

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



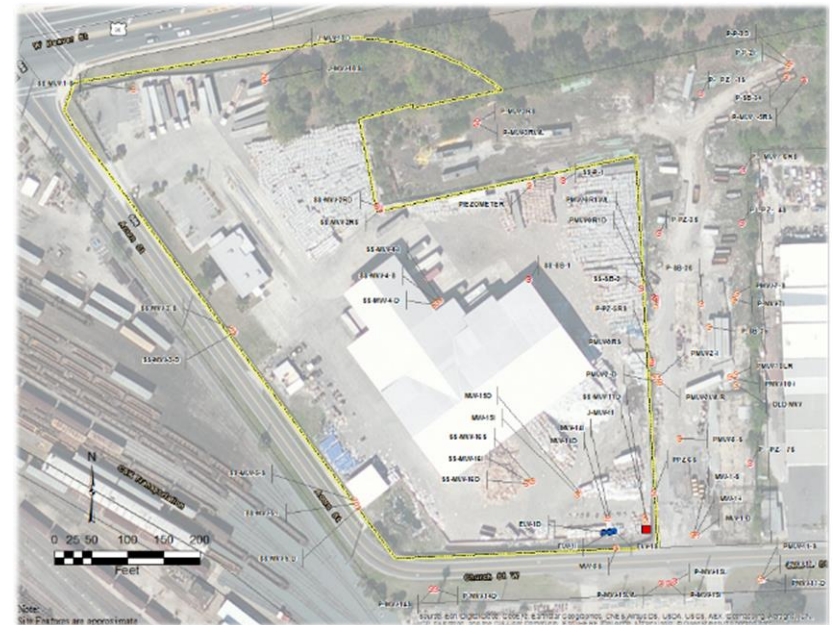
Former MGP Facility: Late 1800s-1950s



Current Jacksonville Facility: 2015

Monitoring Network

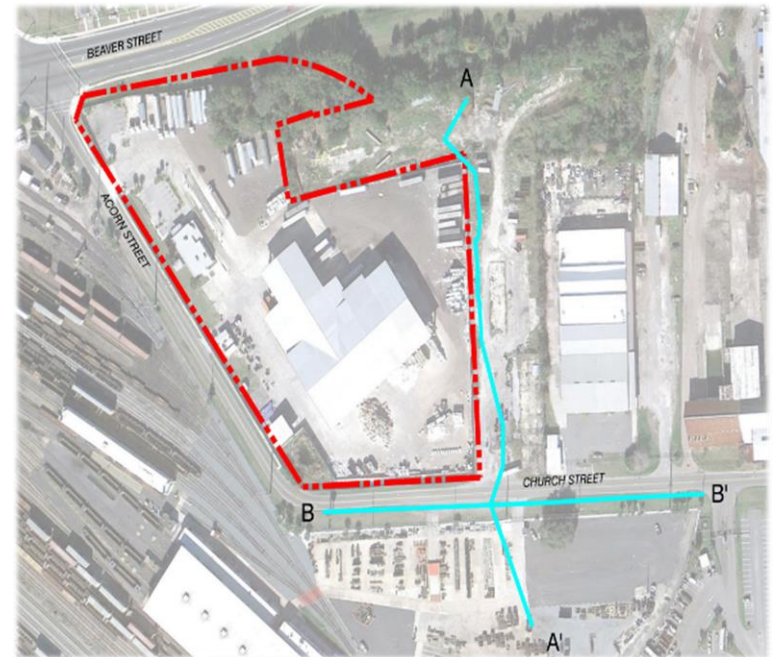
- ❖ Over 80 monitoring wells have been installed on and around the former MGP site since the 1990's, including wells to determine the lateral and vertical extent of groundwater impacts
- ❖ Water levels and groundwater quality have been periodically monitored in the shallow, intermediate and deep sand 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 Assessment Activities: 1990's to Present

Site Setting and Conceptual Model

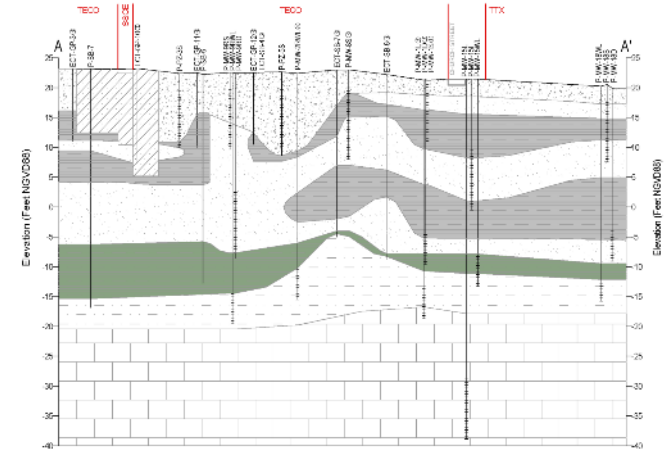
- ❖ Historic MGP operations have contributed BTEX, PAHs, phenols, cyanide, lead and arsenic to site soils and groundwater
- ❖ A substantial portion of the MGP residuals and impacted soil has been removed via excavation and dewatering
- ❖ More than 46,000 tons of MGP waste material and impacted soil have been removed from both properties in phases
- ❖ Approx. 75% of vadose zone soils on western property have been removed



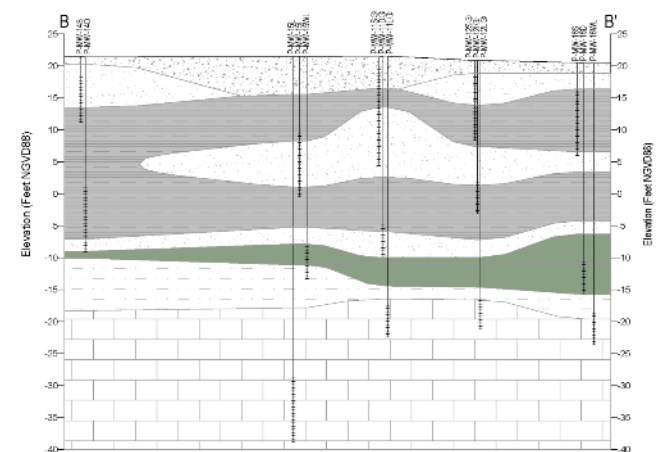
Cross-Sectional Areas

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



A-A'

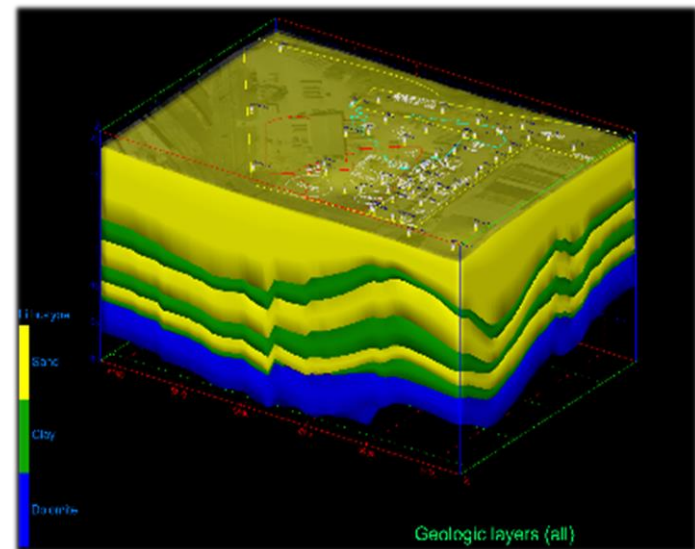


B-B'

COC Concentrations

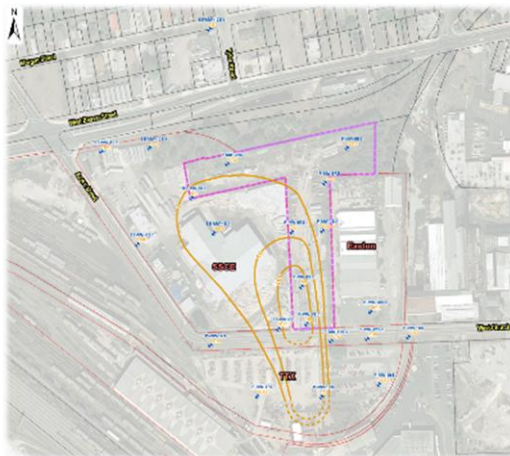
Near the southeast corner of the site:

- ❖ **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

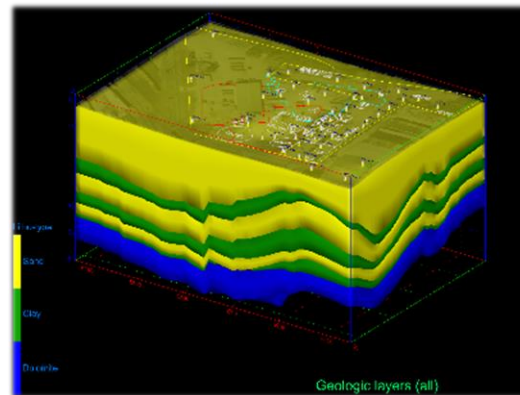


Remedial Strategy

- 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



Shallow Sand Unit
Benzene Isoconcentration Map



Generalized Site Geology
Shallow, Intermediate and Deep Sands



Shallow Sand Unit
Naphthalene Isoconcentration Map

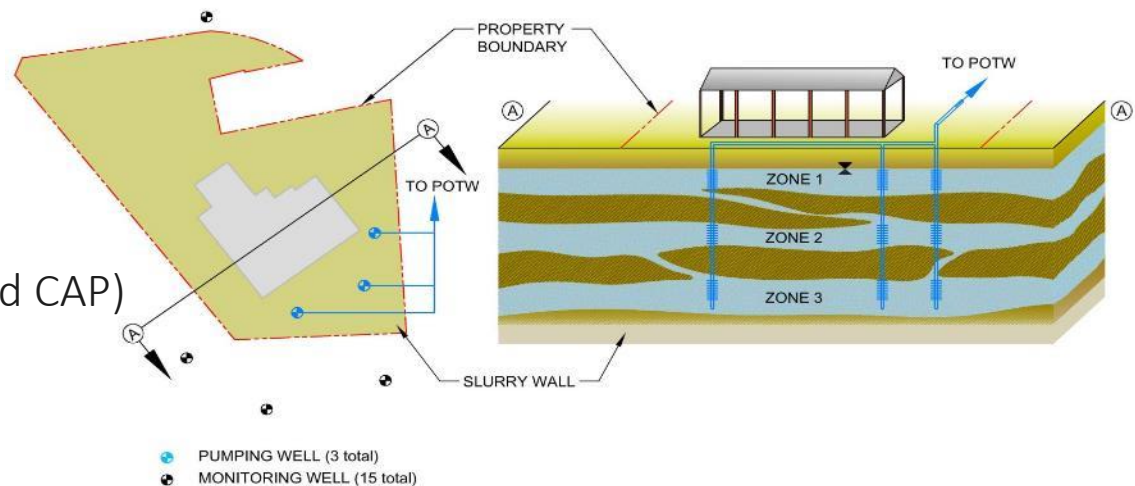
The state approved recommended approach in early 2013

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)

FORMER MGP SITE JACKSONVILLE, FL

ALTERNATIVE 3:
HYDRAULIC CONTAINMENT
WITH CAPPING
DRAWING NOT TO SCALE



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



Remedial System

Capture Analysis-Intermediate Zone

- ❖ 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 reduces when using EPA's distance drawdown application



Capture Zone Effectiveness

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



Capture Zone Effectiveness

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



Computer Touch Screen

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

