GROUNDWATER MONITORING AND REMEDIATION PROJECT SUMMARIES

CLIENT: Cigarette Manufacturer
PROJECT: Tank Removal and Contaminant Modeling

Our engineers and contractors removed one leaking gasoline UST from the vehicle maintenance garage of a cigarette manufacturer's facility. Contaminated soils were discovered and subsequently removed and transported to a permitted facility for heat treatment. A recovery well was installed to remove free product from the water table and groundwater monitoring wells were also installed to delineate the vertical and horizontal extent of the contaminant plume. Slug testing of selected monitoring wells was performed to determine aquifer characteristics at the site. Groundwater modeling was completed using the CONMIG model to predict the fate and transport of petroleum compounds in the groundwater. A CAP was prepared and submitted to the state for remediation of the groundwater in this area through natural biodegradation.

CLIENT: Cigarette Manufacturer
PROJECT: Site Assessment and Contaminant Modeling

Extensive assessment of groundwater contamination in the vicinity of a former gasoline UST was completed by installing a network of shallow and deep groundwater monitoring wells both onsite and on an adjacent property. Modeling was performed using the SOLUTE model to predict the extent and fate of the offsite contaminant plume. A risk assessment was also completed to detail the extent of the potential risk to human health and the environment. A CAP was completed, submitted to and approved by the state Closure of this site using was achieved using a vapor extraction system.

CLIENT: Textile Manufacturer
PROJECT: Tank Removal and Site Assessment

A 12,000-gallon fuel oil UST was removed under the supervision of our personnel. A soil and groundwater assessment was performed once the presence of contamination was confirmed. Initial groundwater assessment activities revealed the presence of petroleum compounds and chlorinated solvents. Subsequent groundwater sampling and assessment has continued to document the presence of chlorinated solvent residuals in the groundwater. Additional assessment activities are required to determine the source and extent of the chlorinated solvent contamination.

CLIENT: **Textile Dyeing & Finishing Facility**
PROJECT: **Evaluation of TCE Contamination**

TCE contaminated groundwater was detected during past site investigations at the client's facility. Several years later, the state responded to past assessment reports and required additional assessment work, identification of the TCE contamination source and recommendations for remediation. LEAF performed sampling of all wells on site and the local surface water receptor, defined the contaminant plume and groundwater flow direction, and initiated soil and groundwater treatment using soil vapor extraction technology.

CLIENT: **Knit Apparel Manufacturer**
PROJECT: **Environmental Assessment**

LEAF was hired by the knit division of a large textile company to conduct a Phase I Environmental Assessment (EA) of a plant closed due to consolidation of operations. LEAF identified a number of environmental concerns for the property, including underground fill and supply lines serving one knitting oil and three diesel fuel aboveground tanks. LEAF collected soil samples below the underground fill and supply lines, and analytical results revealed a release of varsol and diesel fuel had occurred at the fill station for the tanks. Depths of contamination were considerable and required the installation of a temporary monitoring well to obtain a groundwater sample. The groundwater sample indicated that a release of tetrachloroethylene (PCE) had occurred.

LEAF conducted interviews with company employees and determined that, in the past, the plant produced wool fabrics that contained a cleaning operation which stored PCE in the same aboveground tanks. Efforts to determine the horizontal and vertical extent of PCE plume migration are ongoing and have required access agreements for groundwater investigations on adjacent properties. LEAF assisted the client with negotiations so the sale of the property could proceed prior to completion of the required Comprehensive Site Assessment.

CLIENT: **Textile Manufacturer**
PROJECT: **Soil and Groundwater Assessment**

The client contracted our engineers to complete soil and groundwater assessment and remediation activities at a site where the release of petroleum product from a former UST system had occurred. The extent of the remaining soil contamination was defined, the contaminated soils were excavated, and groundwater monitoring was completed. Clean closure for the site has been awarded by the state as a result of removal of the source area.

CLIENT: **Specialty Household Products Manufacturer**
PROJECT: **Environmental Assessment & Regulatory Support**

During a Phase I Environmental Assessment to support refinancing, LEAF identified the potential for groundwater contamination from prior manufacturing activities. Chlorinated solvents were used to clean equipment in the electroplating room during the 1960s and 1970s, but their usage was discontinued. Groundwater monitoring wells were installed using hydropunch technology to collect samples of shallow groundwater at various locations around the site. Several VOCs, such as 1,1,1-trichlorethane, tetrachloroethene, and their decomposition products, were present in the groundwater on site. LEAF developed recommendations for complying with state groundwater regulations, and coordinated negotiations with the regulatory agencies and lending institutions to support the client's loan refinancing.

CLIENT: **Cigarette Manufacturer**
PROJECT: **Site Remediation**

A leaking hydraulic elevator cylinder was discovered during routine maintenance of the elevator equipment. Several hundred gallons of hydraulic oil were released to the environment as a result of a failure in the hydraulic system. Manual recovery of free product was initiated, then an automated, mixed liquids recovery well and pump system was installed. The liquids recovered were separated in the facility's existing oil/water separator and the recovered oil was recycled. Closure was awarded by the state agency after all free liquids were recovered.

CLIENT: **Textile Manufacturer**
PROJECT: **Comprehensive Site Assessment**

Chlorinated solvents were discovered during the assessment of soil and groundwater conditions following the removal of three fuel oil USTs. Research conducted by the client and our engineers revealed that the present owner of the site had never handled chlorinated solvents at this facility and, therefore, was not responsible for their presence in the groundwater. Our team of engineers prepared and submitted a Comprehensive Site Assessment to the state which absolved the present owner from further responsibility.

CLIENT: Family Trust
PROJECT: Soil and Groundwater Remediation

A Phase One Environmental Assessment of the former residential property determined that a heating oil underground storage tank (UST) and a gasoline UST had been removed without subsurface sampling. Soil and groundwater investigation of the two underground storage tanks at the site determined that the gasoline UST had contaminated both soil and groundwater. A Comprehensive Site Assessment (CSA) and subsequent investigative activities requested by the NCDEQ–Division of Waste Management (DWM) were completed and all contaminated soil above the shallow groundwater elevation removed.

A Corrective Action Plan for treatment of the contaminated groundwater and a pilot study of a groundwater removal system was completed. LEAF installed an automated pumping and storage system for removal of contaminated groundwater from four 6" diameter recovery wells. Additional groundwater remediation using Mobile Multi Phase Extraction technology was completed to reduce contaminant concentrations to the Groundwater Standards in the unconfined aquifer as required by the CAP. Site closure has been was awarded with a restriction on usage of groundwater at the site.

CLIENT: Textile Dyeing & Finishing Facility
PROJECT: Groundwater Site Assessment Report

LEAF conducted site assessment activities at the facility that was built in approximately 1901 and was used as a textile dyeing and finishing facility. A total of sixteen groundwater monitoring wells were installed around the perimeter of the facility, but the NC Department of Environmental Quality, Division of Water Quality (DWQ) requested additional assessment of groundwater contamination at the site. LEAF was hired by the client and convinced the DWQ that only additional sampling and analysis of the existing groundwater monitoring wells was necessary. After sampling the existing wells to clarify site conditions, LEAF was able to correct assumptions made by previous consultants and successfully refute allegations that groundwater contamination was the result of onsite activities. LEAF provided documentation that the contamination had in fact migrated onto the site from offsite sources, and the DWQ did not require the client to conduct further groundwater sampling as a result.

CLIENT: Shopping Center Owner
PROJECT: Site Closure Report

Groundwater contamination due to petroleum releases at a convenience store on the client's property was investigated by other consultants. Some of the contamination was improperly attributed to a former service station on the site prior to the convenience store being built. LEAF investigated available records, analyzed technical data, and provided documentation to the NCDEQ that the former service station did not contribute to the groundwater contamination. LEAF was able to establish that onsite groundwater was impacted by an upgradient release, as well as the current USTs operated by the convenience store. NCDEQ did not require the client to conduct any further site investigation.

CLIENT: Private Developer
PROJECT: Groundwater Modeling

A notice of Regulatory Requirements was forwarded to the current owner by the NCDEQ regarding a release of petroleum discovered after removal of USTs. Five petroleum USTs were removed but never operated by the current owner. LEAF installed two additional groundwater monitoring wells and conducted groundwater modeling to predict the maximum dispersion of contaminants at the site. Contaminant transport was simulated using a simple, one–dimensional computer model, which is based on the Domenico analytical solute transport model.

The results indicated that over an extended period of time, the plume will not exceed the NC Groundwater Standard for benzene of 1 µg/L at the property boundary. The contaminant will be contained on site due to the low hydraulic gradient, the high retardation factor of the benzene in the soil, and the biodegradation of the benzene, in this case represented by first order decay. The NCDEQ closed the site investigation which allowed the client to obtain financing for site development.

CLIENT: Plastics Manufacturing
PROJECT: Site Demolition and Remediation

LEAF managed the demolition of a 95,000 sq. ft. plastics manufacturing facility in Jackson County, North Carolina. The property was located in a mixed–use area adjacent to an Outstanding Resource Water (ORW) and a Trout Water (TR). LEAF designed and installed erosion control measures for the 24 hour–25 year storm to protect surface waters of the State. Most building materials were recycled or reused on other sites. Soils and groundwater impacted with hydraulic oils were removed prior to LEAF recommendation for site closure. The NCDEQ closed the investigation allowing the property to be sold.

CLIENT: **Private Developer**
PROJECT: **Groundwater Investigation**

A Phase I Environmental Site Assessment Report (Phase I) indicated four aboveground oil storage tanks were formerly present on the client's commercial property. Soil (3) and groundwater (1) samples collected during the Phase II investigation contained both volatile and semi–volatile compounds indicative of a petroleum release. A Comprehensive Site Assessment (CSA) was requested by the North Carolina Department of Environmental Quality. LEAF collected additional soil and groundwater samples which documented that the groundwater on the subject property does not contain any volatile or semi–volatile compounds above the NCDEQ Groundwater Standards. LEAF also determined that previously identified groundwater contamination was actually on the adjacent property.