



DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
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Ms. Christine Williams
U.S. Environmental Protection Agency, Region I
1 Congress Street Suite 1100 (HBT)
Boston, MA 02114-2023

SUBJECT: RESPONSES TO COMMENTS - DRAFT INTERIM GROUNDWATER
SAMPLING EVENT 04 RESULTS REPORT, INSTALLATION
RESTORATION SITE 03, FORMER NAVAL CONSTRUCTION BATTALION
CENTER DAVISVILLE, RI

Dear Ms. Williams:

The Navy's responses to EPA comments on the subject document are provided as enclosure (1). Four copies of the response to comments (RTCs) are provided.

Most of the comments provided by EPA on the source document were geological and hydrogeological in nature. EPA emphasized these comments on both a macro and micro-scale to suggest possible modifications to the conceptual site model for Site 03 and the surrounding areas. It should be noted that while the Navy appreciates these efforts made by the EPA, the Navy implemented the interim groundwater sampling program in 2001 to collect groundwater analytical data from the deep overburden aquifer to help support the Feasibility Study for Study Areas 01 and 04 and Sites 02 and 03. Groundwater sampling results are presented annually in a data package style report, as outlined by Work Plan Addendum No. 2 (EA, November 2001). The intent of the interim sampling reports is strictly discussion of the field work performed and presentation of the groundwater sampling results. Only limited interpretations of various data sets are performed. Therefore, continual re-assessment and refinement of the conceptual site model based on new information collected during each round of annual sampling is not part of the interim groundwater sampling program. The Navy will perform a comprehensive evaluation, utilizing all of the available data, at the appropriate time to support remedial decisions at the Site 03 area.

The Navy is in receipt of your 7 August 2006 letter regarding discussions at the 8 June 2006 BCT meeting about

discontinuing the interim groundwater sampling program at Site 03. The Navy is currently in the process of re-evaluating the need to continue interim groundwater sampling at this site. Since the June meeting, we have been advised that the Army Corps of Engineers is planning a comprehensive groundwater level measurement and sampling round in the former PR-58 Nike/Site 03 area to support the Remedial Investigation (RI) for the PR-58 Nike Site. Therefore, the Navy has decided to extend the interim groundwater sampling program for one more sampling round and have it coincide with the Army Corps field effort in order to obtain a comprehensive data set for Site 03 and the surrounding area. The data collected during these field events (both the Army Corp of Engineers and the Navy) and previous Site 03 sampling results will be used to refine the conceptual site model at Site 03 and the surrounding area. Furthermore, it will enable an evaluation of any potential impacts to the Site 03 area from the Steam Enhanced Remediation Pilot Test performed at the PR-58 Nike Site.

The Navy will also take this opportunity to collect groundwater elevation measurements from selected monitoring wells at Site 16 so that a comprehensive groundwater surface contour map can be developed covering the area between the PR-58 Nike Site and Site 16 (including the Site 03 area). This data will be used to support the RI for Site 16 and to provide further data with which to address the presence or absence of a connection between the PR-58 Nike Site contamination and Site 16.

If you have any questions, please do not hesitate to contact the Remedial Project Manager, Mr. Curt Frye, at 215-897-4914.

Sincerely,



Dave Barney
BRAC Environmental Coordinator

Enclosure:

1. Responses to EPA Comments, Draft IGWSE 04 (June 2005) Results Report, Site 03 - Construction Equipment Department, Former NCBC Davisville, May 2006 (EPA comments dated 6 June 2006)

Copy to:

Mr. Curt Frye, NAVFAC Midlant
Mr. Louis Maccarone, RIDEM

Mr. Rich Gottlieb, RIDEM
Ms. Maryellen Iorio, USACE
Ms. Kathleen Campbell, CDW Consultants
Mr. Steven King, QDC
Mr. Jon Reiner, Town of North Kingstown
Ms. Lee Ann Sinagoga, TtNUS Pittsburgh
Mr. Stephen Vetere, TtNUS Boston

ENCLOSURE 1

NAVY RESPONSES TO EPA COMMENTS

**RESPONSE TO EPA COMMENTS (DATED JUNE 06, 2006) ON
INTERIM GROUNDWATER SAMPLING EVENT (IGWSE) 04 –
JUNE 2005 RESULTS REPORT
SITE 03: CONSTRUCTION EQUIPMENT DEPARTMENT
FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND**

INTRODUCTION (GENERAL RESPONSE)

A large amount of environmental and hydrogeologic data and information regarding Site 03 and the former PR-58 Nike Site have been collected by the U.S. Navy (Navy) and Army Corps of Engineers (USACE) over the past 25 years. Four comprehensive reports have been prepared for Site 03 and the former PR-58 Nike Site:

- Revised Draft Final, Study Areas 01 and 04 and IR Program Sites 02 and 03, Phase III Comprehensive Remedial Investigation (EA Engineering Science and Technology, Inc. [EA], 1998)
- Draft Final Feasibility Study, Study Area 01 - CED Drum Storage Area, Site 02 - CED Battery Acid Disposal Area, Site 03 – CED Solvent Disposal Area, Study Area 04 – CED Asphalt Disposal Area, Naval Construction Battalion Center, Davisville, Rhode Island (EA, August 2000)
- Draft Report, Characterization of CVOC Contamination at the Former PR-58 Nike Site and Adjacent Navy NCBC Davisville Site 03, North Kingstown, RI (EA, February 2001)
- Draft, Steam Enhanced Remediation Pilot Test, Former PR-58 Nike Site, North Kingstown, Rhode Island (EA, May 2006)

In each of these reports, the hydrogeologic conditions, flow directions, nature and extent of contamination, and attenuation mechanisms have been described, and conceptual site models have been presented. For example, the latest report (SER Pilot Test Report, EA, May 2006) has one chapter (Chapter 4) devoted to “Site History and Conceptual Site Model for CVOC Plume in Deep Groundwater.”

The Navy prepared a draft final Feasibility Study (FS) for Site 03 in August 2000. In order to complete the FS, the Navy agreed to conduct additional monitoring of the deep CVOC plume at Site 03. Three annual monitoring events were performed previously, and results reports were prepared and submitted to the EPA for review and comment. The results of the fourth event are presented in the document currently being reviewed by the EPA. None of the data collected to date during this interim groundwater monitoring program appears to contradict the conceptual model presented in the earlier reports cited above.

For the next sampling event (Event No. 5), the Navy is planning to coordinate with the USACE so that the sampling at Site 03 will be performed concurrently with sampling of the PR-58 Nike Site and off-site wells. In addition, the Navy would like to measure groundwater elevations and possibly collect groundwater samples from select wells at Site 16 within the same general time frame. This will result in a comprehensive and up-to-date set of groundwater elevation measurements and water quality data for the entire area encompassing the Nike Site, Site 03, Site 16, and off-site wells located to the north of the Nike Site. The Navy and USACE will use this data set to further refine the conceptual model for the CVOC plumes, the contaminant sources, and attenuation processes. Once this task is completed, the Navy will formulate a path forward for Site 03 and present it to the BCT for review.

The general comments contained in the EPA review letter are not numbered. In order to address these comments, the Navy has taken the liberty to number each paragraph and respond to the general comments contained in the letter on a paragraph-by-paragraph basis.

GENERAL COMMENTS:

1. *The major observation is that there remains a lack of an effective conceptual site model for the Site 03 and peripheral areas. To date, data has been collected and reported, with no comprehensive assessment of what the data implies. This is not to say that definitive conclusions should be made at this time; however, interpretation of the data as it becomes available would be beneficial in making adjustments to the monitoring program and tying the observed data into a better picture of site wide hydrogeology and potential contaminant fate and transport. This is related to both Site 03 specific source areas and fate and transport, but also adjacent sites including the up gradient former Nike PR-58 site and the down gradient Site 16 area.*

Response: Please refer to the introduction/general response.

2. *Also, inspection of the overburden and bedrock groundwater contours continues to show that the predominant direction of groundwater flow is to the southeast toward Site 16. The origin of up gradient Site 03 groundwater appears to be from two areas, one from the northwest and one from the west. The northwest area appears to be in the proximity of the disposal area just west of MW-Z3-01 and near EA-104 (not shown on figures in this report). The west area appears to be the vicinity of MW03-14D/R/R2. Thus, if the Site 03 Study Area boundaries (as designated) are not source areas, then these two alternative locations are likely sources. The groundwater flow directions presented suggest that any contaminants released in these areas have the potential to already, or in the future, migrate through and/or to the Site 16 area.*

Response: Please refer to the introduction/general response.

3. *While a formal statistical analysis was not conducted on the data presented, review of the data (Figures 7 and 8) from several of the monitoring wells within the Site 03 boundary area suggest that concentrations of chlorinated volatile organic compounds (CVOC) in the deep overburden groundwater appear to be declining at the western up gradient area (MW03-08D and MW03-10D) and increasing at the northwest up gradient area (MW-Z3-01 and MW03-09D). Concentrations of CVOC in several down gradient locations (MW02-03D, MW02-08D, and MW02-11D) appear to be increasing. This assessment was based upon inspection of the presentation of the seven or eight rounds of data from 1995 to 2005. An increase in concentrations can also be inferred for monitoring well EA-111D for the six rounds of data collected. There is insufficient bedrock groundwater data for this evaluation, however, both in terms of the number of samples collected to date, and the number and locations of bedrock monitoring wells, to make similar observations.*

Response: Please refer to the introduction/general response.

4. **Potential Northwest Source Area**

It is not clear where the observed CVOC is originating from or where it is migrating to. While the down gradient, deep overburden groundwater does appear to be increasing in CVOC concentrations, the concentrations of CVOC are approximately 25 to 50 micrograms per liter ($\mu\text{g/L}$). At the MW01-14D location the concentrations are in the single digit range. Reverse path analysis of the deep groundwater flow from inspection of Figure 3A suggests that the origin of the CVOC for these monitoring wells may be in the vicinity of MW-Z3-01. Assuming that the average concentrations of CVOC in this well (750 $\mu\text{g/L}$) are representative of the CVOC concentrations for the origin for the observed down gradient deep overburden groundwater CVOC, there is a decline of approximately 95% CVOC concentrations. This seems unlikely given the travel times and difficulty of biodegradation of CVOC in groundwater.

Response: Please refer to the introduction/general response.

5. *Further, the two up gradient wells (MW-Z3-01 and MW03-09D) to the northwest appear to show increasing CVOC trends based on seven sampling events while one well, MW03-03D, located*

between the two up gradient wells and the down gradient wells with increasing CVOC concentrations, shows a declining trend for eight sampling events. It is not entirely clear what are the mechanisms for observed changes in CVOC concentrations along this pathway. The increases in concentrations of CVOC at the two locations relative to the decline at down gradient MW03-03D well may indicate pulses of CVOC release from the northwest area based upon fluctuations in groundwater elevation, changes in infiltration through overlying waste material, etc.

On the other hand, review of the available hydraulic conductivity values for deep overburden site wells along this pathway combined with the hydraulic gradient provided in this report combined with likely effective porosities for site soils suggests that the increase in CVOC noted in wells around Building 224 most likely did not have sufficient travel time to migrate from the far northwest corner of the Site 03 area.

Response: The Navy does not believe that monitoring wells MW-Z3-01 or MW03-09D are directly upgradient of MW03-03D. Groundwater flow past these two wells is migrating due eastward or northeastward. Flow pathlines should become much clearer once a comprehensive set of groundwater elevations are measured in the near future. Also, please refer to the introduction/general response.

- 6. The source for this increase in CVOC concentrations appears to be in the formal Study Site 03 designated area shown on Figure 2, or possibly the eastern end of the Study Site 04 area. Nonetheless, there still appears to be a source area to the northwest that is not fully reflected in the deep overburden groundwater. That is, the increases noted at the two up gradient wells in the northwest corner may be due to migration from further to the west from the vicinity of EA-104.*

Response: The Navy believes that CVOC contamination in the deep groundwater around Bldg. 224 originated from the MW03-14D source area at the former PR-58 Nike Site and migrated due eastward toward Building 224. The Navy does not agree that any CVOC contamination originated from formal Study Sites 03 or 04. Historical samples from the shallow wells in these areas have never shown any presence of TCE or 1,1,2,2-PCA. The larger scale mapping of potentiometric surfaces will be performed once the comprehensive synoptic water level survey is completed by the Navy and USACE (please see introductory comments).

7. Potential Western Source Area

Inspection of the groundwater flow (Figure 3A and 3B) as well as analytical data (Figures 7 and 8) for up gradient wells MW03-08D, MW03-10D appear to be showing declining concentrations of CVOC. Review of the groundwater flow directions resulted in two observations. The first is that the up gradient area for the deep overburden groundwater appears to correlate the area to the west of MW-Z3-01 while the bedrock groundwater flow directions correlate with the Nike PR-58 area, specifically, near monitoring well MW03-14D/R/R2. The CVOC concentrations for the bedrock well MW03-08R do not appear to be declining, as is the case for the deep overburden groundwater. This also may reflect two different source areas contributing to groundwater flowing in this area.

Response: Please refer to the introduction/general response. The mapping of more definitive potentiometric surfaces will be performed once the comprehensive synoptic water level survey is completed by the Navy and USACE.

- 8. Another, significant observation is that the down gradient flow direction for these two wells is to the southeast toward monitoring wells EA-111D/R. The observed diminishment in CVOC concentrations between MW03-08D/R and EA-111D/R is striking. While the deep overburden and bedrock groundwater CVOC concentrations at MW03-08D/R were recently reported as 1,130 µg/L and 2,060 µg/L, respectively, the down gradient CVOC concentrations in groundwater at EA-111D/R were 7 µg/L and 4 µg/L, respectively. While the down gradient concentrations in CVOC may be increasing (based on only six sample intervals), they are far less than what is currently observed in groundwater at the up gradient monitoring well MW03-08D/R. Further, the CVOC concentrations in groundwater at MW03-08D were significantly higher in the past, especially for MW03-08D, at 8,380 µg/L, in 1995. Thus, the reduction in CVOC concentrations between these two locations is in excess of 99%, a*

highly unlikely scenario given the travel times and difficulty of biodegradation of CVOC, if groundwater is flowing essentially horizontally without significant recharge into the deeper bedrock aquifer.

Response: Please refer to the introduction/general response. More definitive mapping of potentiometric surfaces will be performed once the comprehensive synoptic water level survey is completed by the Navy and USACE. The Navy believes that deep groundwater near MW03-08D is migrating due eastward with possibly a small component of flow toward the southeast. As pointed out in the comment, the large drop in CVOC concentrations between wells MW03-08D and MW03-111D/R is significant. However, the Navy believes this is the case because the plume is migrating primarily eastward toward Building 224, and not southeastward.

9. **Data Gaps**

There are several data gaps at Site 03. The most important of which is the lack of an all encompassing conceptual site model. This major data gap is discussed above in that there appears to be an incomplete picture of where the actual source areas are and what their potential fate and transport pathways are. There appears to be an additional source area to the northwest portion of Site 03, in addition to the likely contribution of CVOC from the former Nike PR-58 area. It is noted that this later likely contributing source area included other activities such as Navy training and operation of a solvent storage facility. Additionally, a past release at either Study Site 03 or Study Site 04 may be contributing to the observation of CVOC in down gradient deep overburden groundwater in the vicinity of Building 224. These areas and a potential additional source at the western edge of the Site 03 area or in that vicinity have not been integrated into a conceptual site model.

Response: The Navy believes that CVOC contamination in the deep groundwater around Bldg. 224 originated from the MW03-14D source area and migrated due eastward. In addition, the Navy believes that groundwater contamination in the northwest corner of Site 03 (i.e., near MW-Z3-01) also originated from the former PR-58 Nike Site and is flowing north-northeast toward the off-site wells.

CVOCs have been detected in only a few shallow and intermediate soils collected at Navy Study Areas 02 and 03 and Sites 01 and 04, and only at extremely low concentrations. Historical groundwater samples collected from shallow or intermediate wells on the Navy property have never shown the presence of TCE or 1,1,2,2-PCA. The Navy feels that there is no substantive data to show that releases on Navy property have contributed to the deep groundwater plume migrating off of the Nike Site. As stated previously, a comprehensive conceptual model will be prepared for the CVOC plume once the comprehensive synoptic study is completed by the Navy and USACE and all historical analytical data have been reviewed (please see introductory comments).

10. *The second major data gap also briefly discussed above is the unexplained behavior of CVOC in groundwater for the deep overburden and also the bedrock groundwater for groundwater that is migrating to the southeast. CVOC contaminated groundwater appears to be migrating vertically downward into the bedrock, at least in locations, rather than migrating predominantly in the deep overburden groundwater. While the vertical gradients between well pairs (deep overburden and shallow bedrock) are not always in the downward direction for-all well locations, most have intervals where the vertical direction of groundwater flow is downward.*

For instance, with the hydraulic gradient provided in the figures and the hydraulic conductivity for MW03-08D and EA-111D provided in the first monitoring event report, groundwater and associated contaminants would travel from the former location to the latter in approximately 8 to 10 years, depending upon the effective porosity (0.20 or 0.25): This would appear to be sufficient elapsed time, given lateral dispersion, even with some level of retardation for higher concentrations of CVOC to be observed at EA- 111D. That is, it would be expected that given the concentration of CVOC at MW03-08D of 8,380 µg/L in 1995 that more than 7 µg/L of CVOC would be observed at monitoring well EA-111D during the recent groundwater monitoring event.

Response: The Navy believes that groundwater at MW03-08D and MW03-10D is migrating due

eastward, toward Building 224, based on the shape of the CVOC plume. Although the potentiometric contours suggest that groundwater could migrate southeastward, the component of flow in this direction must be very low velocity, since contamination has not appeared to any great extent in well EA-111D, as pointed out in the comment. Mapping of potentiometric surfaces, generation of groundwater flowlines, plotting of migration paths of CVOC plume(s), and calculation of groundwater flow velocities will be updated and the conceptual flow model will be revised and refined once the comprehensive synoptic survey is completed by the Navy and USACE. Please refer to the introduction/general response.

11. *Evaluation of groundwater flow directions from both the Site 03 CED Report and the Site 16 Supplemental Data Gap Investigations Report suggest that CVOC contaminated groundwater is likely to migrate to the southeast and then swing to the east from the area of the Former Nike PR-58 and Site 03 areas toward the Site 16 area. It is possible that this CVOC contaminated groundwater might discharge into Davol Pond, but is also just as likely to follow the previously interpreted likely bedrock fault zone running along Davisville Road. The sparseness of groundwater monitoring wells, both in the overburden and bedrock make definitive evaluation of the potential transport pathways impossible. Given the documented high concentrations of CVOC at the former Nike PR-58 site location, assessment of the groundwater and potential contaminant migration pathway from and/or through the Site 03 area is warranted. This is essential to the completion of the Remedial Investigation activities ongoing at the Site 16 area.*

Response: The Navy believes that deep groundwater near MW03-08D is migrating due eastward with possibly a small component of flow toward the southeast. The shape of the CVOC plume strongly suggests that groundwater is migrating due eastward. However, the mapping of potentiometric surfaces will be updated and the conceptual flow model will be revised if necessary once the comprehensive synoptic survey is completed by the Navy and USACE. Please refer to the introduction/general response.

12. *The limited ability to assess potential fate and transport, however, is especially limited in the bedrock. This is because of the sparseness of the bedrock monitoring wells in the Site 03 area and the area just to the south, as well as between these locations and the down gradient Site 16 area. Additionally, while there is some hydraulic conductivity data for the deep overburden wells, there is very limited hydraulic conductivity data for the bedrock wells. This is especially problematic since contaminants may migrate preferentially along bedrock fracture sets that may be difficult to find to begin with, but are much more so with few wells. The transport velocity in these bedrock fractures can be very high. The hydraulic conductivity values ranged from less than 1 foot per day at MW03-08R to over 170 feet per day for EA-106R, as noted in the first interim monitoring report. Therefore, it is likely that additional bedrock groundwater monitoring wells will be necessary to provide information to assess fate and transport.*

Response: The Navy has re-evaluated the historic slug test data for well EA-106R and found that the data were improperly analyzed. The actual hydraulic conductivity calculated for this test is approximately 2.5 feet/day, not 170 feet/day. Only four slug tests on wells opened exclusively to bedrock have been conducted to date. The hydraulic conductivity values for these wells range from 0.3 to 2.5 feet/day. Thus, the Navy has proposed to hydraulically test more bedrock wells in order to more accurately determine the range of hydraulic conductivities that are possible or probable for bedrock.

The mapping of potentiometric surfaces, calculation of groundwater flow velocities, and plotting migration paths of plumes will be updated and the conceptual flow model will be refined once the comprehensive synoptic survey is completed by the Navy and USACE. Please refer to the introduction/general response.

SPECIFIC COMMENTS:

1. *Page 2-3, §2.3, Visual Inspection. Please insert the planned submittal date for the completed LUCIP checklist and an explanation as to why the checklist was not completed.*

Response: The LUCIP checklist for calendar year 2005 was completed on June 9, 2006 and presented in the 2005 Annual LUCIP Letter Report, submitted on August 15, 2006. The original intent was to

complete the LUCIP checklist during a sampling event during December 2005, but that sampling event did not occur.

2. *Page 2-4, §2.4, Quality Assurance/Quality Control. Please summarize the validation report in the text to provide a more thorough explanation of the data qualifiers noted in the tables.*

Response: Page iii of the Data Validation Memorandum provided in Appendix B contains a table explaining the USEPA Region I data qualifiers.

3. Page 2-2, and Tables 5 & 6. Please explain why the Navy made a unilateral decision to only report total 1,2 DCE instead of the isomers separately. EPA was not consulted nor do we agree with this change.

Response: This was an oversight unique to this sampling event and will be corrected for IGWSE 05.