ACTION MEMORANDUM

Town of Coupeville – Navy Water System Improvements
Naval Air Station Whidbey Island
Outlying Landing Field, Coupeville, Washington

1.0 Purpose

The purpose of this Action Memorandum (AM) is to document decisions by the Department of the Navy (Navy) to take additional precautionary measures to reduce concentrations of per-and polyfluoroalkyl substances (PFAS), specifically perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), identified in drinking water supply wells adjacent to Naval Air Station Whidbey Island (NASWI) Outlying Landing Field (OLF) Coupeville, near the Town of Coupeville, Washington.

This AM was prepared per Section 300.415(n)(2) of Title 40 of the Code of Federal Regulations, as part of the National Oil and Hazardous Substances Pollution Contingency Plan. The Navy is the lead agency, under Executive Order 12580, for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) actions at NASWI.

The Navy has implemented two Time-Critical Removal Actions (TCRAs) in response to the discovery of PFOS and PFOA in residential drinking water supply wells near OLF Coupeville at concentrations above the United States Environmental Protection Agency (USEPA) Lifetime Health Advisory (LHA). The first TCRA, an emergency removal action, (Navy, 2017) included supplying bottled water to residents where water from private drinking water supply wells were found to have PFOS/PFOA levels which exceed the USEPA LHA of 70 nanograms per liter (ng/L) threshold. Bottled water is being provided to affected residents for drinking and cooking water use under the first emergency TCRA. A second TCRA (Navy, 2018) was needed to provide residents with another drinking water option besides bottled water to reduce the burden that bottled water usage may have on the residents, while maintaining protectiveness. The Navy offered residents, who have drinking water supply wells with PFOS/PFOA levels exceeding the USEPA LHA, the option to install a point-of-use (POU) water treatment system for their kitchen sink tap water to replace the bottled water. The POU systems will treat the residents' well water, which is used for drinking and cooking purposes, so that PFOS/PFOA concentrations are maintained at levels below the USEPA LHA. To-date, one POU system has been installed and is being used by one residence with a drinking water well above the USEPA LHA in Coupeville, WA.

The Navy is implementing a third Time Critical Removal Action at OLF Coupeville to ensure concentrations of PFOS and/or PFOA remain below the USEPA LHA for the Town of Coupeville water service customers and to provide a more protective and consistent solution for affected private residents near OLF who are currently on bottled water.

The TCRA includes two parts: (1) providing PFOS and/or PFOA treatment for the Town of Coupeville water supply and (2) connecting affected residents to Town of Coupeville water supply.

2.0 Site Conditions and Background

OLF Coupeville was commissioned for use by the Navy in 1943. OLF has supported day and night Field Carrier Landing Practice operations by the Navy for aircraft based out of Ault Field since 1967. Such operations allow aviators to practice touch-and-go, simulating carrier landings and takeoffs. OLF Coupeville is seen by the Navy as an ideal airfield for this type of carrier training due to its remote location and low ambient lighting, which provides pilots an optimum experience that replicates landing aboard an aircraft carrier. There is no formal documentation of aqueous film forming foam, a common source of PFAS, usage at OLF Coupeville.

The Navy conducted on-base drinking water sampling at OLF Coupeville in September 2016. PFOA was detected in one on-base drinking water well below the USEPA LHA, near Building 2807. The PFAS detection initiated the groundwater investigation at OLF Coupeville. No previous groundwater investigations had been conducted at OLF Coupeville, so there was significant uncertainty regarding groundwater flow direction. In November 2016, off-base drinking water wells were sampled under a voluntary sampling program (Phase 1). Due to the uncertainty of groundwater flow direction, the Navy used Building 2807 as the center point to draw a 1-mile radius to initiate the first round of off-base drinking water sampling. Based on the results of the Phase 1 sampling, the off-base investigation area was expanded to include residential wells one-half mile downgradient of locations that exceeded the LHA within the initial 1-mile radius (Phase 2). In Phase 2, a total of 113 drinking water samples were collected from November 2016 to June 2017. Phase 2 work included evaluation of off-base drinking water well construction and installation information. The Phase 1 and 2 results indicated that PFOS and/or PFOA were above the USEPA LHA in seven off-base drinking water wells located south of the OLF Coupeville runway. These wells with USEPA LHA exceedances, and two new wells in the area that could not previously be sampled, were sampled in October 2017. The results of the October 2017 sampling confirmed the USEPA LHA exceedances in the original seven off-base wells and in one new location, for a total of eight off-base drinking water wells with PFOS and/or PFOA levels above the USEPA LHA. The eight affected residential wells supply 10 private residences.

Twenty-seven groundwater monitoring wells were installed between November 2016 and February 2017, and sampled in February and March 2017 as part of an on-base investigation. PFOS and/or PFOA were detected above the USEPA LHA in three wells located near the center of the runway at OLF Coupeville. This on-base investigation also confirmed that the primary groundwater flow direction from OLF Coupeville is to the south toward Admiralty Bay. Based on the information collected, an off-base Phase 3 sampling area was not recommended. The Phase 1 and 2 sampling areas already included the off-base drinking water wells downgradient (in the direction of groundwater flow) from groundwater wells on OLF Coupeville with PFOS and/or PFOA above the USEPA LHA (CH2M 2018a).

The Town of Coupeville sources its municipal potable water supply from wells located adjacent to OLF Coupeville. One Town of Coupeville drinking water supply well (the Keystone Hill well, also called well 1-08), located just west of OLF Coupeville, has also had detections of PFOA below, but near, the USEPA LHA. A monitoring well at OLF Coupeville, within 0.1 mile of the Keystone Hill well, had a PFOA exceedance of the USEPA LHA. To reliably support existing Town of Coupeville water demands, and to satisfy anticipated increases in Town water demands, the Town has plans to increase the pumping rate of the Keystone Hill well from the current rate of 120 to 150 gallons per minute (gpm) to 250 gpm or greater. The Town of Coupeville is concerned that increased withdrawal rates at the Keystone Hill well may result in higher PFOA concentrations in water produced by the well (because of adjacent monitoring wells with PFOA USEPA LHA exceedances), or that PFOA and/or PFOS concentrations may increase in the future even at current pumping rates.

More information regarding the impact of current, and potential increased, Keystone Hill well pumping rates, on groundwater flow directions was needed to better understand potential water quality trends for the well, as well as the feasibility of expanding the Town of Coupeville drinking water system to supply municipal potable water to residences whose private wells show PFOS and/or PFOA levels above the USEPA LHA. Four new monitoring wells (two shallow-deep well pairs) were installed in December 2017, close to the OLF Coupeville base boundary within an approximately 0.5-mile radius of the Keystone Hill well. These wells were installed for PFOA and/or PFOS delineation in groundwater and to use as aquifer testing observation wells. The four new wells were sampled in January 2018, and three were found to have concentrations of PFOA above the USEPA LHA. Aquifer testing at the Keystone Hill well was performed in January 2018. Current pumping rates were used during the test and groundwater levels at eleven surrounding wells were monitored. The objective of the Keystone Hill well aquifer testing was to:

- Evaluate the radius of influence (ROI) and extent of hydraulic capture of the Keystone Hill well when operating under current normal (120 to 150 gpm) pumping conditions.
- Evaluate the potential ROI and extent of hydraulic capture through numerical modeling of the Keystone Hill well with the production rate increased to 300 gpm.

All four new monitoring wells showed groundwater level drawdown in response to pumping at the Keystone Hill well. The PFAS groundwater sampling data and aquifer testing results suggest there is a migration pathway for PFOS and/or PFOA to the Keystone Hill well, and suggest that PFOS/PFOA concentrations in the Keystone Hill well could potentially increase, resulting in exceedances of the USEPA LHA. The results of these evaluations support the need for this TCRA.

3.0 Threats to Public Health or Welfare or the Environment, and Statutory and Regulatory Authorities/Endangerment Determination

Potential releases of pollutants and contaminants may present an imminent and substantial endangerment to public health, welfare, and the environment. Any historical release on Navy facilities has the potential to impact groundwater and drinking water adjacent to the Navy facilities. However, the source and extent of PFOS and PFOA is not yet known. The Navy is continuing to assess potential exposure through drinking water adjacent to the facilities and will implement subsequent site inspections and remedial investigations based on findings.

PFOS and/or PFOA in off-base groundwater is associated with two potential public health threats: (1) exposure from ingestion of groundwater from private drinking water wells with concentrations of PFOS and/or PFOA greater than the USEPA LHA (associated with eight off-base wells supplying ten residences), and (2) potential future exposure of PFOS and/or PFOA greater than the USEPA LHA to residents using Town of Coupeville-supplied water (for residents not currently exposed to PFOS and/or PFOA concentrations above the USEPA LHA). This could be from current or future increased pumping of the Keystone Hill well, or other factors that result in PFOS and/or PFOA levels within the Town of Coupeville water supply exceeding the USEPA LHA.

4.0 Removal Action and Estimated Costs

For this third TCRA, the Navy considered three whole-house potable water options to replace bottled water, or POU water treatment systems for the affected OLF Coupeville off-base residences with PFOS and/or PFOA present in private supply wells at levels greater than the USEPA LHA:

- Connection to the Town of Coupeville water supply, and treatment for PFOS and PFOA removal at the Town's existing water treatment plant (WTP)

- Point-of-Entry (POE) treatment (treatment at the existing household water supply wellhead)
- Drilling new single-home wells for each resident

Due to the local hydrogeology and migration of PFAS into the drinking water aquifer, installing new single-home wells on affected properties will not provide a source of reliable drinking water to residents. The POE treatment would require reoccurring and frequent visits to sample water and replace the filters for the foreseeable future.

The Navy has identified connecting the ten affected residences (associated with eight residential drinking water wells) to the Town of Coupeville drinking water distribution system, and adding granular activated carbon (GAC) adsorption treatment to the Town's WTP for PFOS/PFOA removal, as the most protective and efficient long-term solution. Based on our research, treatment of the Town of Coupeville's WTP is the most protective and efficient method of addressing PFOS/PFOA contamination to impacted eight private wells/ten homes with minimal disturbance to the home owners and also protects the Town's water. The following are reasons why this is the most protective solution for Coupeville.

- The system design will be adaptable to address changes in regulatory status. For example, if new PFAS regulations or applicable advisory levels are established, the Navy will be able to adjust the treatment system, as necessary.
- PFAS concentration and distribution within the aquifer is not yet fully defined. Subsequent investigations will focus on resolving these unknowns. While this investigative process is underway, the Navy's priority will be to reduce any identified exposure, and potential future exposure above the LHA.
- Changes in the PFAS contamination level in the aquifer can be managed at the Town of Coupeville's WTP and will not require further access or coordination access to residences' property.
- Extending the Town's water lines could expedite connecting others to the Town's treated water system if other private wells test positive for PFAS compounds above applicable regulations or advisories in the future.

Currently the Town of Coupeville's WTP draws drinking water from five active wells within the Fort Casey Wellfield, including the Keystone Hill well, located approximately 3 miles south of the Town of Coupeville. The Town has other supply wells within the Town limits; however, these in-Town supply wells are susceptible to salt water intrusion and other significant water quality challenges given the local geology and their proximity to the marine waters. As a result, the Town has increasingly been focusing on and investing in the Fort Casey Wellfield and WTP as its primary municipal drinking water supply source, and has sought to largely discontinue supply from its In-Town supply wells. The Town's main water supply comes from the Fort Casey Wellfield's Keystone Hill well, which is currently pumped at approximately 120 to 150 gpm. Four other Fort Casey Wellfield wells have much lower pumping capacities (with individual pumping rates ranging from 30 to 45 gpm). The Keystone Hill well is the only water supply well with detections of PFOA. PFOA detections at the Keystone Hill well range between 59 and 62 ng/L, which is below the USEPA LHA of 70 ng/L. At the Towns' WTP, water from the Keystone Hill well gets blended with water from the other Fort Casey Wellfield wells reducing the concentration of PFOA to 25 to 38 ng/L in the blended water.

PFOA concentrations at the Keystone Hill well, which are currently at concentrations below the USEPA LHA, could increase because of groundwater contaminant migration, current pumping, and/or planned increased pumping. The current unit processes in the Town's WTP do not remove PFOS and PFOA from drinking water. Therefore, the Navy will upgrade the Town's WTP by adding GAC treatment to remove

PFOS and PFOA from the Town water supply to concentrations below the USEPA LHA. The goal of the Town's WTP upgrade is to keep PFOS and PFOA concentrations in the Town drinking water below the USEPA LHA, regardless of the PFOS and PFOA concentrations in the source raw (water supply well) water.

The ten OLF Coupeville off-base residences that have PFOS and/or PFOA concentrations above the USEPA LHA in their drinking water wells will be connected to the Town of Coupeville water supply. Roughly 8,000 linear feet of distribution piping and associated water supply pumping improvements will be added to the existing Town water system to support these additional connections. To address fire-flow supply provisions for system extension piping, fire hydrants will be installed along the water main alignment, and additional associated fire flow pumping system improvements will be completed.

The Town's WTP and water distribution system upgrades, and fire-flow supply provisions for system extension piping needs will be documented in the administrative record. The total baseline construction cost for this project is preliminarily estimated at $2.5 to $3.1 M. Variability and uncertainty in these estimated costs could still be on the order of plus or minus 30 to 50 percent, consistent with typical estimate variability noted for conceptual and feasibility study project predesign planning under AACE International (formerly the Association for the Advancement of Cost Engineering) Class 4 estimating guidelines. This means that total construction costs could potentially be as high as $3.8 to 4.7 M. The Navy estimates the implementation of all removal action components (including the design, construction, and verification of the water distribution lines, and the modifications to the Town's WTP) will take up to 1.5 years.

The Navy is continuing to evaluate potential PFOS and/or PFOA exposure to the public via drinking water well withdrawals downgradient of OLF Coupeville. If additional drinking water samples above the USEPA LHA are identified during site investigation activities, the Navy will immediately supply bottled water (Navy, 2017) and offer the installation of a temporary POU treatment system (Navy, 2018) for the impacted residences until those affected can be connected to Town of Coupeville water supply. The TCRA action to address the potential future exposure for Town of Coupeville water system users and to connect affected residences to Town of Coupeville water is the Navy's long-term removal action to address the PFOS and/or PFOA in drinking water wells near OLF Coupeville.

5.0 Expected Change in the Situation Should Action be Delayed or Not Taken

Failure to implement this removal action would not address the potential exposure to Town of Coupeville water users to PFOS and/or PFOA concentrations above the USEPA LHA. Bottled water (Navy, 2017) or POU water treatment systems (Navy, 2018) will continue to be provided to residences with PFOS and/or PFOA concentrations above the USEPA LHA until the Town of Coupeville water connection TCRA is implemented. Failure to provide clean drinking water to residents with impacted drinking water would result in exposure to PFOS and/or PFOA above the USEPA LHA.

6.0 Future Regulatory Standards for PFAS

This removal action is being performed for off-base drinking water based on the exceedance of the USEPA LHA for PFOS and PFOA. If the USEPA LHA for PFOA and PFOS is reduced, or additional PFAS compounds are assigned promulgated drinking water standards, the analytical data from all residences' drinking water samples will be re-evaluated. In the event this re-evaluation indicates additional adversely impacted drinking water, additional removal actions by the Navy may be warranted.

7.0 Recommendations

This AM documents approval of the third TCRA selected to address off-base drinking water exposure to PFOS and PFOA for off-base residences near OLF Coupeville. Connecting residences with PFOS and PFOA concentrations above the USEPA LHA in their drinking water to the Town of Coupeville water distribution network and upgrading the Town's WTP to ensure PFOA/PFOS remains below the USEPA LHA provides a protective, long-term solution. Naval Facilities Engineering Command Northwest is undertaking this TCRA.

8.0 Works Cited

Department of the Navy (Navy). 2017. *Emergency Response Action Memorandum, Naval Air Station Whidbey Island, Ault Field, Oak Harbor and Outlying Landing Field, Coupeville, Island County, Whidbey Island, Washington*. February 13.

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CH2M HILL, Inc. (CH2M). 2018. *Evaluation of Per- and Polyfluoroalkyl Substances (PFAS) in Groundwater, Outlying Landing Field Coupeville*. Final Technical Memorandum. May.

Approval:

G.C. Moore
Captain, United States Navy
Commanding Officer

20 Jun 18
Date