From: Ryan Miya
To: Macbeth, Tamzen W.
Subject: Fwd: EPA comments on the Draft Treatability Study Completion Report, Remedial Unit C-5, Building 134, Hunters Point naval Shipyard, San Francisco, CA
Date: Monday, November 14, 2011 2:33:47 PM

Tamzen,
Here are Craig's comments, as requested by Hamide. R

>>> <Cooper.Craig@epamail.epa.gov> 11/9/2011 6:32 PM >>>
Keith and Melanie - This email provides EPA's comments on the Navy's

Draft Treatability Study Completion Report, Remedial Unit-C5, Building

134, Hunters Point Shipyard, San Francisco, California, dated October
2011.

Please let me know if you have any questions concerning these comments.

Sincerely,
Craig Cooper
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GENERAL COMMENTS

1. Information to support dosing rates, mass loading, and radius of
influence (ROI) are not provided in the Draft Treatability Study
Completion Report, Remedial Unit-C5, Building 134, Hunters Point Shipyard
(Draft TS Completion Report). For example, Section 1.2.2.2 (TC1 and TC3
Hydraulic Fracturing with EHC?) indicates that dosing rates of 0.1 percent
(%) weight of EHC?/weight of soil within the dissolved phase plume and a
0.5-1% weight of EHC?/weight of soil in the source zone were used to
achieve a ROI of approximately 20 feet in the dissolved phase plume and

approximately 15 feet in the source zone; however, the text does not
indicate how it was determined that the proposed dosing rates would
achieve the desired ROIs. Further, the text does not clarify why these

dosing rates and ROIs were considered sufficient to address the source

area and dissolved phase plume. While it is understood that dosing rates,
mass loadings, and ROIs are assumptions which were assessed and
achieved/partially-achieved, please revise the TS Completion Report to

clarify how these TS parameters were established to ensure that future

full-scale applications are able to select appropriate values.

2. Design calculations are not provided and/or referenced. While several tables include the parameters used for the design calculations, the design calculations are not included in the Draft TS Completion Report. For example, Tables 2-15 (Heat Capacity) and 2-16 (Energy Calculations) provide an overview of the calculated heat capacity and energy demand for thermal treatment at Building 134; however, the calculations used to evaluate heat capacity and energy demand are not included and/or referenced. As a result, the values presented in the Draft TS Completion Report cannot be substantiated. Please revise the Draft TS Completion Report to provide and/or reference the design calculations used.

3. The Draft TS Completion Report does not substantiate deviations from typical groundwater parameter requirements. For example, Section 2.2.1.1.5 (Groundwater Monitoring Well Development) indicates that wells IR25MW65B and IR25MW66B were developed to 41 nephelometric turbidity units (NTUs) and 37 NTUs, respectively. However, no information is provided to clarify why groundwater turbidity did not meet the typical turbidity requirement of 10 NTUs in these wells. As a result, it is unclear if these deviations potentially impacted the TS. Please revise the Draft TS Completion Report to substantiate deviations from typical groundwater parameter requirements and clarify whether these deviations impacted the TS.

4. Key design considerations are not sufficiently presented in Section 5.2 (Lessons Learned) such that future full-scale applications can utilize the information determined during this TS. For example, the impact of permeability on the TS is not discussed. Section 3.3.3 (Achievement of TC3 Goals) indicates that due to field changes during the TS, injection wells were not installed at the fracture boring locations and there was no evaluation of increased permeability due to fracturing. Without an assessment of increased permeability, the full impact of the hydraulic fracturing cannot be evaluated or its influence quantified. It is also unclear if the decision to only use sand proppant at specified intervals to ensure that hydraulic conductivity in the A- and B-aquifers was successful without an assessment of overall permeability after the performance of the hydraulic fracturing. Please revise the Draft TS Completion Report to provide a list of key design considerations such that

future full-scale applications can utilize the information determined during this TS.

5. Section 3.3.3 (Achievement of TC3 Goals) does not indicate that

the technology to address chlorinated benzenes was modified from the approach proposed in the Final Work Plan, Groundwater Treatability Study
at Remedial Unit C-5, Building 134, Hunters Point Shipyard (the Work Plan). Section 3.3.3 indicates that due to observations during the TS

that indicated chlorinated benzenes were not being readily degraded to

benzene in the vicinity of wells IR25MW11A and IR25MW68A, benzene polishing with sulfate was not completed. Section 2.7 [Polishing in the
Dissolved Phase Plume (TC3)], which is cited for additional information,
clarifies that chlorinated benzenes were treated with LactOil? because of
the limited ability of sulfate to accelerate removal rates of the accumulated 1,4-DCB and chlorobenzene. The modified polishing step included injection of an electron donor amendment using injection wells in
a transect which traversed the plume between IR25MW68A and IR25MW11A to

drive conditions more anaerobic and facilitate reductive dechlorination.
Please revise Section 3.3.3 to clarify that the technology was modified

but the intent of the proposed approach was achieved and therefore, the

original goals were achieved.

6. Section 2.5.1.1 (Amendment Loading) states that EHC? amendment

dosing was weighted based on data from successful bench, pilot and field
scale studies that have been conducted; however, specific information explain how this was done was not provided in the Draft TS Completion Report. For example, it is unclear if the geology and hydrogeology at the
study areas are appropriate for comparison to conditions at Remedial Unit
(RU)-C5. Please revise the Draft TS Completion Report to explain how the
data obtained from the bench, pilot and field scale studies was applied to
RU-C5.

7. The use of sand as a proppant to increase the hydraulic conductivity within the A- and B-aquifers to facilitate additional injections is inconsistently discussed. For example, Section 2.5.2.1 (Fracture Boring Installation) indicates that EHC and sand were batch mixed using potable water, enzyme breaker, and a guar polymer to produce
the fracture slurry. Similarly, Section 2.5.1.2 (Amendment Distribution
with Hydraulic Fracturing) indicates that ?the design specified the intervals for sand emplacement to ensure that cross-communication

between
the A- and B-aquifers through the Bay Mud unit was unlikely. Within the
A-aquifer, sand proppant was emplaced at approximately 13-16 feet bgs in
PFW-2, -3, -4 and -6. Within the B-aquifer, sand was emplaced at
approximately 34-37 feet bgs at PFW-1, and at 27-33 feet bgs at PFW-2,

-3 and -4 (Table 2-13).? However, Section 2.5.1.2 also states that,
?The fracture fluid design specified that the injected fluid consist only
of EHC and drilling fluids (i.e., no sand).? Please revise the Draft TS
Completion Report to clarify why sand was utilized in the fracture slurry
when section 2.5.1.2 indicates that the fracture fluid design specified no
sand.

8. Several monitoring locations were not be sampled during the TS;

however, the text does not clearly indicate why these locations could not
be sampled. For example, Section 3.1.1.1.2 (Evaluation of Radius of
Influence and EHC Loading) states that IR25MW64A could not be sampled
during TC2 operation. While Section 2.6.6.1.1 (Performance Monitoring

Rounds) indicates that IR25MW64A was not sampled due to a steam pocket,

Section 3.1.1.1.2 does not indicate why the sample could not be collected
or discuss the potential impact on evaluation of the TS. For clarify and
transparency, please revise the Draft TS Completion Report to include why
monitoring locations could not be sampled in the sections where they are
discussed and clarify whether the lack of data impacted the evaluation of
the TS.

9. While daylighting/venting are discussed in Section 2.5.2.2
(Amendment Injection), excessive surface heaving, and short circuiting are
not. As such, it is unclear how excessive surface heaving and short
circuiting impacted the TS and can be prevented in future TSs or during

full-scale implementation. Please revise the Draft TS Completion Report
to include a discussion of the excessive surface heaving and short
circuiting noted in Appendix H (Hydraulic Fracturing Report from
FracRite).

10. Information to document the changes made to the post-treatment

sampling plan are not provided in Section 2.5.3.2 (Groundwater Performance
Monitoring). While the changes were agreed upon by the Base Realignment
and Closure (BRAC) Cleanup Team (BCT), justification to support these

changes should be provided. For clarity and transparency, please revise
the Draft TS Completion Report to document information to support the changes made to the post-treatment sampling plan.

11. It is unclear how decommissioned wells and borings within the treatment component (TC) areas impacted the TS. For example, Section 2.6.2.1 (Well Decommissioning) indicates that 13 monitoring wells and three soil vapor wells were decommissioned prior to thermal conduction

heating (TCH). As a result, it is unclear if these decommissioned locations impacted the uniformity and distribution of heating throughout
the treatment units. Please revise the Draft TS Completion Report to discuss if/how decommissioned wells and borings within the TC areas impacted the TS.

12. The impact of elevated baseline conditions for methane and stimulated biological production of methane gas is not sufficiently discussed in the Draft TS Completion Report. Based on Sections 3.1.1.2.2
(Redox Conditions) and 3.3.1.2.2 (Redox Conditions), methane concentrations increased in groundwater at all TC1 and TC3 monitoring wells, fluctuated during TC2 operations, and remained elevated above baseline conditions at the end of the TS. While Section 5.2.2.4 (Presence
of Flammable Gases) indicates that the production of methane was likely

caused by the EHC placed within the heated zone, the text does not discuss
whether elevated baseline concentrations of methane adversely or beneficially impacted the TS. Please revise the Draft TS Completion Report to discuss the impact of elevated baseline conditions and stimulated biological production of methane gas on the TS, including whether the impact was beneficial or not.

13. Based on Figure 3-7 (Estimated Mass Removal Rate), it is unclear
if the use of a photoionization detector (PID) is appropriate to estimate
the total chemical mass in the vapor stream, as compared to analytical

laboratory results. Although Section 3.2.1.2 (Contaminant Extraction Rates) indicates that PID readings, analytical laboratory results, and

system vapor flow rates were used to calculate a site specific correlation
factor to convert the PID readings to a mass per volume concentrations,

the vapor mass removal rate (based on PID) compared to vapor mass removal
rate (based on lab) lines presented on Figure 3-7 do not appear to correlate. Please revise the Draft TS Completion Report to clarify how

the use of a PID is appropriate to estimate the total chemical mass in the
vapor stream, as compared to analytical laboratory results.

14. The length of time cement and grout were allowed to cure and the

bentonite chips were allowed to hydrate is not specified in the Draft TS
Completion Report. For example, Section 2.2.1.1.3 (Well Construction)

indicates that the bentonite chips were allowed to hydrate before grout

was installed; however, the text does not indicate how long the bentonite
chips were allowed to hydrate to ensure standard operating procedures
(SOPs) were followed. Please revise the Draft TS Completion Report to

specify the amount of time cement and grout were allowed to cure and the
bentonite chips were allowed to hydrate.

SPECIFIC COMMENTS

1. Section 2.2.1.1.1, Groundwater Monitoring Well Construction, Page
2-4: The text indicates that four stainless steel groundwater monitoring
wells were installed in the source zone and references Figure 2-3
(Monitoring Well, Soil Vapor Sample, and Soil Boring Locations); however,
Figure 2-3 does not identify the source area. As such, it is unclear if
the four stainless steel groundwater monitoring wells were installed in

the source zone. Please revise Figure 2-3 to include the inferred limits
of the source zone and dissolved phase plume.
2. Section 2.4.6.1, MVS-Modeled Contaminant Mass, Page 2-22:
Information to clarify why the use of 1x10-2 micrograms per liter (ug/L)
for non-detect values does not bias the Mining Visualization Software
(MVS) Model is not provided. The text states that, ?Non-detect values

were entered into the MVS software as 1x10-2 ug/l. While this may bias

the individual estimate high, since a value was assigned at the boundary,
the bias is insignificant.? Please revise the Draft TS Completion Report
to clarify why bias caused by the use of 1x10-2 ug/L for non-detect values
in the MVS Model is insignificant.

3. Section 2.5.2.1, Fracture Boring Installation, Page 2-26: The

text indicates that significant adjustments to the vertical intervals that
were fractures were made due to significant surfacing of the fracture
fluids; however, the adjustments are not specified. As such, it is
unclear what adjustments were made and what lessons can be learned for

future TSs. Please revise the Draft TS Completion Report to clarify what
significant adjustments to the vertical intervals that were fractures were

made due to significant surfacing of the fracture fluids.

4. Section 2.6.3.1.4, Horizontal VEWs, Page 2-41: While a surface cover and insulation were installed, it is unclear if annular space was created above the horizontal vapor extraction well (VEW) locations due to the use of recycled concrete between the sand pack and ground surface. The last sentence of Section 2.6.3.1.4 states that, ?The space above the sand pack was then filled with recycled concrete to ground surface.? No information on the average grain size of the recycled concrete which was used is provided. Please revise the Draft TS Completion Report to clarify whether the use of recycled concrete created annular space between the sand pack and ground surface that could have impacted the TS and any quality control conditions which were applied to the recycled concrete.

5. Section 4.1, Deviations from Work Plan, Page 4-2: The text states that packers were not necessary for hydraulic fracturing and that this deviation had no bearing on the TS results; however, the text does not indicate why this deviation occurred or how it was determined that this adjustment had no impact on the TS results. Thus, it is unclear if this deviation was necessary and how or if it impacted the TS. Please ensure that the cause of each design deviation is documented along with the justification for all deviations discussed in the text.

6. Section 4.1, Deviations from Work Plan, Page 4-3: The text indicates that soil sample 25SS42-0710 was not analyzed for total petroleum hydrocarbons (TPH)-purgeable; however, the text does not indicate why this analysis was not done. As such, it is unclear if it was an error by the sampler or an issue with the soil sample. Please revise the Draft TS Completion Report to provide the reasoning behind all deviations from the work plan.

7. Section 5.2, Lessons Learned, Pages 5-7 and 5-8: The text does not draw conclusions or provide recommendations based on some of the noted problems. For example, since infiltrating shallow groundwater quenched temperatures, minimizing this potential by conducting thermal treating during the dry season should be recommended. Similarly, to minimize the potential for production of flammable gases, it might be better to conduct

thermal heating before EHC? is emplaced. Please consider each problem or
issue that was encountered during the TS and provide
recommendations/lessons learned for each situation.

8. Section 5.2.2.1, Corrosion of Heater Casings, Page 5-7: The issue
regarding corrosion of heater casings is first presented in the Lessons

Learned Section (Section 5.2) and it is unclear how this was discovered.
The discovery of corrosion should be discussed in an earlier section
(i.e., in Section 3, Technology Evaluation), including how the corrosion
was discovered. Please discuss the corrosion of heater casings in Section
3, including how this was discovered.

9. Section 5.3, Recommendations and Integration with BGMP, Page 5-8:
The recommendations for future monitoring do not include rebound
monitoring. Rebound monitoring should be conducted after the TCH polish
and LactOil polish monitoring is complete and should be conducted in other
areas where contaminant concentration could rebound after injected
substrates have been consumed. For example, volatile organic compound

(VOC) concentrations should be monitored in wells like IR25MW16A. Please
review the recommendations and include recommendations for rebound
monitoring.

10. Figure 2-26, Well Construction Details for TCH Heater Borings and
Vertical Vapor Extraction Wells and Figure 2-27, Well Construction Details
for Temperature and Pressure Monitoring Wells and Horizontal SVE Wells:

The specifications for grout and sand utilized for the TCH heater borings,
vertical VEWs, temperature and pressure monitoring wells, and horizontal
soil vapor extraction (SVE) wells are not included on Figures 2-26 and

2-27. For example, Section 2.6.3.1.3 (Vertical VEWs) indicates that #0

sand (e.g., U.S. Silica FillPro Well Gravel #0 or equivalent) was utilized
for the sand pack in the vertical VEWs. Please revise Figures 2-26 and

2-27 to specify the grout and sand utilized for the TCH heater borings,

vertical vapor extraction wells, temperature and pressure monitoring
wells, and horizontal SVE wells.

11. Figure 2-30, Mechanical Layout Plan: Figure 2-30 indicates that
the process equipment outside Building 134 was surrounded by secondary

containment (i.e., 12 foot by 25 foot spill berm); however, secondary containment is not visible in Figure 2-31 [Completed TCH System (outside
of Building 134)]. Thus it is unclear if secondary contaminant was constructed around the process equipment. Please revise the Draft TS Completion Report to clarify whether secondary containment was in place

around the process equipment.

MINOR COMMENT

1. Figure 2-32, Influent and Effluent to the Vapor Treatment System
PID Readings and Corresponding DRE: The x-axis is not labeled in Figure
2-32. Please revise Figure 2-32 to indicate that the x-axis represents

the date.