

LNAPL Recovery - Gulf South Region, USA

Advanced Groundwater Technology +381(64)23-13-751
Energy Sector Remediation Case Study

Large Petroleum Refinery,
Gulf South Region, USA

Key Points:

- Viscous, light non-aqueous phase liquids are discovered migrating from a closed industrial landfill on the groundwater table, threatening release into an ecologically sensitive river
- The recovery strategy included use of a self-contained, LNAPL recovery system at a remote location (no electrical power available)
- An innovative system was designed and constructed to operate independent of the municipal power grid.
- The system consisted of a solar-powered electronic pump controller, pneumatic powered LNAPL recovery pump, and a product reservoir with automatic shut-off for overflow protection

Background

During a routine inspection of a closed industrial landfill, an oily substance was discovered seeping from the bank of an adjacent drainage stream. One outfall of the stream is into an ecologically sensitive river.

Laboratory analysis of the light non-aqueous phase liquid (LNAPL) indicated a

high concentration of total petroleum hydrocarbons (TPH). The complex mixture of TPH was dominated by longer chain hydrocarbons, making the LNAPL viscous, potentially complicating the recovery effort.

Initially, oil sorbent pads were used to clean up the discharge before it could reach the river. However, the oil discharge rate was

observed to increase in response to the seasonal rise in groundwater and river stage levels.

The increased discharge meant the use of sorbent pads was not a long-term solution, and a more active and robust system of LNAPL recovery was necessary to avoid discharging into the river.

Cleanup Approach, System Design

To cut off flow of LNAPL to the river, three actions were implemented. First, to mitigate surface seepage of the LNAPL into the adjacent drainage ditch, an impermeable HDPE geoliner was placed in the ditch. Second, LNAPL which was accumulating in groundwater monitor wells between the landfill and the river were placed on a daily schedule to purge any accumulated TPH. Lastly, an LNAPL recovery system was installed in a new 4-inch

diameter PVC recovery well, screened through the LNAPL pool. To define the horizontal extent of LNAPL, a number of temporary piezometers was installed. Based on the results, the recovery well was constructed near the center of the LNAPL mass to help maximize removal.

Because the LNAPL pool was located in an undeveloped area with no electrical or other utility services, a recovery system designed to

operate independent of a power grid was necessary. The solution was a pneumatically powered skimmer pump coupled with a solar-powered electronic controller.

The recovery system consisted of the following components:

- Pneumatically-powered LNAPL skimming pump with hydrophobic membrane

(Continued on page 2)



Cleanup Approach, System Design

- An electronic pump controller to regulate the duration and frequency of pump operation
- Solar system with pole-mounted photovoltaic panel, voltage regulator and a sealed rechargeable battery (the battery can supply up to 8 days of controller operation under cloudy conditions)
- Air delivery system with regulator for pneumatic power (pressurized ambient air in cylinders, replaced monthly by vendor)
- 55-gallon drum with high-level float automatic shut off; drum for recovered LNAPL placed on secondary containment pallet

The LNAPL recovery system was assembled at the well location in one day and began operation immediately. To achieve an optimum LNAPL recovery rate, pumping rates and durations were varied over a two week period.



“Advanced Groundwater Technology is internationally known for its quality work and commitment to clients”

About Our Organization

Advanced Groundwater Technology (AGT) is a consulting firm of energetic and experienced groundwater scientists and engineers, led by Dragan Kaludjerovic, Ph.D. With 12 years of experience, we specialize in all areas of quantitative hydrogeology

and environmental processes applied to contaminant transport, remediation planning, and design, and development of water supply management alternatives.

We welcome the opportunity to partner with you on your next project. Please contact us to discuss how we can help.

Advanced Groundwater Technology

Phone
+381(64)23-13-751

Web
www.advancegwt.com

E-mail
advancedgwt@gmail.com