# Explanation of Significant Differences Site 8 – Fire Department Training Area #2 Pease Air Force Base NPL Site Portsmouth, Newington and Greenland, New Hampshire

## INTRODUCTION AND STATEMENT OF PURPOSE

This Explanation of Significant Differences (ESD) identifies the rationale behind revisina contaminated groundwater mitigation actions in addition to the existing corrective measures previously put into place for Site 8 - Fire Department Training Area #2, located within the Zone 5 operable unit at the Pease Air Force Base (AFB) National Priorities List (NPL) Site in Portsmouth, Newington, and Greenland New Hampshire. The United States (US) Air Force proposes this modification to the existing remedy to address continued impacts to groundwater associated with historical Air Force operations at Site 8 when Pease was an active installation. Site 8 was used by the US Air Force for aircraft fire training activities from 1961 to 1988 and included the historical use of firefighting aqueous film forming foam (AFFF) to extinguish training exercise fires. Beginning in the 1970s, the AFFF formulation contained perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). These substances have contaminated groundwater at Site 8 as well as other areas of the former base where AFFF was used.

# SITE NAME AND LOCATION

Pease Air Force Base NPL Site Towns of Newington and Greenland and, City of Portsmouth, New Hampshire Site ID: Fire Department Training Area #2 Operable Unit: Site 8, Zone 5

## IDENTIFICATION OF LEAD AND SUPPORT AGENCIES

The US Air Force is the lead agency, with oversight from EPA and the New Hampshire Department of Environmental Services (NHDES), for cleanup of sites at the former Pease AFB under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as modified by the Superfund Amendments and Reauthorization Act. The US Air Force is issuing this ESD as part of the public participation requirements under Section 117(c) of CERCLA (42 USC §9617(c)), Section 300.435(c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and the US Air Force Installation Restoration Program (IRP). In accordance with Section 300.825(a)(2) of the NCP, this ESD will become part of the administrative record for the facility. The administrative record also contains background information that was used to determine the original remedy, as documented in the September 1994 Record of Decision (ROD) (Roy F. Weston (Weston), 1994).

# PUBLIC PARTICIPATION

The discovery of perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) in onbase public groundwater supply wells and offbase residential wells required the US Air Force to undertake both immediate and long-term response actions to address the release of these contaminants to the environment and their associated impacts to human health. In 2015, the US Air Force reactivated the Restoration Advisory Board (RAB) at the request of NHDES to facilitate, in part, communication and community input on the on-going investigation and clean-up of PFOS/PFOA at Pease. The RAB currently includes representatives from Portsmouth, Newington and Greenland, New Hampshire, the US Air Force, EPA, and NHDES,

The information repository, which includes a copy of the administrative record for the Pease Site is available for review at the following location:

20 Short Street Portsmouth, New Hampshire (210) 395-9420 Hours by Appointment Monday through Friday A copy of the administrative record also is available at the following address: http://afcec.publicadmin-record.us.af.mil/

In addition, a notice that briefly summarizes this ESD will be published in the *Fosters Daily Democrat*, the *Portsmouth Herald*, and at SeacoastOnline.com.

This ESD describes and documents the rationale behind the implementation of the groundwater extraction and treatment system (GWETS) to control the migration of PFOA- and PFOScontaminated groundwater away from Site 8.

# SITE HISTORY, CONTAMINATION AND SELECTED REMEDY

## Pease AFB Description and History

The former Pease AFB is located in southeastern New Hampshire within the City of Portsmouth and the towns of Newington and Greenland. Pease is located on a peninsula bounded by the Great Bay to the west and southwest, by the Little Bay on the northwest, and by the Piscataqua River on the north and northeast (Figure 1). The former base is comprised of 4,365 acres located in the center of the peninsula.

In 1951, the US Air Force took possession of an airport located at the former base location, and construction of the facility was completed in 1956. Pease AFB was historically used by the US Air Force to maintain a combat-ready force capable of long range bombardment operations. Various quantities of fuels, oils, lubricants, solvents, and protective coatings were used to support the missions; as a result, contaminants from those substances were released into the environment.

Under the US Department of Defense's Installation Restoration Program (IRP), the US Air Force initiated activities to locate, investigate, and clean up waste sites. Because of the contamination discovered under the IRP, Pease AFB was placed on the National Priorities List in

1990, and the US Air Force, US EPA, and NHDES agreed to remediate it in accordance with the Federal Facility Agreement (FFA) which was signed by the US Air Force, EPA and NHDES in 1991. Concurrent with the finalization of the FFA, Pease AFB was placed on the Base Closure List by the US Congress and was closed in March 1991.

## Site 8 Description and History

Prior to the mid-1970s, mixed waste oil, solvents, and fuels were poured within two burn pit areas at Site 8 and ignited. The mixture was allowed to burn before being extinguished using a water-AFFF mixture. After the mid-1970s, the practice of using waste oils and solvents reportedly ceased and only jet fuel was used for firefighting training exercises. As a result of these historic activities, soil, groundwater, surface water and sediment became contaminated. Interim remedial measures were completed by the US Air Force between 1989 and 1990 and included the removal of petroleum-impacted soil from a drainage ditch connected to one of the former burn pits and the construction and operation of an interim pilot treatment system to remove dissolved volatile organic compounds (VOCs) from contaminated groundwater and to mitigate the migration of this contaminated groundwater away from Site 8. Data collected during the operation of the interim pilot treatment system was used to assess potential groundwater treatment technologies that would be considered as part of future cleanup options for Site 8.

## Early Cleanup Efforts

A small-scale pilot groundwater treatment system was completed in 1990 to treat contaminated extracted groundwater prior to on-site discharge to constructed groundwater recharge trenches. A pilot fuel product recovery system also began operation in 1990. Some of the fuel that was released to the ground as part of firefighting training exercises existed as free-phase product below the ground surface and floated on top of the groundwater table at the site. This free-phase petroleum product was directly pumped from the subsurface and removed by an oil/water separator process and transported off-base to a licensed disposal facility. Any groundwater separated from the free-phase product was treated by the pilot groundwater treatment system prior to discharge to the recharge trenches.

#### 1994 Site 8 ROD

A CERCLA ROD was issued in 1994 that detailed the US Air Force's decision to treat the Site 8 contamination with the following cleanup actions: 1) installation of a soil vapor extraction (SVE) system to remove VOCs from unsaturated soil; 2) installation of a cap over the burn areas to limit infiltration of rain water through impacted soil and enhance contaminant removal by the SVE system; 3) continued free-phase fuel product recovery; 4) construction and operation of a fullscale groundwater treatment system (GWTS) to fully control the migration of contaminated groundwater away from the site; and 5) establishment of institutional controls to prevent disturbance/development of the site and the use of contaminated groundwater.

#### Implementation of the 1994 Site 8 ROD

In 1995, a paved asphalt surface was constructed over the former Site 8 burn areas to minimize rainfall and snowmelt infiltration into the SVE treatment area. The SVE system was constructed in 1995 to address the vadose zone soil containing VOCs and TPH (Figure 2). А petroleum free-phase product recovery system was also installed in 1995. Petroleum product floating on top of the water table surface was recovered by the installation of wells and the operation of small diameter product recovery skimmer pumps. The recovered product was disposed of off-base at a permitted disposal facility. Petroleum product removal continued into 2012, but at dramatically reduced volumes (13 ounces in 2012 down from 24,900 pounds in 1999).

Further evaluations of the SVE and the petroleum free product recovery systems were completed in 2007. In June 2009, the SVE system was optimized to include air sparging (AS), to treat petroleum contaminated soil below the water table. The SVE/AS system operated through 2013 when it was deactivated by the US Air Force (Figure 2 and Figure 3).

The ROD-required Site 8 GWTS was designed and constructed in 1995 to capture impacted overburden groundwater exceeding the clean-up goals and to prevent continued migration of contaminated groundwater to the bedrock waterbearing zone (Figure 3). The system treated both metals and VOCs. The treated groundwater was then discharged to subsurface recharge trenches to provide recirculation and flushing of the impacted groundwater aquifer.

Restrictions on Site 8 groundwater use were implemented through the establishment of a Groundwater Management Zone (GMZ) in accordance with NHDES's Contaminated Site Management Rules. Groundwater within the Site 8 GMZ boundary was determined or assumed to be contaminated above the New Hampshire Ambient Groundwater Quality Standards (NHAGQS).

A long-term monitoring plan was implemented to monitor groundwater, surface water and sediment to assess Site 8 remedy performance and effectiveness. In addition, periodic subsurface soil sampling programs were implemented to evaluate the progress of remedial systems in reducing soil contamination.

From 1995 to 2012, combined treatment operations removed over 330,000 pounds of contamination from the subsurface at Site 8.

The results of long-term groundwater monitoring and periodic subsurface soil sampling have demonstrated that the treatment systems have largely met Site 8 cleanup goals established in the 1994 ROD and the GWTS was temporarily shut-down in 2012. Following the discovery of PFOS/PFOA in Site 8 groundwater, the GWTS was re-started in 2015 with an additional GAC unit and it operated until early 2017 when it was shut-down for construction of the new Groundwater Extraction and Treatment System (GWETS). The presence of PFOS/PFOA in groundwater was not known when the remedy for Site 8 was selected in 1994.

#### Basis for the ESD

In 2009, US EPA's Office of Water developed provisional Drinking Water Health Advisory levels (provisional HAs) for PFOS and PFOA to protect humans from short-term exposure to these contaminants in drinking water. A concentration of 200 parts per trillion (ppt) was established for PFOS and a concentration of 400 ppt was established for PFOA. In September 2012, the US Air Force issued interim guidance on investigating potential sources of per- and polyfluoroalkyl substances (PFAS) in groundwater, specifically at US Air Force base fire training areas. In 2016, the US EPA issued final Drinking Water Health Advisories (HAs) to

protect humans from lifetime exposure to PFOS and PFOA in drinking water. The HAs for PFOS and PFOA are 70 ppt each; in addition, the HA for PFOS and PFOA combined is 70 ppt. Also in 2016, NHDES, under its Contaminated Site Management Rules (Env Or-600), established NHAGQS for PFOS and PFOA. Similar to EPA's HAs, NHDES has set three groundwater standards: 70 ppt for PFOA, 70 ppt for PFOS and 70 ppt for PFOA and PFOS combined, where the chemicals are found together.

Groundwater assessments began in 2013 to identify the presence or absence of PFOA and PFOS at Site 8. In a 2014 report, the US Air Force provided the validated results of two groundwater sampling rounds completed at selected Site 8 monitoring wells. The report confirmed PFOS and PFOA in groundwater exceeded US EPA's 2009 provisional HAs for these contaminants. Some of these exceedances were found in monitoring wells located off-site in the Town of Newington.

In April 2014, the US Air Force collected water samples from the Haven, Smith, and Harrison water supply production wells located on Pease and operated by the City of Portsmouth. The results showed PFOS at 2,500 ppt in the Haven Well, and trace levels in the Smith and Harrison wells. As a result, the City of Portsmouth took the Haven well offline in May 2014. The US Air Force also began an inventory and monitoring program for off-base private residential wells in 2014 to identify whether private drinking water supplies were also impacted with PFOS or PFOA above the US EPA provisional HAs. Four private drinking water wells down-gradient of Site 8 have been identified with PFOS/PFOA concentrations above current EPA HAs. These properties were initially provided with bottled water by the US Air Force until GAC treatment systems were subsequently installed on the affected home water supplies. The US Air Force ensures these residential systems are operating properly and adequately treating these residential groundwater supplies until permanent connections to City of Portsmouth municipal water can be made.

In response to impacts from PFOS and PFOA on the Pease and private drinking water supplies and the potential human health threats posed by consuming this contaminated groundwater, the US EPA issued an Administrative Order (AO) under the Safe Drinking Water Act (SDWA) in July 2015. The SDWA AO requires the US Air Force to address the PFOS and PFOA contamination in groundwater at the Pease Site. The AO requires that Site 8 groundwater be restored to levels less than the HAs for PFOA and PFOS.

#### Explanation of Selected Remedy

In response to the 2015 SDWA AO, a new GWETS has been constructed and began operating in April 2018 (Figure 4). Operation of the GWETS is expected to mitigate continued expansion of PFAS-contaminated groundwater away from Site 8. Ten (10) new groundwater extraction wells were installed to provide more comprehensive hydraulic containment within the deep overburden and shallow fractured bedrock aguifers. The GWETS relies on the use of Best Available Technology to treat contaminants identified in (BAT) the 1994 Site 8 ROD as well as PFOS and PFOA to levels below NHAGQS. The treated groundwater will then be reinjected back to the aguifer. Under the Safe Drinking Water Act (SDWA), BAT is defined as water treatment(s) that USEPA certifies to be the most effective for removing a contaminant.

# DESCRIPTION OF SIGNIFICANT DIFFERENCES

#### Significant Differences

The 1994 ROD prescribed the cleanup objectives and treatment systems to address the release of aromatic hydrocarbons in Site 8 soil and VOCs and metals in groundwater. These systems were deactivated in the spring of 2017 to accommodate construction of the new GWETS. The treatment systems selected in the 1994 ROD did not address PFOS and PFOA; whereas, the selected remedy identified in this ESD will specifically address PFOS and PFOA in addition to the contaminants of concern identified in the 1994 ROD. The GWETS is focused on the treatment of PFOS and PFOA in Site 8 groundwater found to exceed the EPA HAs (Figure 4). The GWETS consists of a new stand-alone building and a new groundwater extraction well network. The GWETS reuses the treated effluent piping and subsurface groundwater recharge trenches from the Site 8 GWTS.

Although the GWETS is a newly constructed system, it serves the same primary remedial objective as outlined in the 1994 Site 8 ROD: to of control the migration contaminated groundwater away from Site 8. The GWETS operates under the same general treatment principles as the former groundwater treatment process: PFAS-contaminated groundwater is extracted from a series of pumping wells which then passes through a series of filters for treatment and is then discharged back to groundwater via subsurface recharge trenches. The treated groundwater will meet the HAs and NHDES AGQS for PFOS and PFOA prior to discharge back into the aquifer.

The GWETS includes groundwater extraction wells screened in both the overburden and shallow fractured bedrock. Piping from the extraction wells to the treatment building is located below ground to allow for year-round groundwater extraction and treatment operations. The GWETS is designed to operate at a maximum flow rate of 200 gallons per minute.

The BAT relied upon to treat extracted groundwater consists of multi-bag filters and liquid-phase GAC to remove suspended solids and organic compounds. Four ion exchange resin vessels, two each in parallel treatment trains, then remove PFOS and PFOA from the extracted groundwater. The treated groundwater is then returned back to the aquifer by pumping it to the existing groundwater recharge trenches (Figure 3).

A regeneration system will remove the PFOS, PFOA, and other adsorbed PFAS compounds from the ion exchange resin treatment media allowing for continual reuse of the resin filters. The two parallel treatment trains of ion exchange resin vessels will allow continued operation of the GWETS during the ion exchange resin regeneration process. The spent resin regeneration fluids will contain methanol, salt and desorbed PFOS, PFOA, and other PFAS compounds. The methanol will be recovered for reuse in the resin regeneration system and the residual desorbed PFAS will be transported offbase for incineration at a permitted treatment facility.

PFOS and PFOA concentrations above the HAs and NHAGQS are known to extend beyond the current GMZ boundary and evaluation of the affected area is on-going. Private residences with drinking water wells exceeding the PFOS/PFOA HAs will be connected to the City of Portsmouth municipal drinking water system.

# CHANGES IN EXPECTED OUTCOMES

The GWETS focuses on the capture and treatment of migrating PFOS- and PFOAcontaminated groundwater away from Site 8. The expected outcomes of the original 1994 ROD did not include the treatment of PFOA and PFOS contamination in extracted groundwater. The hydraulic containment of the PFAS groundwater plume migrating from the Site 8 source area through the overburden and shallow fractured bedrock aquifers is expected to mitigate the migration of this contamination (Figure 4). The proposed GWETS will continue to meet the substantive, nonprocedural requirements of all federal and state ARARs.

The cost for the construction of the GWETS is \$9.3M. A long-term operating and monitoring plan is in place that requires the collection of groundwater elevation and PFAS concentration data as well as treatment system operational data to assess the performance of the GWETS in meeting hydraulic containment and treatment objectives. Should at any time performance monitoring data indicate the GWETS is not adequately containing and treating contaminated groundwater migrating from the site, necessary GWETS modifications will be made by the US Air Force.

Additionally, as part of ongoing PFAS field investigations at Pease, a new Site 8 GMZ will be established and the substantive requirements of NHDES's ground water management permit rules will be met by the US Air Force.

# SUPPORT AGENCY COMMENTS

The US EPA and NHDES have had ongoing involvement in the decision-making process

associated with the changes to the Site 8 remedy. The US Air Force has obtained concurrence from the US EPA and NHDES on this modification to the remedy and confirms that they address the concerns of the community and protects human health and the environment. This ESD does not in any way affect EPA's ability to enforce US Air Force compliance with the Safe Drinking Water Act Administrative Order issued in August 2015. Site 8 groundwater remediation will be deemed "covered" by the FFA so long as the remedial activities are consistent with the objectives set forth in the SDWA AO.

# STATUTORY DETERMINATIONS

The proposed change to the selected remedy will continue to satisfy the statutory requirements of CERCLA Section 121. The Site 8 remedy will remain protective of human health and the environment and will continue to comply with federal and state ARARs and be cost-effective. The construction cost of the GWETS is \$9.3M. This GWETS is monitored to confirm hydraulic containment of the PFOS and PFOA as well as ensuring treated groundwater contaminant concentrations are below the HAs and NHAGQS, for PFOS and PFOA.

## FOR MORE INFORMATION

If you have questions or would like further information about this ESD for Site 8 at the former Pease AFB, please contact:

Roger Walton, Remedial Project Manager Air Force Civil Engineer Center 2262 Hughes Avenue Bldg 171, Ste 155 JBSA Lackland, TX 78236-9853 (210) 395-9420

Questions may also be directed to the project managers for U.S. EPA and NHDES:

Michael Daly U.S. Environmental Protection Agency 5 Post Office Square, Suite 100 Mail Code: OSRR 07-3 Boston, MA 02109-3912 (617)918-1386

Peter Sandin NH Dept. of Environmental Services 222 International Drive, Suite 175 Portsmouth, NH 03801 (603) 559-0022

## AUTHORIZING SIGNATURES

ROBERT E. MORIARTY, P.E., SES, DAF Director, Installations Directorate Air Force Civil Engineer Center

14 MA 19 Date

BRYAN OLSON, DIRECTOR Office of Site Remediation and Restoration USEPA Region 1

Date

Figures (see attached figures)





	and the state of the second	
	Sima second second	States in the states in
and the second s		
		1 Alexandre

	R PRET CITE AND	anne	Air Force Civil Eng 2261 Hughes Building 171, JBSA Lackland, To		Figure 2 Site 8 Historical Layout Features Explanation of Significant Differences for Zone 5: Site 8 Former Pease Air Force Base, Portsmouth, New Hampshire					amec foster wheeler	
0	15	30	60	90	120 Meters	N	NOTES: -Aerial Imagery obtained through ESRI Online Services	7/11/2017	Rev:	Site8_ESD_11x17P	
0	50	100	200	300	400 Feet			Drawn: BRP	Chk: BAS	PROJ: 7753612	02



Figure 3 Site 8 Features tion of Significant Differences for Zo ease Air Force Base, Portsmouth, N	amec foster wheeler				
ES: Imagery obtained through ESRI Online	2/22/2018	Rev:	Site8_ESD_11x	17L	
35	Drawn: BRP	Chk: BAS	PROJ: 775361202		



Air Force Civil Engineer Center 2261 Hughes Avenue Building 171, Ste 155 JBSA Lackland, Texas 78236					eer Center nue 155 § 78236	A	Figure 4 Anticipated Capture Zone for the Interim Mitigation System for Site 8 Explanation of Significant Differences for Zone 5: Site 8 Former Pease Air Force Base, Portsmouth, New Hampshire					amec foster wheeler
)	15	30	60	90	120 Meters		N	NOTES: -Aerial Imagery obtained through ESRI Online Services	7/12/2017	Rev:	Site8_ESD_11x17P	
)	60	120	240		360	480 Feet			Drawn: BRP	Chk: BAS	PROJ: 7753612	02