



Meeker Avenue Plume Superfund Site

Meeker Avenue Plume CAG Meeting

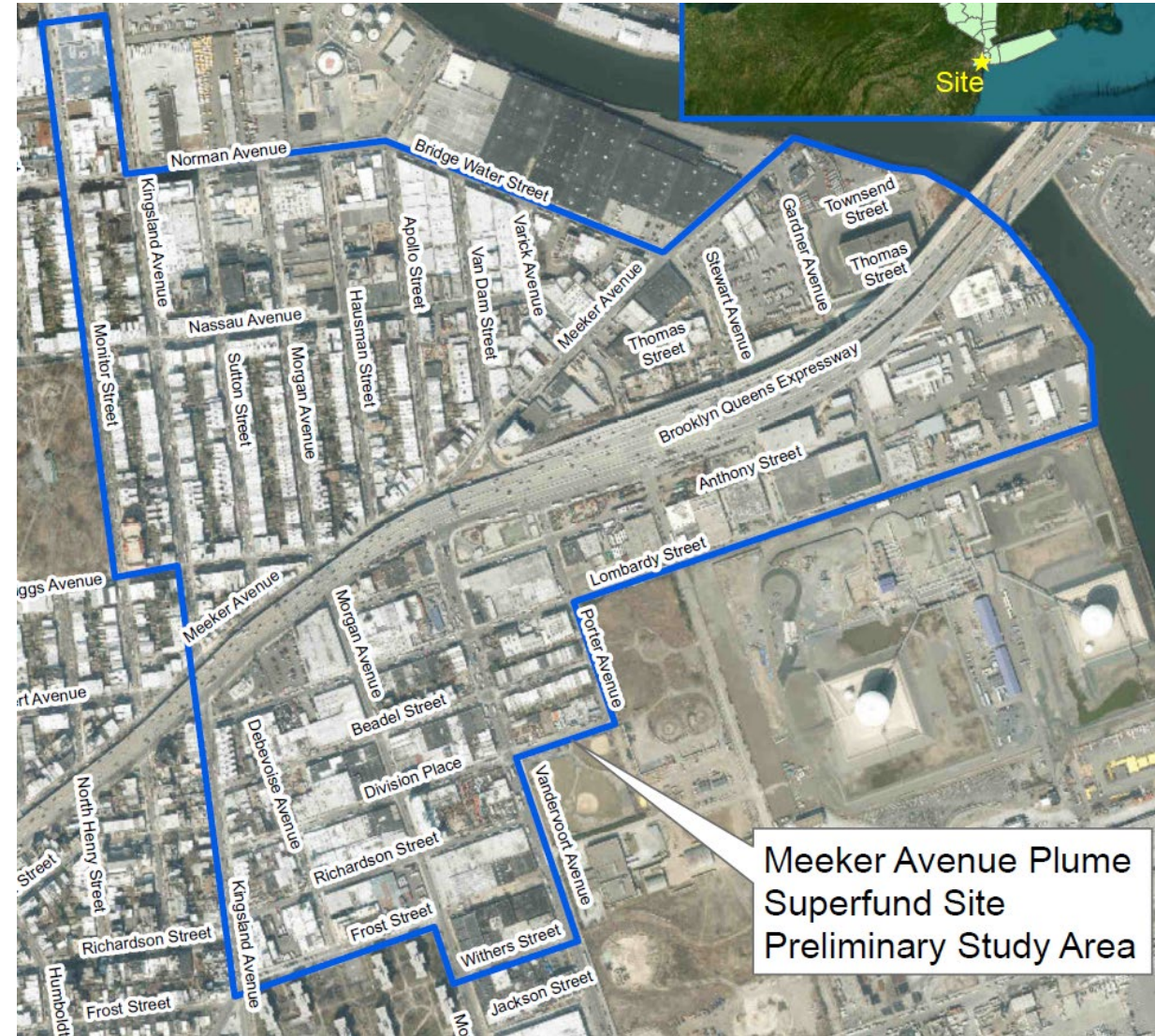
July 10, 2024

Agenda

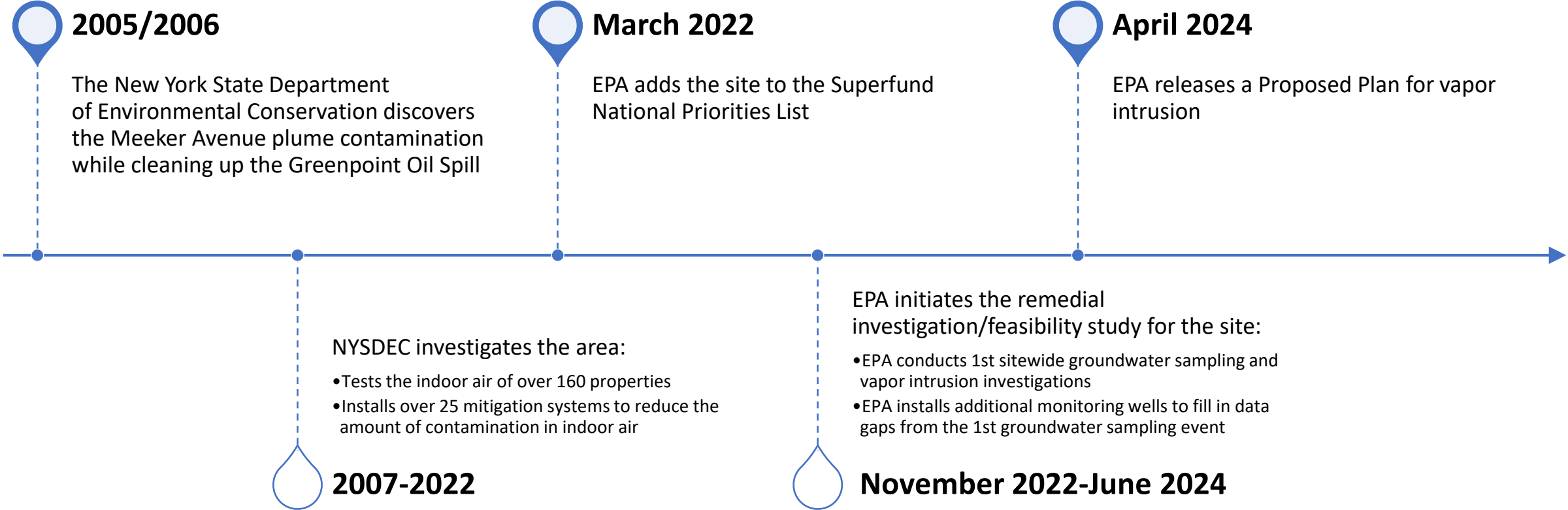
- Site Description / Overview
- Vapor Intrusion Sampling Update
- Monitoring Well Installation / Field Work
- Technical Assistance Grant Program
- Proposed Plan Comment Period
- Risk Assessment

Site Description

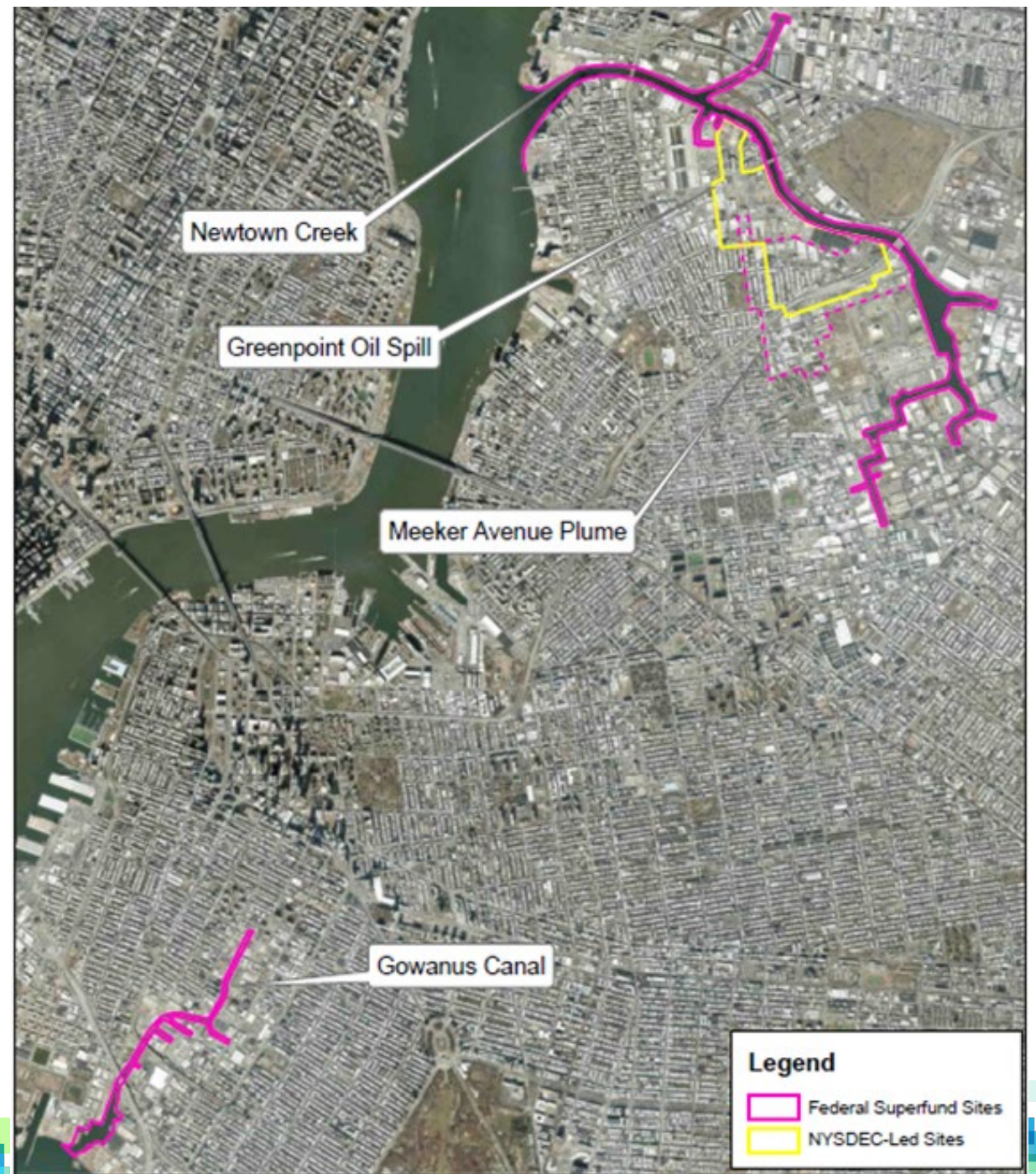
- The Meeker Avenue Plume Superfund site spans several city blocks in the Greenpoint/East Williamsburg area of Brooklyn, New York.
- The soil, soil gas and groundwater at the site are contaminated with chlorinated volatile organic compounds. Trichloroethylene, or TCE, and tetrachloroethylene, or PCE, are considered to be the primary contaminants of concern for vapor intrusion at the site.
- The EPA has not yet determined the full nature and extent of contamination.
- Vapor intrusion is a major health concern.



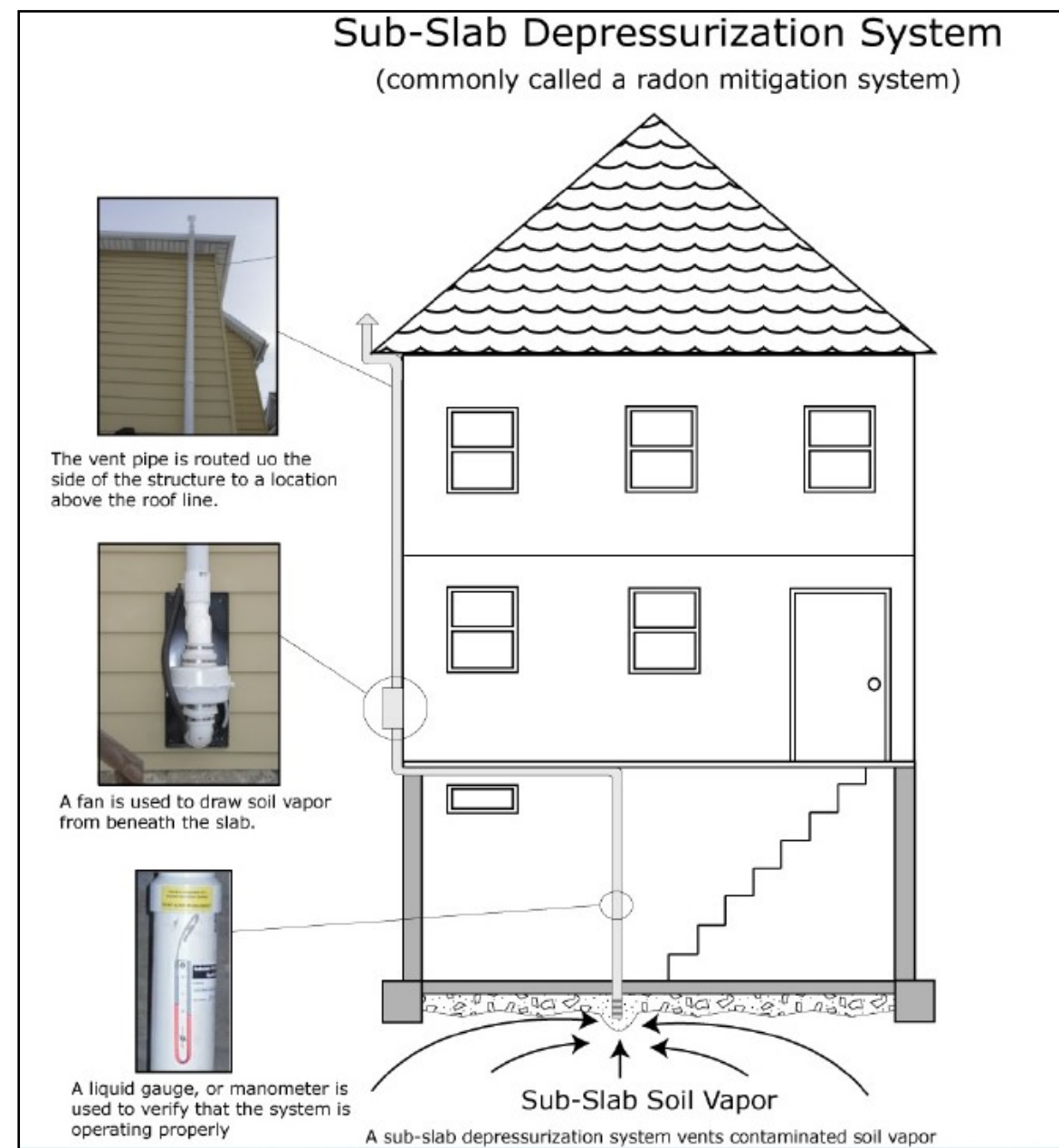
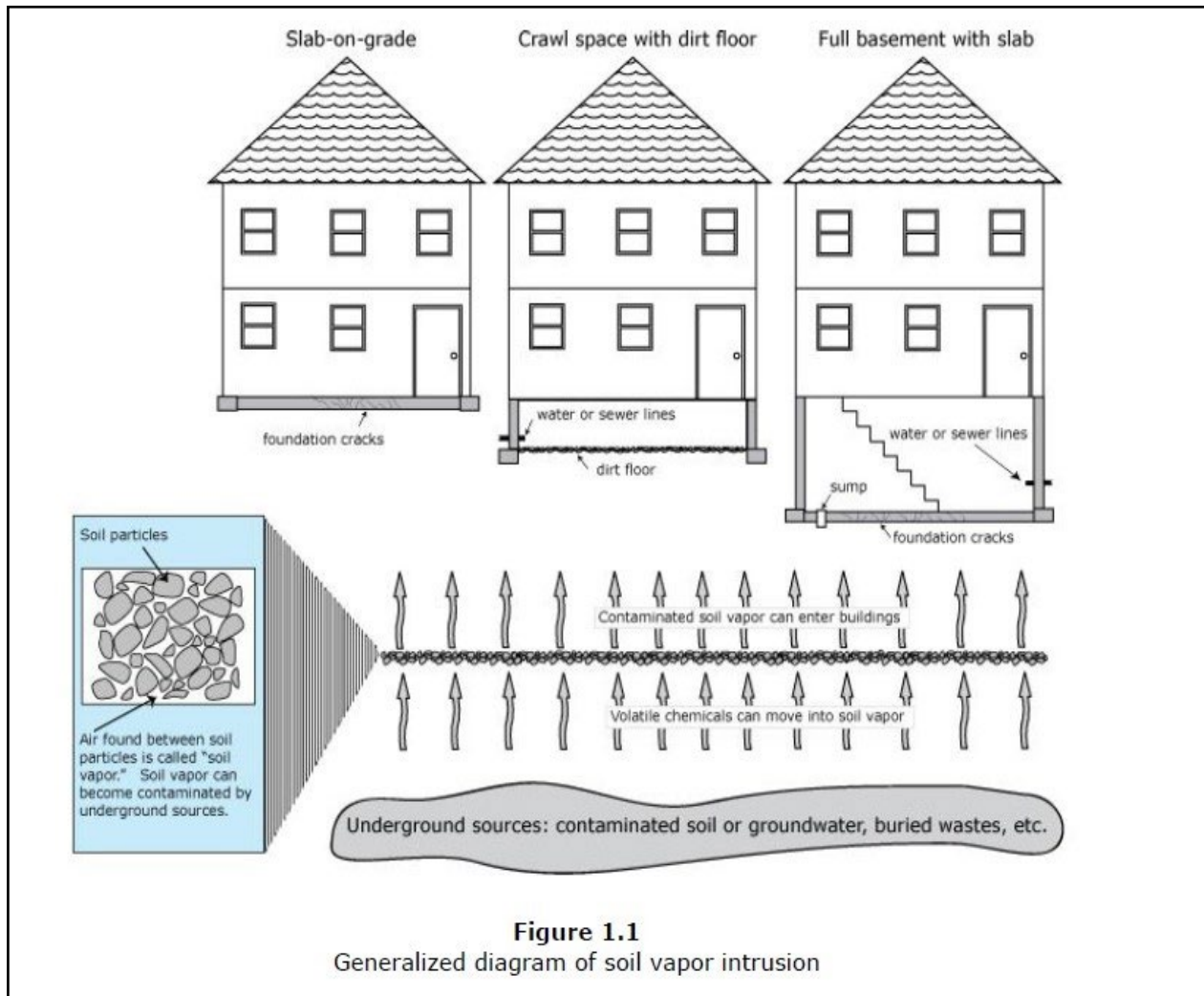
Site Background



Federal Superfund Sites in Brooklyn & the Greenpoint Oil Spill



A Few Words About Vapor Intrusion



Vapor Intrusion Sampling

- Winter 2023/2024
 - December 2023 – 5 properties
 - February & March 2024 – 18 properties (including 1 day care facility)
 - 1 property previously sampled in Winter 2022/2023
- Winter 2024/2025

It is not too early to sign up!

Monitoring Well Installation Update




Monitoring Well Installation Update

- EPA is in the process of installing **40** new groundwater monitoring wells
- Private utility mark-out was completed on 6/03 – 6/04 and 7/10
- Borehole hand clearing started 6/13
- Monitoring well installation started 6/18
- Future:
 - Monitoring well repairs
 - Concrete flag replacement
 - Monitoring well development
 - Monitoring well sampling


Technical Assistance Grant Program

TAG provides up to **\$50K** to community groups to contract technical advisors to interpret and explain technical reports, site conditions, and EPA's proposed cleanup proposals and decisions.

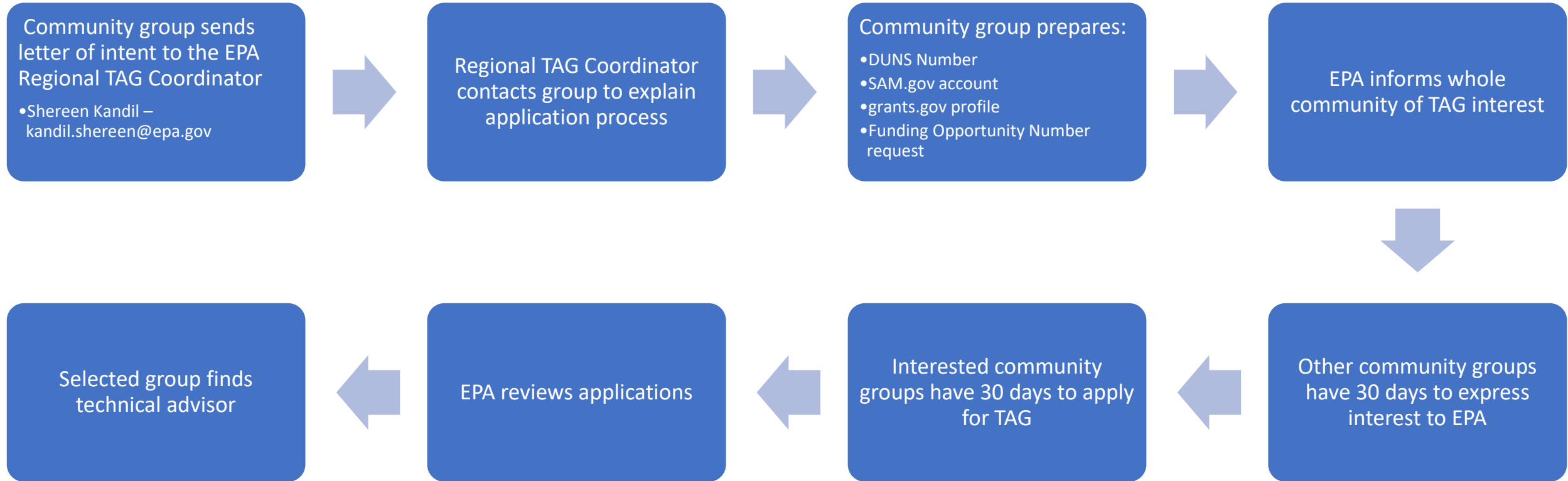


Technical Assistance Grant Program

Qualified applicants include groups that are:


- Incorporated
 - Representing members whose health, economic well-being, or enjoyment of environment may be hurt by a Superfund site
 - Formed because of issues and concerns about a Superfund site
 - Comprised of several smaller groups that came together to deal with community concerns about a Superfund site and its effects on the surrounding area
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Technical Assistance Grant Program Application Process



Technical Assistance Grant Program

Logistics


- Awardee must contribute 20% of project costs
 - Financial or in-kind
 - Funds are paid via reimbursement
 - Can request one-time advance payment of \$5K
 - Most funds must be used on technical advisors
 - Awardee must manage TAG Spending
 - Create bookkeeping system, keep financial records
 - Prepare quarterly progress reports and final report to EPA
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Proposed Remedial Action Plan Update

- Comment Period Ended 6/25
- Responsiveness Summary
- Record of Decision




Superfund Baseline Risk Assessments – Purpose

- 1990 National Contingency Plan calls for a site-specific baseline risk assessment to be conducted as part of the remedial investigation, as appropriate.
 - EPA's Baseline Risk Assessments:
 - Characterize the actual and potential risks of **cancer and noncancer health effects to humans** and **potential hazards to the environment** posed by exposure to *site-related* contaminants,
 - Produce estimates of current and possible future risks and hazards, if no cleanup action were taken;
 - provides the basis for taking an action at a Superfund site
 - Help EPA risk managers select the best cleanup strategies to manage site-related risks to acceptable levels.
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Human Health Risk Assessment – Definition

A Superfund human health risk assessment is an analysis of the potential adverse health effects, both cancer and noncancer, to humans 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.



Human Health Risk Assessment – 4 Step Process

EPA uses a four-step process to assess site-related human health risks for reasonable maximum exposure scenarios:

1. Hazard Identification: Data Collection and Evaluation

- What contaminants exist and are of potential concern?

2. Exposure Assessment:

- How might a receptor be exposed on or off site? Who are the receptors?

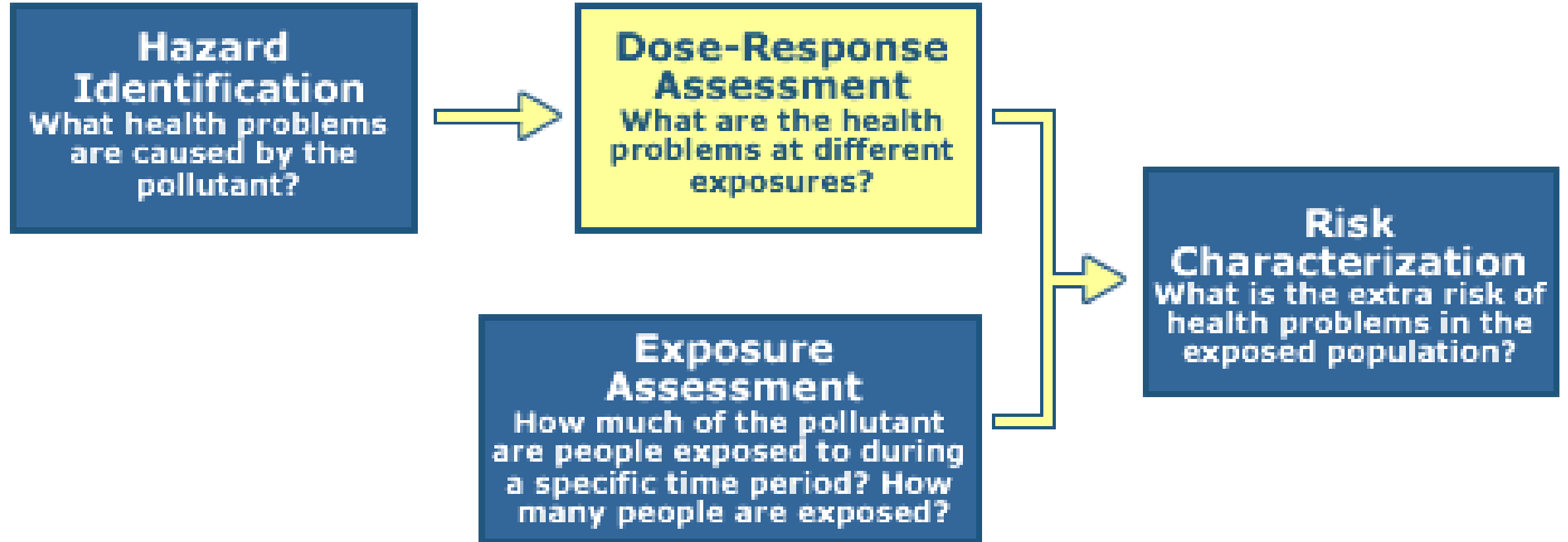
3. Toxicity Assessment: Dose Response Assessment

- At what level of exposure are adverse health effects likely to occur?

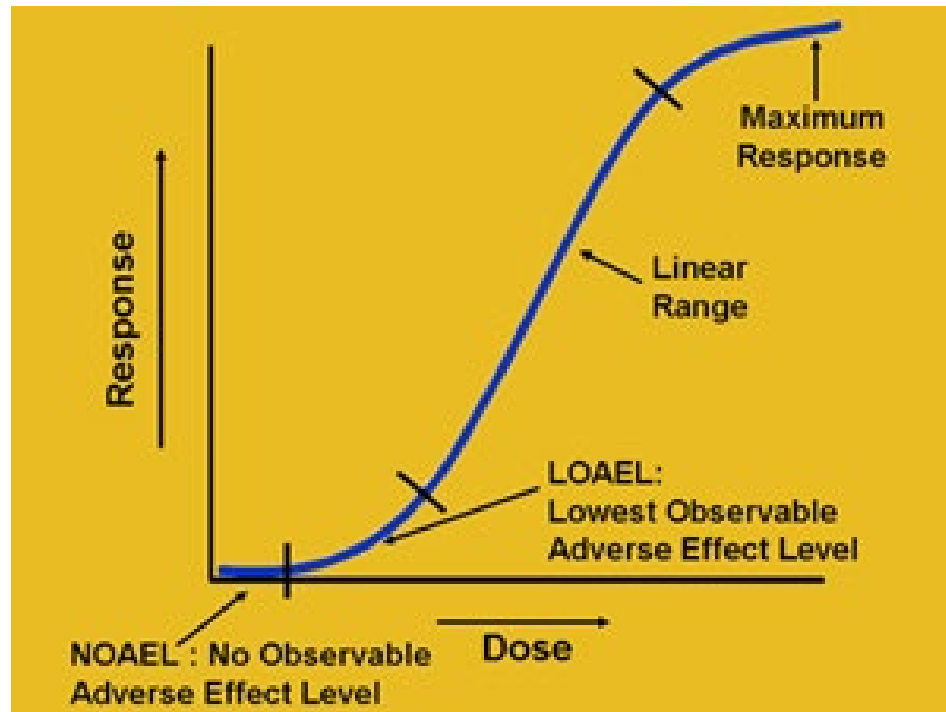
4. Risk Characterization:

- What are the site risks and associated uncertainties?
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The 4 Step Risk Assessment Process

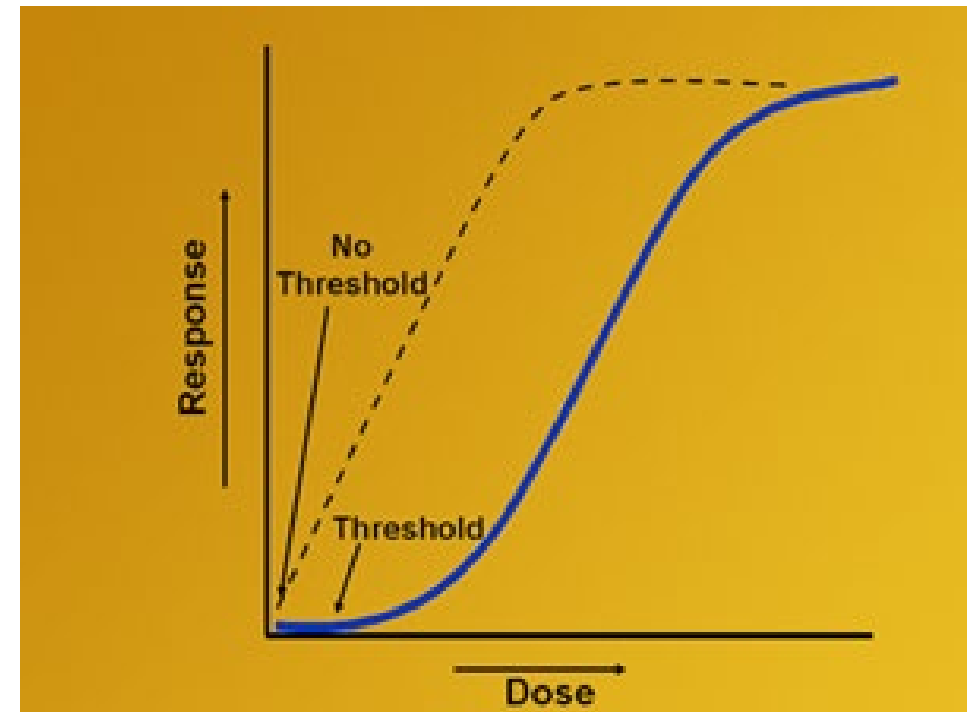


Toxicity Assessment - Dose Response Assessment



Noncancer- *Concept of Threshold:*

A level of exposure exists below which it is unlikely that there would be harmful health effects during a lifetime.



Cancer (dotted line)- *Concept of No*

Threshold: There is believed to be no level of exposure that does not pose a finite probability, however small, of generating a carcinogenic response.


Human Health Risk Assessment – EPA’s Benchmarks

- **EPA’s Noncancer hazard threshold**- Hazard Index set equal to 1
 - Hazard index greater than 1 indicates the potential exists for noncarcinogenic health effects to occur over a lifetime as a result of site-related exposures.
 - Potential of noncancer health effects increases as the hazard index increases.
- **EPA’s Cancer risk range**- 1×10^{-6} to 1×10^{-4}
 - Expressed as an incremental probability, written in scientific notation, of developing cancer over a lifetime as a result of exposure to a carcinogen.
 - 1×10^{-6} corresponds to 1 in 1,000,000 excess cancer risk; one additional cancer may be seen in a population of one million as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment.
 - 1×10^{-4} corresponds to 1 in 10,000 excess cancer risk; one additional cancer may be seen in a population of ten thousand as a result of exposure to site contaminants under the conditions identified in the Exposure Assessment.
- Exposure to site-related chemicals that **exceed 1×10^{-4}** cancer risk or a noncancer hazard index **greater than 1** are typically those that will require remedial action at a Superfund site and are referred to as **chemicals of concern** in the decision document.

Human Health Risk Assessment – Meeker Avenue Plume Superfund site

- EPA conducted an *expedited human health risk evaluation* for the Meeker Avenue Plume site.
- EPA considered all vapor intrusion data obtained by both NYSDEC and EPA:
 - Three properties were chosen to represent high-end exposure conditions: NYSDEC collected two samples, and EPA one.
 - Three additional properties sampled by EPA in November 2022 were also evaluated.

Risk Characterization Results

- Cancer risk estimates associated with exposure to TCE and PCE in indoor air were all below EPA's cancer threshold of 1×10^{-4} , or a one-in-ten-thousand excess cancer risk.
 - Noncancer hazard threshold exceedances stemming from exposure to:
 - TCE - maximum estimated noncancer hazard equal to 6, and
 - PCE - maximum estimated noncancer hazard of 4
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Meeker Avenue Plume Superfund site – Chemicals of Potential Concern & Possible Health Effects

TCE


- Cancer effects:
 - Classified as “carcinogenic to humans” by all routes of exposure.
 - Per EPA, carcinogenic by a mutagenic mode of action.
 - Tumor sites:
 - Hepatic - liver
 - Hematologic - blood
 - Urinary/renal system - kidney
- Noncancer endpoints/effects:
 - Central nervous system, kidney, liver, immune system, male reproductive system and the developing fetus

PCE

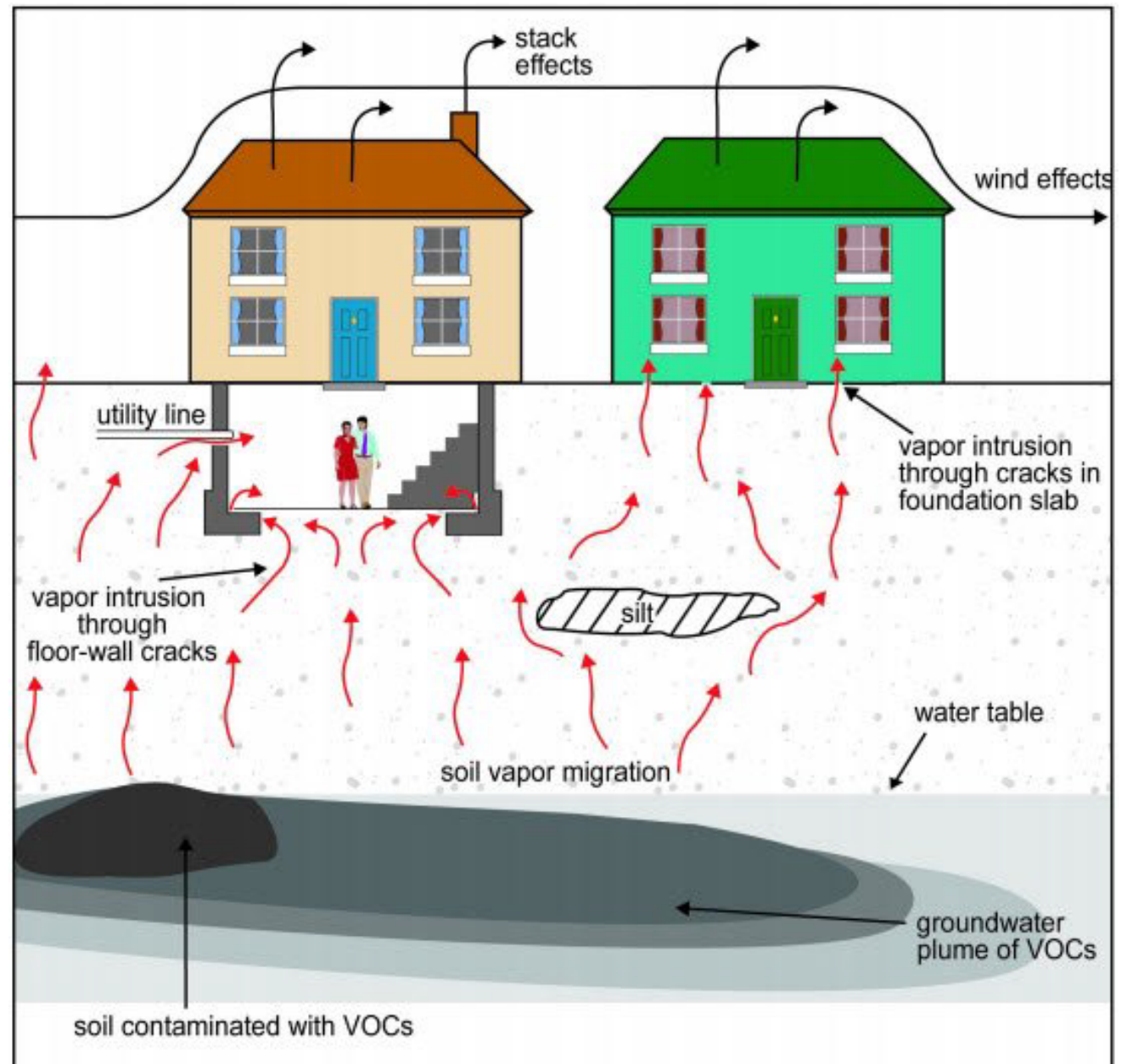
- Cancer effects:
 - Classified as “Likely to be carcinogenic to humans” by all routes of exposure.
 - Tumor sites:
 - hepatic - liver
- Noncancer endpoints/effects:
 - Nervous system and ocular effects through oral and inhalation exposures

Subsurface Vapor Intrusion into Indoor Air – Complete Exposure Pathway Considerations


Per EPA guidance, subsurface vapor intrusion to indoor air is a complete human exposure pathway when the following 5 conditions are met:

1. A **subsurface source** of a vapor-forming chemicals is present underneath or near buildings, e.g. groundwater or soil.
 2. Vapors form and have a **route to migrate**, or be transported, toward the building.
 3. Buildings are **susceptible to soil gas entry**, which means openings exist for the vapors to enter the building, and **driving forces**, such as, air pressure differences between building and subsurface environment, **exist** to draw the vapors from the subsurface through the openings into buildings.
 4. One or more vapor forming chemicals comprising the subsurface vapor sources are **present in the indoor environment**.
 5. The **building is occupied** by one or more individuals when the vapor forming chemicals are present indoors.
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Subsurface Vapor Intrusion: Conceptual Site Model



EPA's Vapor Intrusion Screening Level (VISL) Calculator

- Nationwide online tool used to identify chemicals that are considered to be *sufficiently volatile* and *toxic* to warrant an investigation of the soil gas vapor intrusion pathway when they are present as subsurface contaminants.
 - These vapor intrusion screening-level concentrations, or VISLs, are based on:
 - Default residential or non-residential (commercial/industrial) exposure scenarios reflective of reasonable maximum exposure
 - Set at a target cancer risk level of one per million – 1×10^{-6}
 - Set at a target hazard quotient of 1 for potential noncancer effects
 - Generally, at properties where subsurface concentrations, such as those in groundwater or sub-slab soil gas, of vapor-forming chemicals fall below the recommended VISLs, no further action or study is warranted.
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Vapor Intrusion Screening Levels - Derivation

Residential Exposure (Noncancer risk equation):

$$SL_{\text{res-air-inhn}} \left(\frac{\mu\text{g}}{\text{m}^3} \right) = \frac{\text{THQ} \times \text{AT}_{\text{res-a}} \left(\frac{365 \text{ days}}{\text{yr}} \times \text{ED}_{\text{res}} (26 \text{ yr}) \right)}{\left(\frac{1}{\text{RfC}} \left(\frac{\text{mg}}{\text{m}^3} \right) \right) \times \left(\frac{\text{mg}}{1000 \mu\text{g}} \right) \times \text{EF}_{\text{res}} \left(\frac{350 \text{ days}}{\text{yr}} \right) \times \text{ED}_{\text{res}} (26 \text{ yr}) \times \text{ET}_{\text{res}} \left(\frac{24 \text{ hrs}}{\text{day}} \right) \times \left(\frac{1 \text{ day}}{24 \text{ hrs}} \right)}$$

Commercial/Industrial Exposure (Noncancer risk equation):

$$SL_{\text{com-air-inhn}} \left(\frac{\mu\text{g}}{\text{m}^3} \right) = \frac{\text{THQ} \times \text{AT}_{\text{com-a}} \left(\frac{365 \text{ days}}{\text{yr}} \times \text{ED}_{\text{com}} (25 \text{ yr}) \right)}{\left(\frac{1}{\text{RfC}} \left(\frac{\text{mg}}{\text{m}^3} \right) \right) \times \left(\frac{\text{mg}}{1000 \mu\text{g}} \right) \times \text{EF}_{\text{com}} \left(\frac{250 \text{ days}}{\text{yr}} \right) \times \text{ED}_{\text{com}} (25 \text{ yr}) \times \text{ET}_{\text{com}} \left(\frac{8 \text{ hrs}}{\text{day}} \right) \times \left(\frac{1 \text{ day}}{24 \text{ hrs}} \right)}$$

Multiple Lines of Evidence Approach

- EPA evaluates vapor intrusion data on a building-by-building basis, considering screening levels 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.
- Both cancer and noncancer health effects are considered:
 - Exposure to TCE and PCE are associated with both cancer and noncancer health effects.
 - The vapor intrusion screening levels set at a noncancer hazard of 1 for TCE and PCE are numerically lower, or more health protective/conservative, than the 1×10^{-4} cancer-based levels, therefore EPA conservatively uses the noncancer-based levels in the evaluation of the vapor intrusion pathway at the Meeker Ave Superfund site.
- Ambient air conditions are measured to help assess data:
 - Information on background sources is important to risk managers because the Superfund program, generally, does not clean up to concentrations below natural or anthropogenic background levels.
 - A site-related subsurface source impacting indoor air is needed in order for EPA to take a Superfund action.

Remedial Action Objectives, or Cleanup Objectives - Meeker Avenue Plume Superfund 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.



Questions

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