

Coakley Landfill Site
North Hampton
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The Coakley Landfill Superfund Site (Site) is located in the towns of North Hampton and Greenland and abuts the town of Rye to the east. Situated on the southernmost portion of a 92-acre parcel, the landfill itself is approximately 27 acres and received municipal and industrial wastes from 1972 to 1982. From 1982 to 1985, when land-filling activities terminated, the Site received incinerator residue from the Portsmouth Refuse-to-Energy Facility at Pease Air Force Base.

In 1983, the State received a complaint from residents, living near the southeastern corner of the landfill, about the quality of water coming from their water supply wells. Water samples were taken and the results of the chemical analyses reported the presence of volatile organic compounds (VOCs) in several residential wells. Water lines from three local utility companies were promptly extended into the area and, by the end of 1983, most of the homes and businesses east of the Site were connected to public water supplies.

The Site was listed on the National Priorities List in December of 1983, identifying the following contaminants of concern: benzene, tetrachloroethene, arsenic, 2-butanone, phenol, diethyl phthalate, chlorobenzene, dichloroethene, chromium and nickel. The subsequent remedial investigation and feasibility study (RI/FS) was completed in 1989. The findings of the RI/FS identified the landfill as the source of contamination in local surface waters, groundwater and, to an unknown extent, in wetlands to the west.

The first Record of Decision (ROD) for the Site, signed in June of 1990, required constructing a landfill cap and treating contaminated groundwater. It separated response actions to be taken in the immediate vicinity of the landfill (i.e., source control) from those taken to address contamination outside the landfill footprint (i.e., management of migration).

Operable Unit 1 (OU-1) is a source control action intended to minimize further degradation of the environment by isolating the contaminant sources. The ROD for OU-1 includes consolidating sediments on the landfill, consolidating refuse material within the landfill footprint, constructing a multi-layered landfill cap over the landfill, treating groundwater and landfill gases, and long-term monitoring. Pre-design studies began in the summer of 1992. Construction of the landfill cap began in the fall of 1996 and was completed in August 1998.

Due to limited information concerning off-site contamination of wetlands, a second operable unit (OU-2) required further evaluation of Site conditions in order to determine the most appropriate response action. A second ROD for the Site to address management of migration was issued in September 1994. The ROD for OU-2 calls for groundwater monitoring over the next thirty years while contamination naturally attenuates and the elimination of potential threats posed by the future ingestion of contaminated groundwater by implementing institutional controls restricting the use of the groundwater.

Following completion of the landfill cap, the limited plume of VOC-contaminated groundwater stabilized and began attenuating. Consequently, EPA issued an Explanation of Significant Differences on September 29, 1999, that removed the requirement to extract and treat groundwater directly beneath the landfill. However, in 2009 and 2016, two recently identified contaminants, 1,4-dioxane and per- and polyfluoroalkyl substances (PFAS), respectively, were detected in monitoring wells at the Site and found to be predominantly located west and north of the landfill. Further data collection is warranted to determine if the presence of these contaminants compromise the protectiveness of the remedy.

The Second Five-Year Review was finalized in September 2006 by EPA. A site-wide protectiveness determination could not be made in this review due to sporadic violations of off-site methane gas levels. Follow-up actions included continued quarterly monitoring of compliance boundary gas probes and installation of gas alarm systems in adjacent buildings/homes that may be at risk. Since 2006, methane levels have decreased significantly with no exceedance of regulatory standards in compliance boundary probes since 2011. In December 2015, the Potentially Responsible Parties (PRPs) submitted a proposal for reduced landfill gas monitoring. The Department subsequently approved a decrease in sampling frequency from quarterly to annually.

The September 2011 Five-Year Review concluded that the remedy remained protective of human health and the environment in the short-term. Long-term protectiveness has also been achieved at OU-1 based on continued maintenance of the landfill cap, long-term monitoring, and use restrictions being in-place. Long-term protectiveness will also be achieved at OU-2 when interim groundwater cleanup levels for all contaminants of concern are met and restrictions on the use of groundwater within OU-2 can be removed. Monitoring of the Site will continue until cleanup levels for the contaminants of concern are met.

On August 4, 2015, EPA released an Explanation of Significant Differences that formally incorporated 1,4-dioxane as a Site contaminant of concern, required the implementation of institutional controls over a defined area to prohibit or restrict the installation of new wells or the increased use of existing wells, and several minor changes (e.g., change in terminology regarding groundwater cleanup levels and clarification on approach to determine when groundwater cleanup levels would be attained).

The September 2016 Five-Year Review concluded that the OU-1 remedy remained protective. However, a protectiveness statement for OU-2 was deferred until the following actions are taken: (1) sampling existing or installing and sampling new monitoring wells in the southern area of the GMZ for all COCs and PFAS; (2) sampling private drinking water wells that may exist within the southern area of the GMZ for all COCs and PFAS; and (3) submitting validated data to the agencies from the aforementioned sampling efforts. Sampling of well cluster FPC-3 in the southern GMZ has been completed and reported to support compliance in this area, however, further evaluation of the compliance boundary is warranted. Access to sample an existing drinking water supply well within the southern GMZ area has not been secured; therefore, alternative investigations may be required to fully delineate southern plume boundaries. The next Five Year-Review is scheduled for September 2021.

Sampling and detection of per- and polyfluoroalkyl substances (PFAS) in Site monitoring wells during summer 2016 prompted NHDES to offer sampling and analysis to area private property owners that utilized wells for potable water. Samples collected were analyzed for PFAS, VOCs and 1,4-dioxane in an effort to ensure that area groundwater is safe for potable use. A total of eighty four (84) private wells were sampled and results reported to property owners. In January and September 2017, the Coakley Landfill Group (CLG) also sampled private wells in the area south, east and north of the Landfill that had been previously tested by NHDES. In no case has there been a result that exceeds the 70 parts-per-trillion (ppt) Public Health Advisory or equivalent NHDES ambient groundwater quality criteria for PFAS. Private well sampling/testing will be repeated on a subset of the 84 wells previously sampled and will be performed by the CLG and NHDES on a biannual basis until sufficient data is available to assess modification to the current sampling program.

Exceedances of drinking water standards for several contaminants of concern (i.e., arsenic, manganese, 1,4-dioxane and PFAS) in Site monitoring wells near the northwest corner of the existing groundwater management zone prompted the agencies to expand the groundwater management zone (GMZ) to include additional properties to the north/northwest of the Site. Given the absence of public water to the north of the Site and the on-going build-out of a 10-lot subdivision on Breakfast Hill Road, the agencies supported the PRP's efforts to provide public water to this subdivision. The waterline extension has been completed and the subdivision homes are currently under construction.

The installation, technical evaluation of, and sampling of four new GMZ compliance wells (two well couplets: overburden and bedrock) within the northern area of the GMZ will provide groundwater data at the Site compliance boundary in this area. This is the area of primary concern given the understanding that the bulk of impacted groundwater from the Site moves in a northerly direction coincident with Berrys Brook.

In addition, given that many of the existing private water supply wells in the area extract water from the deep bedrock aquifer (e.g., depths greater than 200 feet, in many cases) and with previous investigations at the Site evaluating contaminant occurrence and transport only in the overburden and shallow bedrock aquifers (depths up to 200 feet), EPA and NHDES requested, in January 2018, that the CLG conduct a Deep Bedrock Investigation at the Site in order to determine the nature and extent of Site contaminants in deep bedrock. Phase 1 of the Deep Bedrock Investigation involves data collection (e.g., borehole geophysics and subsequent sampling of groundwater from select fracture zones) from existing and viable bedrock monitoring wells in the vicinity of the Landfill, including wells to the south of the landfill. Following review of this data, the agencies may require that existing wells be drilled deeper or that new bedrock wells be installed, followed by subsequent data collection. Upon developing a better understanding of the bedrock fracture network and hydrogeology, the agencies anticipate that a groundwater pumping test will be needed (i.e., high volume groundwater extraction from known fractures within the local bedrock aquifer to evaluate response and confirm interconnectivity within the larger fracture network). The result being model development that provides a much more robust understanding of the potential for contaminant movement within bedrock fractures. The Deep Bedrock Investigation is on-going and expected to be completed in 2020.

In December 2016, NHDES sampled surface water for PFAS at various locations along Berrys Brook. This and subsequent sampling by the CLG confirmed that elevated levels of PFAS were present, prompting EPA to develop site-specific screening levels (SLs) for recreational receptors that could be exposed to perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS) and perfluorobutane sulfonate (PFBS) in surface water and sediment associated with the Site. Surface water results to date do not exceed SLs outside the Site GMZ. Note that an exceedance of a SL does not necessarily mean that there is an unacceptable risk at the Site. However, it does indicate that further sampling and evaluation are required. Given these results, and in order to ensure protection, EPA and NHDES will require further sampling of surface water and sediments and continue to evaluate risk to human health and the environment.

The estuary portion of Berrys Brook, approximately five miles downstream of the Site, is stocked with brown trout by the New Hampshire Fish & Game Department (NHF&G) twice per year. There are also warm water native fish species in the upstream-portions of the brook that may be caught and consumed; however, NHF&G is not aware of, nor has evidence of, the occurrence of recreational fishing upstream of the estuary area. Due to concerns of potential PFAS exposure from the consumption of fish, the EPA developed site-specific fish consumption screening levels for PFOA, PFOS, and PFBS and subsequently requested the CLG develop and implement a fish tissue sampling program in a letter dated February 22, 2018. With an abundance of caution, NH F&G also posted the estuary-portion of Berrys Brook as “catch and release” in March 2018, until the results of the fish tissue sampling become available and a determination of exposure risk evaluated.

The results of fish tissue sampling and analysis were reported to the agencies on September 4, 2018. A variety of native and stocked fish were collected from five different locations in Berrys Brook ranging from approximately 1 mile to over 5 miles from the landfill. Of the six PFAS analyzed, PFOA, PFOS, and PFNA were the only compounds detected in fish tissue. PFOS was detected in all samples from the five locations. Eel and shiners caught from the Lafayette Road collection area had the highest PFOS concentrations; however, the levels were still well below what would be considered an unacceptable risk to both children and adults who might regularly consume the fish. The concentration of PFOS in trout tissue was lower than that found in any other species and, therefore, does not present an unacceptable risk to consumers. However, these data demonstrate fish tissue concentrations at a single point in time. The need to perform further fish tissue sampling and associated risk assessment is currently being evaluated by the agencies. The agencies are currently reviewing these results with NHF&G and evaluating the need to retain the “catch and release” posting of the Berrys Brook estuary.