

PACE® ANALYTICAL SERVICES

# CASE STUDY

Underground Storage Tank Remediation -  
A Continuing Effort



# SNAPSHOT

## CLIENT



Henry Nemargut Engineering Services

## INDUSTRY

Engineering Services

## ABOUT

Henry Nemargut Engineering Services' petroleum team conducts investigations and remediations using practical and innovative solutions. Their ability to smoothly navigate federal, state, and local petroleum regulations means more efficient and cost-effective projects for its clients.

# SITUATION

Henry Nemargut Engineering Services was retained by an oil company to conduct a risk-based UST assessment in accordance with North Carolina Department of Environmental Quality (NCDEQ) guidelines and the requirements of 15A NCAC 2L.0115. The company owned five Underground Storage Tanks (UST) which were operated at a corner store facility located in Orange County, North Carolina which is situated in the Carolina Slate Belt. This site contains two facilities which are used as a gasoline convenience store and car wash.

The USTs were last in use at this facility in 2013 and at that time contained (1) 6,000-gallon gasoline UST, (2) 4,000-gallon gasoline USTs, (1) 4,000-gallon diesel UST, and (1) 2,000 kerosene UST. There are also adjacent residential and commercial properties. Municipal water supplies are not available to any properties within 1500 feet.

In May 2016, soils samples were collected from the tank, piping, and dispenser areas following the removal of the USTs. If contamination was detected during closure, then (following North Carolina system

**Many of the procedures that occur once a release has been identified are dependent on laboratory analysis and turnaround time, which can take a few days and sometimes weeks. Henry Nemargut knew that Pace® Analytical would deliver the quality and accuracy of data that would be essential to make accurate, informed decisions based upon the data.**

removal procedures), the soil around the tanks needs to be removed and replaced with uncontaminated soil to assist natural processes in reducing contamination.

During closure operations, a release from the UST was suspected due to a high PID (Photo Ionization Detector) reading and a floating layer of petroleum in the UST excavation site. Site characterization activities determined that elevated chemical of concern (COC) concentrations was present in soil and groundwater, and groundwater plume was present off-site at both residential and non-residential properties.

Initially, six water supply wells were found to have been impacted with methyl tert-Butyl Ether (MTBE) release originating from this UST site.

# CHALLENGES

One of the biggest challenges faced was the sedimentary slate-type rock under the gas station. Because of the rock formation under the tanks, there were fractured planes which have the potential to transport contaminants great distances and at relatively high velocities along discrete channels in rock.

This was compounded by the fact that some of the fuel leaked was racing fuel which contains high amounts of MTBE to achieve the high-octane rating. This causes MTBE concentrations to be very high and requires continued post-excavation testing.

These challenges are exemplified by the changes in plume development. The monitoring well network at this release site was installed between August 2016 and March 2018. In 2016, a sampling event on one well showed EPA Method 6200 Volatile Organic Compounds (VOCs) by Purge and Water Trap presented a concentration of 101,347 ug/l. The Total 6200B concentration noted during the May 2022 sampling event showed a 90% reduction to 9,924 ug/l, indicating a continued groundwater contaminant reduction downgradient of the UST source area.

However, in downgradient monitoring wells, EPA Method 6200B total concentrations increased from March 2018 to historical high concentrations during a November 2021, sampling event, with MTBE concentration increasing to above the North Carolina 2L Standard.

Based on analytical data from November 2022, it appeared that UST pit groundwater mounding caused expansion of the dissolved contaminant through dispersion, resulting in significantly increased concentrations in downgradient wells in all directions from this release site.

# SOLUTION

Recognizing these challenges, Henry Nemargut Engineering required a laboratory partner that understood North Carolina Leaking Underground Storage Tank (LUST) regulations and could provide a guaranteed five-day turnaround with courier service.

The laboratory had to have a strong history and capacity to turnaround TPH as gasoline samples, a full list of semi-volatile organics and volatile organics capabilities that could be provided within specified timeframes for soil. In addition, the laboratory needed to analyze using Method 6200B VOCs in water by purge and trap capillary-column GC/MS Method. Pace<sup>®</sup> Analytical was selected as a single-source laboratory to handle their analytical needs.

**"The levels of customer service from Pace<sup>®</sup> are excellent. Since 2015, Pace<sup>®</sup> has delivered on all the quarterly sampling requirements, including 5-day turnaround and prompt courier service which speaks volumes for our long-term relationship and continued use of Pace<sup>®</sup> as our laboratory sub-contract partner. In addition, for the past seven years we have never had a false positive."**

**- Henry Nemargut, CEO, Henry Nemargut Engineering**

# RESULTS

Ground water and contaminants can move rapidly through fractures in rocks. This presents a unique problem in locating and controlling contaminants because the fractures are generally randomly spaced and do not follow the contours of the land surface or the hydraulic gradient.

Seven years later, new monitoring wells are still being drilled due to the rock formations. Unfortunately, quarterly and bi-annual testing is ongoing because groundwater contamination continues to be a problem in certain areas.

Based on the occurrence of MTBE, diisopropyl ether (DIPE) and oxygenates in six nearby supply wells (located beyond the shallow well network), additional monitoring will be required to define the horizontal migration in the shallow groundwater plume. Additional vertical extent wells are also needed to better assess the weathered rock aquifer in the vicinity of this release site; however, a vertical investigation also represents risks in creating migration pathways for contaminants.

Pace<sup>®</sup> Analytical will continue its long-standing partnership with Henry Nemargut Engineering to monitor contaminants resulting from the removal of the USTs to help safeguard the surrounding ecosystems.

**Pace<sup>®</sup> Analytical was contracted by Henry Nemargut Engineering to provide analysis for:**

- TPH
- Semi-Volatile Organics
- Volatile Organics
- EPA Method 6200B VOCs in Water by Purge and Trap Capillary-Column GC/MS Method

**Henry Nemargut Engineering Services Provided:**

- Well Drilling
- Project Monitoring
- Environmental Risk Assessment & Corrective Action
- Environmental Compliance Consulting
- Project Scheduling & Planning