SMALL PROJECTS GRAND PRIZE WINNER
Remediation of a Former Manufactured Gas Plant Brownfield Property in Downtown Tampa Florida
Process Flow at Tampa MGP

1. Coal/Coke Storage
2. Retort House
3. Purifier Vessels
4. Gas Holder
5. Consumer
MGP Operations Ceased in 1960

...but MGP residuals remained
What is MGP NAPL?

- Byproduct of the gas cooling/purification process (carbureted water gas)

- Condensate forms complex oily liquid mixture: “Coal Tar”

- Quite fluid, with roughly same viscosity as vegetable oil

- Dark red to maroon to brown to black
Field Observations

- Tar Saturated Sands
- Heavily-Stained with Sheens
- Tar Saturated Discrete Lens
Primary Mobile NAPL

Approximate Location of Former Gas Holder

Approximate Extent of Surficial Aquifer Groundwater Impacts

Stable dissolved plume
Project Complexities

- Existing and occupied buildings, roadways, trolley line, and utilities
- Significant hydraulic gradient
- Varying types of NAPL

The final remedial design needed to be flexible to facilitate real-time optimization during operation.
And FAST!....

Due to driving force – Site Redevelopment

Rendering Credit: Tampa Bay Times
Timeline of Events

- Submitted ISR for MPE System
- FDEP Approval of ISR
- Permitting

- Submitted RAP for Site Impacts
- FDEP Approval of RAP

- Construction of MPE System
- MPE System Startup

- Well Installation
- Construction Bid Procurement
- Pilot Testing

- Expansion of MPE System

- Q2 2014
- Q3 2014
- Q4 2014
- Q1 2015
- Q2 2015
- Q3 2015
- Q4 2015
- Q1 2016
- Q2 2016

BSRA Negotiated
Feasibility Study

Pilot Testing

FDEP Approval of RAP
MPE System Startup

Geosyntec.com
Engineers | Scientists | Innovators
Multi-Phase Extraction

MPE involves the extraction of contaminant mass from the unsaturated zone, "smear zone" and saturated zone using submersible pumps or high-vacuum with drop tubes. MPE provides a mechanism for achieving mass removal by:

- Volatilization of adsorbed mass from the vadose and smear zone
- Extraction of contamination groundwater and NAPL
Recovery of mobile NAPL using high vacuum (up to 29-in Hg or 394-in wc)

- Max design flow rate = 100 gpm
- MPE design ROI = 20 ft
- DNAPL and LNAPL treatment
- Mass estimates
  - 3,000 gallons NAPL
  - 82,000 pounds of dissolved/sorbed mass
- 44 MPE wells and 50 injection wells
System Layout

MPE Well

Injection Well

MPE Well Converted to Injection Well
Originality and Innovation

Beneficial Reuse of Treated Effluent
Flexible and Adaptable Manifold and Well Design
Modular Design and Relocatable Process Treatment Train
Geosyntec’s comprehensive integrated approach to rapidly and effectively address all the impacted environmental media was key to receiving concurrence from all the stakeholders.

This project required a team of experienced professionals working in close coordination with FDEP, the City of Tampa, Hillsborough County, TECO PGS, multiple subcontractors, and developers.
Two, 25Hp Liquid Ring Pumps provide the vacuum to extract NAPLs from the MPE wells.

NAPL and groundwater mixture is extracted from the well field and transferred to the treatment components.
MPE Treatment Train

Water is conveyed and discharged in the top of the air stripper tower.

Extracted groundwater and NAPL undergoes separation in the influent chamber.

Volatile are stripped as water passes the treatment trays and contacts air.

NAPL enters internal storage tank.

Groundwater is conveyed and further treated in the downstream treatment components.

A blower at the base of the air stripper provides air for volatilization.
Groundwater is transferred to liquid granular activated carbon units for tertiary treatment.

Recovered vapors are treated by vapor phase granular activated carbon prior to atmospheric discharge.

Treated groundwater is returned to the surficial via an infiltration basin, reinjected to optimize NAPL recovery, or sent to POTW.
Shades of MGP NAPL

“Yes, that’s NAPL”
Constant Optimization is Key to Success

System NAPL recovery

Transition or Shutdown Point

Asymptotic Conditions

Days of Operation
NAPL Recovery

3,300 gallons

Gallons of Recovered NAPL per Month

Total Gallons of Recovered NAPL

Gallons of Recovered NAPL per Month

M1  M2  M3  M4  M5  M6  M7  M8
Can Anyone Guess the Weight of Recovered NAPL in Elephants?
Closing – Transformation of Brownfield

1,000 apartments or condominiums and 40,000 SF of retail space

Significant reductions in MGP waste

Linkage between downtown Tampa to historic Ybor City

Redevelopment proposed to include grocery store in food desert