Overview

The STAR technology was applied as the primary remedy to achieve regulatory closure at a 37-acre former industrial facility in Newark, NJ. Both a surficial fill unit (ground surface to ~10 ft bgs) and an alluvial sand unit (~10-40 ft bgs), impacted with residual and free-phases of coal tar from the historic operations at the site, were remediated via smoldering combustion.

Full-scale Implementation

STAR was applied at the site using three independent treatment systems operating ‘cells’ consisting of multiple ignition points (IPs), vapor extraction wells, and interstitial thermocouples. Ignition points (i.e. standard two-inch steel wells) were installed within impacted zones and connected to an air supply to support the combustion reaction, while removable in-well 9 kilowatt (kW) heaters were deployed as the ignition source for the combustion process. Vapor extraction wells were installed within the cell to capture vapors for treatment using conventional above ground means (i.e., thermal oxidizer). Interstitial thermocouples were installed to monitor temperatures in the subsurface during operations. Cell cycle times were short (days) and following treatment the equipment was removed and reused in another treatment area at the site. Drilling, STAR operations, and remedy verification activities took place concurrently to accelerate the remediation process and facilitate the rapid transfer of the property to the new site owner.

Results

Full scale operations began in 2015, with regulatory certification for site closure and land transfer achieved in September of 2019.

• Over 150,000 lbs of coal tar were destroyed during remedial activities involving the installation, operation, and evaluation of over 2,200 IPs (1723 surficial fill IPs and 482 alluvial sand IPs). Remedy performance was confirmed through the collection of ~1,000 remedy verification samples.

• Remedy verification followed a multiple lines of evidence approach consisting of cores to assess free NAPL, laboratory analysis for EPH, SVOC, VOC, and TarGOST™ for real-time assessment of treatment performance.

• Field staff logged over 200,000 safe work hours over the course of the project.

Conclusions

• STAR was used to achieve regulatory site closure
• Over 2,200 ignition points (IPs) were installed, operated, and evaluated as part of remedial activities on site
• ~1,000 remedy verification samples were collected
• 200,000 safe work hours on site

Regulatory Site Closure with STAR (in situ) to Treat Coal Tar-Impacted Soils
Former Industrial Site in New Jersey

Superior AWARD WINNER 2017

Figure 1: One of three treatment trailers used to control the STAR process and monitor operations. Power for heaters, air to support the combustion reaction, and vapor collection and monitoring are all facilitated through these control systems.

Figure 2: Treatment cell during operations. Up to 20 IPs could be operated simultaneously from each treatment trailer. Visible in this image are the IPs, vapor extraction wells, interstitial thermocouples, and associated piping and electrical connections for an operating ‘cell’.

Figure 3: Vapor extraction wells to collect emissions from the vadose zone for subsequent treatment during operations. Remediation via STAR typically consists of 98-99% destruction (i.e., direct combustion in the subsurface) and 1-2% volatilization (with subsequent capture and treatment above ground).