Proposed Remedial Action Plan

Operable Unit 3 - Groundwater
Ringwood Mines/Landfill Superfund Site
Ringwood, New Jersey

Public Meeting
February 10, 2020

Meeting Participants

- ***Pat Seppi - EPA Community Involvement Coordinator***
- ***Joe Gowers - EPA Project Manager***
- ***Doug Garbarini - EPA Branch Chief***
- ***Damian Duda - EPA Section Chief***

OVERVIEW OF THE SUPERFUND PROCESS

- **Site Discovery** - Information may come from concerned citizens or State or Local authorities.
- **Preliminary Assessment –** Initial evaluation of the site's potential hazards, based upon available background information.
- **Site Inspection –** Inspectors go to the site to collect additional information necessary to evaluate its hazard potential.
- **Site Ranking –** The relative threat posed by the site is assessed using the **Hazard Ranking System**. Sites that rank high enough are proposed for inclusion on the **National Priorities List (NPL),** making them eligible for Superfund cleanup.
- **Remedial Investigation/Feasibility Study (RI/FS) –** During the RI/FS, the nature and extent of contamination is defined and cleanup alternatives are evaluated.

OVERVIEW OF THE SUPERFUND PROCESS (continued)

- **Remedy Selection** - The selection of a cleanup action for the site or a portion of the site is detailed in a document known as a **Record of Decision (ROD)**.
- **Remedial Design** - The Remedial Design provides the details on how the cleanup action will be engineered and constructed.
- **Remedial Action** – The selected cleanup actions are implemented during the Remedial Action phase.
- **Deletion** – Once the site cleanup meets all cleanup goals, the site can be proposed for deletion from the NPL.

SITE HISTORY

- The 500-acre Site was used for the mining of iron ore from the mid-1700s to the early 1900s .
- A subsidiary of the Ford Motor Company purchased the Site in 1965.
- From 1967 through 1971, a Ford contractor disposed of waste from Ford's Mahwah, New Jersey plant at the Site.
- Waste disposed of at the Site included plant trash, paint sludge and drummed waste.
- By 1974, Ford sold off or donated all portions of the Site to the Borough of Ringwood, the State of New Jersey, Public Service Electric and Gas and a nonprofit corporation.

SITE HISTORY (continued)

- The Site was included on EPA's National Priorities List in 1983.
- From 1984 to 1988, Ford's contractor performed an RI/FS.
- In 1988, 7000 cubic yards of paint sludge and soil were removed from the Site.
- In September 1988, EPA issues a ROD which selects long-term groundwater and surface water monitoring as the cleanup plan.
- From 1990 to 1995, an Environmental Monitoring Program was conducted at the Site.
- The Site was deleted from the NPL in 1994, with the belief that all paint sludge and drums had been removed.

SITE HISTORY (continued)

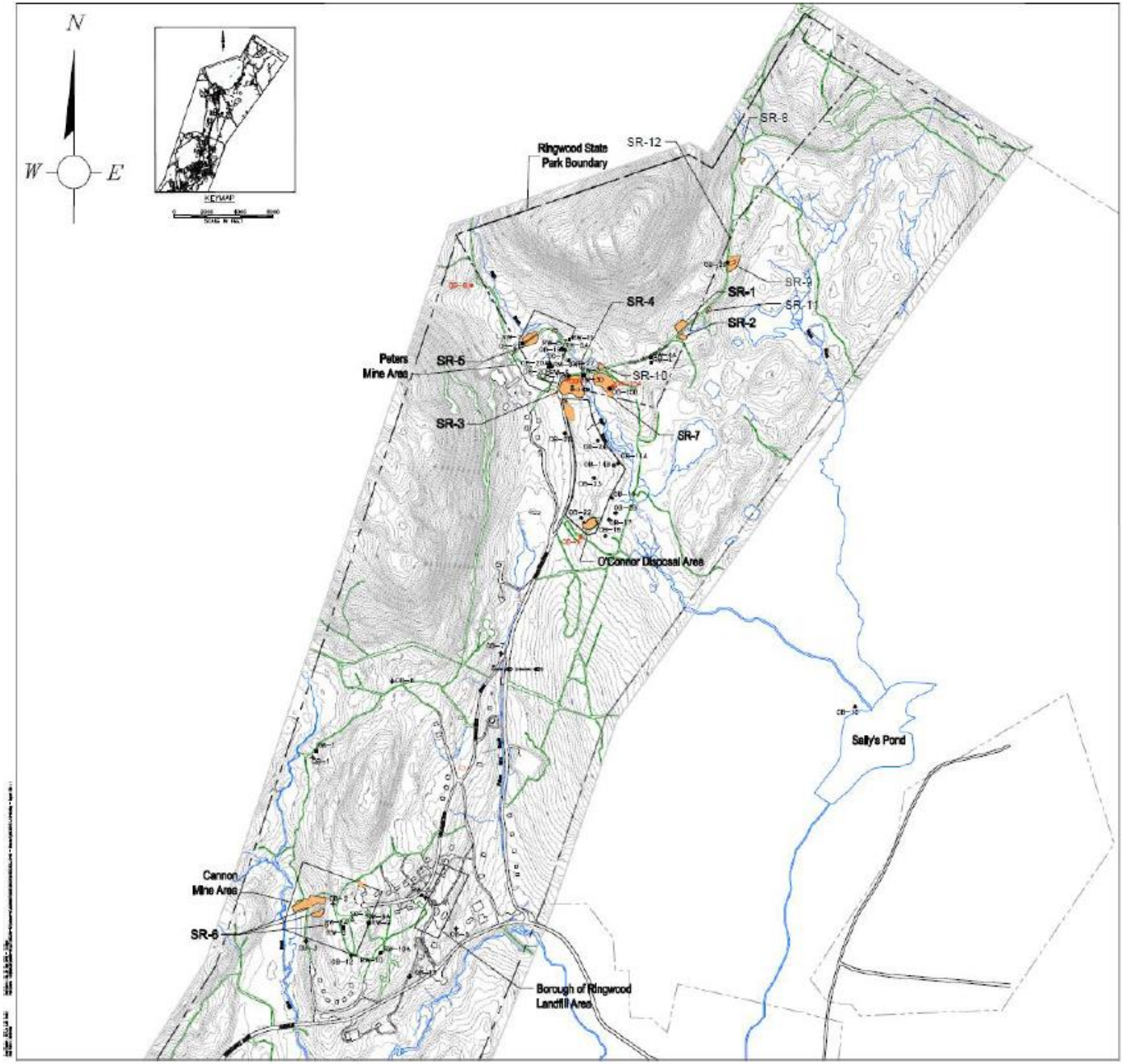
- In September 2003, representatives of Upper Ringwood residents notified EPA of additional paint sludge at the Site.
- In early 2004 EPA representatives observed paint sludge during a Site visit.
- From December 2004 through 2014, Ford removed over 53,800 tons of paint sludge and soil.
- The Site was restored to the NPL in September 2006.

SITE HISTORY (continued)

- In September 2005, Ford entered into an enforcement agreement with EPA to conduct an additional Remedial Investigation.
- In May 2010 Ford entered into an enforcement agreement with EPA to prepare Feasibility Studies for the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas of the Site, as well as groundwater contamination.
- In June 2014, EPA issued the Operable Unit Two (OU2) ROD. The OU2 ROD selected a cleanup plan for the Peters Mine Pit, Cannon Mine Pit and O'Connor Disposal Areas of the Site.

SITE HISTORY (continued)

- From 2011 to 2014, EPA removed lead-contaminated soil from 23 residential properties at the Site.
- In October 2014, Ford entered into an enforcement agreement with EPA to design the OU2 cleanup plan. The OU2 design was approved by EPA in October 2018.
- A judicial Consent Decree which provides that Ford and the Borough of Ringwood implement the OU2 cleanup plan was lodged with the Court in May 2019.


N
W
E
KEYMAP
Ringwood State Park Boundary
SR-12
SR-8
SR-9
SR-1
SR-11
SR-2
SR-4
Peters Mine Area
SR-5
SR-10
SR-3
SR-7
O'Connor Disposal Area
Sally's Pond
Cannon Mine Area
SR-6
Borough of Ringwood Landfill Area

Site-Related Groundwater Remedial Investigation

- From 2004 through 2014, groundwater and mine water samples were collected from up to 55 monitoring wells, the Peters Mine Pit Airshaft and the Cannon Mine Elevator Shaft.
- Groundwater and mine water samples were collected twice a year from 2004 through 2009, and annually from 2010 through 2014.
- Surface water samples were collected from the four brooks which drain the Site and groundwater seeps.
- Sediment samples were collected from the four brooks which drain the Site, The Peters Mine Pit Pond and from the base of the Peters Mine Pit Airshaft.
- Video logging was conducted in the Peters Mine Pit Airshaft and the Cannon Mine Elevator Shaft.
- Additional studies were conducted to evaluate the natural attenuation of contaminants in groundwater and mine water.

Site-Related Groundwater Remedial Investigation Findings

O'Connor Disposal Area (OCDA)

- No volatile organic contaminants were detected above groundwater standards, with the exception of MTBE in one well upgradient of the OCDA.
- MTBE was not widely used in the United States until the 1980s.
- BEHP was the only semivolatile organic contaminant detected above groundwater standards in the OCDA during one sampling event in 2007.
- Arsenic and lead were detected sporadically above their groundwater standard in OCDA monitoring wells, but not in a downgradient monitoring well.
- Arsenic was detected above its surface water standard in the Park Brook in 2012
- Antimony was detected above its surface water standard in the Park Brook in 2005.

Site-Related Groundwater Remedial Investigation Findings (continued)

Cannon Mine Pit Area (CMP)

- No volatile organic contaminants were detected above groundwater standards with the exception of benzene and trichloroethene.
- Trichloroethene was only detected above its groundwater standard in one well in 2008 and 2009.
- Benzene was detected above its groundwater standard in two monitoring wells during one sampling event.
- BEHP was the only semivolatile organic contaminant detected sporadically above groundwater standards.
- Arsenic and lead were detected sporadically above their groundwater standards with no consistent spatial pattern.

Site-Related Groundwater Remedial Investigation Findings (continued)

Peters Mine Pit Area (PMP)

- Benzene was consistently detected above its groundwater standard in PMP Area wells and the Peters Mine Pit Airshaft.
- Benzene levels increased significantly in groundwater samples collected in and immediately downgradient of the Peters Mine Pit during the September 2014 sampling event.
- The results of October 2014 groundwater samples indicated that benzene levels in and downgradient of the PMP had returned to historic levels.
- BEHP was the only semivolatile organic contaminant detected sporadically above its groundwater standard.
- Lead and arsenic were sporadically detected at concentrations in excess of their groundwater standards.

Site-Related Groundwater Remedial Investigation Findings (continued)

Peters Mine Pit Airshaft

- Benzene was detected at concentrations up to 33.2 ug/L, in excess of its groundwater standard of 1 ug/L.
- BEHP was the only semivolatile organic contaminant detected sporadically above its groundwater standard.
- Lead and arsenic were sporadically detected at concentrations in excess of their groundwater standards.
- The results of a stable isotope study conducted in the PMP Area and the PMP Airshaft indicated that microbial communities capable of degrading benzene exist in PMP Area groundwater.

Site-Related Groundwater Remedial Investigation Addendum

- The detection of historically elevated levels of benzene in groundwater from the Peters Mine Pit in March 2015, and the detection of 1,4-dioxane in Site groundwater led to the need for additional groundwater investigations.
- In August 2015, 1,4-dioxane was detected at levels greater than its groundwater standard in water samples collected from the Peters Mine Pit Airshaft and monitoring wells located primarily in the Peters Mine Pit Area of the Site.
- Additional groundwater and/or surface water sampling events were conducted at the Site in December 2015, January 2016, March 2016, May/June 2016, August 2016, February 2017 and August 2017.
- The results of these sampling events indicate that 1,4-dioxane and benzene are detected at their greatest concentration in water samples collected from the bottom of the Peters Mine Pit Airshaft.

Site-Related Groundwater Remedial Investigation Addendum (continued)

- Surface water sampling results indicate the presence of 1,4-dioxane in the Park Brook upstream of Sally's Pond.
- 1,4-dioxane was not detected in surface water samples collected between Sally's Pond and the Wanaque Reservoir.
- In 2018, water samples were collected from six potable wells near the Site. Benzene and 1,4-dioxane were not detected in any of these samples.

Remedial Action Objectives

- Because the RI data indicated that contaminants in groundwater and mine water (benzene, 1,4-dioxane) present the potential for an unacceptable cancer risk if the groundwater or mine water were ever used as drinking water, EPA identified Remedial Action Objectives (RAOs) for groundwater and mine water at the Site in order to develop cleanup alternatives to address this hypothetical/potential human health risk.

  - Prevent exposure to groundwater and mine water containing contaminant concentrations above their respective groundwater standards.
  - Restore the aquifer outside of the capped mine shaft area to applicable groundwater standards.
  - Reduce or eliminate the potential for migration of contamination above applicable groundwater standards.

SUMMARY OF REMEDIAL ALTERNATIVES
Site-Wide Groundwater

Alternative 1 – No Action

- Under this Alternative, no corrective action would be taken for groundwater contamination.
- This Alternative was retained, as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and provides a baseline for comparison with other alternatives.

SUMMARY OF REMEDIAL ALTERNATIVES
Site-Wide Groundwater

Alternative 2 - Monitoring with Institutional Controls

- Active monitoring of groundwater quality and attenuation processes.
- A long-term groundwater monitoring plan would be implemented.
- Sentinel well would be installed and monitored to provide advanced warning of any movement of groundwater contamination toward drinking water resources.
- Surface water would be monitored to confirm that the Site is not threatening the Wanaque Reservoir.
- A Classification Exception Area/Well Restriction Area (CEA/WRA) would be established to restrict future use of contaminated groundwater.

SUMMARY OF REMEDIAL ALTERNATIVES
Site-Wide Groundwater

Alternative 3 - In-Situ Treatment with Monitoring in the Peters Mine Pit Area/O'Connor Disposal Area

- In-situ treatment, likely oxidation, would be used to promote the degradation of groundwater contaminants.
- Wells would be installed in a barrier-style configuration perpendicular to the direction of groundwater flow to introduce oxygen-release compound to the groundwater.
- A long-term groundwater monitoring plan would be implemented and would include the installation and monitoring of sentinel wells.
- Surface water would be monitored to confirm that the Site is not threatening the Wanaque Reservoir.
- A Classification Exception Area/Well Restriction Area (CEA/WRA) would be established to restrict future use of contaminated groundwater.

SUMMARY OF REMEDIAL ALTERNATIVES
Peters Mine Pit Airshaft

Alternative 1 – No Action

- Under this Alternative, no corrective action would be taken in the Peters Mine Pit Airshaft.
- This Alternative was retained, as required by the NCP, and provides a baseline for comparison with other alternatives.

SUMMARY OF REMEDIAL ALTERNATIVES
Peters Mine Pit Airshaft

Alternative 2 - Oxygen Diffusion in the Peters Mine Pit Airshaft

- Under this Alternative, canisters of oxygen-release compound (ORC) would be installed at various depths within the Peters Mine Pit Airshaft to promote the biodegradation of organic contaminants in mine water.
- A cap would be installed across the Peters Mine Pit Airshaft with locking sleeves installed through the cap from which ORC canisters would be suspended on cable.
- Mine water would be monitored to assess effectiveness.
- Replacement of the ORC canisters would occur as necessary to maintain appropriate aerobic conditions.

SUMMARY OF REMEDIAL ALTERNATIVES
Peters Mine Pit Airshaft

Alternative 3 - Treatment/Closure in the Peters Mine Pit Airshaft

- Under this Alternative, granular activated carbon (GAC) and resin would first be introduced to the base of the Peters Mine Pit Airshaft to provide for the adsorption of contaminants.
- Fast-setting grout would placed above the GAC, resin and angular stone.
- Flowable flyash/concrete grout would be placed above the fast-setting grout to the top of the Peters Mine Pit Airshaft.
- A poured concrete slab would then be placed above the grout to serve as a final closure surface.

SUMMARY OF REMEDIAL ALTERNATIVES
Peters Mine Pit Airshaft

Alternative 4 - Peters Mine Pit Airshaft Closure

- Angular stone or quick-setting grout would be installed at the base of the shaft to prevent the movement of materials into adjacent mine openings.
- Flowable flyash/concrete grout mixed with bentonite would be placed above the fast-setting grout to the top of the Peters Mine Pit Airshaft.
- A poured concrete slab would then be placed above the grout to serve as a final closure surface.

EVALUATION OF REMEDIAL ALTERNATIVES

The following nine criteria are used to evaluate the different remedial alternatives individually and against each other in order to select the best alternative:

- *Overall Protection of Human Health and the Environment*
- *Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)* – Evaluates whether the alternative meets federal and state environmental laws or regulations.
- *Long-Term Effectiveness and Permanence* – 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*

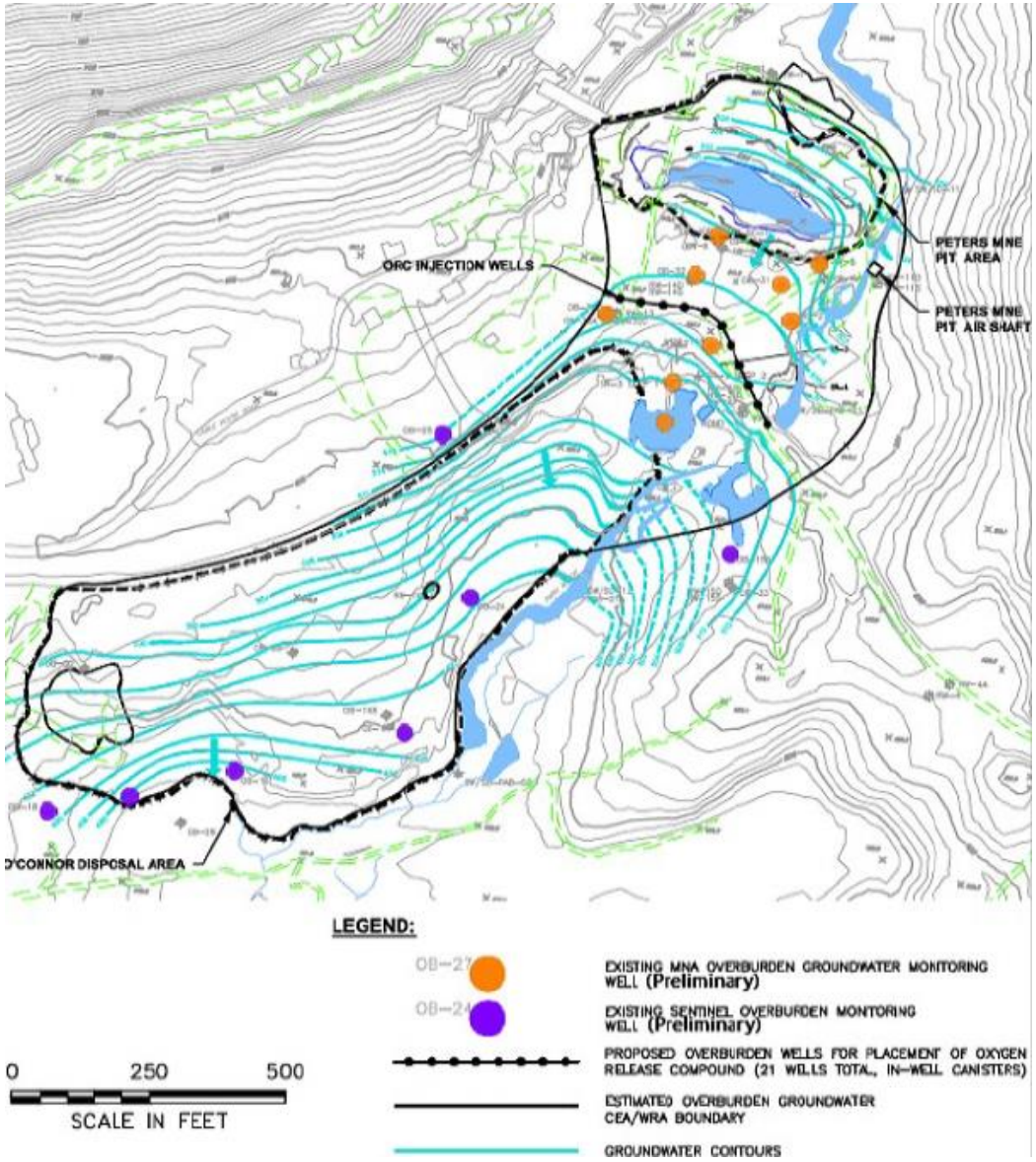
EVALUATION OF REMEDIAL ALTERNATIVES

- *Short-Term Effectiveness* – The length of time to implement an alternative and the risks to the workers, community and environment during implementation.
- *Implementability* – Considers the technical and administrative feasibility of implementing an alternative.
- *Cost* – Includes estimated capital and annual operations and maintenance costs, as well as present worth cost.
- *State/Support Agency Acceptance* – Considers whether the State agrees with EPA's preferred alternative.
- *Community Acceptance* - Considers whether the local community agrees with EPA's preferred alternative.

PREFERRED ALTERNATIVE
Site-Wide Groundwater

EPA's preferred alternative for Site-Wide Groundwater is **Alternative 3, In-Situ Treatment With Monitoring in the Peters Mine Pit Area/O'Connor Disposal Area.**

- In-situ treatment, likely oxidation, would be used to promote the degradation of groundwater contaminants.
- Wells would be installed in a barrier-style configuration perpendicular to the direction of groundwater flow to introduce oxygen-release compound to the groundwater.
- A long-term groundwater monitoring plan would be implemented and would include the installation and monitoring of sentinel wells.
- Surface water would be monitored to confirm that the Site is not threatening the Wanaque Reservoir.
- A Classification Exception Area/Well Restriction Area (CEA/WRA) would be established to restrict future use of contaminated groundwater.


ORC INJECTION WELLS
PETERS MINE PIT AREA
PETERS MINE PIT AIR SHAFT
O'CONNOR DISPOSAL AREA
LEGEND:
EXISTING MNA OVERBURDEN GROUNDWATER MONITORING WELL (Preliminary)
EXISTING SENTINEL OVERBURDEN MONITORING WELL (Preliminary)
PROPOSED OVERBURDEN WELLS FOR PLACEMENT OF OXYGEN RELEASE COMPOUND (21 WELLS TOTAL, IN-WELL CANISTERS)
ESTIMATED OVERBURDEN GROUNDWATER CEA/WRA BOUNDARY
GROUNDWATER CONTOURS
0
250
500
SCALE IN FEET

PREFERRED ALTERNATIVE
Peters Mine Pit Airshaft

EPA's preferred alternative for the Peters Mine Pit Airshaft is **Alternative 3, Treatment/Closure in the Peters Mine Pit Airshaft.**

- Under this Alternative, granular activated carbon (GAC) and resin would first be introduced to the base of the Peters Mine Pit Airshaft to provide for the adsorption of contaminants.
- Fast-setting grout would placed above the GAC, resin and angular stone.
- Flowable flyash/concrete grout would be placed above the fast-setting grout to the top of the Peters Mine Pit Airshaft.
- A poured concrete slab would then be placed above the grout to serve as a final closure surface.

Please send all comments to:

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For additional information about the site contact:

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http://epa.gov/superfund/ringwood-mines