UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

September 21, 2018

Derek J. Robinson, BRAC Environmental Coordinator
Department of the Navy
Base Realignment and Closure Program Management Office West
33000 Nixie Way, Building 50
San Diego, CA 92147

Re: EPA Comments on the Draft Fourth Five-Year Review, Hunters Point Naval Shipyard, San Francisco, California, Dated July 9, 2018

Dear Mr. Robinson:

Attached are EPA's comments on Draft Fourth Five-Year Review, Hunters Point Naval Shipyard, San Francisco, California, dated July 9, 2018.

If you have any questions, please do not hesitate to call me at (415) 947-4187 or e-mail me at lee.lily@epa.gov.

Sincerely,

Lily Lee
Remedial Project Manager

cc:
Nina Bacey, DTSC (via email)
Tina Low, RWQCB (via email)
David Tanouye, RWQCB (via email)
Amy Brownell, SFDPH (via email)
Stephen Banister, US Navy (via email)
Danielle Janda, US Navy (via email)

Review of the Draft Fourth Five-Year Review, Hunters Point Naval Shipyard, San Francisco, California, dated July 2018
EPA Comments dated September, 2018

GENERAL COMMENTS

1. The Draft Fourth Five-Year Review, Hunters Point Naval Shipyard, San Francisco, California, July 2018 (the FYR) does not adequately discuss the Tetra Tech EC Inc. potential contractor manipulation and/or falsification of radiological data at Hunters Point, and its effect on the protectiveness of the radiological remedies. Some of the fraudulent activity has been confirmed through enforcement actions. The interviews in Appendix B of agencies and 17 community residents show that this issue dominates regulator and public concerns. They show this issue has significantly undermined trust in the Navy, and stakeholders are frustrated by the Navy delays and want more communication and transparency. This document should address the issue up front beginning with the Executive Summary and throughout the entire document wherever relevant. Below are examples:

a. Executive Summary: This section should briefly explain the events of the last five years, the current status, and the future plans. Later sections of this document can refer to this explanation. Please include the Navy's commitment that no further transfers of property will occur until the Navy: (1) retests all locations where Tetra Tech EC Inc. performed previous suspect radiological work, and (2) conducts any necessary cleanup to protect public health and meet ROD requirements.

b. Section 1, Introduction: This section should expand on the Executive Summary discussion of the radiological re-evaluation to give more details. Later sections of this document can refer to this explanation.

c. Section 3.1, Basis for Taking Action: This section does not include any discussion or analysis of radiological contamination at all. Please add an explanation for the basis for taking action about radiological contamination, including the history of radiological activities on the site, the fraudulent activity confirmed by enforcement actions, the Tetra Tech EC Inc. Internal Investigation resampling that found five locations needing additional remediation, allegations by former workers, and the radiological data evaluation done by the Navy and regulatory agencies.

d. Section 3.2 Response Actions: This section should include the recent actions taken to address community concerns about health impacts (e.g. review of water, air, and perimeter scan monitoring data and the rework that Tetra Tech EC Inc. did in its Internal Investigation). Please note in the text of this section that all prior Tetra Tech EC Inc. radiological data has been called into question and the Navy has stated openly that they can no longer rely on it. Therefore, these data cannot support any conclusions about protectiveness or completeness of the

remedy, and we will not have any conclusions on long-term protectiveness or completeness until new data is taken and any required remediation is performed.

e. Section 4, Progress Since Last Review: Please summarize the findings related to Tetra Tech EC Inc. prior work. To the extent this topic duplicates information already provided in earlier sections, the text can make referrals to those earlier sections.

f. According to the last paragraph of Section 5.2, "The Navy has completed an extensive review of the radiological remediation documents and data…and has identified the areas where resurveying for radionuclides is required to address all issues discovered;" however, the FYR does not identify the areas that require resurveying. The recommendation in Section 7.0 does indicate that Parcels B-1, B-2, C, D-2, G, E, UC-1, UC-2, and UC-3 are affected, but the text does not discuss the extent of rework that will be necessary.

g. It is unclear how the radiological data issue has impacted the protectiveness determinations for each parcel, because the protectiveness determinations included in the subsections of Section 8.0 are not consistent with the guidelines outlined in the EPA document *Clarifying the Use of Protectiveness Determinations for Comprehensive Environmental Response, Compensation, and Liability Act Five Year Reviews*, OSWER 9200.2-111 (the Protectiveness Guidance), dated September 2012. Please revise the FYR to clarify the extent of radiological rework and the impact of the radiological data issue on protectiveness. EPA will be happy to meet with you to review the factors impacting the protectiveness determinations at each parcel to ensure that the proper protectiveness determinations are made for each parcel in the final FYR.

2. Section 6.2.2, Changes in Toxicity and Other Contaminant Characteristics: EPA Guidance calls for evaluation of the significance of changes in toxicity values and other contaminant characteristics when conducting a Five-Year Review.[1] The EPA's Preliminary Remediation Goal (PRG) Calculators for soil, the Building PRG Calculator for buildings, and the Surface PRG Calculator for surfaces, "which are used to develop risk-based PRGs for radionuclides, are recommended by EPA for Superfund remedial radiation risk assessments."[2] Here is a link to lists, by date, of the changes in these calculators over the past 5 years: https://epa-prgs.ornl.gov/radionuclides/whatsnew.html. EPA has previously commented that this fourth FYR should include updated risk evaluations for existing remediation goals (RGs) using the current versions of the EPA's PRG Calculators, but this is not

[1] Appendix G, in particular the flowchart Exhibit G-4, "Evaluating Changes in Toxicity and Other Contaminant Characteristics," which shows the process you should use to evaluate the significance of changes in toxicity values and other contaminant characteristics when conducting a five-year review. Appendix G, Exhibit G-5, "Hypothetical Scenario for a Change in Toxicity," and Exhibit G-6, "Decision Process for a Hypothetical Change in Toxicity," provide an example of the evaluation process when there are changes in toxicity and other characteristics. *Comprehensive Five Year Review Guidance*, OSWER No. 9355.7-038-P, June, 2001, https://semspub.epa.gov/work/HQ/128607.pdf

[2] "Radiation Risk Assessment at CERCLA Sites," OSWER Directive 9200.4-40, EPA 540-R-012-13, June 2014, Q1, p. 17.

addressed in the FYR. For example, risk should be calculated for soil, buildings, piers, and bollards. Please revise the FYR to include the results of updated risk evaluations for existing RGs using the current versions of the EPA's PRG calculators to ensure that existing RGs remain protective. In performing the new evaluation please also keep in mind the following:

a. Excerpts from EPA Guidance:
    i. "cleanup levels not based on an ARAR should be based on the carcinogenic risk range (generally 10^-4 to 10^-6, with 10^-6 as the point of departure and 1 x 10^-6 used for PRGs." [3]
    ii. "Consistent with existing Agency guidance for the CERCLA remedial program, . . . EPA generally uses 1 x 10^-4 in making risk management decisions."[4]

b. For EPA to sign a Finding of Suitability to Transfer (FOST) for any parcel, the record must also show that the remedy is consistent with the NCP. Please note that if this review shows that the estimate risk is close to 1 X 10^-4, EPA recommends not setting a Remedial Goal too close to this upper bound 10^-4. First, this increases the potential for the combined risk from multiple contaminants of concern found at a single location to exceed the National Contingency Plan (NCP) risk range of 10^-6 to 10^-4. Adding risks from multiple radionuclides of concern found at the same location, even if individual radionuclide concentrations do not exceed the individual thresholds of concern, is consistent with the Unity Rule in the MultiAgency Radiation Survey and Site Investigation Manual (MARSSIM).[5] Second, in general, EPA estimates of risk at a given radionuclide concentration have increased over time. It would be prudent to allow room to accommodate these likely future increases.

c. Buildings PRG Calculator Users Guide:[6]

    i. Hard Surfaces Only - The risk assessment model for dust includes the receptor spending time on hard and soft surfaces. During a September 5, 2018, conference call, the Navy suggested that EPA consider only hard surfaces during the calculation of risk. For the calculation, the Navy suggested that EPA add the time that the receptor would have spent on soft surfaces to the time the receptor spends on hard surfaces. This would give a total time of 16 hours on hard surfaces for child and 16 hours on hard surfaces for adult. Upon researching the current state of the buildings as well as the condition of the areas where radioactive material was used

[3] Id., Q33, p. 27, and OSWER Directive 9200.4-18 (U.S. EPA 1997a).
[4] Id., Q34, p. 27.
[5] "**unity rule (mixture rule):** A rule applied when more than one radionuclide is present at a concentration that is distinguishable from background and where a single concentration comparison does not apply. In this case, the mixture of radionuclides is compared against default concentrations by applying the unity rule. This is accomplished by determining: 1) the ratio between the concentration of each radionuclide in the mixture, and 2) the concentration for that radionuclide in an appropriate listing of default values. The sum of the ratios for all radionuclides in the mixture should not exceed 1." Source: http://www.marssim.com/MARSSIM_Definitions.htm
[6] https://epa-bprg.ornl.gov/bprg_users_guide.html

and stored, EPA agreed that only hard surfaces should be considered. In addition, the transfer factor of hard surface (i.e. 0.5) is much greater than the soft surface (i.e. 0.1). This suggests that a receptor is more likely to transfer contamination onto his/her skin from hard surface than a soft surface such as carpet. If the assumption is that all areas within the building is a hard surface and more time is spent on hard surfaces, the risk will increase, creating a more conservative model.

ii. Changing K to 0.38: The BPRG allows the user to add a dissipation rate to the model. The dissipation rate is described in the User's Guide as follows: "In some circumstances, the load of dust on a contaminated surface, to which receptors are exposed, may decline over time. Dissipation of dust may result from cleaning, and transfer to skin and clothing. Different surfaces may be cleaned at different rates and any dissipation rate used should consider a representative cleaning frequency." Currently, the dissipation rate default for the BPRG calculator is set to 0 yr^{-1}. This assumes that a contaminant reservoir is present. By assuming a non-zero for the dissipation rate, the model suggests that various consistent mechanisms will occur to dissipate the contaminant year after year. Mechanisms for example could include a combination of cleaning, resuspension and dilution with uncontaminated dust. Not having a dissipation factor also ensures that if by chance contamination does get back into the home that recontamination is accounted within the model. The User's Guide also warns users about adding a dissipation rate: "WARNING: Using a dissipation rate constant or changing the value of t should only be done once a complete understanding of the mathematics involved in deriving the equation is gained and the site conditions have been fully investigated." The Navy's dissipation rate suggested was 0.38 yr^{-1} , which comes from a study of the Binghamton State Office Building contaminated with dioxin. If a non-zero dissipation factor is applied to the model, the dissipation rate must be calculated using data from the Hunters Point Naval Shipyard (HPNS). Outside data and studies cannot be applied to HPNS.

iii. Reducing transfer factors: The fraction transferred from surface to skin used in the BPRG default are 0.5 for hard surfaces and 0.1 for soft surfaces. Since only hard surfaces are being considered, the Navy suggested that the transfer factor for hard surfaces of 0.5 be reduced to 0.2 since "20% removable" is what has been assumed at Hunters Point, and is a national standard as published by EPA ORIA. With extensive research conducted for hard surfaces at the World Trade Center, EPA cannot deviate from the default of 0.5 for hard surfaces. If further studies and/or tests have been conducted at HPNS regarding the percent of removable contamination, EPA may adopt those fractions.

d. Radon gas in a building can accumulate without implementation of radon reduction approaches. EPA's Office of Air and Radiation wrote, "Some natural

ventilation occurs in all homes. . . . However, once windows, doors and vents are closed, radon concentrations most often return to previous values within about 12 hours. Natural ventilation in any type of home should normally be regarded as only a temporary radon reduction approach because of the following disadvantages: loss of conditioned air and related discomfort; greatly increased costs of conditioning additional outside air; and security concerns."[7]

3. EPA has previously requested that a re-evaluation of the volatile organic compounds areas requiring institutional controls (VOC ARICs) boundaries at HPNS be conducted as a part of the fourth FYR due to changes in soil gas toxicity criteria and the appropriateness of the attenuation factor used in the Johnson and Ettinger model (JEM) to calculate the Soil Gas Action Levels (SGALs) for the Record of Decision. EPA further requested that an attenuation factor of 0.03 be used in the JEM model in the re-evaluation. Although the FYR acknowledges this as an issue, the re-evaluation is not included in the FYR. Please revise the FYR to include a re-evaluation of VOC ARICs boundaries using 0.03 as the attenuation factor in the JEM.

4. Section 6.2.2, Changes in Toxicity and Other Contaminant Characteristics: The Records of Decision (RODs) or Explanations of Significant Differences (ESDs) for some parcels define Tier 1 and/or Tier 2 soil action levels for chemicals for specific circumstances. For example, the Parcel E ROD, the Parcel C ESD, and the Parcel G ESD define Tier 1 and/or Tier 2 action levels that are five times or ten times the Remedial Goals (RGs). The RGs were based on the chemical specific risk-based concentration (RBC), laboratory practical quantitation limit (PQAL), or the Hunters Point ambient level (HPAL). While it does not make sense for the RGs and action levels to be lower than the HPAL or PQAL, if Tier 1 or Tier 2 levels end up mathematically exceeding five times or ten times the RBCs in the new review, this is a situation that warrants further discussion. For example, based on Table 15, the risk from arsenic at the Residential RG (HPAL) is 1.63 x 10-5. Any arsenic concentrations of 68 mg/kg or higher in soil would exceed a risk of 10-4 for residential reuse. Where RGs were based on a PQAL or HPAL, and not an RBC, the FYR should evaluate the Tier 1 and Tier 2 levels to see if they exceed five times or ten times the RBC. If so, then please put this issue on the agenda for a monthly meeting of the Base Closure Team for discussion with regulatory agencies.

5. The FYR does not include an Institutional Controls Summary Table in Section 3, Response Action Summary, as indicated by the EPA 2016 Five Year Review Recommended Template, OLEM 9200.0.89 (EPA 2016 FYR Template). Please revise Section 3 to include an Institutional Controls Summary Table.

6. There are numerous inconsistencies in the FYR. For example, in Section 6.3 Question C, the FYR only identified atmospheric warming as a potential issue that may call into question the protectiveness of the remedy. However, in Section 7, Issues, Recommendation, and Other Findings, radiological rework is also identified as an issue that may call into question the protectiveness of the remedy. Please review the FYR for consistency and revise accordingly.

[7] 2016 Consumers Guide to Radon Reduction, EPA 402/K-10/005, 2016, https://www.epa.gov/sites/production/files/2016-12/documents/2016_consumers_guide_to_radon_reduction.pdf

7. The FYR indicates that Parcel A is not included in the FYR because the parcel required no action under CERCLA. Although Parcel A was clean-transferred to the City and County of San Francisco, CDPH is conducting additional radiological surveys at Parcel A to address community concerns. To date, at least one radiological anomaly associated with Navy activity, a deck marker, has been identified and removed from Parcel A. Please revise the FYR to acknowledge community concerns, the cause of the community's concerns, the ongoing investigation by CDPH, and the potential for the Navy to conduct additional actions at Parcel A if CERCLA related issues are identified as a part of the CDPH investigation.

8. One removal action, the 1988 Basewide Removal of PCB [polychlorinated biphenyls]-Containing Transformers is only included in Table 10 for Parcel E; however, this action should also be included in the pre-Record of Decision (ROD) action tables for Parcels B, C, and D (Tables 2, 4, and 7). Please revise the pre-ROD action tables for Parcels B, C, and D to include the 1988 Basewide Removal of PCB-Containing Transformers.

9. The FYR does not address some of the concerns expressed during the interview process. For example, one of the Regulatory Agency Interview Records in Appendix B1 asks the Navy to "address in the Five-Year Review the steps the Navy has already taken and will take in the future to improve contractor oversight." Similarly, the Community Member Survey Records in Appendix B2 ask for feedback regarding how the Navy can communicate better with the local community, but the FYR does not include any recommendations to improve communication with the community. Please ensure the requests and concerns identified during the interview process are addressed in the main text of the FYR.

10. Section 8.0 does not include protectiveness determinations for Parcel E or Parcel E-2. While it is understood that the remedies are not complete for Parcels E and E-2, the Protectiveness Guidance includes information to assist in determining protectiveness if the remedies are not yet complete. Please revise Section 8.0 to include protectiveness determinations for Parcel E and Parcel E-2.

11. There are several uncertainties related to the observations made during the site inspections. These include, but are not limited to the following:

a. Section 5.3 states that minor holes were observed at Installation Restoration Site (IR)-07/18, but these holes did not impact the effectiveness of the soil cover; however, it is unclear whether these holes will continue to be monitored in the future to ensure they do not expand (i.e. it is unclear whether the operations and maintenance contractor is aware of the holes). In addition, the FYR does not include a figure depicting the location(s) of the holes.

b. According to Section 5.3, there was "minor damage caused by weed growth at seams in the asphalt cover" at Parcel B-1, as well as at Parcels C and G; however, it is unclear whether weed control will be implemented to prevent additional

damage to the seams. In addition, the FYR does not include a figure depicting the location(s) of the weed concerns at Parcels B-1, C and G.

c. The second to last paragraph of Section 5.3 states that "The newly installed asphalt cover in Parcel UC-3 was observed to be in good condition, with only minor damage caused by frequent traffic on the roadway surface;" however, it is unclear why evidence of damage was observed and whether there are any actions that could be taken to minimize damage to the asphalt cap. In addition, it is unclear why there is already damage to a newly installed asphalt cover, which could lead to concerns regarding the longevity of the asphalt cover at Parcel UC-3. Lastly, the FYR does not include a figure depicting the location(s) of asphalt damage at Parcel UC-3.

d. According to the last paragraph of Section 5.3, "Monitoring well surface completions observed during the site inspections were found to be in good condition," but the text does not indicate whether locks were present and secure on the well heads and if all wells were marked/labeled. In addition, there is no summary of the condition of the Soil Vapor Extraction (SVE) systems and associated extraction wells present at Parcel C.

Please revise the FYR to provide additional information regarding the observations made during the site inspections.

12. None of the parcel-specific figures depict the past or current groundwater plume extents. This information is required to demonstrate remedy progress. Depiction of plume extents is important for evaluation of Question A, which evaluates remedy performance (i.e., the text should not just discuss what actions were taken, but whether these remedy actions have been effective). Please revise the FYR to include figures depicting the past and current groundwater plume extents and include an evaluation of progress in addressing groundwater plumes in the text discussing Question A.

13. Some of the remedy components discussed in the text of the FYR are not depicted on the parcel-specific figures. Examples include, but are not limited to the following:

a. Figure 6 does not depict the location(s) of the in-situ groundwater treatment areas or the soil hot spot removals at Parcel C.
b. Figure 7 does not depict the location(s) of the in-situ groundwater treatment or the soil hot spot removals for Parcel D-1.
c. Figures 8 and 9 depict remedy components for Parcels E and E-2, respectively, but these figures should distinguish between remedy components that have been implemented and remedy components that are still in progress since many remedy components have yet to be implemented. In addition, the title of Figure 9 references Parcel E, but should reference Parcel E-2.
d. Figure 10 does not depict the location(s) of the in-situ groundwater treatment areas or the soil hot spot removals at Parcel G.

Please revise the parcel-specific figures to depict all the applicable remedy components for each parcel. Alternatively, if the parcel-specific figures will become too cluttered, please add additional figures to depict applicable remedy.

SPECIFIC COMMENTS

1. **Section 1.0, Introduction, Page 1-1:** Section 1.0 states that "This fourth five-year review was conducted for all parcels at HPNS (except Parcel A);" however, Parcel F is also not evaluated on this FYR because the ROD has not been completed. In addition, Section 1.0 does not identify who conducted the review and when it was conducted. Please revise Section 1.0 to clarify that Parcel F is also not evaluated in the FYR. Please also revise Section 1.0 to identify who conducted the review and when it was conducted.

2. **Section 3.2.4, Pre-ROD Activities and Remedy Selection at Parcel E (Parcels E, E-2, and UC-3), Page 3-5:** The description of the Parcel E-2 ROD requirements in Section 3.2.4 is too generic. This parcel differs from the others because it contains a landfill. While it is understood that the specific components are included in Table 12, Section 3.2.4 should better describe requirements to address the Parcel E-2 landfill, including wetland mitigation. Please revise Section 3.2.4 to better describe requirements for addressing the Parcel E-2 landfill, including wetland mitigation.

3. **Section 3.3.1.2, LTM and Maintenance Activities, Page 3-9:** According to the first paragraph on page 3-9, "The annual inspection event was conducted in April 2016 during the fifth year of LTM [long-term monitoring] and maintenance, but was not formally documented;" however, the text does not explain why there was no formal documentation of the 2016 annual inspection event. In addition, future annual inspections need to be formally documented to support the future FYRs. Please revise Section 3.3.1.2 to explain why there was no formal documentation of the 2016 annual inspection event. Please also ensure future annual inspections are formally documented.

4. **Section 3.3.1.2, LTM and Maintenance Activities, Page 3-10:** Further information should be provided about the exceedance of the lead RG in groundwater. The Groundwater Monitoring discussion states that "lead concentrations exceeded the RG of 14.44 micrograms per liter (µg/L) during one sampling event (September 2017)" and that this result "is the first time lead concentrations have exceeded the RG in the past 10 years." However, the text does not discuss the potential cause of the increased lead concentrations or indicate whether any additional investigation or action is needed. Please revise the text to discuss the potential cause(s) of the increased lead concentrations and to indicate whether any additional investigation or action is needed regarding lead in groundwater.

5. **Section 3.3.2.1, RA Activities and Implementation of ICs, Page 3-11:** Section 3.3.3.1 states that injections were performed in 2013 and that "post-injection groundwater monitoring is ongoing," but does not indicate how frequently post-injection monitoring is conducted, for how long post-injection monitoring will continue, or the outcome of the

monitoring (i.e., whether injections were successful at reducing concentrations, if additional injections are needed due to concentration rebound, or if insufficient information is available). More than five years have passed since injections were performed, so the FYR should discuss whether injections have been successful. Please revise Section 3.3.2.1 to indicate how frequently post-injection monitoring is conducted, how long post-injection monitoring will continue, and to summarize the outcome of the post-injection monitoring.

6. **Section 3.3.2.1, RA Activities and Implementation of ICs, Page 3-12 and Section 8.3, Parcel B-2, Pages 8-1 and 8-2:** According to Section 3.3.2.1, in-situ treatment of mercury using a stabilizing agent is currently underway at Parcel B-2 to minimize migration of mercury in groundwater to the bay; however, given that the actions to address mercury are still in progress and mercury is still present above trigger levels, it is unclear how protectiveness is impacted. Section 8.3 includes multiple statements regarding protectiveness at Parcel B-2, including:

   - "The remedies completed to date for Parcel B-2 are protective of human health and the environment;" and
   - Stabilization of mercury in soil "will be protective of the environment."

   A single protectiveness determination should be provided for each applicable medium at Parcel B-2 and the protectiveness statement should be consistent with the guidelines outlined in the Protectiveness Guidance. Please revise the protectiveness statement for Parcel B-2 in Section 8.3 to include a single protectiveness determination and to be consistent with the guidelines outlined in the Protectiveness Guidance.

7. **Section 3.3.2.2, LTM and Maintenance Activities, Page 3-13:** Section 3.3.2.2 does not discuss the damage to the Parcel B-1 durable cover due to a major water line leak. Please revise Section 3.3.2.2 to discuss the water line leak and the resulting damage to the durable cover.

8. **Section 3.3.2.2, LTM and Maintenance Activities, Page 3-14:** The Groundwater Monitoring discussion of Section 3.3.2.2 states an investigation for per- and polyfluoroalkyl substances (PFAS) was conducted at IR-10 "as a result of historical uses," but does not summarize the historical uses for this site. In addition, it is unclear whether there are any other sites at Hunters Point that require investigation for PFAS. Please revise Section 3.3.2.2 to summarize the historical uses for IR-10 related to PFAS. Please also revise the FYR to indicate whether there are any other sites at Hunters Point that require investigation for PFAS.

9. **Section 3.3.3.1, RA Activities and Implementation of ICs, Pages 3-15 and 3-17 and Figure 6, Overview of Remedy Components for Parcel C:** The text at the bottom of page 3-15 states that "Construction and operation of five SVE systems within Remedial Unit (RU)-C1, RU-C2, RU-C4, and RU-C5 began in 2013," but Figure 6 shows eight SVE areas within these RUs and does not identify which areas currently have SVE systems (e.g., Areas 2, 4, and 5 do not have SVE systems yet per the text). In addition, Section 3.3.3.1 states that "System operation has not yet been performed at Areas 2, 4,

and 5," but does not estimate when SVE will be conducted at these areas. Please revise Figure 6 to distinguish between areas with SVE and areas that have not yet had SVE operations implemented. Please also revise Section 3.3.3.1 to indicate when SVE operations are planned for Areas 2, 4, and 5.

10. **Section 3.3.3.1, RA Activities and Implementation of ICs, Page 3-17:** Section 3.3.3.1 states that several injections occurred between 2014 and 2017 and that "Post-injection groundwater monitoring is currently being performed under the BGMP [Basewide Groundwater Monitoring Program];" however, the text does not indicate how frequently post-injection monitoring is conducted, how long post-injection monitoring will be required, or when sufficient data will be available to determine the outcome of the injections (i.e., to evaluate whether injections were successful at reducing concentrations or if additional injections are needed due to concentration rebound). Please revise Section 3.3.2.1 to indicate how frequently post-injection monitoring is conducted, how long post-injection monitoring will continue, and when sufficient data will be available to determine the outcome of the injections.

11. **Section 3.3.3.1, RA Activities and Implementation of ICs, Page 3-18:** Section 3.3.3.1 should discuss the radiological remediation of Buildings 211 and 253 that will be conducted in the future. While it is understood that the work is still in the planning stages, the text should outline the remediation that will be conducted. Please revise Section 3.3.3.1 to discuss the radiological remediation of Buildings 211 and 253 that will be conducted.

12. **Section 3.3.4.1, RA Activities and Implementation of ICs, Page 3-19 and Section 6.1.2, Durable Covers, Page 6-3:** Section 3.3.4.1 includes construction of durable covers; however, durable covers at Parcel D-1 are not discussed in Section 6.1.2. Please revise Section 6.1.2 to discuss durable covers at Parcel D-1.

13. **Section 3.3.7.2, LTM and Maintenance Activities, Page 3-29:** The Landfill Cap Inspection and Maintenance discussion does not discuss the removal of the interim landfill cap. This cap was removed so that the final cap can be constructed. This is important because once the interim cap was removed, previous inspection and monitoring activities no longer apply. Please revise Section 3.3.7.2 to discuss the removal of the interim landfill cap.

14. **Section 3.3.9.1, RA Activities and Implementation of ICs, Page 3-31 and Section 6.1.4, In-Situ Groundwater Treatment, Page 6-5:** Section 3.3.9.1 includes treatment of volatile organic compounds (VOCs) in groundwater at the IR-71 plume using in-situ bioremediation (ISB) or zero-valent iron (ZVI); however, in-situ groundwater treatment at Parcel G is not discussed in Section 6.1.4. Please revise Section 6.1.4 to discuss in-situ groundwater treatment at Parcel G.

15. **Section 3.3.10.2, LTM and Maintenance Activities, Page 3-36; Section 8.8, Parcel UC-1, Page 8-3; and Section 8.9, Parcel UC-2, Page 8-3:** The first paragraph on page 3-36 states that "During preparation of this five-year review, the durable covers in Parcels UC-1 and UC-2 were observed to be severely damaged due to redevelopment

construction activities;" however, this status does not appear to be reflected in the protectiveness determinations for these parcels, found in Sections 8.8 and 8.9, respectively. Both Sections 8.8 and 8.9 state that the remedies "are protective of human health and the environment." The Protectiveness Guidance should be used to make protectiveness determinations for Parcels UC-1 and UC-2 that reflect the compromised durable covers during construction activities. Please revise the protectiveness determinations for Parcels UC-1 and UC-2 in Sections 8.8 and 8.9, respectively, to account for the compromised durable covers during construction activities.

16. **Section 3.3.11.1, RA Activities and Implementation of ICs, Page 3-37 and Section 8.10, Parcel UC-3, Page 8-4:** In regard to VOCs in soil gas near well IR74-MW01A, Section 3.3.11.1 states, "The Navy is evaluating this hazard to determine if it is necessary to designate an ARIC [Area Requiring Institutional Controls] in this area to address future inhalation and other exposure hazards;" however, this ARIC evaluation does not appear to be reflected in the protectiveness determination for Parcel UC-3 in Section 8.10. Section 8.10 states that the remedies at Parcel UC-3 "are protective of human health and the environment." The Protectiveness Guidance should be used to make a protectiveness determination that reflects the uncertainty that remains to be addressed by the ARIC evaluation. Please revise the protectiveness determination for Parcel UC-3 in Section 8.10 to account for the uncertainty that remains to be addressed by the ARIC evaluation.

17. **Section 4.0, Progress Since Last Review, Page 4-1:** Section 4.0 does not include subsections for Parcels E, E-2, or UC-3, so it is unclear whether these parcels were included in the Third FYR. Please revise Section 4.0 to clarify whether Parcels E, E-2, and UC-3 were included in the Third FYR.

18. **Section 6.1.2, Durable Covers, Page 6-3:** Section 6.1.2 states that "the durable covers, as required by the RODs, were implemented properly and are functioning as intended in IR-07/18 and Parcels B-1, B-2, C, G, UC-1, UC-2, and UC-3;" however, this statement is not accurate for Parcels UC-1 and UC-2. Section 3.3.10.2 states that "Parcels UC-1 and UC-2 were observed to be severely damaged due to redevelopment construction activities" and Section 5.3 indicates that the covers at these parcels were not inspected during the site inspection. Please revise Section 6.1.2 to indicate that the durable covers in Parcels UC-1 and UC-2 are not currently functioning as intended, but will be repaired following completion of the construction activities. Please also revise Section 6.1.2 to describe any practices that are in place to prevent exposure at Parcels UC-1 and UC-2 while the durable covers are in disrepair.

19. **Section 6.1.3, SVE, Pages 6-4 and 6-5:** Section 6.1.3 states that SVE is expected to begin in Areas 4 and 5 of Parcel C in 2018, but does not estimate when SVE will begin for Area 2. In addition, Section 6.1.3 states that the SVE systems are "not operating efficiently to reduce the mass of source contamination in soil" and "[o]ptimization of the existing SVE systems will not significantly improve source mass reduction," but does not specify to which systems this applies (e.g., Parcel B-1, Parcel C, all current SVE systems, etc.) or indicate whether this will impact whether future SVE systems (e.g., Areas 2, 4, and 5 of Parcel C) will be implemented. Lastly, the FYR does not indicate how the

RAOs will be achieved if the source mass is not reduced. Please revise Section 6.1.3 to estimate when SVE will begin at Area 2 of Parcel C. Please also revise Section 6.1.3 to identify which SVE systems are not operating effectively and to discuss whether this will impact whether future SVE systems will be implemented. Lastly, please revise the FYR to discuss how the RAOs will be achieved if the source mass is not reduced.

20. Section 6.1.4, In-Situ Groundwater Treatment, Page 6-5 and Section 6.1.5, MNA and LTM of Groundwater, Page 6-6: Section 6.1.4 indicates that the in-situ groundwater remedies are functioning as intended, but does not discuss the stability of groundwater plumes (i.e., whether the extent of each plume is increasing, stable, or decreasing) or the stability of groundwater concentrations (i.e., whether groundwater trends are increasing, stable, or decreasing). Similarly, Section 6.1.5 indicates that the monitored natural attenuation (MNA) groundwater remedies are functioning as intended, but does not discuss the stability of groundwater plumes or of groundwater concentrations. Please revise Sections 6.1.4 and 6.1.5 to provide additional information regarding the performance of the in-situ groundwater remedies and MNA groundwater remedies, respectively.

21. Section 6.1.6, Radiological Surveys and Remediation, Page 6-7: The bullet points under Section 6.1.6 indicate that the radiological remedies have been successfully completed and are functioning as intended at IR-07/18 and Parcel D-1; however, it is unclear whether these remedies were determined to be functioning as intended because the Navy found no evidence of compromised radiological data for these areas or if this work was done by a different entity. The text should state why these radiological remedies are functioning as intended. Please revise Section 6.1.6 to clearly indicate whether the radiological remedies for IR-07/18 and Parcel D-1 were determined to be free of compromised radiological data.

22. Section 6.1.6, Radiological Surveys and Remediation, Pages 6-7 and 6-8: The System O&M [Operations and Maintenance] discussion states that "O&M is not applicable to the completed radiological remedies in Parcel D-1, because this parcel has been radiologically released;" however, this is not consistent with the second to last paragraph of Section 6.1.6, which states that "ICs [institutional controls] for radionuclides are applicable to a portion of Parcel D-1, as this area was not released by the Phase 1 and Phase 2 TCRAs [time-critical removal actions]." Please revise Section 6.1.6 to resolve this discrepancy.

23. Section 6.2.2, Changes in Toxicity and Other Contaminant Characteristics: This section defines "ambient" level as "naturally occurring chemicals." However, "ambient" levels could also include anthropogenic sources that are not due to Navy contamination, e.g. lead in dust from roads nearby. Also, please recall that the Parcel G ROD, for example, stated "The Navy acknowledges that industrial sources of metals exist at HPS and that there is a potential that some concentrations of metals could have sources other than naturally occurring materials. The Navy has worked to remove these sources during the response actions taken to date. The Navy further acknowledges that the regulatory agencies do not agree with the Navy's position that ubiquitous metals are naturally

occurring." Similar language appears in the Parcel G ESD, Parcel B ROD, etc. Please adjust the definition in the FYR to be more complete.

24. **Section 6.2.4, Changes in Exposure Pathways, Page 6-14:** According to Section 6.2.4, "The feasibility assessment concluded that current site conditions are appropriate for residential use in most of Parcel G" and "An ESD [Explanation of Significant Differences] to the Final ROD was prepared to document the reduction in the areas requiring residential land use restrictions, based on the recommendations of the feasibility assessment;" however, it is unclear whether the reduction in the areas requiring residential land use restrictions is impacted the by issues related to potential contractor manipulation and/or falsification of radiological data at Hunters Point. If the feasibility assessment was based in part on impacted radiological data, then this should be stated in Section 6.2.4. Please revise Section 6.2.4 to clarify whether the feasibility assessment for residential use conducted at Parcel G used any impacted radiological data.

25. **Section 7.0, Issues, Recommendations, and Other Findings, Page 7-1:** In accordance with the EPA 2016 FYR Template, please revise the FYR to include IR 07/18 as a site without issues and recommendations.

26. **Section 7.0, Issues, Recommendations, and Other Findings, Page 7-1:** Section 7.0 indicates that the SVE implementation in Parcels B-1 and C has limited effectiveness due to diffusion-limited conditions in the subsurface and recommends that the use of the SVE technology be evaluated for each treatment area. Yet, the FYR also concluded that the limited SVE effectiveness does not affect future protectiveness. Diffusion limiting conditions in the subsurface can impact remedy effectiveness and therefore future protectiveness. Please revise the FYR to indicate that limited SVE system effectiveness may affect future protectiveness.

27. **Section 7.0, Issues, Recommendations, and Other Findings, Page 7-2:** Section 7.0 indicates that the issue related to radiological data quality does not affect current protectiveness, but it is not clear why current protectiveness is not a concern. In addition, Section 7.0 also indicates that the Navy plans to resolve this issue by November 1, 2023, but it is unclear why five years are necessary to complete this corrective action. Please revise Section 7.0 to clarify why the identified issue does not impact current protectiveness and re-evaluate the milestone date.

28. **Section 8.0, Protectiveness Statement, Page 8-1 through 8-4:** In accordance to the Protectiveness Guidance, for remedies with issues that do not effect current protectiveness yet requires more actions to determine long term protectiveness, the corrective protectiveness statement should be "The remedy at Parcel *(fill in parcel identification)* currently protects human health and the environment because *(describe the elements of the remedy that protect human health and the environment in the short-term).* However, in order for the remedy to be protective in the long-term, the following actions need to be taken *(describe the actions needed)* to ensure protectiveness."

29. **Section 8.4, Parcel C, Page 8-2:** Section 8.4 includes multiple statements regarding the protectiveness at Parcel C, including the following:

a. “The remedies completed to date for Parcel C are protective of human health and the environment;” and
b. Additional groundwater treatment “is currently underway and expected to be protective in the future;” and
c. “Operation of the SVE system at Areas 1, 3, 6, 7, and 8, is ongoing and ICs will be relied upon in the future to protect human health.”

A single protectiveness determination should be provided for each of the applicable media at Parcel C and the protectiveness statement should be consistent with the guidelines outlined in the Protectiveness Guidance. Please revise the protectiveness statement for Parcel C in Section 8.4 to include a single protectiveness determination and to be consistent with the guidelines outlined in the Protectiveness Guidance.

26. Table 10, Pre-ROD Response Actions for Parcel E (i.e., Parcels E, E-2, and UC-3): Table 10 is missing the Metal Slag Area Removal Action, which occurred during the same time frame as the Metal Debris Reef Removal Action. Please revise Table 10 to include the Metal Slag Area Removal Action.