REMEDIATION

Philadelphia Refinery
LEGACY REMEDIATION

WHAT IS REMEDIATION?

Remediation is the process of addressing environmental contamination that is present above a cleanup standard. This is accomplished by using one or more treatment methods until the contamination is either removed, concentrations are reduced to meet the site's cleanup levels, or the contamination has been isolated or immobilized such that it does not pose a risk to human health or the environment.

- Remediation does not always mean the site is restored to background (pre-development) conditions.
- Following successful remediation, the impacts of former site operations and residual contamination will have been addressed. Areas that have been cleaned up will be available for reuse.

Common types of remediation technologies:

- **LNAPL/groundwater extraction and treatment** – LNAPL and groundwater are pumped out of the ground and to an above-ground treatment plant to treat the contaminants in the liquid. This is a common method of addressing LNAPL/groundwater plumes.
- **Air sparging** – air is injected through injection wells below the water table. As the air moves upward through groundwater to return to land surface, contaminants in groundwater vaporize and are carried in the air stream. Transfer into the vapor phase (into what is called soil vapor) reduces contaminant concentrations in groundwater. Vapors are then captured and treated. Air sparging does not result in air emissions that would affect site workers or neighboring properties.
- **Soil vapor extraction (SVE)** – a vacuum is applied to extraction wells which are drilled into contaminated soil (above the water table). The vacuum removes contaminated soil vapor which is captured and treated. SVE may be used in combination with air sparging.
- **Natural attenuation monitoring** – relies on a combination of natural processes to reduce (attenuate) contamination levels over time, one of which is bioattenuation where microorganisms in the soil reduce contamination. Through routine sampling, concentrations are monitored over time to ensure concentrations are decreasing.
- **Capping** – a barrier such as clean soil or pavement installed on top of contaminated soil that prevents direct human exposure to the underlying soil and infiltration of rainwater. By preventing contact with the soil, this mitigates the risk of adverse effects that would occur if humans were to exposed to the soil.

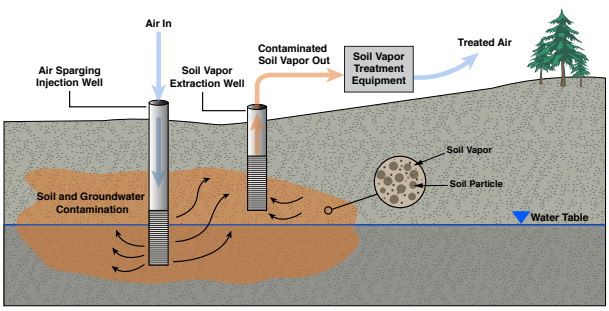
DEFINITIONS

Light Non-aqueous phase liquid (LNAPL)
chemicals that exist as liquids but do not dissolve easily in water, such as gasoline, diesel, and other petroleum products and that generally "float" on top of water

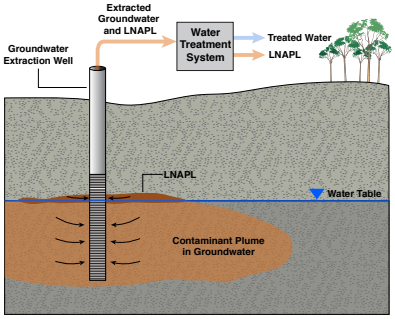
Contamination
a chemical present in environmental media (soil, groundwater, surface water, air) that is regulated by PA DEP or another regulatory body

Cleanup level
the concentration to which a regulated chemical must be cleaned up (remediated to levels that are shown to be protective of human health and the environment)

AIR SPARGING AND SOIL VAPOR EXTRACTION



LNAPL/GROUNDWATER EXTRACTION AND TREATMENT



REMEDIATION

Who decides what remediation method is used?

- For any remediation method selected, detailed plans for remediation will be prepared which consider many factors including site-specific conditions (e.g. geology, hydrogeology) that would affect the success of the remedy, anticipated longevity of different remedy options, climate change resiliency, routine maintenance requirements to maintain effectiveness, the estimated time to achieve cleanup levels, and other factors.
- The regulatory agency must approve the detailed remediation plans prior to implementation via a Cleanup Plan (in Act 2).

WHAT STAGE OF THE ACT 2 PROCESS IS THIS?

- Remediation occurs after the remedial investigation and after cleanup standards have been established and approved by PA DEP and EPA. However, “interim measures” may be put into place without a Cleanup Plan if deemed necessary to be protective of human health and the environment. At the Former Philadelphia Refinery, there were also remediation systems in place prior to joining Act 2.
- Remediation can occur according to different schedules in different areas of the Former Philadelphia Refinery
- Remediation can overlap with redevelopment activities

How is human health and the environment protected during remediation?

- During remediation, the contractor completing the work uses best management procedures to protect human health and the environment. Permits may also be required for certain types of work.
- Depending on the treatment technology used in various areas, this may include dust suppression measures and air monitoring to control off-site air impacts and stormwater control and erosion protection measures to control off-site impacts including impacts to surface water bodies.
- Remediation systems and equipment are routinely inspected and maintained to control their effectiveness and ensure the treatment method in place remains protective of human health and the environment.
- Residents do not need to take extra precautions during remediation. However, residents may notice increased truck traffic and periods of noise disturbances during work hours for certain treatment methods.