

## **RCRA FACILITY CORRECTIVE ACTION**

### **Remedial Investigation, Design, Construction, and O&M for Petroleum Hydrocarbons Confidential Site, Southern Illinois**

A Project Team managed by current Swenson – Marzec & Associates, Inc. (SMA) was retained by a major oil company to investigate and remediate soil and groundwater at one of its former petroleum refineries. The 400-acre facility operated for over 60 years until its closure; it now functions as a bulk petroleum distribution terminal. The ongoing RCRA Facility Investigation/Corrective Action at the site is valued, to date, at over \$25 Million (all overseen by the Project Team).

The terminal and surrounding industrial area is served by numerous petroleum pipeline systems and companies that distribute crude oil and refined petroleum products. Despite best management practices and standard industry precautions, spills and releases have occurred at the facility and from the numerous pipeline systems serving the terminal over the more than 70 years of operations.

The facility is located on alluvial sediments and glacio-fluvial deposits, consisting of silts and clays underlain by sand that coarsens with depth. A highly productive and permeable aquifer underlies the finer-grained deposits and ranges in thickness from 60 to 80 feet; it is used extensively by industry and local municipalities for process and drinking. Bedrock is over 100 feet below ground surface.

The Project Team manages several remedial investigations for soil, groundwater, and light non-aqueous phase liquid (LNAPL) beneath the facility and surrounding area, all in accordance with a consent order negotiated with the state. The subsurface stratigraphy and extent of LNAPL was defined by Cone-Penetrometer and Rapid Optical Screening Tool (CPT/ROST™) borings, hollow-stem auger borings, and roto-sonic borings. Monitoring wells were installed throughout the area to evaluate the thickness of LNAPL and extent of dissolved phase contamination in the aquifer and overlying fine-grained deposits. Groundwater monitoring, consisting of fluid level measurements and collection of groundwater samples (using a variety of techniques including low-flow dedicated pumps, bailers, and HydraSleeves™) for laboratory analysis, is ongoing. Soil investigations, to evaluate vapor migration as well as the extent of soil contamination in the vadose zone, are also ongoing.

In addition to the investigation work, the Project Team has performed aquifer pumping tests; a variety of pilot studies looking for ways to enhance the recovery of LNAPL; and groundwater modeling to support the design of soil, groundwater, and LNAPL remediation systems. SMA serves as the lead design and resident engineer for the remediation efforts conducted at the facility; and has prepared all design drawings, bid specifications, solicitation of subcontractors, construction oversight, and construction completion reporting associated with the following remediation systems:

- A SVE system to remove hydrocarbon mass and recover petroleum vapors along the property boundary;
- An array of skimmer pumps located throughout the facility;

- A large capacity groundwater extraction well (200 GPM) to maintain inward gradient control and prevent dissolved phase constituents from migrating offsite;
- A mobile internal combustion engine (ICE) unit for high vacuum recovery (HVR) and low-flow dual-phase extraction (LFDPE) operation and pilot testing at several locations; and
- A LFDPE system to recover LNAPL along the property boundary of the facility.

The operation and maintenance of the above systems along with the treatment and handling of recovered fluids from these systems is managed by SMA. To date, these systems have recovered almost 800,000 gallons of LNAPL; predominantly along a property boundary that is up gradient of a residential area.

SMA manages the data collected from the investigations and ongoing remediation systems using an environmental database system (EQuIS© by EarthSoft, Inc.). The EQuIS database system allows SMA to:

- Receive and manage all site data via electronic data deliverables (EDDs);
- Ensure the quality and consistency of all site data stored in a central database;
- Provide immediate access to the most current environmental data for project managers and the client through either a desktop or web-based application;
- Provide data analysis support utilizing third-party software with direct interfaces to EQuIS (e.g. ArcGIS, Surfer, MODFLOW, and gINT);
- Manage over a million records containing chemical, geotechnical, hydrological, and geological data. In the near future, operational and maintenance data along with real-time monitoring of various remediation systems will be managed within EQuIS;
- Model, interpret, and present the data as three-dimensional visualizations and animations using Environmental Visualization Software (EVS) by C Tech Development Corporation.

SMA also participates in regular meetings, teleconferences, presentations and negotiations with the state regulators and supports the client in ongoing litigation with the state and third parties (including the presentation of expert opinion reports).