

Response Summary

BP Pipelines

OIL SPILL 175th and White Oak Avenue



Hammond, Lake County, Indiana
Federal Project Number (FPN): E10528

Jim Mitchell, OSC

Background

- Week of August 13th citizen complaints of odors in vicinity of 175th and White Oak Avenue
- Citizen reported flames out of basement floor drain
- Hammond Fire Department (HFD) flushed sewers with water
- HFD notified BP of LEL reading in sewers
- Product observed in sewer at 175th and White Oak

Background

- BP shut down the pipeline “ The White Oak System”
- The system carries refined petroleum products from BP Whiting Refinery to a terminal in Manhattan Illinois.
- 12 inch pipeline containing 90% gasoline 10% diesel
- BP closed upstream and downstream block valves
- Booms placed in sewer catch basins and primary and secondary outfall at Walnut lift station
- Vac trucks removed product from sewer manways and Walnut lift station

Administrative Order Signed

Day 2

- Stop pressurized flow from the pipeline at the suspected discharge location at 175th and White Oak Avenue by August 18th, 2010;
- Excavate and identify the source of the pipeline release by 1800 hours on August 22, 2010 as directed by USEPA, State and local officials in Unified Command;
- Deploy appropriate oil recovery and containment devices and equipment, *e.g.* skimmers, vacuum trucks, absorbent/containment booms by August 18, 2010;
- Perform continuous air monitoring and sampling as directed by USEPA and public health officials beginning August 18, 2010;
- Assess and mitigate any impacts to drinking water supplies associated with the discharge beginning August 18, 2010;
- Assess impact and or contact of oil to the 30 inch drinking water line which runs adjacent to pipeline, through excavation, air monitoring and if necessary, visual inspection as directed by USEPA, State and local officials in Unified Command;
- Perform groundwater, storm water, surface water, soil and sediment sampling of impacted areas as directed by USEPA, State and local officials in Unified Command;
- Notify USEPA immediately, but no later than Sunday August 22, 2010 after discovery of the discharge point and of the date and time that the discharge of oil from the pipeline ceased and the date and time the discharge of oil ceased into the sewer that runs to the lift station that may discharge to the Little Calumet River at Walnut Avenue;
- **Remediate the oil and contaminated soil in accordance with the Workplan by September 15, 2010;**
- Remediate any impacted areas (including shoreline if any) along the Little Calumet River by September 15, 2010;
- Dispose of all wastes at USEPA approved disposal facilities; and
- Submit a final report to USEPA detailing all work completed including monitoring and analytical data, disposal records, and all documentation related to the response by October 1, 2010.

Unified Command

- IDEM
- City of Hammond
- USEPA
- BP

UNIFIED COMMAND

- Objectives:
 - Install a dewatering system to remove liquids from excavation pit
 - Safely expose the underground pipeline, remove the concrete encasement and identify the location of the discharge
 - Place a temporary clamp on the discharge point while the remainder of the pipeline is de-oiled
 - Permanently repair pipeline
 - Prevent migration to Little Calumet River
 - Characterize soil and groundwater to determine impacts
 - Perform air monitoring to support worker and public safety
 - Assess impact and or contact of oil to drinking water lines
 - Determine impacts to storm water and surface water
 - Remediate oil and contaminated soil in accordance with clean-up objectives

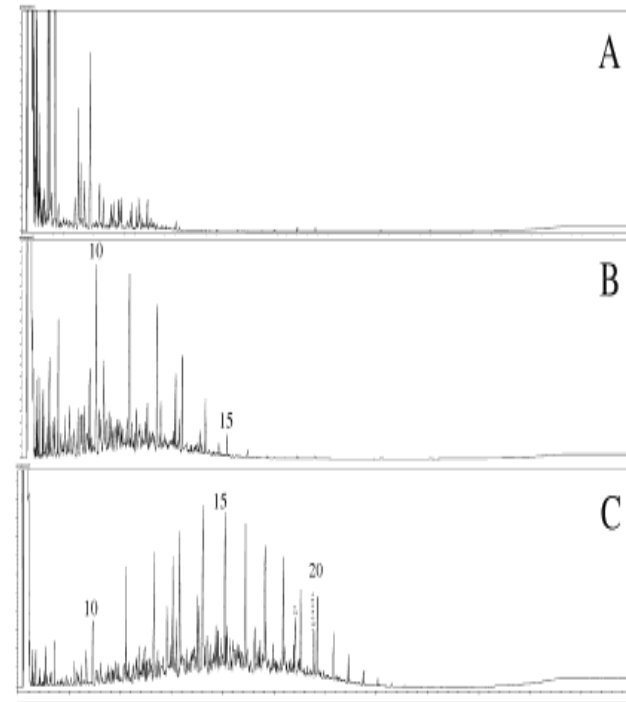
Chemicals of Concern

White Oak System transported gasoline, kerosene, and diesel fuel. COCs evaluated include:

- BTEX/MTBE
- PAHs
- TPH
- GRO
- ERO

Fingerprinting from MW 37 indicate 92% gasoline 8% diesel range hydrocarbons

Chemical Fingerprinting of Spilled or Discharged Petroleum 23



Clean-up Objectives

- Clean-up objectives and analytical methods were derived:
 - IDEMs RISC Technical Guide (IDEM, 2001b)
 - Residential property – RISC Residential Default Closure Levels (RDCLs) for soil and groundwater
 - Hammond streets and right of ways RISC Industrial Closure Levels (IDCLs)
 - Analytical
 - BTEX/MTBE – EPA Method 8260
 - TPH & GRO – EPA SW-846-8015D
 - PAHs – EPA Method 8270

Pipeline

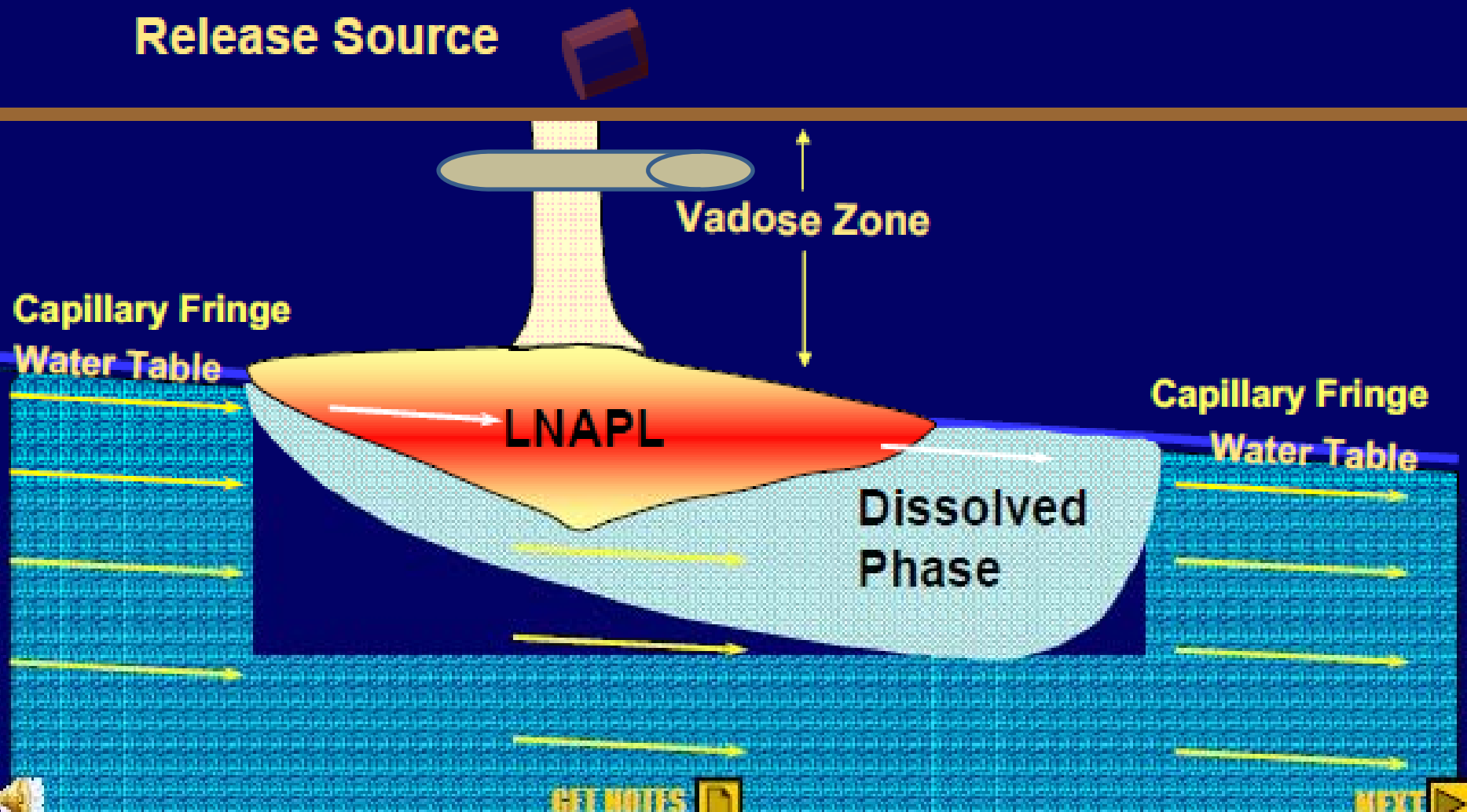
- PHMSA provided oversight of pipeline repair operations, testing and re-start plan
- Release caused by corrosion
- Pipe bends encased in concrete which accelerated corrosion
- Additional test dig performed 2 blocks west of release site and concrete encasement investigated





LNAPL Release

Release Source



Assessment of Impacts

Soil- General

- Began August 18 and continued until impacts fully delineated
- Vertical and horizontal
- Geoprobe, hand augers and, potholes
- Advanced to depths as great as 24 feet bgs
- Soil boring logs generated for each location

Sampling Outside Utility Corridor

- 93 soil borings collected
- Acetate lined stainless steel sampler
- Acetate sampler portion replaced prior to sample collection
- Samplers 4-5 feet in length
- Each borehole sample split
- One placed on ice and one headspace analysis with a PID

EPA and START provided oversight of all assessment activities

Assessment of Impacts (cont).

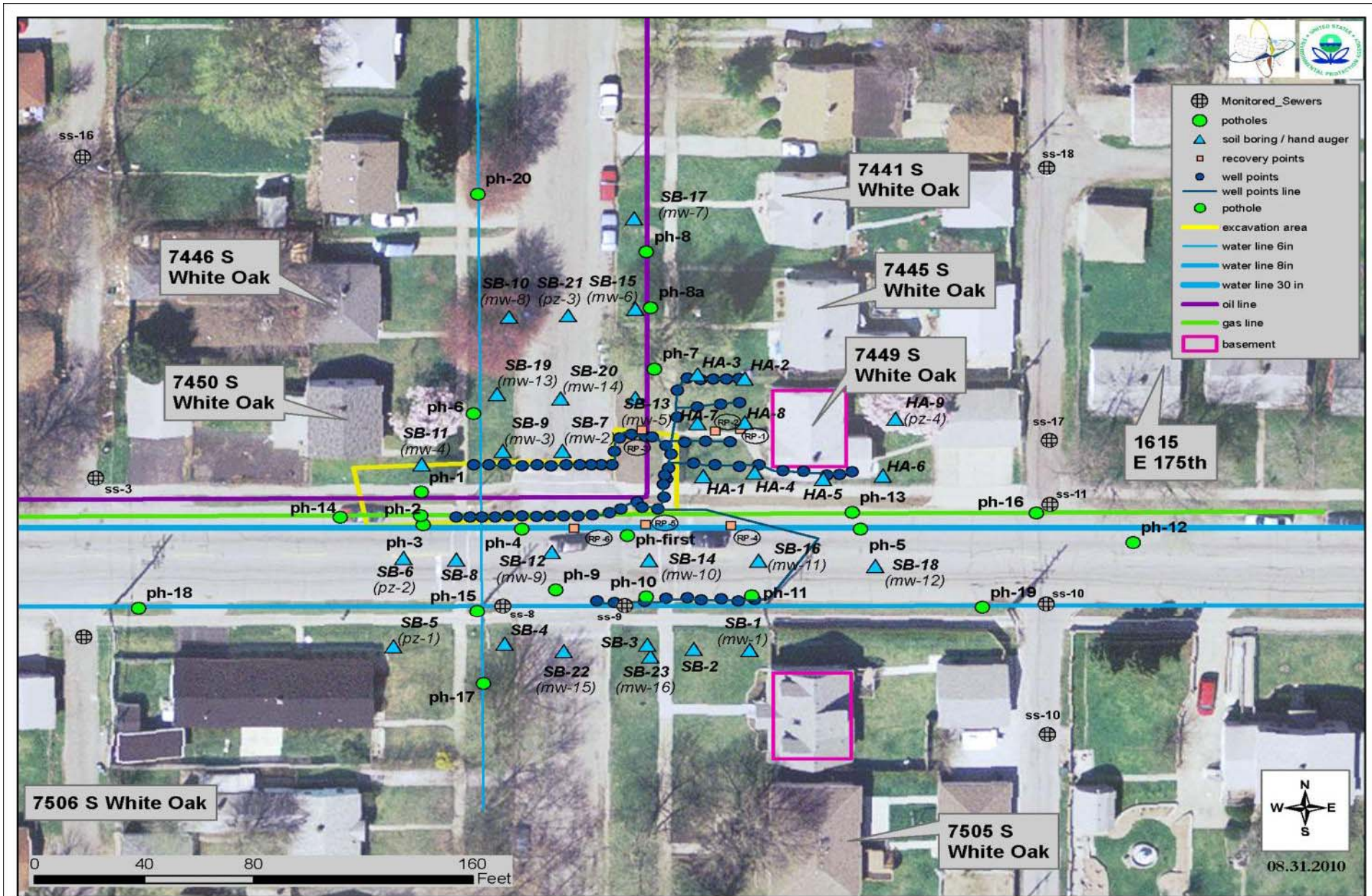
Inside Utility Corridor

- Pothole or vacuum digging techniques were used to expose utilities
- After pothole reached desired depth, hand auger was used to collect sample
- Each borehole sample split
- One placed on ice and one headspace analysis with a PID
- 174 sample collected from 88 soil borings

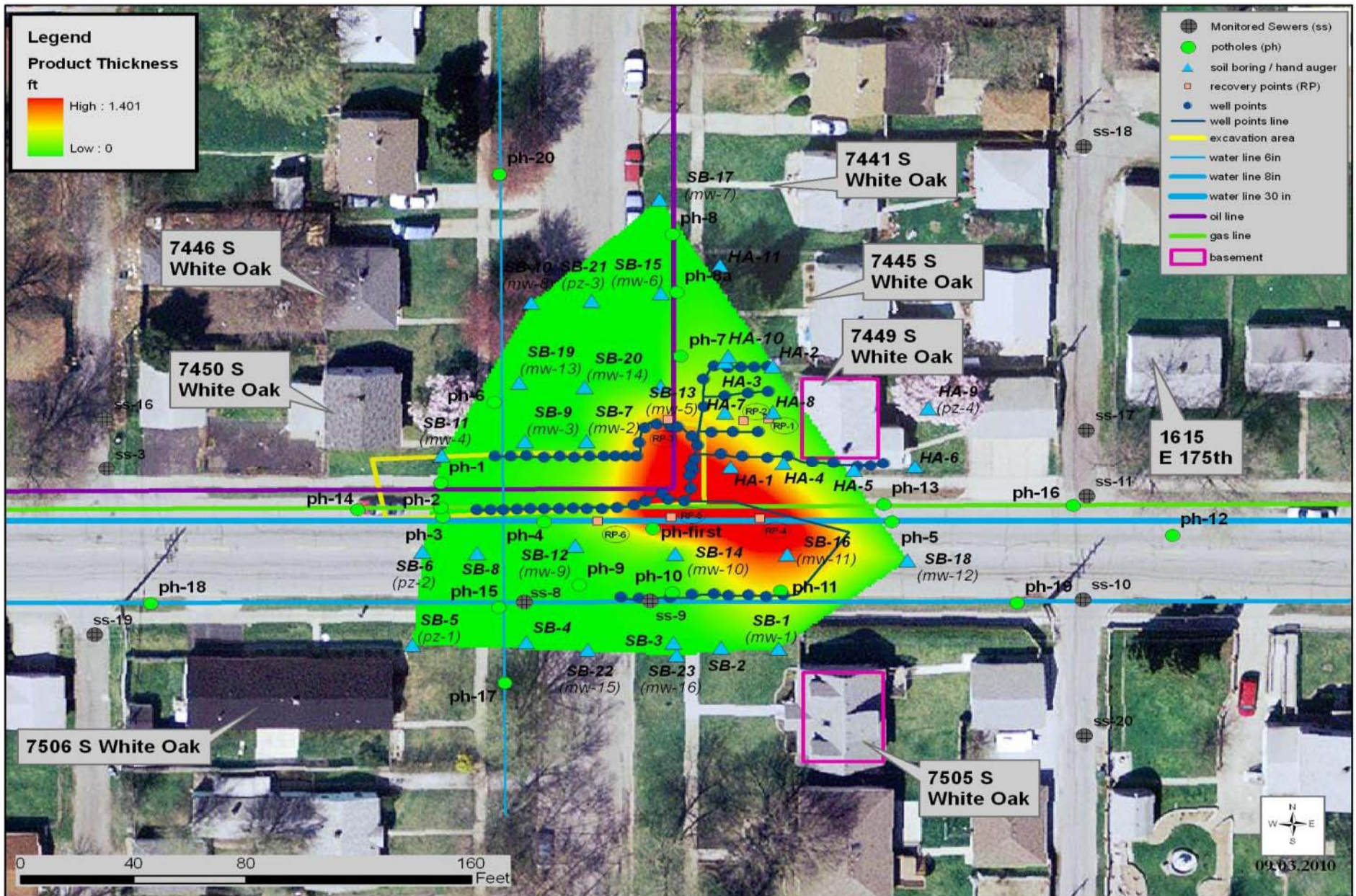
Site Hydrology

- Unconsolidated sediments consisted of sand to 12 feet below grade
- Sand underlain by clay with silt or sand to 24 feet below grade
- Groundwater present within the sand unit, ranging 4-7 feet below grade
- Groundwater depth dependant on dewatering activities that lowered water table to control migration and allow excavation

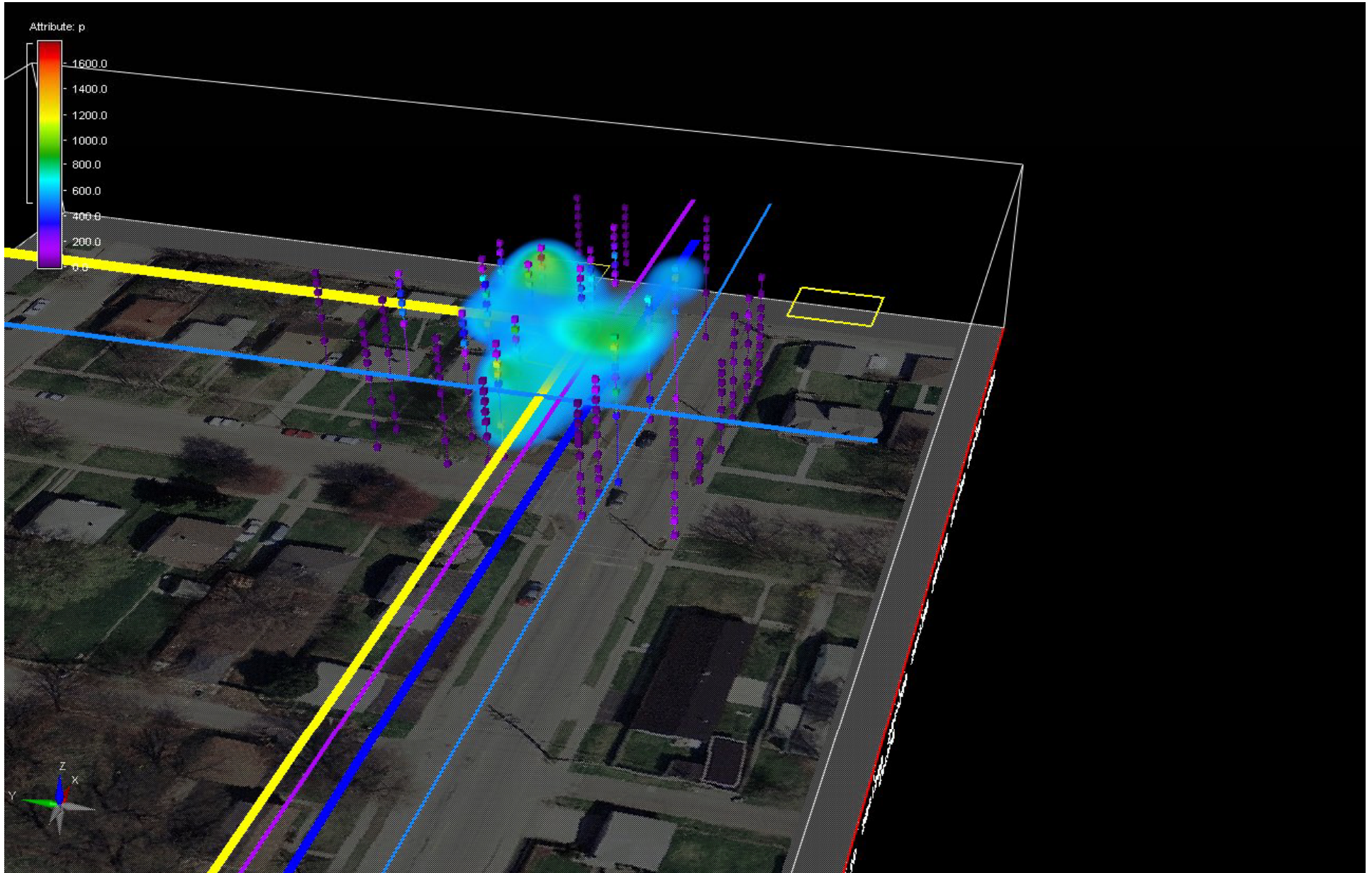
Site Sampling Map



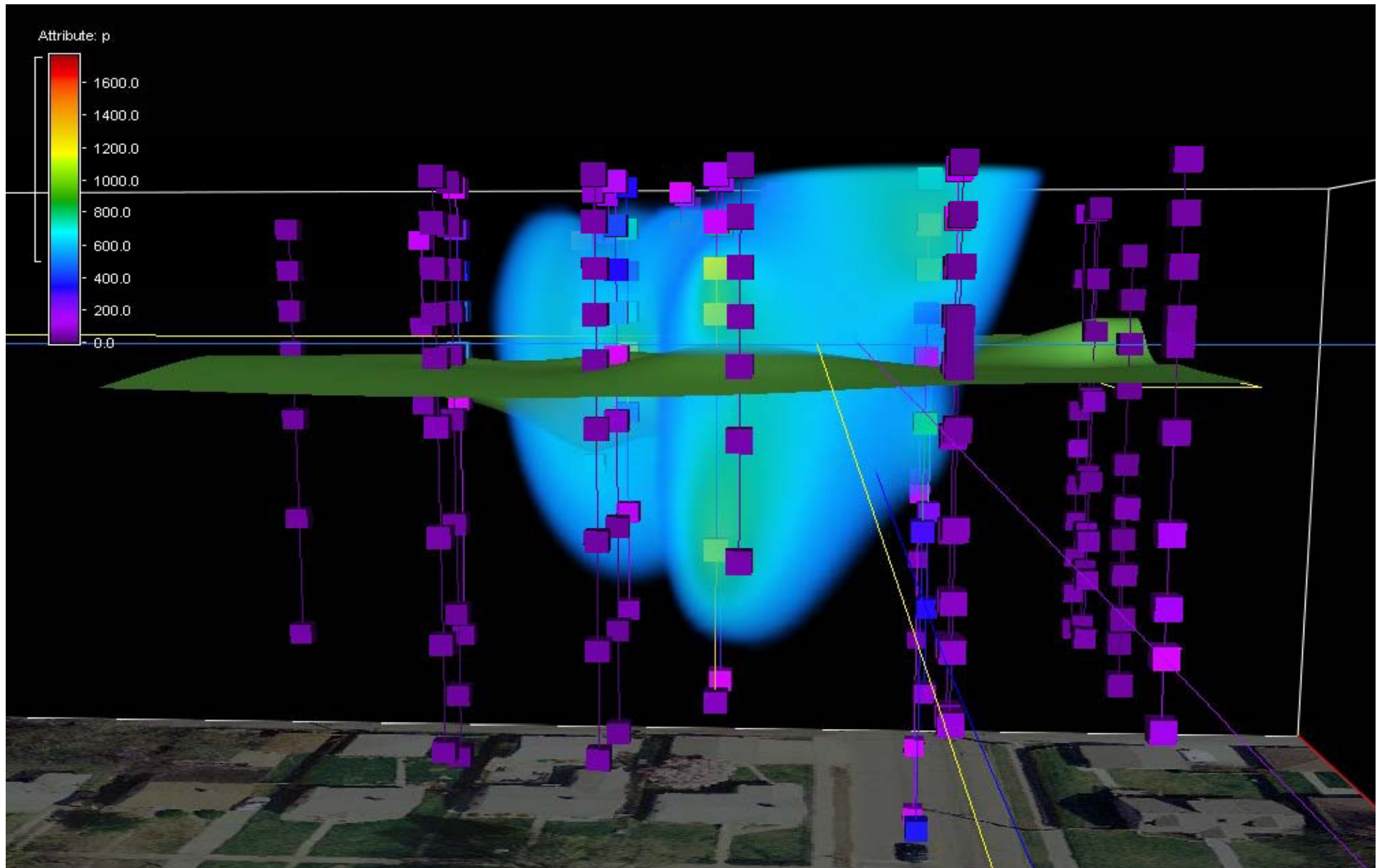
Example Product Thickness Map



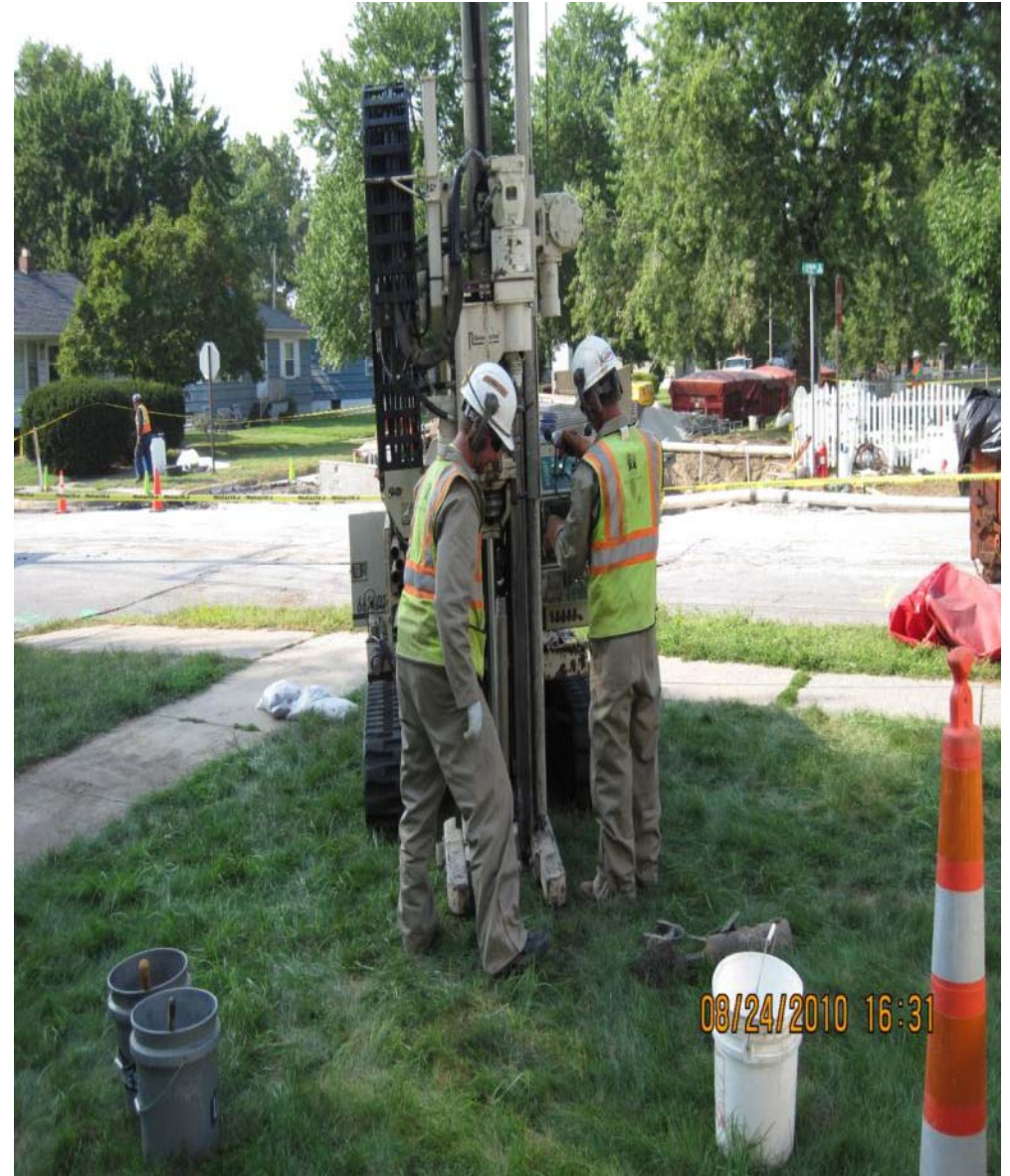
Example VOC 3D Map Looking East



Example VOC Map with Water Table



Pothole Technique & Geoprobe



Air Sampling

Residential Home Air Sampling

- EPA removed all homeowner contributors to indoor benzene
- ERT TAGA bus screened all houses (BTEX)
- BP followed up with summa canisters
- Summa samples collected for 24 hours
- 1 home exhibited benzene levels in excess of the ATSDR screening level
- Residents re-located and home razed
- 2nd home also eventually razed

Public

- START/ANTEA combined eventually taken over by Antea
- AreaRae Network deployed
- Benzene integrated (Ultra-Rae) measurements taken when VOCs greater than 50 ppm
- Real time VOC measurements captured with RAT shape files created for visualization
- Routine sewer monitoring performed VOCs/Benzene
- Air monitoring hit above action level required work shut down and re-evaluation

Air Sampling & Groundwater

Vapor Intrusion

- Vapor ports installed in residences basement or garage
- Vapor probes installed
- Borehole installed 6" below probe depth
- Routine Tedlar bag sampling of vapor port performed to evaluate vapor intrusion while work being performed

Groundwater

- Monitoring wells constructed of 1 or 2 " diameter PVC pipe
- Screens 10 feet long w/riser above ground
- Monitoring well network gauged daily to confirm hydraulic control
- After 2 months gauging move to weekly
- Oil/water interface measurements
- GW contour maps created and demonstrated radial flow towards recovery points
- Ground water samples collected on a monthly basis

Assessment (cont).

Free Product/LNAPL

- Free product at location HA-1, HA-4, HA-5
- Recovery wells placed at these locations and allowed to accumulate overnight
- Free product ranged from .01 feet to 3.63 feet
- Aggressive free product recovery through dewatering system, internal combustion engines (ICE), and Vac trucks
- December 15, 2010 last day LNAPL measured at the site

Drinking Water

- Residents supplied drinking water by 6, 8 and 30 inch water lines
- Four homes sampled by Hammond Water Department (HWD)
- No impacts to drinking water observed
- HWD concerned with integrity of seals through direct LNAPL contact and vapor intrusion
- Sections of water lines traversing the intersection were replaced

Remedial Action

Technologies

- **Dewatering System** – lowered water table and recovered liquid product and groundwater
- ***Vac trucks and ICE units** – connected to recovery wells and used to recover free product, impacted GW and petroleum vapors - system referred to as a dual-phase system (DPE) since both liquids and vapors recovered
 - ***Well suited for sandy soils w/shallow water table**

Dewatering System

- Consisted of extraction pump recovering GW through manifolded recovery points into a frac tanks
- Valves adjusted daily to maximize water/ LNAPL recovery
- Operated continuously from August 18th through February 15, 2011

Remedial Action (cont).

ICE Units

- Uses internal combustion engine to destroy petroleum vapors extracted from subsurface
- Total of 5 ICE units
- Start with propane liquids and vapors is separated before entering ICE unit
- Regulator determines correct amount of vapor, propane, and air mixture for comn
- Air passed through a series of catalytic converters to ensure complete combustion
- Also use to treat Vac truck exhaust vapors

Vacuum Truck

- Connected to stingers in recovery wells and used to recover liquids and vapors from subsurface
- Vapors emitted through exhaust stack
- Operation 20 hours per day and then only during daytime hours
- Vapors treated through ICE units after arrival
- Source of area vapor complaints

Remedial Action

Excavation

- Initiated after all free product removed
- Work plan developed and approved by USEPA
- PID bagged headspace technique used to define excavation extents
- PID method used to guide excavation activities – 10ppmv
- Sidewall sample collected every 20 linear feet
- Full COC analyzed
- Robust QA/QC
- GPR used to locate all utilities
- Extended dewatering system
- Sheet piling used to provide sidewall support and divided excavation into manageable sections which could be excavated and backfilled safely

Remedial Action

Excavation

- Soft dig technologies used when close to utilities
- Water lance used to break up soil
- Hydro Vac with remote controlled vac-hose used to remove soil in utility corridors
- Utility corridors excavated and backfilled in 20 foot sections
- All other locations bucket excavator used
- Flowable fill material which is a mixture of cement , sand and water was fabricated to achieve compaction and inhibit flow from unexcavated areas into active excavations
- Lower permeability 10^{-4} compared to typical 10^{-1}
- Gypsum also used as backfill to expedite bio-remediation

Post Remediation Assessment

Soil

- 152 confirmatory samples collected
- Soil cleanup objectives not attainable in all areas due to utilities and equipment limitations
- Four confirmatory bottom soil sample locations, BOT 56,59,60, and 62 exhibited one or more COC above cleanup objective
- Areas above cleanup objectives owned by the City of Hammond
- Residual soil impacts further characterized as requested by the City

Groundwater

- Post excavation GW sampling from entire monitoring well network performed
- Small impacted seen but limited to excavated areas
- Impacted areas isolated indicating small hot spots.
- GW monitoring will continue on quarterly basis

Metrics

- Dewatering System
 - 21,438 gallons of free product
 - 1,176,250 gallons of impacted groundwater
- ICE Units
 - 41,556 pounds of petroleum vapors
 - Equivalent to 6,645 gallons of gasoline
- Vac truck
 - 4,064 gallons of gasoline
- Excavation
 - 14,067 tons of impacted soil

Site Closure

- Closure of RAO
 - Site referred to IDEM State Clean-up Program
 - Quarterly monitoring reports submitted to document site conditions
 - BP will attempt to obtain No Further Action (NFA) status once clean-up objectives are met
 - If clean-up objectives are not met after eight quarterly monitoring events, a formal closure strategy prepared by BP and presented to IDEM

Lessons Learned

- Coordination and cooperation are the key to success
- Must keep Pipeline Operations involved as RP lead, do not allow transition of leadership to Pipeline Remedial
- Carbon filtration systems for recovery of saturated gasoline vapors difficult, require expert operators – Recommend ICE Units for vapor destruction
- If possible, treat vapors from VAC truck
- Hydro-excavator good for surgical excavation operations, but noise is a big concern in residential areas
- Capture borehole log data electronically
- Subsurface mapping and contours essential
- RP need to continually verify hydraulic control
- Consult with expert hydro geologist
- Evaluate well point depths
- If UC is established at a Marriott....