

**Beede Waste Oil Site  
Plaistow  
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The Beede Waste Oil/Cash Energy site consists of two parcels totaling about 40.6 acres at 221 Main Street in Plaistow. Waste oil recycling operations had reportedly been conducted there since the 1920s and later facility operations included waste oil processing and resale, fuel oil sale, contaminated soil processing into cold-mix asphalt, anti-freeze recycling, and other related industries.

Contamination on the site originated from poor storage and handling of waste oil and other products as well as the unlined and uncovered storage of large contaminated soil piles. Elevated concentrations of polychlorinated biphenyls (PCBs) were first detected by NHDES in waste oil found in several above-ground storage tanks following complaints of odors in 1979. Numerous notices, letters of deficiency, administrative orders and court orders to cease operations and perform investigation and remedial activities were issued from 1980 to 1992.

Following the cessation of commercial operations in 1994, more than 1.5 million gallons of oily liquid waste and sludge, stored in approximately 100 above-ground storage tanks and more than 1,000 drums, remained at the facility. The tanks and drums contained hazardous waste, including PCBs, metals, and volatile organic and chlorinated organic compounds. Seventeen large soil piles, totaling more than 27,000 cubic yards and containing varying levels of contamination, were also left on-site.

Properties in the surrounding residential neighborhood are predominantly served by individual water supply wells. Testing of drinking water wells found contamination, generally consisting of chlorinated solvents, at some adjacent properties. NHDES installed treatment systems on wells with groundwater contamination levels above State standards and provided bottled water to ensure that residents could safely drink and use their water. NHDES and EPA (agencies) continue to oversee the monitoring of water quality in residential wells in the vicinity of the site.

Between 1992 and 1998, the agencies undertook interim measures and removal actions to mitigate exposure to contamination, including containment of the oil leakage to Kelley Brook and additional site fencing. In the summer of 1996, EPA initiated a time-critical removal action to remove much of the above ground hazardous waste. With the cooperation of NHDES and with supplemental State funding, the action was extended in 1997 to remove non-hazardous wastes, resulting in the removal and proper disposal of all tanks and drums and their contents.

Zones of contaminated soil and pools of oil floating on the groundwater table were found in the subsurface. The floating oil is referred to as light, non-aqueous phase liquid (LNAPL). The LNAPL at the site is contaminated with solvents, PCBs and metals. EPA conducted a non-time-critical action between 1999 and 2005 to extract as much LNAPL from the subsurface as practicable, thereby reducing oil seepage to Kelley Brook and area

wetlands. This action resulted in approximately 91,000 gallons of LNAPL being removed from the groundwater.

The site was added to the National Priorities List in December 1996 and with funding from EPA, the remedial investigation/feasibility study (RI/FS) was initiated in 1997 under NHDES management. The RI report, which characterizes site conditions and evaluates the risks to human health and the environment, was released in February 2001. The FS report, which evaluates cleanup alternatives, was released in January 2002. The proposed plan for cleanup of the site was presented for public comment in June 2002. EPA carefully considered all comments received during the proposed plan's public comment period and, with NHDES's concurrence, selected the preferred alternative as the most appropriate remedial action for the site. This cleanup decision is documented in the Record of Decision (ROD) that was signed on January 9, 2004.

The ROD calls for remedial actions that will be protective for the reasonably anticipated future use of the site, which includes elderly housing, a community center and recreational fields. The ROD requires the excavation of sediments, soil piles and contaminated soil that is less than 10 feet below ground surface (bgs) for off-site treatment and/or disposal. Contaminated soil greater than 10 feet bgs, which is acting as a source of groundwater contamination, will be treated in-place using soil vapor extraction, and include heating the soil to enhance the removal of contaminants remaining in the deep soil. Contaminated groundwater will be extracted and treated on-site to restore it to Ambient Groundwater Quality Standards prior to releasing to the ground surface and allowed to infiltrate back to the groundwater via specially designed basins. A groundwater management zone will be established to manage the contaminated groundwater and institutional controls will be implemented to prevent the excavation of soils greater than 10 feet in depth.

In 2006, negotiations were conducted with a group representing the major potentially responsible parties (PRPs) to reach an agreement to design and implement the remedial action. The agreement was formalized in a Consent Decree (CD) and calls for the PRPs to clean up the site under the oversight of the agencies. On April 16, 2007, the CD was lodged in the District Court for New Hampshire and the PRPs (now "Performing Parties") initiated some of the preliminary planning work associated with the \$48 million comprehensive site cleanup plan selected in the 2004 ROD. The CD was entered by the Court on July 22, 2008 and, immediately thereafter, field work associated with several pre-design investigations and studies commenced.

From 2009 through 2011, the Performing Parties conducted pre-design investigations, with the agencies oversight, to support the design of the cleanup action. Pre-design investigations included soil and sediment investigations to further delineate the extent and volume of contaminated soil (including soil piles) and sediment that will require excavation or treatment. Several treatability studies were also conducted to determine the appropriate means to eliminate the sources of groundwater contamination and to clean the contaminated groundwater. Field tests and laboratory analyses were conducted to determine the need for thermal enhancement of the soil vapor extraction system. The

results of this treatability study indicate that thermal enhancement of the soil will effectively remove the subsurface contamination that poses a long-term threat to groundwater quality. Another treatability study was conducted to determine the best treatment technology to employ in treating the contaminated groundwater and achieve the groundwater cleanup goals. Additional field tests and infiltration tests were performed to support an extensive groundwater modeling effort to determine the design for the groundwater extraction, treatment and discharge system.

In 2011, the sequence for the implementation of the remedial action activities was modified to accelerate the groundwater treatment component of the remedy and thereby address one of the principal threats to public health. The sequence of implementation includes: 1) implementation of the groundwater treatment system; 2) implementation of the thermally-enhanced soil vapor extraction system to eliminate the sources of groundwater contamination at depth; 3) excavation and removal of contaminated landfill material and contaminated sediments in Kelley Brook and 4) excavation and removal of contaminated shallow soils.

On-site remedial construction activities began in earnest in 2012. In September and October of 2012, the intersection of Danville Road and Main Street was reconfigured to better align the intersection with a new driveway to the site. A new security gate and additional fencing on the southern portion of the site were also installed. Where contaminated soil was located in the path of the new driveway, it was excavated and stockpiled on-site for future disposal. In late 2012, a waterline was extended to provide a reliable clean source of potable water to households near the site whose water wells had been impacted by the site. Groundwater quality in the vicinity of these households and on-site will continue to be sampled as necessary to monitor groundwater quality in the area.

Construction of the first phase of the remedial action (Management of Migration, or MOM, utilizing a groundwater extraction, treatment and discharge system) began in late December of 2012 and groundwater treatment was initiated in November 2013.

An on-site steam propagation test for the Phase 1 thermal system was conducted in December 2013 to provide additional information to support the final design of the thermally-enhanced soil vapor extraction system which will eliminate sources of groundwater contamination in the deep soil. Due to the large energy demand of the thermally enhanced system and the limitations of the natural gas infrastructure in the area, the thermally-enhanced soil vapor extraction system is being conducted in two phases. The design of the Phase 1 thermal system was completed in 2014 with startup beginning in May 2015 and operations continuing until February 2016. The Phase 1 target treatment zone soil volume was 32,841 cubic yards located in the vicinity of the former site lagoon. The Phase 1 target treatment area was 87,800 square feet and targeted soils from 10-26' below ground surface. During Phase 1 operations, an estimated 28.7 million pounds of steam was injected into the subsurface and 6.6 million gallons of heated water was extracted and treated. An estimated total contaminant mass (vapor +

liquid) of 150,066 pounds was recovered during Phase 1 thermal operations, including an estimated volume of 17,278 gallons of free phase oil.

During the Phase 1 thermal operation, a pilot test was conducted in the Phase 2 thermal area to gather information that was used to design the Phase 2 program. The Phase 2 thermal program design was completed in September 2017 with construction and system startup occurring in 2018. Due to unexpected delays in system procurement and faulty equipment, Phase 2 operations were pushed into the winter months of 2018/19 and are likely to extend into early summer 2019.

The Phase 2 target treatment zone soil volume is 21,456 cubic yards that is located north and east of Phase 1 within the former underground/aboveground storage tank area and is bounded along the northeast perimeter by a subsurface barrier (sheet pile) wall. The Phase 2 target treatment area is 56,148 square feet and targets soils from 14-26' below ground surface. During Phase 2 operations, an estimated 43.5 million pounds of steam will be injected into the subsurface. To date, it has been estimated that a total contaminant mass (vapor + liquid) of 21,700 pounds has been recovered during Phase 2 thermal operations, including an estimated volume of 2,803 gallons of free phase oil.

The design for the excavation of the former landfill, surface soils, and Kelley Brook sediments is anticipated to be completed in 2020. Excavation will likely begin in 2020 or early 2021.