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**Draft Final Parcels D-1 and G Groundwater Treatability Study Technical Report,
IR-09, IR-33, and IR-71, Hunters Point Shipyard, dated January 2010.**

This letter contains comments from the City and Lennar.

Specific Comments:

- 1. Executive Summary, page ES-5, third paragraph:** Please consider using "semiannually" in place of "bi-quarterly" to be consistent with current terminology used in the BGMP documents.
- 2. Section 2.1.5.1, page 23:** In the statement regarding stabilization of field parameters, how did the general criterion of "to within approximately 10 percent of the previous readings" apply to the pH as it is a logarithmic scale – was another criterion applied to pH?
- 3. Section 2.2.1.1, page 30, first paragraph, last sentence:** Throughout Section 2.2, there are references stating that metals or certain VOCs were not included in the ZVI injection program. Would it be more complete to say that they were not included as analytes in the program?
- 4. Section 2.2.3.3, page 44, third bullet:** Clarify where the seventh barrier was to have been located (and how many points it contained), and whether the line of points that were not completed (west end of Row A) is actually located where they were planned to be shifted to.
- 5. Section 2.2.3.3, page 44, fourth bullet:** With the absence of the planned injection points west of Building D-A, the distance from well IR33MW63A and contaminants that may be in that area to the nearest line of injections points (downgradient barrier Row B) is now about 100 feet. Given the expectation that there will be a 3-year life for the barrier, the ZVI may be largely depleted by the time the contaminants that would have been treated by Row

A reach Row B. Please note this condition and discuss its ramifications in terms of the long-term effectiveness criterion.

6. **Section 2.2.3.3, page 44, fourth bullet, line 6:** The word “rate” was supposed to be replaced with “coefficient” as indicated in the response to comments on the draft report. The rate at which the sorption occurs has little to do with the extent of the sorption. Please make the change.
7. **Section 2.3.1.1, page 45, fifth line:** The implication is that the fracturing “creates more uniform permeabilities”. This is actually not the case. It creates a fissure in which the local permeability is much greater than the non-fractured volume of soil. Please revise to say that the fracturing creates “a greater bulk permeability and extends the effective ROI of the injection technology”.
8. **Section 2.3.3.1, page 59, first complete paragraph:** The error in units of 0.4 lb/cubic yard is still in this section although it was corrected previously in Section 2.3.2.2. Please review throughout the report and correct as appropriate. Also, while the injection mass ratio of 9.3 exceeded the minimum target ration of 8.1, it did not exceed the target ratio of 10.8; please revise the text accordingly.
9. **Section 2.4.3, last paragraph (page 71):** The sentence that describes the post-injection ethane assessment seems to have been incorrectly deleted. Please review this paragraph and revise as necessary.
10. **Section 2.4.4, page 71, bottom of the page:** Whereas in earlier sections the presence of benzene has been dismissed as having trended downward and ND in 7 of the prior 11 readings, now the statement is made “Benzene was selected because detected benzene concentrations in one well in IR-33 exceeded the remediation goal on a regular basis.” There may be concern because of the re-appearance of benzene in this area at a concentration (9.74 ppb) is greater than 10 times the groundwater criterion of 0.63 ppb. Please revise the text as necessary to resolve this apparent inconsistency.
11. **Section 3.1, page 73, first paragraph:** This section begins by stating that, “The technical performance of the ZVI injection is primarily a function of the ability of the ZVI to reduce the mass of TCE and chloroform in groundwater”. We recommend actually calculating the mass of TCE and chloroform destroyed by ZVI, as that would be the most direct way of comparing ZVI to other groundwater treatment technologies (e.g., groundwater extraction and treatment, in-situ chemical treatment, or other).

Percent reduction of concentration is another useful way of comparing treatment technologies, so the information presented in Tables 29 and 30 is useful. However, the calculation of the cost per cubic yard of saturated soil treated (\$336/cy) is not comparable to other groundwater treatment technologies and is therefore of limited value. Taking “credit” for treatment of saturated soil 50 feet downgradient is of dubious value; the downgradient soil will not be “treated” with ZVI, as the iron is not expected to migrate 50 feet downgradient. The impacted groundwater downgradient of the ZVI is not expected to be “treated”, either; if anything, it is the impacted groundwater located *upgradient* of the ZVI

that will be treated over the next few years as it flows through the ZVI “barrier”. Thus a more appropriate method of evaluating effectiveness would be to calculate the gallons of impacted groundwater that were treated with the initial injection and the gallons of impacted groundwater that are anticipated to be treated over the next 3 years. Please revise this portion of the evaluation accordingly.

12. **Section 3.1.1.1, page 74, fifth line.** Use of the term “declining trend” suggests statistical significance whereas there are not enough samples here to support such a trend analysis. Rather than use this term, simply indicate a decline in concentrations as determined by the pre- to post-injection ratios in general. The term “declining trends” also appears in two locations in the first paragraph of Section 3.1.1.2 on p. 75. Please revise accordingly.
13. **Section 3.1.1.2, page 76, last paragraph:** This paragraph discusses decreasing concentrations in IR33MW63A west of the line of injection points in Building D-A, but does not explain how this could have happened (or if it is just a temporary condition). Please explain.
14. **Section 3.1.2:** The stated primary objectives included “Evaluate and document the technical performance (concentrations reductions) and cost effectiveness of the ZVI technology with respect to remediation of groundwater containing VOCs such as TCE, PCE, and chloroform, and metals such as hexavalent chromium and nickel”(p. 8). While this section documents the costs of the study and presents estimates of treatment costs per cubic yard, it does not (nor is it discussed elsewhere in this report) present a discussion of the cost-effectiveness of the technology nor compare these costs to those of other applicable technologies. Although it is understood that issues of timeliness may impede selection of the most cost-effective technology, please provide at least a brief cost-effectiveness comparison to other technologies studied at HPS (e.g., in-situ sequential anaerobic-aerobic treatment, other ZVI studies).
15. **Section 3.2:** Was any attempt made to determine the distribution of the ZVI as a function of distance from the injection point to ascertain the uniformity of the emplacement laterally? Was the target mass ratio achieved all the way to the estimated ROI? Please clarify.
16. **Section 4.0, Summary, Conclusions, and Recommendations and Figure 17.** Although the treatability study appears to have been successful in terms of reducing the concentration of chloroform in groundwater at IR-71, recontamination is a possibility so long as the source and/or previous site use leading to these impacts has not been identified. This is particularly true given that the extensive presence of chloroform was not known or anticipated at the initiation of this TS (Final Work Plan for the Parcel D Groundwater Treatability Study, IR-09 and IR-71, August 2007). Please discuss this issue where appropriate in this document.
17. **Section 4.0, page 92, last paragraph:** The stated objective (Section 1.4, p. 8) was to determine the cost-effectiveness of ZVI, not just cost. In regards to cost effectiveness, please note comment 10 above. We recommend changing the wording to “cost effectiveness” in conjunction with any discussion of objectives.

18. **Section 4.0, page 93, second-to-last paragraph:** It seems premature to state that, “Risks from the vapor intrusion exposure pathway are unlikely to occur at unacceptable levels for potential future commercial/industrial workers and residents across all four groundwater plumes assessed.” The Navy’s *Draft Memorandum Approach for Developing Soil Gas Action Levels for Vapor Intrusion Exposure at Hunters Point Shipyard* dated 30 November 2009 will ultimately provide the vehicle for this determination and, as noted in comments provided on the memorandum, regulatory criteria related to VOCs are anticipated to change in the near future. Please acknowledge the draft soil gas action levels memorandum and discuss the fact that the results of this treatability study and future soil gas sampling will be evaluated per the protocols in that memorandum once it is finalized.
19. **Figure 12:** Interpreted contour lines should not be extended into the Bay.

Minor Comments:

1. Executive Summary, page ES-3, line 3: Insert “to” between “conducted” and “aid”.
2. Executive Summary, page ES-5, line 7: Please consider replacing “Footage” with “a few feet of.”
3. Section 1, page 1, second paragraph, second line: Suggest adding an “s” to “VOC”
4. Section 2.2.2, page 36, last paragraph, fifth line: Suggest “results” rather than “data”.
5. Section 2.2.3.3, page 43, first bullet, first line: Suggest inserting “planned” after “10”.
6. Section 2.2.3.3, page 43, second bullet, third line: Suggest inserting “interpreted” before “size”.
7. Section 3.1.1, page 73, definition of factor B: Suggest “or” instead of “and”, i.e., “Week 12 or Week 18”.
8. Section 4.0, page 89, second bullet, last line: Should the reference be to IR-09 and not IR-33?

Sincerely,

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