# Responses to Comments
# Draft Feasibility Study Report for Site 21
# St. Juliens Creek Annex
# Chesapeake, Virginia

PREPARED FOR: Walt Bell, NAVFAC Mid-Atlantic
Tim Reisch, NAVFAC Mid-Atlantic
John Burchette, EPA Region III
Karen Doran, VDEQ

PREPARED BY: CH2M HILL

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## Comments from EPA, provided 4 November 08.
## RPM Comments

1. ***Comment:*** *Alternative 3.* Under Alternative 3, the opening paragraph states that, "Implementation of this remedial alternative will likely require more than one round of treatment, especially within the high concentration zone." However, when reviewing the description of the treatment in the high concentration zone the FS states on page 4-6, "One injection round of ZVI is assumed to be sufficient to reduce contaminant concentrations to less than 1,000 ug/l." These statements do not appear to be consistent with one another. Please provide evidence/ research (supporting either a single or multiple injections) and revise theses statements to correspond with one another. Additionally, please consider how the number of injections will affect the cost.

   **Response:** The text will be clarified. One round of ZVI is assumed to be sufficient to reduce contaminant concentrations to less than 1,000 ug/L in the high concentration zones as a result of the relatively long expected life of ZVI in the subsurface. The following reference provides a case study that indicates that one injection round of ZVI may be sufficient for this reduction in concentration: http://arstechnologies.com/cal003_pneumatic_fracturing_ferox.html.
   If the ZVI injection reduces concentrations to below 1,000 ug/L but does not achieve the PRGs, one follow-up injection within that area with EVO is then assumed to be sufficient to achieve the PRGs based on results of the following case study: http://costperformance.org/profile.cfm?ID=411&CaseID=409. The actual number of injections that will be necessary to achieve the PRGs is not known, and will be determined based on the results of the groundwater performance monitoring.

2. ***Comment:*** *4.3.3, Dehalococcoides gene analysis to prevent complications with ERD.* EPA suggests a gene analysis is done on the dehalococcoides at the site to

determine if the current population has the Vinyl Chloride Reductase gene. This gene is necessary for the complete degradation of CVOC's. Not doing so may result in a population without the gene causing stall-out at Vinyl Chloride.

**Response:** *Dehalococcoides* (DHC) gene analysis was conducted during the Remedial Investigation. Groundwater from four monitoring wells (SJS21-MW02S, -MW07S, -MW12S, and -MW13S) within the shallow CVOC groundwater plume were sampled for DHC deoxyribonucleic acid (DNA) BAV1, 195, and FL2 functional genes analysis to evaluate the capability of the indigenous microbial community to break down TCE all the way to ethene. The functional genes were found to be present at three of the four wells sampled. Therefore, it was assumed that bioaugmentation will not be conducted as part of this remedy. Groundwater performance monitoring will be conducted and if it shows that VC is accumulating, then bioaugmentation may be considered in those areas. Additional text has been added to Section 4.3.3 to clarify.

3. ***Comment:*** *4.3.3. Alternative 3.* It had been discussed at various times that the Navy would not necessarily be comfortable drilling a significant number of points through the slabs of the Site 21 buildings. However, figures 4-3 and 4-4 both show a significant number of the injection points within the footprint of the buildings at the site. Please explain if installing these points is the approach the Navy is willing to take. If other remedial alternatives are being considered in these areas, please evaluate them in the FS.

   **Response:** As indicated in the text, the injection layout shown on Figures 4-3 and 4-4 is conceptual and does not consider buildings or utilities. The Remedial Design will give proper consideration to these features and determine the actual injection point layout. The conceptual simplification is appropriate for the evaluation of a remedy at the Feasibility Study phase, and does not unduly discount or reject any particular remedy that may be better suited near utilities or beneath buildings.

4. ***Comment****: 4.3.4. ISCO and ISCR in high concentration areas.* The FS states, "Once the concentrations of all COC's have been reduced to less than 1,000 ug/l for a sufficient period that it is apparent that rebound is not occurring" we will transition to the low-zone treatment approach. Please provide a more descriptive timeframe than a "sufficient period" and what would be done if rebound is found to be occurring or state this will be addressed in the RD.

   **Response:** This will be evaluated as part of the Remedial Design. A statement reflecting that details of the technology transition and monitoring will be addressed during the Remedial Design will be added.

5. ***Comment:*** *Table 5-1 Action 1 Long-Term Effectiveness & Permanence.* Please revise the sentence "…with no treatment or monitoring, uncertain if/when". Additionally please revise the descriptions of alternative 1 and 2 to match more closely (i.e. alternative 1, "suggests limited reductive dechlorination of VOC's is occurring naturally". Alternative 2, "suggests reductive dechlorination of

VOC's".) Since neither remedy is active, please add "limited" to the description of alternative 2.

**Response:** The sentence "…with no treatment or monitoring, uncertain if/when" has been revised to "….with no treatment or monitoring, *it is* uncertain if/when…". The word "limited" as been removed from the Long-Term Effectiveness and Permanence text for Alternative 1. Although the remedy is not active, there are no known factors limiting the natural degradation.

6. ***Comment:*** *Table 5-2 Reduction of Toxicity, Mobility, & Volume through Treatment.* Neither the no action alternative, nor the MNA alternative, provides treatment. Please explain why they would not be ranked with the same value, or revise these values to match one another.

   **Response:** As indicated in Section 5.2.4, although Alternative 2 does not provide active treatment, which is the statutory preference, the natural reduction of contaminant concentrations is expected over time. Because the natural reduction of contaminants will be monitored under Alternative 2, but not under Alternative 1, Alternative 2 received a higher score.

**Comments from EPA, provided 4 November 08.**
**Editorial Comments**

1. ***Comment:*** *Implementability.* Under no action, please remove the word so. Under ISCO final bullet, please remove the word so.

   **Response:** Under No Action, "so" has been removed and replaced by "; therefore". "so" has been removed under ISCO.

2. ***Comment:*** *Page 5-4 2nd Full paragraph, final sentence.* Please revise the sentence "Alternative 1 is serves".

   **Response:** The sentence has been revised.

3. ***Comment:*** *Section 5.2.2 Compliance with ARARs.* Please revise 1st sentence that currently reads, "Alternatives 2, 3, and 4 are expected to comply with ARARs" to, "Alternatives 2, 3, and 4".

   **Response:** The text has been changed as requested.

4. ***Comment:*** *Table A-3. Federal Executive Order 11900. Comments.* Please revise the comment to read, "A wetland is not present within Site 21."

   **Response:** The text has been changed as requested.

5. ***Comment:*** *Table A-4 Groundwater Management Act. Comments.* Please revise sentence to 300,000 instead of 300,00.

   **Response:** The text has been changed as requested.

6. ***Comment:*** *Table A-5 Format issues.* Some of the wording is cut off. Please fix borders.

   **Response:** The formatting has been corrected.

**Comments from EPA, provided 4 November 08.**
**Hydro Comments**

1. ***Comment:*** *Table 3-1.* I believe RBCs should be used for the PRGs.

   **Response:** No change has been made to Table 3-1. As described within the text, the table provides the PRGs, which have been established based on the MCLs. The EPA Region III RBCs, have been replaced by EPA region wide RSLs. Both the RBCs and RSLs are conservative screening levels used in human health risk assessment to select chemicals of potential concern for evaluation in the risk assessment and are not appropriate for establishing site-specific PRGs. The total risk level associated with the use of MCLs as the PRGs for TCE and vinyl chloride (the two carcinogenic COCs) falls within the acceptable range of $10^{-4}$ to $10^{-6}$. The total hazard level associated with the use of the MCL as the PRG for cis-1,2-DCE is below an HI of 1. Therefore, the use of MCLs as the PRGs will not result in risks levels above USEPA acceptable risk levels and use of MCLs as the PRGs is acceptable. The calculation of the risk and hazard levels for the MCLs will be incorporated into the FS.

2. ***Comment:*** *4.2, Screening of Remedial Technologies, p. 4-2.*

   1. I am unclear how O&M costs can "screen out" a technology and how this fits in with the regular costs.
   2. I do not disagree with the "carbon footprint" as noted here, but it should be clearly explained what is meant at the site by this term (electricity and/or energy costs, $CO_2$ emissions, water usage, etc). Additionally- what is the carbon footprint required to make permanganate, etc? Where does it come from?
   3. Please elaborate on how P&T is "inconsistent with Navy policy". This statement seems inconsistent with EPA Guidance.

   **Response:**

   1. In accordance with EPA Guidance for Conducting Remedial Investigations and Feasibility Studies (USEPA, 1998), "Information available at the time of screening should be used primarily to identify and distinguish any differences among the various alternatives to evaluate each alternative with respect to its effectiveness, implementability, and cost. Only alternatives judged as the best or most promising on the basis of these evaluation factors should be retained for further consideration and analysis." Therefore, high O&M cost can be used to screen out a technology, particularly for alternatives that are no more effective or implementable than other technologies with lower associated O&M cost.

2. The discussion of carbon footprint within this FS focuses on the lifecycle energy consumption during implementation and operation of the technologies. Although there is a carbon footprint associated with the earlier aspects of all of the technologies (e.g., production of permanganate, manufacturing of PVC for injection points, energy costs to transport materials and equipment to the site), it is difficult to quantify. Additionally, the carbon footprint resulting from the production processes for technologies such as ZVI and permanganate are generally similar and/or largely insignificant when compared to implementation and long-term operations, particularly for O&M intensive remedies such as pump-and-treat. Because there is general team consensus as to what remedy is appropriate for this site, further evaluation/quantification of the carbon footprint associated with the technologies considered is not recommended.
3. "Navy/Marine Corps Policy for Optimizing Remedial and Removal Actions Under the Environmental Restoration Program" (Ser N45C/N4U732343, 2004) cautions against the evaluation of any remedy that includes pump and treat as a component. Navy experience has shown that the use of pump and treat is generally ineffective in reaching final cleanup levels and often results in high operating and maintenance costs, and that these costs often continue to be incurred further into the future than anticipated. Navy policy requires approval from NAVFAC headquarters for the installation of a pump and treat system at any ER site. This Navy policy is consistent with EPA's technology primer, "Green Remediation: Incorporating sustainable Environmental Practices into Remediation of Contaminated Sites" (EPA, 2008).

3. ***Comment:*** *Alternative 2.* MNA-p. 4-4. Sampling frequency, as noted in the third paragraph, should be quarterly for at least 2 years.

   **Response:** Comment noted. A specific monitoring plan is outside of the scope of this FS and will be developed based on the selected alternative during the Remedial Design and the site-specific performance monitoring plan.

4. ***Comment: 4.3.4. ISCR and ERD p. 4-5, 2nd paragraph.*** I am unclear how the funding determines the sequencing/schedule. Please elaborate.

   **Response:** The effectiveness of the remedy is independent of sequencing. Therefore, whether to initially implement ISCR in the high-concentration zones and ERD in the low-concentration zone together or to initially only implement ISCR in the high-concentrations, followed by a site-wide application of ERD, will be determined based on when funding is available. No change has been made to the text.

**Comments from EPA, provided 17 November 08.**
**Toxicologist Comments**

1. ***Comment:*** Arsenic concentrations will be high until remediation is complete. With this mind, EPA believes arsenic should be retained as a COC for groundwater. At minimum, arsenic should not be ruled out based on CERCLA petroleum exclusion as stated in Section 2.3, Human Health Risk Assessment.

   **Response:** Based on data collected to-date, arsenic is not a site-related COCs. Arsenic monitoring will be conducted during the performance monitoring if an alternative is selected that relies on reducing conditions which may mobilize naturally occurring arsenic. The monitoring plan will be developed during the Remedial Design.

2. ***Comment:*** *Table 3-1*. Please keep in mind, MCL's alone may not be protective of cumulative risk and thus when remediation is complete, a final risk assessment will be performed to determine if cumulative risk is within EPA's acceptable benchmark criterion.

   **Response:** As discussed in the response to Hydro Comment 1, the total risk level associated with the use of MCLs as the PRGs for TCE and vinyl chloride falls within the acceptable range of $10^{-4}$ to $10^{-6}$. The hazard level associated with the use of the MCL as the PRG for cis-1,2-DCE is below the acceptable HI of 1. Therefore, the use of MCLs as the PRGs is appropriate, and achieving the MCLs will be protective of cumulative risk. The calculation of the risk and hazard levels for the MCLs will be incporporated into the FS.

**Comments from VDEQ, provided 12 November 08.**
**Typographical Comments**

1. ***Comment:*** *Page 4-7, second paragraph.* Replace "principal" with "principle".

   **Response:** The text has been changed as requested.

2. ***Comment:*** *Page 5-5, first paragraph, last sentence.* Should "Alternative 4" actually be "Alternative 3"?

   **Response:** The text has been changed to refer to Alternative 3.

**Technical Comments**

3. ***Comment:*** *Page 4-6, second full paragraph, second sentence.* Please provide supporting evidence that only one round of injections in the high concentration areas is needed to achieve <1,000 ug/L, i.e., case studies.

   **Response:** See response to EPA RPM Comment #1.

4. ***Comment: Page 4-8, first full paragraph, first sentence.*** Please provide supporting evidence that only one round of injections in the low concentration areas is needed to achieve <MCLs, i.e., case studies.

**Response:** See response to EPA RPM Comment #1.

5. ***Comment: Figure 4-3 & 4-4.*** As previously discussed by the partnering team, injection points within the buildings may affect vapor intrusion at the site, please discuss how the chosen alternative will address this issue.

   **Response:** See response to EPA RPM Comment #3. The potential for vapor intrusion will be evaluated and considered during the Remedial Design.

**Comments from VDEQ, provided 2 December 08.**
**ARARs Comments**

1. ***Comment: Table A-2*** – the Virginia Water Quality Standards (WQS) should be applicable. Since the contamination extends into an adjacent surface water body, the remedy should ensure that contaminant levels remain below the WQS.

   **Response:** The CVOC plume at Site 21 does not extend to an adjacent water body. The storm sewer passing through the CVOC plume was identified in the RI as a potential transport mechanism for CVOCs in shallow groundwater to reach the Site 2 inlet because a storm sewer survey identified light to moderate damage within the storm sewer system, allowing some infiltration of groundwater into the storm sewer line. CVOCs were detected in surface water at the outfall of the storm sewer system. However, the storm sewer outfall discharges to a surface water body located within the boundary of Site 2, at which a higher concentration CVOC shallow groundwater plume has been identified and is discharging to the same surface water body. Based on the conclusions of the Site 21 RI report, no further action was determined to be necessary for surface water under Site 21 because the surface water is being evaluated and addressed as part of Site 2. Therefore, the Virginia WQS should be "not applicable" for Site 21, but "applicable" for Site 2.

**Comments from EPA, provided 9 December 08.**
**General Comment**

1. ***Comment:*** EPA is concerned with arsenic not being included as a COC and only monitored during the RD. Although the cumulative MCL risk from VC and TCE are within the risk arrange, the mobilization of arsenic will undoubtedly occur during the active remedy at Site 21. Thus the addition of arsenic may cumulatively present additional carcinogenic risk outside of the acceptable range. By not including arsenic, the cumulative carcinogenic risk contributed by arsenic is not being accounted and thus carcinogenic risk contributed by arsenic would remain in the groundwater.

   **Response:** Although arsenic was a contributor to the cumulative risk in the HHRA, it was concluded in the Site 21 RI Report (CH2M HILL, 2008) that it is naturally occurring and not a site-related contaminant. Arsenic commonly occurs as natural mineral coatings of the sand and gravel in the aquifer. Remediation of naturally occurring substances is not required under CERCLA [42 USC 9604 (a)

(3) (a)]. Because arsenic was a contributor to the cumulative risk in the HHRA, it will continue to be a contributor during remediation, but will still not be a result of a CERCLA release. The fact that naturally occurring arsenic may be mobilized was evaluated as short-term effectiveness in the FS, which considers environmental impacts from the remedy. The evaluation acknowledges that naturally occurring arsenic may be mobilized, but it is not expected to be very mobile and to stabilize over time, and arsenic monitoring will be conducted to confirm. The monitoring plan, including duration and frequency of monitoring and contingencies for addressing any adverse effects, will be developed during the Remedial Design. Exposure to the groundwater will be prevented through the LUCs that will be implemented at the site to prevent exposure to site COCs until the RAOs are achieved.