Expedited Site Assessment at a large Naval Fuel Terminal

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Abstract: Craney Island Naval Depot, Portsmouth, Virginia is the US Navy's largest fuel terminal. The base supports naval fuel storage operations within the region and includes several large capacity fuel storage tanks, above and below grade piping, fuel pump stations and dispensing systems, and pier side fuel facilities. Large fuel terminals offer an excellent condition for implementing expedited site assessment procedures. Generally there have a long-term stable mission, contiguous release sites, similar hydro-geologic conditions, and understandable risk conditions.

In May 2000, a petroleum release was identified in a stormwater outfall at one of the fuel farms. An underground stormwater drain line transverses the area and discharges to a surface channel. It is believed that free-product entered the stormwater pipe through cracks and other entry points at the groundwater/product interface. In response to the petroleum release, a site characterization study of the fuel storage tank CI-272 area was undertaken. Tanks in this farm are 2.1 million-gallon "cut and cover" bulk storage tanks. The site work was sequenced to meet funding restraints and program priorities. A site check was performed to show that the plume located in the area of tank CI-272 was not related to other known release sites. The Navy's Site Characterization Analysis and Penetrometer System (SCAPS) was deployed in May 2000 to perform the limited Site Check. SCAPS uses laser-induced fluorescence (LIF) technology to detect petroleum contamination in subsurface soils. The SCAPS probe also collects Cone Penetrometer Test (CPT) data to provide soil classification profiles, conventional soil, and groundwater samples to determine hydro geologic conditions. The site check resulted in the suspected tank being drained and taken out of service in May 2000. Demolition of the tank occurred in November 2000.

The Environmental Protection Agency, Office of Underground Storage Tanks published a strategy[4] for expedited site assessments that promotes quicker studies through field concentrated decision-making. The strategy features a 7 step process that emphasizing goal development and delegation of decision making to obtain clear objectives. The fifth step is iterative with the field-derived results driving the proceeding events. By making

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[4] *Expedited Site Assessment Tools for Underground Storage Tanks – A Guide For Regulators*, EPA Document # 510-B-97-001, March 1997.

decisions in the field, the team use derived results to plan additional study events thus accelerating and enhancing study activities through local interpretation.

The assessment was performed using SCAPS and its goals were to address the findings of the site check and to evaluate the extent and potential impact of the release. The assessment objectives were:

- Evaluate the tank as a contaminant source;
- Starting at the tank expand the assessment grid to determine the lateral extent of the impact;
- Locate sites of thickest accumulation for positioning of immediate remedial activities;
- Study the stormwater drain line's connection with the discharge and the drain line's potential as a barrier to lateral migration and;
- Establish the magnitude of threat to Craney Island Creek.

Initially a grid of LIF "push locations" dividing the tank area into four quadrants was established around the suspect source. The extent of contamination found in each quadrant formulated the focus for additional data collection. The outer limits of the LIF push grid were set to ensure background LIF data was collected from all quadrants of the site. Interpretation of the LIF data provided the foundation used to establish the vertical extent of contamination, the identification of the optimum intervals for sampling, and the placement of monitoring and recovery wells, including their respective screen intervals (30 LIF/CPT push holes, 3 soil-boring samples and the installation of 6 monitoring wells). A sample of JP-5 jet fuel obtained from the site was used to obtain a spectral plot standard for LIF readings and establish the spectral signature related to the contaminant in the ground. Confirming the fuel spectrum helped the field crew ascertain contaminate trends and push locations. Petroleum contamination was identified across a vertical range from 4 to 12 feet (BGS) at several LIF/CPT push locations. Field interpretation indicated that the emphasis be placed on the northern side of the tank. Soil samples were collected to help quantify the significance for the LIF data. Four groundwater samples were taken and tested for volatile organics and Total Petroleum Hydrocarbons (TPH).

Data analysis determined that a non-aqueous free petroleum product plume covering 3.5 acres and up to 8-feet thick is currently floating on groundwater in an area north and east of the suspected tank source. Using the results from the Site Characterization Report, a risk assessment was done to establish risk-based, remediation endpoints to address each phase of petroleum contamination and to comply with accepted state guidelines for the Virginia Voluntary Action Program. Once product thickness levels reach thickness less than 1/8 inch, active free product collection can be halted. Product-impacted soils will be remediated through natural attenuation processes.

The areas location situated contiguous with an established contaminate site streamlined the risk assessment task because the general hydrologic conditions and pollutant character were established. The risk assessment's findings are that the greatest potential impact to the environment is via the spread of contamination through groundwater into adjacent surface waters and marsh areas; tank closure activities are advisable to remove the source; and that additional corrective actions are required. A remedial approach of

aggressive free product removal linked to mitigation of discharges of free-product accumulated in the underground stormwater drain line would prevent the further migration of the product plume. The contaminated groundwater plume will be monitored in creek site wells and should dissolved phase contaminants be detected, corrective actions will be implemented.