CAPPING & REMEDIAL EXTRACTION OF GROUNDWATER IN A SHALLOW MARINE SHORELINE SEQUENCE

Jacksonville Recycling Facility
Former MGP Site in Florida
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Jacksonville Recycling Site History

- The Jacksonville Recycling facility is located on a property that was historically the site of a manufactured gas plant (MGP).

- The MGP plant operated between the late 1800s and 1955.

- The MGP site was partitioned and is currently owned by two separate owners.

- The ownership dates back to the 1990’s from a predecessor company.

- Impacts to soil and groundwater from historic operations have resulted in implementation of a remedial alternative that will contain and reduce off-site groundwater impacts.
Monitoring Network

- Over 80 monitoring wells have been installed on and around the former MGP site since the 1990’s, including wells to determine the lateral and vertical extent of groundwater impacts.

- Water levels and groundwater quality have been periodically monitored in the shallow, intermediate and deep sand layers and within the upper dolomite/limestone deposits.

- Groundwater sampling and analytical results indicate concentrations have remained fairly consistent since monitoring began in the 1990’s.

- It appears that all COCs are attenuating downgradient of the former MGP facility.
Site Setting and Conceptual Model

- Historic MGP operations have contributed BTEX, PAHs, phenols, cyanide, lead and arsenic to site soils and groundwater.

- A substantial portion of the MGP residuals and impacted soil has been removed via excavation and dewatering.

- More than 46,000 tons of MGP waste material and impacted soil have been removed from both properties in phases.

- Approx. 75% of vadose zone soils on western property have been removed.

Cross-Sectional Areas
Site Setting and Conceptual Model

- Impacts to groundwater have been delineated in the shallow, intermediate and deep sand zones (40 to 50 feet thick), which overlie thick dolomite/limestone deposits.

- Organic contaminants (BTEX and PAHs) are readily degradable.

- Clay layer restricts downward migration.

- Groundwater in the underlying dolomite/limestone located at a depth of 40 to 50 feet has not been impacted.
COC Concentrations

Near the southeast corner of the site:

- **Intermediate Zone:** Benzene ranges from 490 to 640 ug/L and Napthalene ranges from 17 to 12,000 ug/L

- **Deep Zone:** Benzene ranges from 17 to 1,600 ug/L and Napthalene ranges from 300 to 7,000mg//L

- Groundwater COC concentrations in the underlying dolomite/limestone have been non-detect or well below CTLs

- Cyanide has generally been detected, but below CTLs
Remedial Strategy

• Site assessment activities confirmed that contamination from the site has migrated off-site

• The Florida Department of Environmental Protection (FDEP) requires that contamination be mitigated and contained

• Several proposed remedial options were discussed with the FDEP

The state approved recommended approach in early 2013
Remedial Actions Considered

- In-Situ Low Temperature Desorption
- In-Situ Stabilization
- In-Situ Oxidation
- Site Capping
- Groundwater Controls
- Soil Removal
- Encapsulation (Slurry Wall and CAP)
Selected Remedy

- Install “containment” extraction wells and design extraction system to operate locally and remotely
- Equip the wells with pumps, power and discharge to the JEA (municipal sewer system) sewer
- Contain COCs & allow offsite natural attenuation with monitoring
- Incorporate institutional controls and land use restrictions
- Install low permeability cap over site to control direct contact with remaining impacted soil and to reduce infiltration and migration potential
- Redesign & enlarge the existing stormwater system and add new detention basin
Assuming Q=2.6 gpm, and T=79 ft²/day, from the extraction well capture includes:

- Radius of capture of 235 feet
- Max. upgradient capture 470 feet
- Downgradient stagnation point of 150 feet

The capture effectiveness is reduced when using EPA’s distance drawdown application.
Capture Analysis-Deep Zone

- Assuming Q=5.8 gpm, and T=191 ft2/day, from the extraction well radius of capture analysis includes:
  - Radius of capture of 292 feet
  - Max. upgradient capture 584 feet
  - Downgradient stagnation point of 186 feet
  - The capture effectiveness reduces when using the distance drawdown curves equation
Extraction System Implementation

- In 2015, a remedial system was designed and constructed that included:

- A PLC based control system that monitors and tracks key extraction system parameters. These parameters include water levels measured in extraction wells EW-1I and EW-1D, process flow rates in each extraction well and total flow from both wells.

- Remote access to operating system by owner and consultant

- Design/redevelop new stormwater retention basin and paving system
System Operations

- A pumping rate of 2-3 gpm for the intermediate zone extraction well and a pumping rate of 5-6 gpm for the deep zone well should be sufficient to contain the plumes on the on-site and off-site.

- The extracted groundwater is pre-treated with an oil/water separator, permitted and discharged into the local POTW, and the system is operated using PLC, transducers, pump controllers, and supporting equipment.

- The extraction system has been operating continuously since September 2015.

- The effluent quality being discharged to the local POTW is well below discharge limits.
Summary

- The former MGP site operated for over 60 years, ending in the late 1950s
- Impacts to underlying soils and groundwater were delineated
- Off-site groundwater plumes extend several hundred feet downgradient
- An hydraulic containment system was selected to remedy the impact to three separate sand zones
- The system was designed and constructed to capture COCs beyond the limits of contamination on-site
- The system has been operational since September 2015
Q&A