INTRUSION PATHWAY?

In order for the vapor intrusion pathway to be complete, there must be volatilization of Site-related contaminants from contaminated groundwater or other subsurface sources through the vadose (or unsaturated) zone to the soil vapor underneath a structure (i.e., sub-slab soil vapor). These contaminants can then migrate through the slab into indoor air. Contaminant vapors move from an area of higher concentration to an area of lower concentration. The vapor intrusion pathway is complete when Site-related contaminants migrate into indoor air where vapors may be inhaled.

Ideally, this sampling is conducted during the winter heating season, which runs from mid-November through March in the New York City area, because this is when the greatest potential for subsurface vapor intrusion is expected to occur.

The results of the sampling are evaluated through multiple lines of evidence to make recommendations on next steps. The potential recommendations may include (1) that the results clearly indicate that no action is required; (2) that the results are not clear and additional sampling is required; or (3) the results indicate that contamination from the soil, groundwater, and/or soil gas is entering or has the potential to enter the structure above Remedial Action Levels (further defined below) and, therefore, soil vapor mitigation in the structure is required.

The purpose of OU2 is to evaluate alternatives for addressing unacceptable risks associated with Site-related soil vapor intrusion when mitigation is required.

Current Status of Investigation

There are currently well over 1,000 properties within the preliminary Study Area for the Site that are at potentially impacted by vapor intrusion of Site-related contamination; the potential for vapor intrusion depends on multiple factors, including the condition of

the building itself and the level of contamination beneath and near a structure. As such, EPA's goal is to conduct vapor intrusion sampling at as many properties as possible within the Study Area. As part of this effort, EPA has been seeking consent for access to conduct the sampling while working closely with the community on outreach efforts to help increase awareness about the Site and encourage the public's overall willingness to provide access.

EPA began soil vapor intrusion sampling activities at the Site as part of OU1 in November 2022. As of December 2023, EPA has conducted vapor intrusion sampling and fully evaluated the results at 18 residential structures, 11 public housing buildings, and one public school. Out of these, EPA has determined that vapor mitigation is not needed at this time at any of the properties it has sampled, and that further monitoring should be conducted at three of the residential properties. In addition, in February and March 2024, EPA sampled 18 properties and will be evaluating the results, and will be conducting additional sampling in the future. NYSDEC did, however, identify 26 properties that they determined required the installation of sub-slab depressurization systems to mitigate risks from vapor intrusion when they were conducting work prior to the Site being designated as a Superfund site, and two that required the sealing of cracks/gaps. As such, EPA fully anticipates identifying additional properties that would require vapor intrusion mitigation during the ongoing OU1 RI/FS process.

EPA has recently completed an initial round of groundwater sampling at the Site. This sampling effort included surveying more than 370 existing groundwater monitoring wells and sampling 344 of these for CERCLA-related hazardous substances including VOCs, semi-volatile organic compounds, 1,4-dioxane, pesticides, polychlorinated biphenyls, metals, and per- and polyfluoroalkyl substances. Once the analytical results from the groundwater sampling are fully available, the data will be used to refine the extent of the preliminary Study Area, to determine the location of additional wells that need to be installed to fill in data gaps, and to help better determine areas where future vapor intrusion sampling should be conducted.

PRINCIPAL THREATS

Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. They include liquids and other highly mobile materials (*e.g.*, solvents) or materials having high concentrations of toxic compounds. A detailed explanation of principle threat wastes can be found in the information box, "What is a Principal Threat?" on this page.

WHAT IS A "PRINCIPAL THREAT?"

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air, or acts as a source for direct exposure. Contaminated groundwater generally is not considered a source material; however, non-aqueous phase liquids in groundwater may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. A decision whether and how to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria. This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

This response action does not address source materials constituting principal threat wastes because no such materials are part of this operable unit. The interim action that is being evaluated in this Proposed Plan solely addresses vapor intrusion of contaminants into structures from subsurface sources of contamination. Soil vapor is neither a source material nor a principal threat waste.

SUMMARY OF SITE RISKS

Human Health Risk Assessment

EPA conducted an expedited human health risk evaluation of the soil vapor intrusion exposure pathway

as part of the FFS for OU2 to estimate the risks associated with exposure to Site-related contaminants of potential concern (COPCs) in indoor air. The evaluation utilized data obtained by both NYSDEC and EPA.

The approach for the expedited risk evaluation consisted of comparing sub-slab soil vapor and indoor air concentrations against current, risk-based vapor intrusion screening levels (VISLs). Two residential properties previously assessed by NYSDEC, as well as one residential property assessed by EPA, were chosen for this evaluation. These properties were chosen because, based on a review of the data, they are representative of high-end exposure conditions.

Based on the results of the soil vapor intrusion sampling thus far, the primary Site-related COPCs associated with OU2 are currently PCE and TCE. As the OU1 RI/FS is still ongoing, it is possible that additional Site-related COPCs may be identified in the future, but the expedited risk evaluation focused on these two COPCs.

EPA recommends comparing the maximum detected sub-slab and indoor air results to the appropriate EPA VISLs for residential use based on a cancer risk of $1x10^{-6}$ or hazard quotient (HQ) of 1 when evaluating the VI pathway and determining potential risks. The results of these comparisons are provided below.

TCE: The concentration of TCE in the sub-slab at the residential properties that were evaluated ranged from 18 micrograms per meter cubed ($\mu g/m^3$) to 300 ug/m^3, and the concentration of TCE in the basement and/or first floor indoor air ranged from 0.549 $\mu g/m^3$ to 12 $\mu g/m^3$. The noncancer hazards associated with these concentrations ranged from an HQ <1 up to an HQ = 6, which exceeds the goal of protection of an HQ = 1. Cancer risks associated with exposure to TCE at the residential properties evaluated were all below $1x10^{-4}$. The HQ value and the significance of $1x10^{-4}$ are described in the information box on the next page entitled, "What is Human Health Risk and How is it Calculated?"

PCE: The concentration of PCE in the sub-slab at the residential properties that were evaluated ranged from 1,400 $\mu g/m^3$ to 4,200 $\mu g/m^3$, and the concentration of PCE in the basement and/or first floor indoor air ranged from 37 $\mu g/m^3$ to 170 $\mu g/m^3$. The noncancer hazards associated with these concentrations ranged from an

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases under current- and anticipated future-land uses. A four-step process is utilized for assessing site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at the site in various media (*i.e.*, soil, groundwater, surface water, and air) are identified based on such factors as toxicity, frequency of occurrence, and fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of and dermal contact with contaminated soil and ingestion of and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario that portrays the highest level of human exposure that could reasonably be expected to occur is calculated.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health hazards, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health hazards.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks for all COPCs. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a "one-in-ten-thousand excess cancer risk"; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of 10^{-4} to 10^{-6}, corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk. For non-cancer health effects, a "hazard index" (HI) is calculated. The key concept for a non-cancer HI is that a "threshold" (measured as an HI of less than or equal to 1) exists below which non-cancer health hazards are not expected to occur. The goal of protection is 10^{-6} for cancer risk and an HI of 1 for a noncancer health hazard. Chemicals that exceed a 10^{-4} cancer risk or an HI of 1 are typically those that will require remedial action at a site and are referred to as chemicals of concern, or COCs, in the final remedial decision document or Record of Decision.

HQ <1 up to an HQ = 4, which exceeds the goal of protection of an HQ = 1. Cancer risks associated with exposure to PCE at the residential properties evaluated were all below $1x10^{-4}$.

TCE and PCE are considered the contaminants of concern (COCs) for OU2.

Ecological Risk Assessment

The first step in an ecological risk assessment is to evaluate completed exposure pathways for ecological receptors. For OU2, there are no completed ecological exposure pathways, as the focus of this operable unit is centered on vapor intrusion into buildings. As such, an ecological risk assessment was not performed as part of the OU2 evaluation process.

Conclusion

Based on the results of the expedited human health risk evaluation, a remedial action is necessary to protect public health, welfare, and the environment from actual or threatened releases of hazardous substances.

It is EPA's judgment that the preferred alternative summarized in this Proposed Plan is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are specific goals to protect human health and the environment. These objectives are based on available information and standards such as Applicable or Relevant and Appropriate Requirements (ARARs), to-be-considered (TBC) advisories, criteria, and guidance, and site-specific risk-based levels, if applicable. The primary objective of any remedial strategy is overall protectiveness.

The following RAOs have been established for OU2 to address soil vapor intrusion risks at the Site:

- Prevent exposure by current and future occupants to Site-related PCE and TCE-contaminated vapors within structures that would result in a noncancer hazard index greater than 1.
- Prevent the migration of contaminated subsurface vapors into the indoor air of structures from Site-related PCE and TCE in soil and/or groundwater above remedial action levels based on current and reasonably anticipated future land use.

REMEDIAL ACTION LEVELS

To achieve the RAOs, EPA has identified the following Remedial Action Levels (RALs)[1] for TCE and PCE:

COC	Residential Remedial Action Levels ($\mu g/m^3$)		Commercial / Industrial Remedial Action Levels[2] ($\mu g/m^3$)	
	Indoor Air	Sub- slab	Indoor Air	Sub-slab
TCE	2.1	70	8.8	290
PCE	42	1,400	180	5,800

The RALs represent current EPA VISLs set at a target HQ = 1, which falls midway between EPA's cancer risk range of $1x10^{-6}$ to $1x10^{-4}$.

These RALs will be considered with other Site-specific lines of evidence such as subsurface geology and hydrogeology, the structural characteristics of each building, and proximity to other impacted structures in determining whether there is a need for remedial action. The need for remedial action will also be determined in consultation with NYSDEC and the New York State Department of Health (NYSDOH), including consideration of NYSDOH's Guidance for Evaluating Soil Vapor Intrusion in New York State.

SUMMARY OF REMEDIAL ALTERNATIVES

Section 121(b)(1) of CERCLA, 42 U.S.C. § 9621(b)(1), mandates that remedial actions must be protective of human health and the environment, be cost-effective,

[1] Consistent with EPA's Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway (OSWER 9200.2-154, 2015), the RALs are developed assuming an attenuation factor from sub-slab to indoor air of 33.

[2] The commercial/industrial RALs assume an eight-hour workday, which is protective of most non-residential settings and can be adjusted as needed to account for property-specific conditions.

comply with ARARs, and utilize permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) of CERCLA also establishes a preference for remedial actions that employ, as a principal element, treatment to reduce permanently and significantly the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site. Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants that at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to Section 121(d)(4) of CERCLA, 42 U.S.C. § 9621(d)(4).

Descriptions of the remedial alternatives considered to address vapor intrusion impacts resulting from Site-related contamination are provided below. More detail can be found in the FFS report prepared for OU2.

The construction time for each alternative does not include the time required to design the remedy, negotiate the performance of the remedy with any potentially responsible parties, or procure necessary contracts.

Alternative 1 - No Action

The NCP requires that a "No Action" alternative be evaluated to establish a baseline for comparison with other remedial alternatives. Under this alternative, no action would be taken with regard to addressing vapor intrusion at the Site.

Total Capital Cost:	*$0*
Total O&M:	*$0*
Total Cost:	*$0*
Construction Time:	*0 years*

Alternative 2 - Vapor Intrusion Mitigation

Under this alternative, vapor intrusion mitigation would be implemented at structures where EPA determines that, based on multiple lines of evidence, vapor intrusion of the COCs is occurring at concentrations that exceed the RALs. The goal of vapor intrusion mitigation would be to prevent contaminated soil vapors from entering and/or accumulating in structures at concentrations that represent a threat, or a potential threat, to human health. The potential for vapor intrusion to occur at a particular structure is dependent upon several factors, including subsurface geology and hydrogeology, the structural characteristics of the building, and proximity to other impacted structures or sources. Different impacted structures may therefore require different vapor mitigation strategies based on factors such as age of the building and construction type, the depth to groundwater beneath a structure, etc. For the purposes of the cost estimate, the mitigation actions include sealing cracks and gaps in the slab, installing a concrete slab or comparable membrane system in instances where only a dirt floor is present, and installing active sub-slab depressurization mitigation systems for a projected number of 100 properties, which is approximately 10 percent of the properties within the interim Study Area.

The cost estimate reflects the estimated costs for mitigation in the event that an estimated 100 structures within the Study Area are found to require vapor mitigation as a result of sampling and the other lines of evidence described above. The cost estimate also takes into consideration other factors including costs for addressing basements and crawl spaces without any existing concrete floor, as well as larger multi-unit structures that would require more depressurization points than smaller structures. The cost estimate also reflects one year of estimated costs for operation and maintenance (O&M) of sub-slab depressurization mitigation systems to ensure the systems are operating properly for the estimated 100 properties. The sampling and mitigation is expected to occur on a rolling basis over a period of five years. If it is determined that a property requires a sub-slab depressurization system, EPA will work with the owner to arrange for the installation of the system. Construction can be completed in as little as one day, and it can take up to one week or longer for the installation of larger commercial systems. The time required for the construction is dependent on property owners providing access.

The specific details and cost of the mitigation system for any particular building would be determined during remedial design.

Total Capital Cost:	*$1,124,000*
Total O&M:	*$21,200*
Total Cost:	*$1,145,200*
Construction Time:	*5 years*

EVALUATION OF ALTERNATIVES

In evaluating the remedial alternatives, EPA considers the following nine evaluation criteria set forth in the NCP: overall protection of human health and the environment; compliance with ARARs; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; cost; and state and community acceptance. Refer to the table below for a more detailed description of the evaluation criteria.

This section of the Proposed Plan summarizes the evaluation of the relative performance of each alternative against the nine criteria, noting how each compare to the others under consideration. A detailed analysis of alternatives can be found in the FFS.

Overall Protection of Human Health and the Environment

A threshold requirement of CERCLA is that the selected remedial action be protective of human health and the environment. An alternative is protective if it reduces current and potential future risk associated with each exposure pathway at a site to acceptable levels.

Alternative 1 (No Action) would not meet the RAOs and would not be protective of human health and the environment since no action would be taken.

Alternative 2 (Vapor Intrusion Mitigation) would control exposure to Site-related contaminants from vapor intrusion into residential and non-residential structures. Contaminated sub-slab vapor would be prevented from entering and/or accumulating in buildings at concentrations that represent a potential threat to human health. Therefore, when implemented at impacted buildings, Alternative 2 would be protective of human health and the environment.

Compliance with Applicable or Relevant and Appropriate Requirements

In accordance with the NCP (40 CFR § 300.430(f)(l)(ii)(c)(l)), interim actions such as this are not required to comply with ARARs as long as the final remedial action at the Site will attain them. Consequently, no ARARs have been identified for this interim action.

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES

Overall Protectiveness of Human Health and the Environment evaluates whether and how an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.

Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Long-Term Effectiveness and Permanence

Alternative 1 would involve no active remedial measures and, therefore, would not be effective in eliminating the potential exposure to contaminants. Alternative 2 would be effective in the long term. Previously installed vapor mitigation systems at other structures in the area have demonstrated effectiveness in addressing vapor intrusion concerns. Long-term effectiveness of the vapor intrusion mitigation systems would be provided by establishing and implementing O&M procedures to ensure that the systems continue to

mitigate the potential threat to human health posed by vapor intrusion at impacted structures at the Site.

Reduction of Toxicity, Mobility, Volume of Contamination through Treatment

Alternatives 1 and 2 would provide no reduction in toxicity, mobility, or volume. However, under Alternative 2, Site-related contaminants in vapor form would be prevented from entering into buildings at concentrations that represent a potential threat to human health.

Short-Term Effectiveness

Alternative 1 does not involve any active construction activities that could present a risk to workers or the public.

Implementation of Alternative 2 would not be expected to result in short-term risks to the community, the workers installing the vapor intrusion mitigation systems, or the environment in general. Any potential threats to the workers from inhaling hazardous substances in vapor form during system installation would be minimized with the implementation of appropriate health and safety measures.

As for short term impacts, no time is required for construction of Alternative 1. Under Alternative 2, the installation of sub-slab depressurization systems can be completed in as little as one day and it can take up to one week for the installation of larger commercial systems. While, for planning purposes, it is estimated that Alternative 2 may take up to five years to install the estimated 100 systems to address vapor intrusion concerns within the Study Area, this would not, however, be a continuous five years of effort. Rather, the installations would happen as the need is determined through the ongoing OU1 RI/FS process.

Implementability

Alternative 1 does not involve the application of any technology, therefore, there are no issues relating to feasibility of implementation.

Alternative 2 is considered to be readily implementable. The installation of vapor mitigation systems under Alternative 2 would use readily available services and equipment. Such systems have already been installed at other buildings in the area and have shown to be reliable and effective in addressing vapor intrusion and mitigating exposures.

Cost

There is no cost associated with Alternative 1 because no activities are implemented.

The estimated cost of Alternative 2 was developed as a range of costs because the total number of residential versus non-residential buildings that require vapor mitigation is not currently known. In addition, the actual costs could vary depending on the particular building and would be determined during design. The estimated total cost includes capital costs and O&M costs for one year to ensure the system is operating properly. After one year, O&M of the vapor mitigation system is turned over to the State.

Note that Alternative 2 provides for the potentiality of designing, installing, and maintaining vapor mitigation systems, but it does not address the electricity costs to operate the vapor mitigation system. The operating costs for these systems are minimal, similar to costs to operate radon mitigation systems, and they would be the responsibility of the property owner.

The estimated total cost for Alternative 2 is $1,145,200.

State Acceptance

NYSDEC concurs with EPA's preferred alternative.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Responsiveness Summary section of the ROD. Based on public comment, the preferred alternative could be modified from the version presented in this Proposed Plan.

PREFERRED REMEDY AND BASIS FOR PREFERENCE

Based upon an evaluation of the remedial alternatives, EPA, with the concurrence of NYSDEC, proposes Alternative 2, Vapor Intrusion Mitigation. Vapor intrusion mitigation would be implemented at residential and non-residential structures at the Site where multiple lines of evidence indicate that vapor

intrusion is occurring at concentrations that represent a threat or a potential threat to human health.

The potential for vapor intrusion to occur at a particular structure is dependent upon several factors, including subsurface geology and hydrogeology, the structural characteristics of each building, and proximity to other impacted structures or sources. Different impacted structures may therefore require different vapor mitigation strategies based on factors such as the age of the building and construction type, the depth to groundwater beneath a structure, etc. As such, the preferred alternative has the following key components, some or all of which may be used at any particular property: the installation of sub-slab mitigation systems; engineering measures such as the sealing of cracks and gaps in the lowest level slab of a structure; the installation of a concrete slab or comparable membrane system in instances where only a dirt floor is present; and one year of O&M. This alternative has the estimated total cost of $1,145,200.

Basis for the Remedy Preference

Alternative 2 (Vapor Intrusion Mitigation) is the preferred alternative because it meets the threshold criteria to protect human health and the environment by preventing contaminants of concern from entering indoor air at levels that pose an unacceptable risk. The exact number of residential properties to be remediated will be determined upon completion of additional vapor intrusion sampling during the ongoing OU1 RI/FS. Based upon the information currently available, EPA believes the preferred alternative meets the threshold criteria and provides the best balance of tradeoffs compared to the other alternative with respect to the balancing and modifying criteria set forth in the NCP. The preferred alternative is considered protective of human health and the environment in the short-term until a final remedy is implemented for the Site. Although this interim action is not intended to address fully the statutory mandates, the preferred alternative, if implemented, would satisfy the statutory requirements of Section 121(b) of CERCLA, namely being (1) protective of human health and the environment and (2) cost effective. EPA expects the final remedy for the site will fully satisfy the statutory requirements. The preferred alternative would be readily implementable using technologies proven to be effective at this Site, as well as similar sites. The short-term effects of the preferred alternative include potential impacts to workers, but these could be mitigated using appropriate health and safety measures.

The preferred alternative does not satisfy the preference for treatment because vapor intrusion mitigation systems do not treat the subsurface vapor source, and treatment of groundwater and/or soil gas is outside the scope of this interim action. The environmental benefits of the preferred alternative may be enhanced by consideration, during the design, of technologies and practices that are sustainable in accordance with both the EPA Region 2's Clean and Green Energy Policy and NYSDEC's Green Remediation Policy[3]. This would include consideration of green remediation technologies and practices.

With respect to the two modifying criteria of the comparative analysis, which are state acceptance and community acceptance, NYSDEC concurs with the preferred alternative and community acceptance will be evaluated upon the close of the public comment period.

COMMUNITY PARTICIPATION

EPA provides information regarding the cleanup of the Site to the public through meetings and announcements published in the local newspaper. EPA and NYSDEC encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that are being conducted there. The interim remedy for the Site will be selected after reviewing and considering all information submitted during a 30-day public comment period.

The dates for the public comment period, the date, location, and time of the public meeting, and the locations of the Administrative Record files are provided on the front page of this Proposed Plan.

[3] See http://www.epa.gov/greenercleanups/epa-region-2-cleanand-green-policy and http://www.dec.ny.gov/docs/remediation_hudson_pdf/der31.pdf

FOR FURTHER INFORMATION
The administrative record file, which contains copies of the Proposed Plan and supporting documentation, is available at the following locations:

EPA Region 2 Superfund Records Center
290 Broadway, 18th Floor
New York, New York 10007-1866
(212) 637-4308
Hours: Monday-Friday – 9 A.M. to 5 P.M.

Brooklyn
Greenpoint Public Library
107 Norman Avenue
Brooklyn, New York 11222
Hours:
Monday, Wednesday, Friday – 10 A.M. To 6 P.M.
Tuesday – 1 P.M. to 8 P.M.
Thursday – 10 A.M. to 8 P.M.
Saturday – 10 A.M. to 5 P.M.
Sunday -- Closed

In addition, the administrative record file is available on-line at:

https://www.epa.gov/superfund/meeker-avenue-plume

Figure 1 - Site Location Map