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RESPONSE TO U S EPA REGION I COMMENTS ON THE DRAFT REMEDIAL INVESTIGATION WORK PLAN/TIER II SAMPLING AND ANALYSIS PLAN AQUIFER PROTECTION DISTRICT AT HANGAR 1 FORMER NAS SOUTH WEYMOUTH MA
01/28/2015
RESOLUTION CONSULTANTS

JANUARY 28, 2015 RESPONSE TO UNITED STATES DEPARTMENT OF ENVIRONMENTAL PROTECTION (EPA) COMMENTS DATED JANUARY 6, 2015
FOR DRAFT REMEDIAL INVESTIGATION WORK PLAN/TIER II SAMPLING AND ANALYSIS PLAN; AQUIFER PROTECTION DISTRICT AT HANGAR 1 DATED NOVMEBER 2014
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Note that where the comment response provides revised text, original text is shown in italics, text additions are shown in bold italics, and deleted text is shown as strikethrough.

GENERAL COMMENTS:

1. **Comment:** Pursuant to Section 26.3 of the November 1999, "Federal Facility Agreement (FFA) – South Weymouth Naval Air Station, Weymouth, MA", the Navy is obligated to address past or future releases of hazardous substances, contaminants or pollutants resulting from Navy activities, regardless of whether it has sold or transferred an interest in the property. In addition, CERCLA requires that the both the source of contamination, as well as any area to which it has come to be locate, be identified, investigated, and evaluated as to current and/or potential threats to public health or welfare or the environment. Although the ESD states that the "placement of deed restrictions will be the final action for the 22-acre parcel", the confirmed detection of PFCs (i.e., PFOA and PFOS) in monitoring wells located in both the APD and non-APD portions of the former Hangar 1 property, renders the issue of one area being "covered by the ESD" and one not, irrelevant.

   Response: Comment noted. In the course of discharging its responsibilities under the FFA and CERCLA, the Navy is required to gain the concurrence of the EPA in certain decisions. As was the case for the Hangar I Explanation of Significant Differences (ESD) signed by Navy and EPA where the decision to establish deed restrictions and assert that this would be the final action for the 22 acre parcel was concurred by EPA. Through this concurrence the Navy was able to warrant to the future landowners that all necessary remedial actions had been performed and the property was suitable for transfer. It is therefore quite disconcerting to the Navy (and presumably the new property owners) that, lacking any new or different information (detections of PFCS in the APD and non-APD were known at the time), the EPA would now consider the differentiation of the APD and the non-APD "irrelevant".

2. **Comment:** As discussed in the attached cover letter (and as detailed in EPA's "Guidance for Conducting RI/FS' under CERCLA"), the Hangar I RI Work Plan should be amended to incorporate, at a minimum, all of the components of a comprehensive Sampling and Analysis Plan (comprised of a Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP)). Specifically, the FSP should specify and outline all necessary activities to obtain additional site data. It must include an evaluation explaining what additional data are required to adequately characterize the site, conduct a baseline risk assessment, and support the evaluation of remedial technologies in the FS. It should also clearly state sampling objectives; necessary equipment; sample types, locations, and frequency; analyses of interest; and a schedule stating when events will take place and when deliverables will be submitted.

   The QAPP should address all types of investigations conducted and should include, but not be limited to, a description of the project (should be duplicated from the work plan), a project organization chart (illustrating the lines of responsibility of the personnel involved in the sampling phase of the project), quality assurance objectives for data (such as the required precision and accuracy, completeness of data, representativeness of data, comparability of data, and the intended use of collected data), sample custody procedures, type and frequency of calibration procedures for field and laboratory instruments, internal quality control checks, and quality assurance performance audits and system audits. Based on recent BCT discussions regarding this effort, EPA should emphasize that it less concerned about the actual name of the document (i.e. RI Work Plan vs Tier II SAP) and more concerned that the scope of the investigation adequately characterizes the nature and extent of PFC contamination at the Hangar 1 site. This includes the identification and through evaluation of probably source areas and any other area to which PFCs have come to be located, within and/or outside of the PDWSA/PPA.

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Response: In March 2005, the EPA Office of Solid Waste and Emergency Response (OSWER) formally adopted the use of the UFP-QAPP for the use at Federal facility hazardous waste sites. The initial focus of the UFP-QAPP development was on Federal Facility response actions under CERCLA and RCRA (OSWER Guidance 9272.0-20). Additionally, as stated in the UFP-QAPP manual (EPA, 2005), the UFP-QAPP focuses on the required content of Sampling and Analysis Plans, Work Plans, and Field Sampling Plans. The *Draft Remedial Investigation Work Plan/Tier II Sampling and Analysis Plan* was presented in the optimized Tier II UFP-QAPP format used by the Navy to streamline the planning process for many types of investigations including Remedial Investigations. The Tier II UFP-QAPP format includes project description, a project organization chart, quality assurance objectives for sample collection/laboratory activities, sample custody procedures, type and frequency of calibration procedures for field (included in provided SOP Appendix) and laboratory instruments, and internal quality control checks. Additionally the Tier II UFP-QAPP format includes an evaluation of what data are required to complete project objectives (including a baseline risk assessment), sampling objectives, sample types, sample locations, sample frequency, and analyses of interest. In summary, the UFC-QAPP follows EPA guidance and includes all of the requested information.

3. **Comment:** As noted in EPA's previously-issued comments on the "Hangar 1 SAP and FFTA LTM Plan - Perfluorinated Compounds", significant data gaps exist in the current Hangar 1 groundwater monitoring well network that must be addressed to facilitate adequate characterization of PFOA/PFOS in the area associated with Hangar 1. Specifically, additional groundwater data should be collected from the area east and downgradient of MW05-033, additional details regarding groundwater flow direction in the area southsoutheast of Hangar 1 should assimilated and analyzed, existing monitoring well screen depths should be confirmed and analyzed to confirm adequate placement and their ability to capture migrating plumes, and an updated groundwater flow mapping should be prepared based on the recent synoptic water level measurements collected as part of the aforementioned Hangar 1 sampling effort.

   Response: Monitoring wells have been proposed in locations that are thought to be sufficient to characterize the extent of PFOS and PFOA at Hangar 1. It is understood that if PFOS and PFOA contamination are identified in any of the boundary monitoring wells the determination of the extent of contamination will be considered incomplete and additional investigation will be warranted, as described in Decision Rule #1 of the *Draft Remedial Investigation Work Plan/Tier II Sampling and Analysis Plan*:

   If analytical results indicate that sufficient data was collected to characterize the extent of PFOS and PFOA in groundwater within the APD, then additional characterization data will not be collected and the Navy will prepare an RI report documenting investigation findings. If the extent of PFOS and PFOA in groundwater within the APD is not resolved, then further data will be collected during an additional optional mobilization.

   Should definition of the extent of PFOS and PFOA contamination in groundwater be considered incomplete an additional mobilization will occur.

4. **Comment:** PFCs were often produced and used in mixtures containing process residuals. Recent evidence suggests that these residuals can degrade to form intermediates and PFCs (such as PFOS and PFOA). Given that multiple forms of PFCs can exist at a site and that both PFOA and PFOS have already been confirmed at concentrations exceeding EPA's Provisional Health Advisories, EPA requests that the scope of the proposed RI be expanded to include sampling and analysis for all poly- and perfluorinated alkyl substances, PFC precursors, and intermediate degradation products.

   Response: It is currently the Navy's policy that investigations should focus on PFCs for which toxicity values are available. Currently PFOS and PFOA are the only two PFCs with available toxicity values. Sampling and analysis of additional PFCs may be included in the future to facilitate remedial design or when the state of the science improves and additional toxicity information becomes available.

5. **Comment:** Additional and/or modified figures that provide a visual reference to former Hangar 1-related structures and components, historic and proposed sample locations, and other site-specific features discussed in the draft work plan, should be incorporated into the document. Specifically, a figure (similar to Figure 2-2 in the March 1999, Removal Action Report for Hangar 1) should be added that shows the locations of the oil-water separator, the drain lines impacted by the AFFF spill, and the sanitary sewer and oil-water separator

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that received the discharge from the spill. Similar components of the Crash Truck Garage, if any, should also be included on the figure. See also the specific comments on Figure 10-2.

Response: Comment noted. An additional Figure will be included in the *Draft-Final Remedial Investigation Work Plan/Tier II Sampling and Analysis Plan* that shows structures and components, historic and proposed sample locations, and other site-specific features discussed in the draft work plan. This figure will also include the locations of the oil-water separator, the drain lines impacted by the AFFF spill, the sanitary sewer and oil-water separator that received the discharge from the spill, and any similar components in the Crash Truck Garage.

6. **Comment:** An assessment of leaching potential is typically characterized by analyzing soil concentrations and comparing them to the default or calculated leaching criteria. Please elaborate upon the proposed "synthetic precipitation leaching procedure" and provide justification to evaluate/assess leaching potential based solely on the results of this specific test.

   Response: The Synthetic Precipitation Leaching Procedure (SPLP) is an EPA SW-846 test method that is used with solid samples from a contaminated site to estimate the site-specific adsorption-desorption potential of a contaminant that may impact groundwater.

   The work plan will be modified to state that soil samples will be analyzed for PFOA and PFOS (without first undergoing SPLP extraction) and compared to calculated leaching criteria. If the leaching criteria are exceeded, then the samples will be analyzed following SPLP extraction.

7. **Comment:** Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are ionic compounds that tend to migrate via water from shallow to subsurface soils. In light of the limited number of subsurface soil samples collected to date, additional sampling is recommended from within the former trench drain system (and other potentially impacted, subsurface locations**) to adequately rule out the potential presence of PFOA/PFOS at depth (**areas where shallow soils were excavated (i.e., trench drain piping system) with minimal, if any, consideration/assessment of potential subsurface soil contamination.

   Response: As stated in Worksheet 10:

   Soil borings were advanced adjacent to groundwater sample locations and at target locations associated with the AFFF ASTs, distribution system, drain system, and the former Crash Truck Garage. The highest concentrations of PFOS and PFOA were detected in the vicinity of the former AFFF ASTs (North Lean-To) and former Crash Truck Garage (South Lean-To) just above the water table. Based on the current land use, there are no identified human or ecological receptors potentially impacted by the presence of PFOS and PFOA in soil…

   Should results of the proposed SPLP analysis show that soil and/or concrete are leaching PFOS and PFOA at concentrations that are impacting groundwater quality, the need for additional sampling will be evaluated.

8. **Comment:** The aforementioned March 1999, Removal Action Report for Hangar 1 refers to the cleaning of other AFFF-containing, above-ground storage tanks at Naval Air Station South Weymouth, and specifically mentions the former firehouse located immediately northwest of Hangar 1. Please elaborate on this discussion and identify locations, if any, of other AFFF storage tanks.

   Response: At the same time of the Removal Action Report at Hangar 1, Foster Wheeler completed Removal Action Reports for Building 96 (the former firehouse), Building 117, and Building 82 Hangar 2. Based on the review of these documents, no additional fixed storage AFFF tanks were identified; however AFFF solution was stored in 5 gallon containers and mobile tanks in the firehouse and around the aprons. Existing and planned sampling locations cover these potential release points.

9. **Comment:** Please include a list of references for documents cited in the work plan.

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Response: References will be included in the *Draft-Final Remedial Investigation Work Plan/Tier II Sampling and Analysis Plan*

PAGE-SPECIFIC COMMENTS:

10. **Comment:** Page 6-2, Worksheet #6- For clarification purposes, please identify members of the "project team" and describe their relationship, if any, to the "responsible entity" in the preceding column.

    Response: The "Name" column in Worksheet #6 lists the contact associated with the "Responsible Entity" column (i.e, for Responsible Entity 'Resolution Consultants TOM', Michelle Snyder is the contact).

11. **Comment:** Page 6-2, Worksheet #6. SAP Changes- The Sampling and Analysis (SAP) is a "Primary" document in accordance with Paragraph 10.2 of the aforementioned South Weymouth FFA. As such, the current plan to limit EPA notification to "significant" field changes is unacceptable. Please amend this section to ensure that EPA is notified of any SAP change, modification, amendment, and/or field change (excluding those related to costs) within 5 business days.

    Response: Comment noted. This change will be made as requested.

12. **Comment:** Page 6-1, Worksheet #6 - The last page for this worksheet was mislabeled as WS 6-1 instead of WS 6-6 (the previous page is labeled WS 6-5). Please verify and revise as appropriate.

    Response: This will be corrected.

13. **Comment:** Page 3, Section 7.2 - SOP 3-07 requires a horizontal accuracy of 0.1 feet. If that accuracy is not Navy's intent, please indicate that SOP 3-07 will be modified for this project and provide the appropriate expected post-processed accuracy.

    Response: Worksheet #21 will be updated to state that sub-meter accuracy is required (as stated in Worksheet 14) rather than 0.1 feet.

14. **Comment:** Page 10-3, Figure 10-2 - Please amend the figure to include an overlay of monitoring well locations and corresponding historic and current PFC detections (i.e., a combination of Figures 10-1 and 10-2).

    Response: This figure will be amended as request to include an overlay of monitoring wells. Historic and current PFOS and PFOA detection figures will be included as an Appendix to the *Draft-Final Remedial Investigation Work Plan/Tier II Sampling and Analysis Plan.* Inclusion of the PFOS and PFOA detections to Figure 10-2 would "crowd" the figure and make it difficult to identify site features.

15. **Comment:** Page 10-3, Figure 10-2 - Figure 2-2 from the March 1999 Removal Action Report for Hangar 1 indicates that the two AFFF tanks were not located in the northwestern comer of the building as shown but rather in the next bump out to the northeast. Please include definitive documentation in the RI WP supporting the location of the AFFF tanks and the associated soil sampling locations.

    It is presumed that most if not all of the spilled AFFF drained to the interior floor trenches and discharged to the sanitary sewer on the west side of Hangar 1 and flowed north in the sewer, following the sewer network to some undetermined discharge point. Please edit this figure to show this sanitary sewer and its northern extent including manholes. Please also identify the material type and construction for the sewer pipe.

    It is also possible that some of the AFFF may have discharged to the exterior door trenches and ultimately to the storm sewer on the southwest of Hangar 1 and the storm sewer and oil-water separator on the northeast. If this occurred AFFF may have penetrated farther north into the aquifer protection district along the storm sewer and to the discharge point of the storm sewer. Please provide the details of the

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cleanup performed for the AFFF spill so the potential areal extent of the impacts of the spill can be better understood.

Response: The March 1999 Removal Action Report incorrectly identified the location of the AFFF tanks and AST. The former AFFF tanks and AST as depicted in Figure 10-2 are shown in the appropriate locations based on the review of "as-builts" for the AFFF piping system. Figure 10-2 will be updated to include the sanitary sewer including manholes. The construction of the sewer pipe is not known and could be constructed of either concrete or cast iron. Based on the size of the piping, it is unlikely that it is constructed of clay tile. Should further definitive information become available it will be included in the *Draft-Final Remedial Investigation Work Plan/Tier II Sampling and Analysis Plan.*

Information detailing the cleanup performed for the AFFF spill is not available.

16. **Comment:** Page 10-4, Section 10-3 - For reasons previously discussed, the paragraph should be amended to reflect the fact that the "division" of the site into two parcels was a conceptualized in the December 2011, ESD as a means to facilitate Navy/LNR land-purchase discussions/negotiations in late-2011 (i.e., the designation of a "non-APD" area allowed for the inclusion of an additional 22-acres in the land purchase agreement).

    Response: The text in Section 10-3 will be revised to state:

    The division of Hangar 1 into two separate parcels was conceptualized as a means to facilitate land transfer discussions between the Navy, EPA, MassDEP, South Shore Tri-Town Development Corporation (SSTTDC) and their master developer. An Explanation of Significant Differences (ESD) with public comment signed by Navy and EPA was issued for Hangar 1 to address the presence of PFOS and PFOA in groundwater outside of the APD at concentrations exceeding the PHA. The ESD added an institutional control remedy and a deed restriction was placed on the property prohibiting the use of groundwater as a source of drinking water in a 22-acre area of Hangar 1 (outside the APD) as presented in Figure 10-1 (Tetra Tech 2011). This remedy was protective of human health and the environment and the 22-acre parcel was determined to be suitable to transfer. The portion of Hangar 1 area within the APD was not part of the ESD and will be the subject of a future decision document.

17. **Comment:** Page 10-6, Figure 10-3 - Please revise the figure to show updated groundwater flow based on April 2014, synoptic water level measurements.

    Response: Figure 10-3 will be updated to include approximate ground flow direction.

18. **Comment:** Page 10-7, Section 10-3 - Please include a discussion of groundwater flow as confirmed by synoptic water level measurements collected in April 2014.

    Response: The third paragraph of page 10-7 will be updated to state:

    As of April 2014, *the measured depths to groundwater at Hangar 1 range from approximately ~~3~~* ***7*** *to 13 feet bgs and groundwater flow ~~is to the south and southwest~~* ***has both a southeasterly and southwesterly component.***

19. **Comment:** Page 10-7, Section 10.4.2 - Please edit the text to confirm that the oil-water separator has also been removed.

    Response: The last two sentences of Section 10.4.2 will be updated to:

    It is possible some releases in the Hangar 1 area may have also been directed to the outside floor drains, which were connected to the storm water drainage system. The two ASTs were drained in January 1997. All drains and piping inside and outside the Hangar were removed prior to 2004 (Tetra Tech 2009). ***The oil water separator associated with the interior drains and sanitary sewer was removed in October 1998 (Foster Wheeler 1999).***

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20. **Comment:** Page 10-8, Section 10.4.3 - Please check the first sentence which contradicts the statement at the top of this page regarding the location of the maximum PFOS/PFOA concentrations detected in soil.

Response: Comment noted. The last sentence of the first paragraph on page 10-8 will be updated to state:

Prior investigations identified the highest PFOS/PFOA in soil just above the water table in the vicinity of the former ASTs ***and the former Crash Truck Garage****.*

21. **Comment:** Page 10-8, Section 10.4.3, ¶2- Please include a table documenting the reduction in the magnitude of PFOS and PFOA concentrations in the overburden aquifer at Hangar 1 because the cited reference does not provide that documentation. Please note that two sampling events are not sufficient to document a trend; therefore, the implications of the existing text are overstated and should be revised.

Response: Comment noted. The intent of this statement was to indicate that concentration have decreased between the initial investigation in 2010 and the April 2014 monitoring event. The intent was not to document a trend. This text will be removed from the *Draft-Final Remedial Investigation Work Plan/Tier II Sampling and Analysis Plan.* Tabulated data will be provided in the Draft Remedial Investigation Report.

22. **Comment:** Page 10-9, Section 10.4.5 - Several portions of this section may warrant revision based upon the outcome/resolution of previously-identified issues.

Response: Section 10.4.5 will be updated based on other comment responses, if appropriate.

23. **Comment:** Page 10-11, Section 10.4.5 - The document states that dermal contact with PFOS and PFOA in groundwater is not proposed due to lack of chemical-specific information. New information is available for PFOA, however, in Franko et al2014. Dermal Penetration Potential of Perfluorooctanoic Acid (PFOA) in Human and Mouse Skin. J. Toxicol. Environ. Health, Part A: Current Issues 75:1, 50-62. The kp at reasonable pH (about 5) is about 8.8E-05 cm/hr (Table 3). Please evaluate this paper and use it to calculate dermal risk of PFOA for groundwater exposure if appropriate. If not, please discuss why in the uncertainty section and whether dermal exposure could be significant. It is uncertain whether EPA would continue to maintain that this is "outside the effective domain" now that there are experimental measurements.

Response: A review of available literature related to the dermal absorption of PFOS and PFOA will be performed as part of the risk assessment to determine if the evaluation of the dermal contact pathway for PFCs is considered appropriate. If deemed appropriate, dermal contact pathways for PFOS and PFOA associated with groundwater exposure will be evaluated in the HHRA. If not deemed appropriate, the dermal pathways will not be quantitatively evaluated and a qualitative discussion will be provided in the uncertainty assessment.

24. **Comment:** Page 10-11, Section 10.4.5 - The discussion at the end of this section states that ecological receptors are not considered to contact groundwater under a current or future use scenario. Since groundwater containing PFOS and PFOA migrates toward surface water (French Stream, TACAN ditch), there should be an evaluation whether these PFCs can reach levels in the hyporheic zone of French Stream or TACAN ditch that are toxic to aquatic organisms. Work plan should include either modeling or piezometer sampling to rule out this potential risk to aquatic organisms.

Response: The Navy's responses to comments received on the draft Technical Memorandum, Perfluorinated Compounds in Surface Water and Sediment (Tetra Tech, 2011b) addressed concerns expressed by EPA on potential ecological impacts of the detected concentrations of PFCs in sediments and surface water in the East Branch of French Stream (Tetra Tech, 2012a). The responses noted that an ecological risk assessment (ERA) was conducted as part of the FFTA RI. The ERA concluded that based on site specific toxicity testing, potential exposure to chemical stressors in the wetland environments at the

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FFTA is not likely to result in significant potential risk to wetlands vertebrate and invertebrate wildlife receptors (Appendix A-3). In addition, the French Stream Ecological Risk Assessment Technical Memorandum concluded that while French Stream shows some degree of impairment, this impairment does not appear unique to the Base, does not appear to be directly related to unacceptable exposure to chemical stressors, and is generally similar in reaches upstream of the Base (ENSR, 2009). This demonstrates that chemicals present in surface water and sediment for operations at FFTA, including the use of AFFF in training exercises, do not pose a significant risk to ecological receptors.

25. Comment: Page 11-1. SAP Worksheet # 11 - The entire worksheet may need to be revised based upon outcome/resolution of several previously-discussed issues. Additional comments may be issued, if warranted, based on EPA/Navy/MassDEP discussions at the January 8, 2015, BCT meeting.

Response: Comment noted. Changes will be made as appropriate based on BCT discussions.

26. Comment: Page 11-2, Section 11.3. ¶1 - For clarity the areas subject to investigation should be more thoroughly described as the areas impacted by the historical spill of 5,000 to 10,000 gallons of AFFF including the surface area impacted by the spill, the soil beneath the former drain lines and the oil-water separator(s), and the soil surrounding the sanitary sewer in the vicinity of Hangar 1 as well as the soil and concrete in the vicinity of the Crash Truck Garage. Please also clarify whether any drains existed for the Crash Truck Garage. Navy needs to clarify in this document whether or not the parkway overlies the former Crash Truck Garage; however, the existence of the parkway does not necessarily establish that a source area is not present beneath the parkway due to the ionic nature of PFOS and PFOA which would have allowed them to penetrate into the subsurface with water. Navy needs to provide details to justify not sampling in a potential source area beneath the parkway.

Response: Comment noted. Section 11.3 is designed to identify data that are required to resolve the problems described in Section 11.1 and answer Principle Study Questions. The Navy is focusing this Remedial Investigation on determining the extent of PFOS and PFOA groundwater contamination at Hangar 1 and identifying any potential continuing sources. The Navy believes the most likely continuing source area would be in the vicinity of the former AFFF ASTs and the Crash Truck Garage. As stated in Decision Rule #3:

If soil and concrete leachate concentrations exceed PFOS and PFOA project screening levels, then the data will be further assessed to gauge the magnitude of ongoing source contributions to groundwater and the need for additional actions (which may include, but is not limited to an updated decision document, Land Use Controls, source removal, or remedial design)

The flexibility of this decision rule allows for the BCT to evaluate data and make the decision to return to the field to investigate potential sources, should it be deemed necessary. Should it be required, the area under the parkway can be investigated. It is the Navy's preference to investigate adjacent to the parkway (if necessary) before disturbing the newly constructed road. Based on proposed sample locations presented in figure 17-1, all samples should be able to be collected.

27. Comment: Page 11-2, Section 11.3, ¶3 - Inaccurate water levels may be obtained if the sampling event occurs following a significant precipitation event due to the extent of impermeable surface in the project vicinity which could cause mounding at the perimeter of the impermeable surfaces.

Response: The third bullet will be updated to state:

- *Groundwater Level Measurements: Synoptic water level measurements will be collected from existing and new site monitoring wells during this investigation to provide information regarding groundwater elevations and flow gradients within the overburden and bedrock aquifers.* ***Every effort will be made to measure synoptic water levels during a period of time without a significant rain event.*** *This data will be used to refine the CSM.*

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28. **Comment:** Page 11 -2, Section 11.3 - Project action levels should be 1/10 of the calculated RSL values for tapwater if such values are based on HQ =1. PALs are typically used for selection of contaminants of potential concern. The risk assessment should include any other chemical detected above RSLs set at cancer risk= 1E-06 or HQ =0.1.

Response: Consistent with the scope of the Remedial Investigation, the HHRA will evaluate concentrations of PFOS and PFOA detected in Site groundwater. No other chemicals are proposed for evaluation in the HHRA. As documented in the Record of Decision (ROD) for Hangar 1 (July 2010), the streamlined HHRA for Hangar 1 (conducted in 2009) identified two groundwater COPCs, chloroform and manganese. The HHRA further evaluated these COPCs and concluded there was no unacceptable risk to human health. Only one of these compounds, chloroform, shares a common target endpoint with PFOS and/or PFOA (liver). Therefore, a target HQ of 0.1 for calculation of PFOS and PFOA is considered highly conservative. However, screening levels for PFOS and PFOA will be calculated based on a target HQ of 0.1, as requested. Please note that a target HQ of 0.3 could be used to derive PFOS and PFOA screening levels and still be protective of a cumulative noncancer target HI of 1 for the Site. If the screening levels are exceeded, the site-specific information based on number of compounds acting on the same target organs and site-specific target HQ levels will be incorporated into the Tier II HHRA calculations.

29. **Comment:** Page 11-3, Section 11.4 - The site boundaries shall consist of the surface area impacted by the spill, the soil surrounding the former drain lines and the oil-water separator, and the soil surrounding the sanitary sewer in the vicinity of Hangar 1 as well as the soil and concrete in the vicinity of the Crash Truck Garage including any soil surrounding impacted drains or sewers. Please edit the text accordingly.

Response: Comment noted. The intent of Section 11.4 is to define the study area boundaries. The current language in Section 11.4 allows for a broad interpretation of the areal extent of the site that could potentially be impacted by PFOS and PFOA:

The study boundaries will consist of the area surrounding the former Hangar and the APD as shown on Figures 10-2 and 10-3.

As stated in response to comment 7, should results of SPLP analysis show that soil and/or concrete are leaching PFOS and PFOA at concentrations that are impacting groundwater quality, the need for additional sampling will be evaluated. Based on the results of previous soil investigations there are no risks associated with PFOS and PFOA in soil and that investigation is considered complete. The focus of this investigation is to determine the extent of groundwater contamination and to identify potential continuing sources.

30. **Comment:** Page 11-3, Section 11.5 - Please revise the "decision rules" to acknowledge that any decisions regarding future, next steps will be made by the Navy, in consultation with MassDEP and EPA, as required by CERCLA and in accordance with the November 1999, South Weymouth FFA.

Response: The following test has been added following the first sentence of Section 11.5:

Decisions regarding future, next steps will be made by the Navy, in consultation with MassDEP and EPA, as required by CERCLA and in accordance with the November 1999, South Weymouth Federal Facilities Agreement.

31. **Comment:** Page 11-3, Section 11.5 - Decision Rule #3 -Please edit the text to read: " ... exceed PFOS and/or PFOA project .... ".

Response: Change will be made as recommended.

32. **Comment:** Page 14-3, Section 14, ¶1 - Navy should propose supplemental soil sampling depth intervals other than just those at the water table to demonstrate with reasonable certainty that soil is not a continuing source of AFFF contamination.

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Response: This investigation has been scoped to focus on areas were the greatest concentrations PFOS and PFOA have been encountered. Based on previous investigations PFOS and PFOA are expected to be at the greatest concentrations just above the water table. Should additional investigation be warranted based on the results of the initial scoped locations, the BCT will determine if additional borings/sample intervals are required during an optional additional mobilization.

33. Comment: Page 14-5, Section 14, ¶4 - Please add a second sentence to this paragraph that reads: "To ground-truth the sample locations with Site features, GPS coordinates will also be collected from several definable Site features and used to establish sample locations relative to these features."

Response: This text will be added as requested.

34. Comment: Page 14-5, Section 14, ¶5 - Please add another paragraph to describe the management of soil waste that cannot be returned to the boreholes.

Response: Comment noted. The last paragraph on page 14-5 was been modified to state:

Investigation-derived waste, consisting of water generated during decontamination processes ***and soil waste that cannot be returned to the boreholes*** *will be collected in properly labeled 55-gallon drums, sampled for waste characterization, and temporarily staged in Building 41 for subsequent offsite disposal in accordance with SOP 3-05.*

35. Comment: Page 14-7, Section 14, Data Management and Review - Pursuant to paragraphs 14.3 and 31.1 of the November 1999, South Weymouth FFA, a summary of" quality-assured results" (of sampling and tests (and other data generated through implementation of the FFA)), must be provided to EPA prior to monthly BCT (i.e. Project Manager) meetings. The summary should include "all data received and not previously provided by the Navy during the reporting period (i.e., prior month). In addition, any "unvalidated" data included in the summary package should be included and identified as "draft".

Response: Comment noted.

36. Comment: Page 17-1, Worksheet #17 - For reasons previously stated, the scope of the proposed investigation is unacceptable and must be expanded to include the collection of samples from the entire former Hangar 1 property, including, but not limited to, the "non-APD" area. Specifically, soil borings/monitoring wells are needed downgradient (i.e., south-southeasterly direction) of monitoring well locations (former) MW05-308, 1-H1-MW-902, MW05-304, MW05-302, MW05-306, MW05-031, MW05-034, and MW09-006. While the newly proposed bedrock monitoring wells are needed to fill previously-identified data gaps, additional data is needed from areas between existing and proposed locations.

Response: In an effort to address concerns that PFOS and PFOA contamination is migrating in a southeasterly direction monitoring wells H1-MW-108 and H1-MW-108D will be re-located approximately 150 feet northeast.

As discussed previously, the *Draft Remedial Investigation Work Plan/Tier II Sampling and Analysis Plan* was designed to allow the flexibility of an optional second mobilization should the BCT find it necessary. Based on this flexibility, the Navy feels the scope of the Remedial Investigation is appropriate. The Remedial Investigation has been scoped to be “holistic”, encompassing sample locations both inside and outside of the APD.

As discussed in response to comment 3, monitoring wells have been proposed in locations that are thought to be sufficient to characterize the extent of PFOS and PFOA at Hangar 1. It is understood that if PFOS and PFOA contamination are identified in any of the boundary monitoring wells the determination of the extent of contamination will be considered incomplete and additional investigation will be warranted, as described in Decision Rule #1 of the Draft Remedial Investigation Work Plan/Tier II Sampling and Analysis Plan:

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If analytical results indicate that sufficient data was collected to characterize the extent of PFOS and PFOA in groundwater within the APD, then additional characterization data will not be collected and the Navy will prepare an RI report documenting investigation findings. If the extent of PFOS and PFOA in groundwater within the APD is not resolved, then further data will be collected during an additional optional mobilization.

Should definition of the extent of PFOS and PFOA contamination in groundwater be considered incomplete an additional mobilization will occur.
As stated previously, should results of analysis show that soil and/or concrete are leaching PFOS and PFOA at concentrations that are impacting groundwater quality, the need for additional sampling will be evaluated. Based on the results of previous soil investigations there are no risks associated with PFOS and PFOA in soil.

37. Comment: Page 17-1, Worksheet # 17, Groundwater Sampling - Please verify that 2014 synoptic water level results were used to update groundwater flow mapping and in the identification of proposed soils and groundwater sampling locations.

Response: Yes, 2014 synoptic water level results were used to update groundwater flow mapping and these groundwater flow were used in the scoping of proposed monitoring well locations. Soil and concrete borings were located based on previous PFOS and PFOA detections in an effort to identify location with the greatest potential for leaching to groundwater.

38. Comment: Page 17-1, Table 17-1 - How do the screen intervals for replacement wells, H1-MW-900, -901 and -902 compare to the previous MW-306, -307, and -308 wells? (Unfortunately, MW -900 and -901 appear to be located beyond the northern-most extent of previous PFC detections and as such, may not be truly representative of previous (PFC-confirmed) sample locations.

Response: Replacement wells, H1-MW-900, -901 and -902 are screened from 3 to 13 feet bgs. The destroyed wells MW05-306, MW05-307, and MW05-308 were screened from 5 to 15, 5 to 15, and 3 to 13 feet bgs, respectively.

39. Comment: Page 17-1, Table 17-1 - The Navy's proposed well screen intervals need to be presented in this work plan based on existing groundwater depth data, contaminant detections, and data gaps. As necessary, proposed intervals can be field adjusted to address unforeseen Site conditions. Please identify all proposed well screen intervals and provide the rationale for the intervals selected.

Response: Comment noted. Proposed, estimated screen intervals will be included in Table 17-1.

40. Comment: Page 17-2, Section 17, ¶3 - Navy should propose supplemental soil sampling depth intervals other than just those at the water table to demonstrate with reasonable certainty that soil is not a continuing source of AFFF contamination.

Response: See response to comment 32. Based on previous investigations PFOS and PFOA are expected to be at the greatest concentrations just above the water table. Should additional investigation be warranted based on the results of the initial scoped locations, additional borings can be advanced during an optional mobilization.

41. Comment: Page 17-3, Figure 17-1 - This figure by itself is inadequate to present the sampling locations. Figures presenting sampling locations relative to potential source areas, such as drains, impacted sewers, oil-water separator, sumps, and impacted surface areas are required to properly evaluate the proposed sampling plan. Please supplement this work plan with such figures.

Response: An additional figure (17-2) including the requested features (when known) will be included in the *Draft-Final Remedial Investigation Work Plan/Tier II Sampling and Analysis Plan.*

42. Comment: Page 17-3, Figure 17-1 - Based in the positioning of wells around the perimeter of the groundwater restriction boundary, it appears that a goal of the proposed remedial investigation is to

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evaluate the adequacy of the groundwater restriction boundary. Therefore, please edit this work plan to include that as one of the investigation's goals if that is the intent.

Response: The planned Remedial Investigation is designed to determine the extent of PFOS and PFOA in groundwater at Hangar 1 and to determine if there are any potential continuing sources in the vicinity of the former AFFF ASTs and former Crash Truck Garage. The investigation was not intended to evaluate the adequacy of the groundwater restriction boundary.

43. **Comment:** Page 17-3, Figure 17-1 - Monitoring wells H1-MW102 and H1-MW-102D should be relocated farther south closer to the potential source area to evaluate the groundwater there. If PFOS or PFOA are detected at concentrations exceeding the provisional health advisory values, supplemental step-out well locations can be established to better define the limits of contamination. Currently there are no wells immediately northwest of the potential source areas.

    Response: Figure 17-1 will be updated by moving H1-MW102 and H1-MW-102D approximately 100 feet south.

44. **Comment:** Page 17-3, Figure 17-1 - Monitoring wells H1-MW101 and H1-MW-101D should be moved to be adjacent to H1-SB103. If PFOS or PFOA are detected at H1-MW101, H1-MW-101D, H1-MW101, or H1-MW-101D at concentrations exceeding the provisional health advisory values, supplemental step-out well locations can be established to better define the limits of contamination.

    Response: Monitoring well H1-MW104 and H1-MW-104D will be moved adjacent to H1-SB103. Monitoring wells H1-MW101 and H1-MW-101D will be moved approximately 100 feet south. This movement along with the movement of H1-MW102 and H1-MW-102D has created a line of monitoring wells running east to west utilizing monitoring wells H1-MW101(D) through H1-MW105(D). As stated in previous responses, if required, an additional mobilization will be conducted.

45. **Comment:** Page 17-3, Figure 17-1 - Include a new bedrock well adjacent to MW05-303 and potentially at MW05-302. If PFOS or PFOA are detected at concentrations exceeding the provisional health advisory values at MW05-303 then supplemental step-out well locations, including near MW05-302, can be established to better define the limits of bedrock contamination.

    Response: A new bedrock monitoring well will be included adjacent to MW05-302 (MW05-302D). Movement of monitoring well H1-MW-104D to be adjacent to H1-SB103 will place a deep well approximately 75 to 100 feet from MW05-303. The Navy does not believe an additional well is required at this location.

46. **Comment:** Page 17-4, Table 17-2 - Collecting soil samples only at the top of the water table does not confirm that there is no source of leachable PFOS or PFOA in the soil. A more comprehensive soil sampling effort is warranted to better characterize the soil to identify potential sources of leachable PFOS and PFOA.

    Response: The Navy believes the most likely continuing source area would be in the vicinity of the former AFFF ASTs and the Crash Truck Garage at the soil/groundwater interface. As stated in Decision Rule #3:

    If soil and concrete leachate concentrations exceed PFOS and PFOA project screening levels, then the data will be further assessed to gauge the magnitude of ongoing source contributions to groundwater and the need for additional actions (which may include, but is not limited to an updated decision document, Land Use Controls, source removal, or remedial design)

    The flexibility of this decision rule allows for the BCT to evaluate data and return to the field to further investigate potential sources should it be necessary.

47. **Comment:** Page 21-1 - If the 0.1 -foot accuracy required by SOP 3-07 will not be attained please add a note to the comments column to indicate that SOP 3-07 will be modified for this project.

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Response: Worksheet #21 will be updated to state that sub-meter accuracy is required (as stated in Worksheet 14) rather than 0.1 feet.

48. Comment: Page 23-1, SAP Worksheet #23 - Please include as an attachment to this SAP, copies of the analytical SOPs listed on this worksheet.

Response: Unfortunately the analytical SOP for the analysis of PFOS and PFOA is a TestAmerica proprietary technique and is not distributed. Upon requesting this SOP from TestAmerica the following overview was provided:

Overview of Perfluorocarbon (PFC) Analysis by TestAmerica Denver Laboratory

- TAL Denver has developed an LC/MS/MS procedure that detects and quantifies perfluorooctanoic acid (PFOA, CAS# 335-67-1), ammonium perfluorooctanoate (APFO, CAS# 3825-26-1), and 14 additional PFCs.
- TAL Denver reports the compound as PFOA or APFO, per the client's instruction. The instrument cannot distinguish between the two compounds, as both dissociate and are detected as the same anion.
- TAL Denver holds multiple certifications for the determination of PFCs: DoD ELAP, Florida (NELAP), Oregon (Primary NELAP), Minnesota, New Jersey (NELAP), and Virginia (NELAP).
- The reporting limit for aqueous samples is (0.02-0.04)ug/L (all PFCs).
- The reporting limit for soil samples is (0.8-2.0)ug/kg (all PFCs).
- The extraction procedure for aqueous samples involves solid phase extraction (SPE).
- The extraction procedure for soils involves sonication and tumbling procedure.
- The LC/MS/MS is operated in the electrospray (ESI) negative ion mode.
- We use labeled analogs as isotope dilution compounds, to compensate for extraction inefficiency.
- We quantify by internal standard technique.
- Aqueous samples are collected in 250mL HDPE containers. Samples are shipped on ice and stored at 4 degrees C. Minimum sample volume is 250mL.
- Soil samples are collected in 250mL HDPE containers. Samples are shipped on ice and stored at 4 degrees C. Minimum sample amount is 10g.
- TAL Denver imposes an extraction holding time of 7 days from collection and an analytical holding time of 40 days for aqueous samples. There is no regulatory holding time.
- TAL Denver imposes an extraction holding time of 14 days from collection and an analytical holding time of 40 days for soil samples. There is no regulatory holding time.

Should the EPA have specific comments on this method the Navy will contact TestAmerica for clarification. The SPLP SOP is attached.

49. Comment: Appendix A, SOP 3-07. Page 3, Section 7.2 - The horizontal survey accuracy specified, 0.1 feet, is not consistent with the accuracy specified in the text. Please review and correct as appropriate.

Response: Worksheet #21 will be updated to state that sub-meter accuracy is required (as stated in Worksheet 14) rather than 0.1 feet.

50. Comment: Appendix A. SOP 3-07, Page 3, Section 8.1 - Please correct the third bullet: mean sea level is not the same as the lower low water level.

Response: The words "(Lower Low Water Level)" will be removed from SOP-3-07.

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JANUARY 28, 2015 RESPONSE TO MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION (MassDEP) COMMENTS DATED DECEMBER 5, 2014
FOR DRAFT REMEDIAL INVESTIGATION WORK PLAN/TIER II SAMPLING AND ANALYSIS PLAN; AQUIFER PROTECTION DISTRICT AT HANGAR 1 DATED NOVMEBER 2014
FORMER NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

Note that where the comment response provides revised text, original text is shown in italics, text additions are shown in bold italics, and deleted text is shown as strikethrough.

MassDEP COMMENTS:

1. **Comment:** Section 10.4.2 should also identify the AFFF distribution system as a potential source of AFFF (refer to Section 10.2), and the work plan should summarize prior work that confirmed it is not a source (e.g., soil sampling results and clean-out documentation) or include provisions to assess it as a potential source.

   Response: An additional sentence will be added to Section 10.4.2 that identifies the AFFF distribution system as a potential source of AFFF. Additionally, text will be included that will summarize both the AFFF tank removal and line cleanout A portion of this Remedial Investigation is to determine if soil and/or concrete in the areas with the highest PFOS and PFOA soil concentrations are acting as a continuing source. Section 10.4.2 has been modified to state:

   A spill of 5,000 to 10,000 gallons of AFFF occurred on 21 October 1987, inside Hangar 1. The spill was contained in the oil-water separator, which flows to the sanitary sewer. This spill was managed in accordance with the Spill Prevention, Control, and Countermeasure Plan. Several inadvertent releases of AFFF from the two AFFF ASTs in the North Lean-To were also reported. Inadvertent releases were reported from the fire hose nozzles and piping from the ASTs and pump room. It is possible some releases in the Hangar 1 area may have also been directed to the outside floor drains, which were connected to the storm water drainage system. ***Additional inadvertent releases may have occurred from the AFFF distribution system that connected the two ASTs and the fire suppression system within Hangar 1.*** *The two ASTs* ***and associated floor drain systems*** *were drained* ***and cleaned*** *in January 1997.* ***Oil-water separators on the east and west end of Hangar one were decommissioned at the same time (Foster 1999).*** *All drains and piping inside and outside the Hangar were removed prior to 2004 (Tetra Tech 2009). Prior investigations identified the highest PFOS/PFOA in soil just above the water table in the vicinity of the former ASTs.* ***Although these concentrations were measured below Navy and Marine Corps Public Health Center calculated screening levels, additional data is need to determine if soil and concrete in this area is acting as a continuing source of PFOS and PFOA.***

2. **Comment:** Section 10.4.2: The sentence indicating that the highest PFOS/PFOA concentrations in soil were reported in samples collected in the vicinity of the former ASTs is inconsistent with statements in the first paragraph of Section 10.4.3. Please confirm or correct as appropriate.

   Response: The last sentence of the first paragraph will be updated to state:

   Prior investigations identified the highest PFOS/PFOA in soil just above the water table in the vicinity of the former ASTs ***and the former Crash Truck Garage****.*

3. **Comment:** Section 10.4.4: Please add detail to describe the transport pathway(s) by which PFCs could accumulate in concrete foundations creating a continuing source of PFCs contamination (e.g., sorption from groundwater and/or penetration of concrete floors).

   Response: The first paragraph of section 10.4.4 will be updated as follows:

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PFOS and PFOA are highly soluble with a high affinity for aqueous transport; in general unlikely to volatilize, and do not readily sorb to soil (Agency for Toxic Substances and Disease Registry 2012). However, residual PFOS and PFOA may ~~leach from~~ ***be present in*** *soil and abandoned infrastructure (concrete foundations)* ***at concentrations that can act as a continuing source*** *to groundwater.* ***As rain moves through these solid matrices PFCs (in particular PFOS) can leach at concentrations above U.S. EPA provisional health advisory (PHA) screening levels for groundwater. The level of residual impacts can vary depending on the concentrations present in the solid matrix, the duration of release, and the age of release.***

4. **Comment:** Section 10.4.5: The work plan should explain why exposure to PFCs in soil will not be evaluated in the risk assessment, or soil exposure should be evaluated in the risk assessment.

   Response: Additional language will be added to the end of Section 10.4.5 that states:

   During the Phase II Environmental Baseline Survey (Tetra Tech, August, 2012), PFCs in soil were not detected above the site specific screening values for soil calculated by the Navy and Marine Corps Public Health Center, as approved by EPA and MassDEP. Soil at Hangar 1 requires no further action and will not be evaluated during this Remedial Investigation

5. **Comment:** Section 11.3: To confirm that the soil samples used to assess leaching are collected from potential source zones, the soil samples and leachate extracted from each of the soil samples should be analyzed for PFOS and PFOA.

   Response: The work plan will be amended to include analysis of soil for PFOS and PFOA.

6. **Comment:** Worksheet #15: The work plan should explain why the more stringent USEPA Provisional Health Advisory (PHA) values for PFOS and PFOA were not selected as PALs for residential exposure. In addition, for review purposes, the work plan should include the calculations used to determine the proposed PALs (e.g., an appendix with input- and output-screen images).

   Response: The work plan will be revised to include the PHAs in the selection of PALs, in addition to the risk-based screening levels protective of a residential drinking water pathway and soil to groundwater leaching pathway (both calculated using the USEPA RSL Calculator based on default USEPA exposure assumptions for a residential scenario and a target HQ of 0.1). The input and output pages associated with use of the USEPA RSL calculator to derive the risk-based screening levels will be presented in Appendix C of the Draft-Final RI work. Use of the RSLs for comparison with site data to identify whether further evaluation of potential risk is necessary is consistent with USEPA Risk Assessment Guidance. The RSLs (and the proposed values calculated using the RSL calculator) are based on USEPA default exposure assumptions for a residential exposure scenario. The PHAs for PFOS and PFOA are not consistent with USEPA defaults for a residential exposure scenario, and are therefore not considered for use in the proposed HHRA.

7. **Comment:** Figure 17-1: As suggested by the proposed locations of well pairs MW-103/MW-103D, MW05-033/MW-110D, MW-107/MW-107D, and MW-108/MW-108D, MassDEP recommends relocating MW-106/MW-106D east-northeastward to the immediate vicinity of the groundwater restriction boundary for potential long-term monitoring purposes.

   Response: This change will be made as requested. A revised figure will be included in the Draft-Final RI Work Plan.

8. **Comment:** Figure 17-1: To assess and potentially reduce the downgradient extent of PFCs delineated in bedrock, MassDEP recommends that a bedrock well be installed adjacent to existing overburden well MW05-302, which appears to be located near the core of the PFCs plume.

   Response: This change will be made as requested. A revised figure will be included in the Draft-Final RI Work Plan.

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9. **Comment:** Figure 17-1: Available data indicate that PFCs contamination is not likely to extend as far north as the proposed location of well pair MW-102/MW-102D. To assess this possibility and potentially reduce the northern extent of PFCs contamination, MassDEP recommends that well pair MW-102/MW-102D be relocated southeastward to the southwest corner of the Cummings Road-Shea Drive intersection.

   Response: This change will be made as requested. A revised figure will be included in the Draft-Final RI Work Plan.

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