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COMMENTS TO DRAFT PARCEL D-1 AND G GROUNDWATER TREATABILITY SUTDY TECHNICAL REPORT IR-09, IR-33, AND IR-71, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Dear Mr. Forman:

Thank you for the opportunity to review the Draft Parcel D-1 and G Groundwater Treatability Study Technical Report IR-09, IR-33, and IR-71, Hunters Point Shipyard, San Francisco, California dated July 2009 (GWTS Report). Based on our review of the draft GWTS Report, the Department of Toxic Substances Control (DTSC) has the following comments:

General Comments

1. **Benzene Remediation.** Given that benzene cannot be remediated using zero-valent iron, it is unclear how the IR-33 benzene plume fits into the stated objectives of the groundwater treatability study. Text should be added to clarify this issue in all locations where project objectives are discussed in the GWTS Report.
2. **Redevelopment Plan.** According to the City of San Francisco's redevelopment plan, a portion of Parcel G is currently zoned for mixed use. If the City of San Francisco does not change the development plans and zoning remains consistent with the redevelopment plan, an assessment of risks to potential future residents in the mixed use area(s) will be required.

Specific Comments:

3. Executive Summary, Page ES-1.
 - 3.1 Project Approach subsection. An explanation as to why the post-injection assessment did not include an assessment of risks to potential future residents must be provided.
 - 3.2 Summary of GWTS Findings subsection. Please specify which IR-17 plume (East, West, or both) in which plume displacement was observed.
4. Section 1.1.2 - Future Land Use, Page 3 and Section 1.4.2 – GWTS Risk Screening Criteria, Page 9. According to the City of San Francisco's redevelopment plan, a portion of Parcel G is currently zoned for mixed use that may include residential; therefore, screening criteria for future residents for groundwater and soil vapor exposures should also be established and included in the screening criteria tables. See General Comment #2.
5. Section 1.4.2 - GWTS Risk Screening Criteria, Pages 9 and 10.
 - 5.1 Groundwater Screening Criteria for Volatile Organic Compounds (VOCs): These criteria are based on 10 times the groundwater remediation goals established in the Parcel D FS Report. Please clarify that these screening criteria are for the inhalation pathway only (soil gas from VOCs in groundwater). It does not address ingestion and dermal contact. Please provide justification for not addressing these pathways.
 - 5.2 Groundwater screening criteria for metals for San Francisco Bay protection: Please discuss how the two sets of screening criteria (San Francisco Bay Protection Goal and San Francisco Bay Trigger Level) were used in the treatability study.
 - 5.3 Groundwater screening criteria for metals for construction worker safety: These criteria account for construction worker safety based on dermal contact with groundwater in a trench. Groundwater screening criteria for VOCs for construction workers based on dermal contact should also be established.
6. Section 2.1 - Pre-Injection Assessment. Page 12. The 2nd Paragraph states that "the number of completed sampling locations exceeded the minimum GWTS work plan requirements." However, the table comparing the planned versus completed soil vapor and Hydropunch® locations presents seven planned Hydropunch® locations and only three completed locations for the IR-09 North plume. Please revise the text to be consistent with the table.

7. Section 2.1.1.2 - Pre-Injection Soil Vapor and Hydropunch® Sample Collection, Page 15, 3rd Paragraph. Please verify that collection of the Hydropunch® groundwater samples using a disposable bailer prior to analysis for volatile organic compounds (VOCs) was consistent with the method that was previously presented in the approved GWTS work plan. The use of a disposable bailer appears inconsistent with the description provided in Section 2.1.5.1 which states that groundwater samples collected during the GWTS well sampling event using micro-purge sampling techniques was conducted in accordance with the current HPS groundwater sampling protocols as described in the GWTS work plan. If the use of a disposable bailer was inconsistent with the approved work plan(s), the rationale for use of a different groundwater sample collection method must be provided.
8. Section 2.1.2.1 - Pre-Injection Soil Vapor and Hydropunch® Sample Results, Pages 16-17, 3rd Paragraph. Please clarify what the "J" represents from the IR-33 benzene detections or remove from the text.
9. Section 2.1.5 - Pre-Injection Groundwater Sampling, Pages 21-24. The text states that the Groundwater Treatability Study Work Plan originally proposed a total of 78 wells for sampling during the pre-injection assessment, but fewer wells were installed than originally planned. The text should be expanded, preferably on a specific case by case basis, to provide the reasons why fewer wells were installed as well as sampled during the pre-injection assessment than originally planned.
10. Section 2.1.5.2 - Pre-Injection Groundwater Monitoring Well Sampling Results, Pages 23-25.
 - 10.1 The analytical method numbers for hexavalent chromium, carbon dioxide/carbon monoxide, sulfide and alkalinity are inconsistent with the list in Appendix E, page E-3.
 - 10.2 Pre-Injection Metals and Other Analyte Results: Please identify the metals that exceeded the groundwater screening criteria.
11. Section 2.2.1.1 – IR09-North, Pages 27-28.
 - 11.1 2nd Paragraph: The metal detections were compared to either the screening criteria for construction workers or SF Bay protection. Please clarify that the results were compared to the lower of the two sets of criteria.
 - 11.2 The 2nd paragraph states that TCE was detected above the screening criterion of 29 to 48 µg/L. Table 1 does not provide a range of TCE screening criterion for IR-09. Please delete the reference to the 48 µg/L criterion since this criterion is for IR-71.

- 11.3 The 3rd paragraph cites a nickel screening criterion of 965 µg/L. The SF Bay protection goal and the SF Bay Trigger level in Table 2 are 96.48 and 906 µg/L, respectively. Please reconcile and clarify which of these sets of criteria is used for screening the groundwater results.
12. Section 2.2.1.2 – IR-09 South, Page 28. The 2nd paragraph states “Nickel and hexavalent chromium detections did not exceed the GWTS groundwater screening criterion for San Francisco Bay protection of 1544 and 900 µg/L, respectively (Table 2)”. Table 2 includes the respective SF Bay protection goal and SF Bay Trigger level of 96.48 and 906 µg/L for nickel, and 50 and 600 µg/L for hexavalent chromium. Please reconcile and clarify which of these sets of criteria is used for screening the groundwater results.
13. Section 2.2.1.3 – IR-33, Pages 29 and 30.
- 13.1 The 3rd paragraph states that carbon tetrachloride was not considered a health concern to commercial/industrial workers through vapor intrusion. Based on the potential redevelopment of the site to mixed uses that may include residential, vapor intrusion to future residents should be evaluated since carbon tetrachloride was detected above the California Human Health Screening Level (CHHSL) for residential land use in soil gas samples from IR-33 and its groundwater concentration increased from 0.3 to 0.95 µg/L in the 2008 sampling event.
- 13.2 The last paragraph states “Nickel and hexavalent chromium detections did not exceed the GWTS groundwater screening criterion for San Francisco Bay protection of 385 and 700 µg/L, respectively (Table 2).” Table 2 includes the respective SF Bay protection goal and SF Bay Trigger level of 96.48 and 906 µg/L for nickel, and 50 and 600 µg/L for hexavalent chromium. Please reconcile and clarify which of these sets of criteria is used for screening the groundwater results.
14. Section 2.2.1.4 – IR-71 West, Pages 30 and 31. The last paragraph states “Nickel and hexavalent chromium detections did not exceed the GWTS groundwater screening criterion for San Francisco Bay protection of 385 and 700 µg/L, respectively (Table 2).” Table 2 includes the respective SF Bay protection goal and SF Bay Trigger level of 96.48 and 906 µg/L for nickel, and 50 and 600 µg/L for hexavalent chromium. Please reconcile and clarify which of these sets of criteria is used for screening the groundwater results.
15. Section 2.2.1.5 – IR-71 East, Pages 31 and 32 and Section 2.2.1.6 – Groundwater Data Outside of Identified Plumes, Page 32. The last paragraph of these sections state “Nickel and hexavalent chromium detections did not exceed the GWTS

groundwater screening criterion for San Francisco Bay protection of 96.5 and 50 µg/L, respectively (Table 2)." Table 2 includes the respective SF Bay protection goal and SF Bay Trigger level of 96.48 and 906 µg/L for nickel, and 50 and 600 µg/L for hexavalent chromium. Please clarify which of these sets of criteria is used for screening the groundwater results.

16. Section 2.2.2 – Pre-Injection Soil Vapor Risk Analysis, Pages 33-34. Soil vapor risk analysis should also be conducted for potential future residents.
17. Section 2.2.3 – Site Conceptual Model for ZVI Injection Design, Page 35. Please discuss the site specific data or information to support the conclusion that the A-aquifer is not a potential source of drinking water pursuant to the cited Water Board Resolutions. See General Comment on the potential future residential land use.
18. Section 2.2.3.3 – ZVI Injection, Page 40. The first bullet under the injection design states that the ZVI barriers were extended east so that portions of IR-East plume could also be remediated where the plumes merge with a reference to Figure 17. This figure does now show the IR-East and IR-West plume boundaries. Please show the plume boundaries in Figures 17 and 22.
19. Section 2.4.1.1 – IR-09 North Post-Injection Week 2 Results, Page 59.
 - 19.1 1st Paragraph: Please identify the borings where soil gas samples were taken in this section and in the following sections discussing the Week 6, Week 12 and Week 16 sampling at IR-09 and IR-71 since not all locations were sampled at each event.
 - 19.2 Last Paragraph. Please clarify the statements that detections below the method reporting limit (MRL) for chloroform and above the MRL for toluene were qualified as non-detect due to blank contamination results. Appendix E does not discuss this detections and data qualification. This comment also applies to the following sections that discuss the QA/QC sample results.
20. Section 2.4.1.3 – IR-North Post Injection Week 12 Results, Page 60.
 - 20.1 1st Paragraph: Two soil vapor and four groundwater samples were collected; however, Figure 26 only shows one soil gas results and three groundwater results. Soil vapor results for IR09SV28 and groundwater results for IR09MW06A were not included on Figure 26.
 - 20.2 2nd Paragraph: PCE was detected at IR09SV002; however, this sample location was not shown on Figure 26. Please explain why this location was not sampled during Week 2 and Week 6.

21. Section 2.4.2 – IR-71 West Post Injection Results, Page 61. 3rd Paragraph:
Appendix E does not include the purge logs.
22. Section 2.4.2.1 – IR-71 West Post Injection Week 2 Results for Rows B, C, F and G, Page 62. Please identify the sample IDs where the 10 soil vapor, 9 Hydropunch® and 5 groundwater samples were collected since some of the locations were sampled for both soil gas and groundwater. It is difficult to distinguish which locations were sampled on Figures 26 and 27.
23. Section 2.4.2.2 – IR-71 West Post Injection Week 6 Results for Rows B, C, F and G, and Week 2 Results for Rows H and I, Page 62. Please identify the sample IDs where the 23 soil vapor, 7 Hydropunch® and 8 groundwater samples were collected since it is difficult to distinguish which locations were sampled on Figures 26 and 27.
24. Section 2.4.2.3 – IR-71 West Post Injection Week 6 Results for Rows B, C, F and G, and Week 6 Results for Rows H and I, Page 63. Please identify the sample IDs where the 21 soil vapor, 5 Hydropunch® and 10 groundwater samples were collected since it is difficult to distinguish which locations were sampled on Figures 26 and 27.
25. Section 2.4.2.4 – IR-71 West Post Injection Week 6 Results for Rows B, C, F and G, and Week 6 Results for Rows H and I, Page 64. Please identify the sample IDs where the 19 soil vapor, 2 Hydropunch® and 11 groundwater samples were collected since it is difficult to distinguish which locations were sampled on Figures 26 and 27.
26. Section 2.4.3 – Post Injection Changes in Groundwater Geochemistry and Metals Concentrations. Table 11 provides a summary of the pre-injection and Table 27 provides the post-injection results for metals gases, and general minerals. Table 11 includes results for barium, beryllium, cadmium, copper, silver and thallium. Please discuss the rationale for not presenting the results for these metals in Table 27. Likewise, mercury results were included in Table 27 and not in Table 11.
27. Section 2.4.4 – November 2008 BGMP Data Results, Page 66.
 - 27.1 Please identify the wells where VOCs were detected.
 - 27.2 The last paragraph states that the November 2008 data indicate that the injection process was not causing groundwater conditions to deteriorate outside the injection areas. Please clarify this statement since the injections were conducted after the groundwater sampling.

- 27.3 Metals: The metal results on Figure 28 should also be discussed in this section.
28. Section 3.1.1.1 – Reduction of TCE and Chloroform Concentration in Soil Gas, Page 68. 3rd Paragraph: The percent reduction and maximum detection presented for chloroform in IR-71 West are inconsistent with the values in Table 29.
29. Section 3.1.1.2 – Reduction of TCE and Chloroform Concentrations in Groundwater, Page 69.
- 29.1 The 1st paragraph states that the groundwater screening criterion for chloroform is 1.2 µg/L and for TCE is 2.9 µg/L. Table 1 lists these values as remediation goals and includes a separate list of screening criteria. Please clarify how the remediation goals and the screening criteria were used in the GWTS.
- 29.2 1st Paragraph: Please clarify the last statement since the TCE groundwater concentrations are compared to the soil gas risk screening criterion.
30. Section 3.2.1 – ARS Radius of Influence Analysis, Page 72. Please specify where ZVI daylighted from injection point A3 in the figures.
31. Section 3.2.1 – Pressure Transducer Readings, Page 73. Attachment E data or files were not included in the CD-ROM copy.
32. Section 3.2.4 – Post-Injection Analysis of Iron Concentrations in Soil, Pages 76-77.
- 32.1 Attachment 1 report was not included in the paper or CD-ROM copy.
- 32.2 Table 31: Please include in the footnotes how the iron concentrations were determined or calculated.
33. Section 3.3 – Potential Plume Displacement, Page 77. The 2nd paragraph states that soil vapor increases should be temporary because the concentrations in the underlying source (groundwater) should result in the decline of soil vapor concentrations over time. There are no groundwater wells near this soil gas sampling location; therefore, it is possible that contaminated groundwater was displaced and migrated from the source towards this soil vapor sampling location.
34. Section 4.0 – Summary and Conclusions, Transition of GWTS Monitoring Wells to BGMP, Page 82.

- 34.1 IR-09: Well IR09MW45F (Figure 27) should be included in the monitoring program to monitor any displacement or migration of TCE from IR09MW51F. IR09MW45F is downgradient of soil vapor sampling location IR09SV28 where TCE concentrations increased after the injections. An alternative would be to install a new well near IR09SV28.
 - 34.2 IR-71: Well IR71MW32 should also be included in the monitoring program to monitor the increased chloroform soil concentrations at IR71SV25-2-1. An alternative would be to install a new well near IR71SV25-2-1.
35. Figures. Please show the plumes that are shown in Figure 3 in each plume-specific figure (Figures 13-18) for ease of review and identifying the plumes and sample locations.
36. Appendix A – Screening Level Soil Vapor Risk Analysis
- 36.1 As the redevelopment plan includes mixed-uses that may include residential, risk analysis should also be conducted for future residents.
 - 36.2 Table A-8: Please report the exposure point concentrations in $\mu\text{g}/\text{m}^3$ in accordance with the model input concentration units and explain why carbon tetrachloride was not included in this table. Attachment A1 includes the Johnson and Ettinger Model results for carbon tetrachloride.
 - 36.3 Please include a summary table of the representative concentrations that were used in the Johnson and Ettinger Model in Attachment A1 (e.g. 200 $\mu\text{g}/\text{m}^3$ for benzene, 34 $\mu\text{g}/\text{m}^3$ for carbon tetrachloride, etc).
 - 36.4 Attachment A2: Please verify the input concentrations in the model as the same concentration of 200 $\mu\text{g}/\text{m}^3$ was used for benzene and cis-1,2-dichloroethylene, and the same concentration of 34 $\mu\text{g}/\text{m}^3$ was used for carbon tetrachloride, chloroform, m-xylene, o-xylene, tetrachloroethylene, trichloroethylene and methylene chloride,
37. Appendix E – Quality Control Summary Report
- 37.1 Introduction: The week numbers and corresponding dates do not match with the text on Section 2.4-Post Injection Assessment on pages 57 to 66. For example, there is no Week 18 sampling in Section 2.4-Post Injection Assessment, and IR-09 and IR-71 post injections week 2, 6, 12 and 16 sampling were conducted at different months.

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- 37.2 Data Validation Methodology, Page E-3. The GWTS samples were not analyzed for flashpoint and pH. Some of the analytical method numbers are inconsistent with Section 2.1.5.2 - Pre-Injection Groundwater Monitoring Well Sampling Results on pages 23 and 24.
- 37.3 Data Quality and Data Usability, Page E-13. This section should discuss the detections in the blank samples and their qualification as usable data as discussed in Section 2.4-Post Injection Assessment. See comment above.
- 37.4 Attachment E-1, The Data Validation Reports (*This attachment presented on CD-ROM only (index, plus five files)*). The reports were not included in the CD-ROM copy.

If you have any questions, please call me at (510) 540-3775.

Sincerely,

for 
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