Responses to Regulatory Agency Comments on the Draft Final Parcels D-1 and G Groundwater Treatability Study Technical Report, IR-09, IR-33, and IR-71, Hunters Point Shipyard, San Francisco, CA (January 2010)

Comments from: Sarah Kloss, U.S. EPA, Region 9, San Francisco, CA. Comments received February 16, 2010.

Comment No.	Page No.	Section, Figure, Table	Comment	Response
1	Various (e.g., page 35, paragraph 3)	Various	A few times in the report, Paragraph 3 on Page 35 for example, the following sentence appears: "A secondary purpose of the SVRA is to provide an assessment of the current human health risks from vapor intrusion by accounting for ZVI and treatment and incorporating data from the soil vapor sampling conducted under the GWTS." Since all the evaluated exposure pathways are not currently complete (site is not re-developed), I would change the wording for the phrase "current human health risks" to something like "potential human health risks based on current soil vapor concentrations." Also, while the BCT is still working through the Approach for Developing Soil Gas Action Levels for Vapor Intrusion at Hunters Point Shipyard, we would like to hold off on making any final decisions for the soil gas at Parcels D-1 and G.	The comment has been noted. The reference to the secondary purpose of the SVRA has been revised on Page 35 and on Page A-1 of Appendix A, to focus on providing "an assessment of the potential human health risks based on current soil vapor concentrations".

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Comments from the City and Lennar by: Amy D. Brownell, P.E., Environmental Engineer, San Francisco City and County Department of Public Health, Environmental Health Section, Hazardous Waste Program. Comments received February 19, 2010.

Specific Comments

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1	ES-5, third paragraph	Executive Summary	Please consider using "semiannually" in place of "bi-quarterly" to be consistent with current terminology used in the BGMP documents.	The reference to "bi-quarterly" has been changed to "semiannually" throughout the report.
2	23	2.1.5.1	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?	Ten percent of the prior field reading also applies to pH (i.e., 10% of 7.0 pH units is 0.7 pH units). No change was made to the document text in response to this comment.
3	30, first paragraph, last sentence	2.2.1.1	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?	The word "analyte" refers specifically to a chemical or constituent included in an analytical procedure. We were not defining which metals or VOCs were included in the analytical procedure used, but rather which VOCs or metal concentrations did not exceed the GWTS screening goals. If the concentrations did not exceed the GWTS screening goals then the metal or VOC was "not included" in the ZVI injection program. No changes to the document text were made in response to this comment.
4	44, third bullet	2.2.3.3	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.	The seventh injection barrier originally consisted of 16 injection points in the north-to-south oriented trench adjacent to groundwater monitoring well IR33MW63A (see trench location in Figure 22). The injection point spacing and projected injection radius were similar to the

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				spacing/radius currently shown for Row A on Figure 22 (see injection circles shown within Building D-A). Subsequently, an east-to-west oriented trench was installed (Row A with the 16 lightly shaded injection circles shown west of Building D-A on Figure 22); however, continuing radiological soil removal activities prevented access to this area during the time the ZVI injections were being performed. Four injection points were subsequently installed inside Building D-A to complete the portion of the barrier that could be installed. The text in Section 2.2.3.3 discusses the changes in injection row positioning, so no changes to the document text were made in response to this comment.
5	44, fourth bullet	2.2.3.3	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	Comment noted. The best indicator of changes in chloroform mass within the area where Row A was proposed is data from groundwater monitoring well IR33MW63A. This well has been recommended for continued monitoring under the Basewide Groundwater Monitoring Program. If VOC concentrations in this and other wells in the post-injection monitoring program continue to indicate acceptable groundwater concentrations, then the long-term effectiveness

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			terms of the long-term effectiveness criterion.	criterion would have been met and no further action would be necessary.
6	44, fourth bullet, line 6	2.2.3.3	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.	The word "rate" has been replaced with the word "coefficient" with the resulting change in the text as follows: "...chloroform has a low adsorption coefficient on organic carbon".
7	45, fifth line	2.3.1.1	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".	Fracturing will have limited effect on a coarse-grained soil and a greater effect on a fine-grained soil, so the term "more uniform" is appropriate as used. However, the suggested change is also appropriate so the sentence has been changed to indicate that "fracturing results in a greater bulk soil permeability, thereby extending the effective ROI of the injection events."
8	59, first complete paragraph	2.3.3.1	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.	The error has been corrected throughout the report where the incorrect value was provided. The text in Section 2.3.3.1 already compares the estimated injection mass ratio to the design range and to the average mass ratio (10.8) used at Parcels B and C. No changes to the document text were made in response to this comment.
9	71, last paragraph	2.4.3	The sentence that describes the post-injection ethane assessment seems to have been incorrectly deleted. Please review this paragraph and revise as necessary.	The text describing the post-injection ethane assessment has been restored.

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10	71, bottom of the page	2.4.4	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.	To be consistent with earlier sections, the 3rd sentence of the 4th paragraph of Section 2.4.4 has been revised as follows, "Benzene was also selected for evaluation because benzene concentrations in one well in IR-33 exceeded the remediation goal in the past." It should be emphasized that when the text in Section 2.4.4 says benzene was "selected", it only refers to the selection of benzene in a graph on Figure 27 to evaluate concentration trends. This does not mean benzene was selected for inclusion in the ZVI injection program. Section 2.4.4 does state "The benzene graph for former well IR33MW61A (and replacement well IR33MW01A) also shows a strong declining trend, with current concentrations below the groundwater remediation goal." This is consistent with statements in earlier sections.
11	73, first paragraph	3.1	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).	While there are a multitude and variety of ways to analyze data and estimate cost and effectiveness, a consistent and agreed-upon approach had to be selected at the beginning of the project. The methods used to estimate the cost per cubic yard and technology effectiveness in this report were discussed with the Navy, DTSC, and the EPA, and are consistent with methodologies used in prior groundwater treatability studies. The Navy does not believe it is necessary that mass reduction

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			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.	calculations be performed for the various technologies, including ZVI, groundwater extraction, etc.). ZVI has reduced VOC mass as shown by the reduction in VOC concentrations over the period of record following ZVI injections. This concentrations/mass reduction will continue to be monitored per the post-injection monitoring recommendations in the GWTS. No changes to the document text were made in response to this comment.
12	74, fifth line	3.1.1.1	Use of the term "declining trend" suggests statistical significance whereas there are not enough samples here to support such a trend	A declining trend is supported by the three rounds of soil vapor sampling at referenced locations; these data indicate a consistent decline; hence, the

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			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.	reference to a declining trend is considered appropriate despite the absence of a formal statistical analysis. No changes to the document text were made in response to this comment.
13	76, last paragraph	3.1.1.2	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.	A number of wells and soil vapor probes in and around the injection barriers showed substantial reductions in groundwater and soil vapor concentrations, respectively, as a result of the injection process due to a combination of ZVI reduction, VOC volatilization/stripping, vapor and groundwater dispersion, and related injection processes. Data collected to date indicate that this is not a temporary process, but is consistent with remediation of a limited, dissolved-phase groundwater plume that has migrated away from a former source area. Continued monitoring of the wells will be conducted under the BGMP to continue to track trends in groundwater concentrations. No changes to the document text were made in response to these comments.
14		Section 3.1.2	The stated primary objectives included "Evaluate and document the technical performance (concentrations reductions) and cost effectiveness	The intent of the cost effectiveness section was to provide data similar to data provided in other treatability study reports performed at Parcels B

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			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).	and C; not to provide an analysis versus technologies not evaluated under this GWTS. Moreover, costs of ZVI studies elsewhere are not necessarily applicable for comparison and ZVI treatment was not previously implemented at this parcel for comparison purposes. While cost effectiveness is an important factor with respect to continued use of ZVI at HPS, VOC mass reduction and achievement of risk reduction goals are more critical. No changes to the document text were made in response to this comment.
15		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.	The ZVI distribution was assessed using a variety of methods as discussed in Section 3.2, incorporating sensors, monitoring points, site observations, and soil samples taken at multiple distances from the injection points. This sampling network/program provided sufficient evidence that the ZVI was being spread throughout the soil volume defined by the injection interval and the ROI. The ROIs presented in Section 3.2 were based on a conservative assessment of the various ROI measurements, so the area defined by the

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				ROI would represent an area with a higher portion of ZVI mass than outlying areas. The estimated injection mass ratios provided in Sections 2.3.2.2 and 2.3.3.2 represent the average distribution throughout the injection volume defined by the injection interval and the ROI. Variations in ZVI distribution due to changes in soil lithology or other factors were addressed by using thinner injection intervals (2.5 to 3-feet) and overlapping injection points. As noted in prior responses to comments, the overall effectiveness of the ZVI injections was demonstrated by the substantial reduction in VOC concentrations in soil vapor and groundwater in the injection zones. No changes were made to the text in response to this comment.
16		4.0 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	The primary sources of these VOCs (site operations, chemical use/handling/storage, etc.) have been removed. The presence of secondary sources (soil and groundwater) was assessed by 1) evaluation of historical data and 2) the collection of additional soil vapor and groundwater samples (see Section 2.2.1). No primary or secondary

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			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.	sources were identified; hence, the GWTS conceptual site model was based on the concept that the groundwater plumes represented the sole remaining sources of VOCs at the site. This position was supported by the significant decline and lack of rebound in the dissolved VOC plumes, especially after ZVI injections. Therefore, these remaining sources (plumes) are residual in nature and are expected to deplete over time; in turn, this depletion would also result in a decline in VOC soil vapor concentrations over time. Groundwater monitoring has been proposed to further assess this source depletion over time. No changes were made to the text in response to this comment.
17	92, last paragraph	4.0	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.	See discussion in response to City of San Francisco comment #14.
18	93, second-to-last paragraph	4.0	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	The Draft Memorandum Approach for Developing Soil Gas Action Levels for Vapor Intrusion Exposure at Hunter's Point (SGAL Memorandum) is in a Draft Final stage. To summarize, the SGAL Memorandum outlines an approach to

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			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.	screen soil vapor concentrations across Hunter's Point based on SGALs (yet to be finalized), and to use this screening to identify chemicals of concern (COCs) for the vapor intrusion pathway. In turn, the revised COC list would be used to revise any risk assessments performed prior to implementation of the SGAL Memorandum. The screening-level soil vapor risk assessment performed as part of the GWTS pre-dated preparation of the SGAL Memorandum. Moreover, it was performed with the primary purpose of evaluating the effectiveness of the GWTS, rather than as a revision to previous risk assessments for Parcels G and D-1. This notwithstanding, the approach to identification of COCs for the screening-level soil vapor risk assessment appending the GWTS incorporates inclusion of all detected chemicals in soil vapor samples as COCs for the risk assessment. Hence, while no direct comparison was made to the soil gas action levels proposed in the Draft Final SGAL Memorandum, the COC selection process documented in the GWTS is more conservative than the approach outlined in the SGAL Memorandum. Also worth noting is that the soil vapor risk assessment demonstrated the absence of

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				unacceptable risks following remediation efforts. No changes are proposed in response to this comment.
19	N/A	Figure 12	Interpreted contour lines should not be extended into the Bay.	The contour lines on Figure 12 have been revised per the comment.

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Minor Comments

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1	ES-3, line 3	Executive Summary	Insert "to" between "conducted" and "aid".	Text modified as noted.
2	ES-5, line 7	Executive Summary	Please consider replacing "Footage" with "a few feet of."	Text has been modified as follows: "ZVI injections were performed near buried underground utilities…"
3	1, second paragraph, second line	1	Suggest adding an "s" to "VOC"	No change has been made to the document.
4	36, last paragraph, fifth line	2.2.2	Suggest "results" rather than "data".	Text modified as noted.
5	43, first bullet, first line	2.2.3.3	Suggest inserting "planned" after "10".	Text modified as noted.
6	43, second bullet, third line	2.2.3.3	Suggest inserting "interpreted" before "size".	Text modified as noted.
7	73, definition of factor B	3.1.1	Suggest "or" instead of "and", i.e., "Week 12 or Week 18".	Text modified as noted.
8	89, second bullet, last line	4.0	Should the reference be to IR-09 and not IR-33?	Correct. Text has been modified to read "…at any sampling location within IR-09 North".

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Comments from: Ryan Miya, State of California Department of Toxic Substances Control (DTSC). Comments received February 25, 2010.

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1			We would like to reiterate our request provided in comments #34(a) and #34(b) requesting inclusion of well IR09MW45F (in IR-09) for TCE and well IR71MW32 (in IR-71) for chloroform in the monitoring program to verify that TCE in IR-09 and chloroform in IR-71 migration has not and will not occur. I understand that historic groundwater monitoring data has indicated that the plumes are stable and are most likely even decreasing as a result of the implemented treatability study. However, due to the increased TCE and chloroform soil gas concentrations observed after the injections (TCE at IR09SV28, and chloroform at IR71SV25-2-1), we would like to have downgradient monitoring wells from these locations included in the post-injection monitoring program as additional verification that TCE and chloroform are no longer an issue.	A revision to the original responses to comments 34a and 34b (See Appendix J) is provided below: 34a. It should be noted that groundwater monitoring well IR09MW45F in IR-09 has been decommissioned; however, the proposed monitoring network is considered adequate to assess long-term trends in TCE concentrations in groundwater at IR09. The basis for this determination is discussed in the first paragraph of Section 2.2.3.2. Specifically, historical groundwater monitoring data, data collected during pre-injection sampling events in June and July 2008, and data collected during the supplemental BGMP monitoring program indicate that the TCE plume in IR-09 North was relatively stable. TCE concentrations in groundwater in the source well (IR09MW51F) declined, and TCE either was not detected or detected at low concentrations only in multiple surrounding wells (including IR09MW45F). Therefore, the TCE groundwater plume boundaries are considered either stable or shrinking in size based on the declining TCE groundwater concentration trends. It should also be noted that a parcel-wide soil vapor survey will be conducted, which will include a soil vapor sampling point to be co-located with former soil vapor probe IR09SV28. Soil vapor sampling during the base wide soil vapor survey from a soil vapor probe co-located

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				with IR09SV should further help to confirm TCE plume stability. Any soil vapor results in excess of their respective soil gas action levels (SGALs) then will be further evaluated at the conclusion of the basewide soil vapor survey. This additional evaluation may include revision of the SVRA based on soil vapor detections of chemicals exceeding SGALs, which may be conducted under the base wide soil vapor survey project. The text of Section 4.0 has not been revised in response to this comment. 34b. Groundwater monitoring wells IR71MW22A and IR71MW24A are at appropriate locations to monitor changes in the IR-71 West chloroform plume and no additional well installation is recommended, including monitoring well IR71MW32 which has been decommissioned. This conclusion is based on the fact that VOCs have not been detected at IR71MW32A during the four sampling events conducted since the well was installed. As discussed in the response to DTSC Specific Comment No. 33, post-injection Hydropunch® borings located immediately next to IR71SV25-2-1 have shown substantial VOC concentration declines in groundwater after the ZVI injections. As indicated in the response to comment 34a, a parcel-wide soil vapor survey will be conducted,

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				which will include soil vapor sampling point to be co-located with former soil vapor probe IR71SV25-2-1. Soil vapor sampling during the base wide soil vapor survey from a soil vapor probe co-located with IR71SV25-2-1should further help to confirm chloroform plume stability. The soil vapor results in excess of their respective SGALs then will be further evaluated at the conclusion of the basewide soil vapor survey, including necessary revisions of the SVRA. The text of Section 4.0 has not been revised in response to this comment.

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Signature	Name	Title	Date
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Acronyms/Abbreviations:

BRAC = Base Realignment and Closure *CO = Contracting Officer* *NAVFAC SW = Naval Facilities Engineering Command SW* *RPM = Remedial Project Manager*
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