



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

NEW ENGLAND - REGION I
1 CONGRESS STREET, SUITE 1100 (HBT)
BOSTON, MASSACHUSETTS 02114-2023

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NCBC DAVISVILLE

5090.3a

May 15, 2006

Curtis Frye
Dept of the Navy, BRAC PMO Northeast
Code 5090 BPMO NE/CF
4911 South Broad St
Philadelphia, PA 19112-1303

Re: Supplemental Phase II Remedial Investigation Data Package Report for IRP Site 16, at the former Davisville Naval Construction Battalion Center, North Kingstown, RI

Dear Mr. Frye:

Pursuant to ' 7.6 of the Davisville Naval Construction Battalion Center Federal Facility Agreement dated March 23, 1992, as amended (FFA), the Environmental Protection Agency has reviewed the subject documents and comments are below.

General Comment:

1. Due to the voluminous hydrogeological comments, I have enclosed those separately along with several figures and a seep correlation spread sheet.

Specific Comments:

2. Page 2-23, last bullet - The method for methane, ethane and ethene is a screening method (SW 846 Method 3810). If the Navy is looking to document natural attenuation, then a more quantitative method is recommended.
3. Section 4.4 Seeps: please also evaluate the seeps with Ecological Screening values such as AWQC as there could also be an ecological risk due to exposure to seeps.
4. Section 4.4: The last paragraph of this section states that there is no apparent correlation between detected concentrations in groundwater and those detected in seep samples. However, as shown on the attached spreadsheet, the data in Table 4-36 of this report indicate that there is a high correlation (correlation coefficient = 0.98) between the concentrations of individual PAHs in SEEP 16-01 and groundwater in the upgradient monitoring well (28-GW-07S). Please address this evidence that suggests that chemicals in the seep are from the site.

5. Section 4.6: The last paragraph in the section entitled "Soil" indicates that pesticides, dioxins and furans in Site 16 soils are not considered to be important site-related contaminants although dioxins and furans may have been formed near the FFTA during deliberate burning of structures. Since the dioxins and furans exceed soil PRGs and are site related, EPA requires that the risks of these chemicals be addressed in the RI, even though they may make a low contribution to the total risk and the dioxin total concentrations are less than EPA's risk management criteria of 1 ug/kg.
6. Section 4.6: The last bullet in the section entitled "Seeps" again asserts that there is no apparent correlation between detected concentrations in groundwater and those in the seep samples. Please address the high correlation (correlation coefficient = 0.98) between the concentrations of individual PAHs in SEEP 16-01 and groundwater in the upgradient monitoring well (28-GW-07S). Please address this evidence that suggests that chemicals in the seep are from the site. See attached graph.
7. Section 6.1, Allen Harbor Sediments and Surface Water: please also evaluate the sediments and surface water with a future dermal exposure scenario to determine if there is a human health swimming and/or wading risk.
8. Section 6.1, Building 41 Area and 6.3 Contaminant Behavior in the Environment: daughter products may also be present due to contamination of the original solvent or due to abiotic degradation of PCA from an upgradient source. Please include these other theoretical explanations.
9. Section 7.0, Preliminary recommendations for resolving data gaps, While EPA agrees that the area near former building 41 has been fully evaluated for the presence of CVOC in the soils, EPA also agrees with the Navy that additional near surface and surface soil sampling is needed to address the question of protectiveness.
10. Section 7.0, Preliminary recommendations for resolving data gaps: include PCBs as analytes of concern in the soil sampling.
11. Section 7.0, Preliminary recommendations for resolving data gaps: include BTEX for groundwater monitoring plans.
12. Section 7.0, Preliminary recommendations for resolving data gaps: please provide Navy rationale for not including all wells at site 16 for the next round of groundwater monitoring.
13. In addition to these comments, please see attachment for additional hydrogeological comments.

If you have any questions with regard to this letter, please contact me at (617) 918-1384.

Sincerely,

Christine A.P. Williams, RPM
Federal Facilities Superfund Section

Attachments

cc:

Louis Maccrone, RIDEM
Johnathan Reiner , ToNK
Steven King, RIEDC
Bill Brandon, EPA (via e-mail only)
Steve DiMattei, EPA (via e-mail only)
Rick Suggat, EPA (via e-mail only)
Kathleen Campbell, CDW (via e-mail only)
Conrad Leszkiewicz, CDW (via e-mail only)
Lee Ann Sinagoga, Tetra Tech NUS, Inc (via e-mail only)

GENERAL COMMENTS

Review of this report has resulted in the conclusion that the Navy still has not developed a thorough, sound hydrogeological conceptual site model. In addition, the document while objective in sections has several subsections and paragraphs that are very subjective and appear to be opinion or prejudicial without supporting fact or data. As a result, the identified data gaps presented and the recommended additional investigative actions are not commented on in detail since they would add little to what is already known about the hydrogeological nature and extent of contamination at site 16. While additional investigative work is warranted, implementation of additional work proposed is not likely to resolve critical hydrogeological unknowns at site 16 or significantly further refine the hydrogeological conceptual site model for use in a feasibility study. In particular, the Navy appears to remain focused on the former area of Building 41 as the major groundwater source area and has recommended significant additional work in this area. While additional investigations in this area will be valuable to determine protectiveness, it is not the optimal application of the Navy's resources to refine the hydrogeological conceptual site model

Specifically, the interpretations provided by the Navy still do not coincide with the interpretations of source areas and contaminant migration pathways previously developed by EPA. Further, the conceptual model presented and discussed is not a convincing argument, given the available data, for EPA to change its concept for source areas and fate and transport of chlorinated volatile organic compounds (CVOC) or polycyclic aromatic hydrocarbons (PAH). Rather, the recently collected data from the Supplemental Phase II investigations have further strengthened the interpretation of the likely source areas and contamination migration pathways previously put forth by EPA. This major disagreement should be resolved before any additional work is proposed for Site 16.

While the Navy does appear to have acknowledged the contribution or at least potential contribution of sources other than the former Building 41 area, particular concern is the continued interpretation by the Navy that the former Building 41 is a major source area that is the primary cause of the CVOC distribution in groundwater that is oriented from the vicinity of that location to the northeast. The Navy continues to interpret this as the major source area and migration pathway with any other contributions being only minor and ancillary to this source and the plume interpreted by the Navy to be emanating from this area. This postulation is made even though the subsurface has been extensively sampled in that area through soil borings, soil head space screening, and soil sample collection. No new or innovative thinking appears to have been applied to the data. Instead, the Navy is simply recommending further additional soil sampling in and around the former Building 41 area, which while not adding to the hydrogeological knowledge it will help determine protectiveness.

While marginally noting the contamination to the north of Davisville Road, near MW16-40, the Navy has not considered this as the potential likely source of CVOC to the former Building 41 area with the fate and transport pathway of CVOC from this area being to the south of Davisville Road and then to the former Building 41 area. This potential and

probably likely pathway has been ignored or missed. That is, as noted in the Specific Comments below, there are clear indications from soil sampling, groundwater sampling, soil boring head space readings, and the stratigraphy beneath the central Site 16 area that CVOC appears to have migrated from the area north of Davisville Road, including possibly the former firefighting training area (FFTA) to the area of MW16-59 through a dipping and channeled silt layer, and then to the missing silt layer in the vicinity of the former Building 41 area. This fate and transport pathway interpretation made by EPA appears to have been completely ignored by the Navy.

Other likely source areas are also either given minimal attention or ignored. Only minimal attention is paid to the FFTA when the data clearly shows a major plume of CVOC migrating to the east from that location to the east, separate from any “plume” that might migrate from the former Building 41 area. It appears that any contamination in this area has been interpreted to be an extension of the one “plume” emanating from an as of yet, undefined source in the vicinity of the former Building 41 area. This approach is not understood when the historical information of the site usage (FFTA) and investigative data, both geologic and analytical, supports interpretation of a significant release of CVOC to the subsurface with likely migration to the east from this area.

No consideration is given to the potential for CVOC contribution from the shallow bedrock to the deep overburden in the vicinity of the former Building 41 area even though there are recorded upward vertical gradients and ambient groundwater flows in that area coincident with anomalies in groundwater flow patterns. Connected to this potential CVOC discharge area is the potential up gradient source area(s) near the former Nike PR-58 and Site 03 areas which are also summarily discounted even though the groundwater flow patterns and the concentrations of CVOC at those locations along with substantial data gaps in that direction suggest that that area should be considered. While this potential pathway may or may not exist, if the area of the former Building 41 is a significant contributing source to the area of CVOC contaminated groundwater, there is reason to believe that this is the reason. At present, however, there has been little or no analysis to investigate this potential aspect of the conceptual site model.

An additional area of concern is the apparent dismissal of impact from Site 16 to Allen Harbor sediments, particularly PAH. There is extensive discussion in this report about how the marina activities, dock pilings, and storm water runoff have caused PAH contamination in the Allen Harbor sediments. However, while these activities may have impacted the harbor sediments, the data clearly shows a depositional pattern of PAH in harbor sediments aligned with the seep closest to the area of creosote dipping operations. Further, there is no supporting data to document that the dock pilings, etc. are the cause of this depositional pattern, even though there is extensive verbiage that this is the case. Even the area of the storm drain discharge is not necessarily totally impacted due to storm drain runoff. That is, seepage around the storm drain piping, and infiltration from groundwater into breaks and gaps in the piping where the piping lays at least partially below the groundwater table have not been considered. The intensity of the argument presented in the text is all the more surprising given the historic documented creosote

dipping operations which were likely to provide far more PAH mass than the other potential sources.

Also surprising is that the report also includes a so called extensive “analysis” of CVOC at the site based upon only three or four sampling rounds. This is followed by a detailed discussion of the “analysis.” Despite the statistical meaninglessness of this “trend analysis” the Navy has interpreted that the concentrations of CVOC at Site 16 are “strongly rapidly declining.” Perhaps this is the case, but this determination cannot be made at this time. Thus, the inclusion of this prejudicial interpretation lessens the credibility of the analysis and interpretations made in this report. This trend analysis and conclusions along with the approach taken toward contamination contribution into Allen Harbor suggest that the analysis and conceptual site model developed has been done so without complete objectivity.

To some extent, knowledge of similar site operations is also questioned by the discussions of two issues within the Site 16 area north of Davisville Road. The first is the manner in which dioxins and furans are dismissed. While these constituents might not be problematic, text in the report “cautions” the reader that chlorine is needed during the combustion process for these constituents to be generated. The presence of chlorinated solvents appears not to have been considered as a possibly contributor chlorine. Specifically, there was no mention of the potential for bleach (chlorine) to be present as a result of decontaminating agent non-corrosive (DANC) even though these materials have been documented to have been released at Sites 07 and 09 and at the former Nike PR 58 site. Thus, there is a definite potential for chlorine to have been present.

Further, the discussion of burning in the FFTA appears to indicate a lack of working knowledge of military sites and the purpose of fire fighting training. That is, almost anything that can burn or needs to be disposed of was often brought to these training events. There is significant information about fire training areas and co-disposal of solvents. Subsequent to disposal and conduct of the fire training activity, what does not burn (solvents included) is washed into the subsurface with prodigious amounts of water used for the fire fighting training to put out the fire. Therefore, significant residual of almost any type of contaminant should be expected at former fire training areas.

An additional concern relative to the fate and transport model is the potential effects of the storm drain network. While many segments of the storm drain probably lay above the groundwater table, the limited data provided for Site 16 appears to show that just east of the former Building 41 area, and just south of Davisville Road, that the invert of the storm drain is positioned below the groundwater table. This situation has the potential to control at least shallow groundwater flow patterns. While the storm drain network was partially presented, no attempt was made to investigate the potential impacts of the storm drain of movement of groundwater and CVOC. That is, storm drains are usually not water tight between end sections, and they often develop breaks and cracks that allow infiltration of groundwater if any portion of the pipe is below the groundwater table.

SPECIFIC COMMENTS

1. *Page 1-5, Section 1.3, 1st Paragraph:* This paragraph references Figure 1-5 which shows the locations of available manhole and invert elevations. Inspection of the invert elevations on that figure and the groundwater elevations on Figures 3-8 through 3-11 show that the inverts for the manholes adjacent and just east of the former Building 41 area lay below the piezometric water elevations. The importance of this is that storm drains are not water tight structures and often can be very broken and disjointed allowing significant volumes of infiltration. As such, they can exert hydraulic control over groundwater flow and contaminant migration. See Specific Comment 2, below.
2. *Figure 1-4:* This figure shows the location of a storm drain in critical position near the eastern edge of the former Building 41 area. As noted in Specific Comment 1 above, and 3 below, this storm drain has the potential for impacting groundwater flow and contaminant migration due to its elevation relative to groundwater. Therefore, an invert survey and storm drain video camera inspection is warranted to determine potential impacts of this structure. Also, the new storm water detention basin is interpreted to be in the location of this figure, yet it is not depicted. The location of the detention basin with a description of its design (lined or not, etc.) plus its current discharge location and routing and any standing water elevation, should be provided on this figure and in the text.
3. *Figure 1-5:* The inverts for manholes near to MW16-21, MW16-23, and MW16-24 are given as 9.59 feet above mean sea level (MSL). The groundwater elevations at those locations range from approximately 10 to 12 feet above MSL. Review of the historic groundwater elevations for Site 16 contained in Table 3-3 also shows that groundwater elevations have been at least two to three feet higher at times. There are also manholes located further up gradient near MW16-15, for instance, where the piezometric elevations are higher. A detailed survey of all storm drain inverts should be made along with inspection of potential groundwater infiltration into the storm drain network east of the former Building 41 footprint and along Allen Harbor Road.
4. *Page 2-17, Section 2.8, 4th Bullet:* This bullet implies only one CVOC plume at Site 16. As discussed elsewhere in these comments, EPA has found significant data to suggest several plumes at this site. As such the assumption of only one plume is not correct, even if it is only meant to imply the “major” plume. What the Navy is interpreting as one “plume” is actually an extensive area of CVOC contaminated groundwater created by several sources.
5. *Page 2-19, Section 2.9:* The discussions presented in this section are not specifically commented on point by point, except to say that some of the statements are not concurred with and appear to be subjective. While some of the polycyclic aromatic hydrocarbons (PAH) in Allen Harbor can be attributed to marina activities, dock pilings, and storm water runoff, the analysis and assumption that contributions from the Site 16 area are trivial is incorrect. The limited “advanced forensics analyses” notwithstanding, it is highly likely given the distribution of PAH usage at the Site 16 area, and diesel and motor fuels and oils as well (i.e. training activities), and the distribution of observed PAH

in Allen Harbor, to wit, very close to the Site 16 shoreline of Allen Harbor, that potentially significant contributions from Site 16 have impacted Allen Harbor sediment. It is acknowledged that the potential risk may not be to a level that warrants further action (although for PAH there does appear to be a risk). However, the text incorrectly diminishes Site 16 as a potential source.

6. *Page 2-24, 2nd Paragraph:* The importance of water level measurements in Davol Pond and the Detention Basin in the Site 16 area is re-emphasized. Given the relative lack of groundwater elevation data up gradient from Site 16 the water level of Davol Pond is an important data gap. Also, infiltration from the Detention Basin to groundwater with subsequent potential mounding raises concern for how groundwater flow directions may have been altered as a result of this pond. EPA has previously also requested a hydraulic analysis of the detention pond including how much storm water runoff is routed to this pond during different design storms. This information has not been provided.

7. *Page 2-24, Section 2.11, 2nd Bullet:* The statement that “As detailed in Table 2-1, all subsurface soil samples were collected at a depth of 40 feet bgs (below ground surface) or greater” should be expanded. Was this because these were the only locations where indications of elevated head space readings were encountered as suggested by the soil boring logs? Or was this due to a preset soil sampling plan? Based upon inspection of the soil boring logs, it appears that the sampling was due to only encountering elevated soil gas screening values at those locations. The text implies that there is potential for significant soil contamination at shallower elevations when no indications have been provided in the soil boring logs which are very numerous over the eastern portion of the former Building 41 footprint. This is critical since the Navy is proposing additional soil sampling in this area when the area of the former Building 41 footprint already appears to have been extensively sampled for only CVOCs. Other analysis is needed to determine protectiveness of this area for both human health and the environment.

8. *Page 2-25, 2nd Bullet:* It is noted that 3.4 inches of rainfall was noted for the area approximately one week prior to the water elevation measurements. What was the water level, if any, in the Detention Pond and did it impact the groundwater elevation measurements? Is this pond a lined pond or does runoff to the pond infiltrate to the subsurface when it is below the discharge outlet?

9. *Table 2-3, Page 2 of 6, Phase II Conclusions, 6th Bullet:* This conclusion is premature and not supported by the data. (It is understood that this is a summary of conclusions from previous documents, but it appears to have been adopted in further sections of this report). There are downward gradients in the former Nike-PR 58 and Site 03 area as well as upward gradients in the Site 16 area. It should also be noted that for most of the shallow bedrock wells, the well is an open 25 foot long borehole with the deep overburden well only a few feet away with a 10 foot long screen. Upwelling groundwater can be ameliorated by measuring the piezometric head in the bedrock well and comparing that elevation with the deep overburden well a few feet above.

Further, much of the area just east of the former Building 41 area is filled shoreline. It is reasonable to expect that upward discharging groundwater would be found in the vicinity of site 16. Additionally, the Nike PR 58 area has a well documented release of CVOC, including trichloroethylene (TCE) such that dense non-aqueous phase liquid (DNAPL) is present although not located. In addition, the extent of this CVOC has not been determined. That is, a simple advection-dispersion assessment would suggest that the TCE would be found at higher concentrations in down gradient of the release area if the release was confined primarily to overburden only.

The groundwater elevations presented on the various figures also clearly shows groundwater flow paths from the Nike PR 58 and site 03 areas. While there are limited data points between those locations and site 16 (including a lack of a surface water elevation for Davol Pond) no flow net analysis has been performed and no interpretation of where the CVOC at the former Nike PR 58 and site 03 areas have migrated to has been performed. While the release at that area may have migrated elsewhere, biodegraded en route, etc. this remains a major data gap.

10. *Table 2-3, Page 2 of 6, Phase II Conclusions, 7th Bullet:* (It is understood that this is a summary of conclusions from previous documents, but it appears to have been adopted in further sections of this report). It is reiterated in this comment that there is more than one CVOC plume at Site 16 as will be discussed in subsequent Specific Comments. It is also not clear, to EPA, that the area of the former Building 41 footprint is the major source for all of site 16.

11. *Page 3-3, Section 3.4, 1st Paragraph:* There is a reference to an “overgrown gravel pit.” These types of features often are areas where waste materials are disposed of. Has this area been investigated? Please briefly clarify the RI QDC investigation in the text.

12. *Page 3-5, Section 3.6.2, 3rd Paragraph, 3rd Sentence:* This sentence, describes the CVOC “plume” migration in the deep overburden groundwater. This appears to show agreement with previous investigation interpretations noted above. However, EPA is not of the opinion that there is one CVOC plume at this site, nor is the route of transport similar to that described in the text.

13. *Page 3-6, 2nd Paragraph:* The description of the middle lithologic unit is incomplete. This influence of this unit on migration of CVOC has apparently not been integrated into the hydrogeological conceptual site model. Analysis of the stratigraphy for Site 16 appears to show that dipping silt and clay layers and the absence of continuity in places have had a major impact of the present observed distribution of CVOC. This issue will be addressed in subsequent comments.

14. *Page 3-6, 4th Paragraph, 1st Sentence:* Again, there is reference to the one CVOC plume in the deep overburden. Based upon the analyses performed by EPA this does not appear to be the case.

15. *Page 3-7, 3rd Paragraph, 1st Sentence:* See Specific Comment 14.
16. *Page 3-8, 2nd Paragraph:* The description of “valleys” in the bedrock is not correct. There are several troughs or linear depressions in the bedrock that extend perhaps 20 feet or so at most below surrounding rock. Further, there are several troughs or linear depressions within the site area not just two. These appear to be indications of multiple faulting with off-sets of fault axes.
17. *Page 3-14, Shallow Groundwater Zone:* Assessment of shallow groundwater flow is incomplete. This is in part due to the absence of shallow groundwater wells in one or more areas of the site. Additionally, there is no discussion of potential impacts of the storm drains that lay to the east of the former Building 41 and along Allen Harbor Road that may be influencing groundwater (and contaminant) flow. See Specific Comments 1 through 3.
18. *Page 3-16, 2nd Paragraph, Summary of Groundwater Flow:* EPA believes there is insufficient data to describe the direction of groundwater flow.
19. *Figure 3-8:* For the shallow groundwater, there appears to be a groundwater divide in the vicinity of the former Building 41 area with flow to the southeast as well as to the northeast. However, there are insufficient shallow wells in that area to fully define the shallow groundwater flow directions. It is also noted that the shallow groundwater contours are inflected inward toward the seep at Allen Harbor. This would support the transport of contaminants from the FFTA and the creosote dipping tank area to that location.
20. *Figure 3-9:* A similar comment is made for flow in the intermediate zone. Also, extension of the 16 foot contour around MW16-13I and MW16-33I to the south would further support the interpretation of a ground divide if this had been included on the figure. In addition, for the intermediate zone, the contours drawn do not appear to be fully descriptive in that there appears to be an inflection along the axis from MW16-43I to MW16-02I. This inflection suggests a subsurface influence on groundwater flow.
- 21: *Figure 3-10A/B:* While the deep overburden groundwater flow more closely follows the northeast axis, a closer inspection of the groundwater elevations (not shown on Figure 3-10A, but interpreted from the data during this analysis) shows that the groundwater elevations in the vicinity of the eastern half of the former Building 41 footprint are very convoluted when incorporating groundwater elevations at a scale smaller than the one foot interval. This suggests that there is an anomaly in this area that is affecting groundwater elevations.

Also, when comparing the groundwater contours for the up gradient former Nike PR-58 and Site 03 areas, there clearly appears to be a flow path from that location to the Site 16 area. In particular, the 16 foot and 17 foot contours appear to be incorrectly drawn. For the 16 foot contour, this should curve to the west side of the former water tower and turn around forming an inflection, similar to that for the 17 foot contour around

monitoring well EA-110D rather than being brought straight down to the south as has been depicted.

Further, there is no basis to curve the 17 foot groundwater elevation back to the west as shown. As noted in Specific Comment 9, there is insufficient data to fully describe groundwater and potential contaminant migration from the up gradient former Nike PR-58 area and Site 03 to the Site 16 area. The available data suggests that there is a pathway from the Nike PR-58 area to the Site 16 area. At a minimum, given the documented major source at the Nike PR-58 area, no significant source being found around the former Building 41 area, and the scarcity of data in between, it is premature to rule out the up gradient area as a contributor to the Site 16 area. This is a major data gap.

22. *Figure 3-11:* As with the deep overburden zone, the groundwater elevations in the shallow bedrock also show an anomaly. Inspection of this figure shows a depression at MW16-71R with an elongation of the groundwater elevation at MW16-32R, -68R, and -14R when viewed at the 0.25 foot contour interval. Further, there is a significantly lower groundwater elevation at MW16-15R2 compared to MW16-15R. While this might appear inconsequential, given that they can be smoothed out at the one foot contour interval, this is the area that is postulated as being the “source” of the CVOC “plume” that is migrating to the northeast. As such, additional scrutiny as to what is occurring at this location is warranted. Also, as with most of the other intervals, there is a paucity of groundwater elevation data points to the east and south to declare that groundwater flow is predominantly to the northeast. While a segment certainly is, it also appears that the area of the former Building 41 lies on a groundwater divide with flow to the southeast as well.

23. *Page 3-16, 3rd Paragraph:* Where is the “paleovalley” that is described in this paragraph? Inspection of Figure 3-6 shows only a series of shallow bedrock depressions or troughs at various locations throughout Site 16. While a linear depression may be oriented along a southwest-northeast strike, the area can be more accurately described as an area that has undergone significant faulting and fracturing as a result of stresses converging in this area. This is also suggested (Figure 3-7) by the numerous rock cores with low rock quality designations (RQD).

24. *Page 3-19, Summary of Vertical Hydraulic Gradients:* It is stated in the last sentence to this section that “based upon the analysis of vertical gradients between the deep overburden and shallow bedrock, there are no clear trends. At a minimum, this does not rule out that the Site 16 area is a general discharge zone for groundwater from up gradient. While there are locations with apparent downward vertical gradients between the deep overburden and the shallow bedrock, there are also numerous locations with upward vertical gradients from the shallow bedrock to the deep overburden.

In addition, inspection of the screen intervals for the wells shown on Table 3-1 reveals that for most, if not all, of the shallow bedrock to deep overburden well pairs, the shallow bedrock well has a 25 foot open hole with only a 3 to 4 foot vertical separation between the bottom of the 10 deep overburden well screen to the top of the 25 foot open

rock hole. As such, there is potential for significant piezometric elevation differences within the rock borehole to be muted where incoming, discharging groundwater from preferential fracture sets is diluted, thus diminishing either the magnitude of the upward vertical gradient, or masking it entirely.

Two examples of this appear to be shown on Table 3-2. MW16-14R and MW16-28R both are reported to have exhibited upward flow under ambient conditions during observations from the geophysical surveys, even though on Figure 3-15, the vertical hydraulic gradient for those two wells is shown to be downward from the deep overburden to the shallow bedrock. As such, the potential for predominant upward discharge of groundwater from bedrock to overburden along with transport of CVOC with the discharging groundwater cannot be ruled out at Site 16.

25. *Page 3-22, Section 3.7.5.5, Groundwater Velocities:* The arithmetic mean may be presented for comparison, but the geometric mean of the hydraulic conductivities should have been used to calculate groundwater velocities. Also, it should be explained why “the fastest” travel time was desired rather than a range from slowest to fastest.

26. *Page 4-7, Section 4.2.1, 7th Sentence:* The text focuses on TCE. While TCE is the predominant CVOC, focus on TCE may not allow complete understanding of the distribution of CVOC at Site 16. For instance, it is stated that subsoil TCE concentrations ranged from 1 to 55 µg/L. However, SB16-41 testing results shows that the total CVOC was 1,896 µg/L 16 to 18 feet below the ground surface. The difference consisted of dichloroethylene (DCE) and vinyl chloride (VC). Assessment of the fate and transport of CVOC should take into account the total mass, and not just one component, even if that component provides the bulk of the mass overall.

27: *Page 4-8, 3rd Paragraph, 1st Sentence:* The statement that “Most of the TCE detections exceeding the aforementioned criteria were reported for deep (saturated zone) subsurface soil samples collected from the former Building 41 area. This statement is not correct. Inspection of Figures 4-2 and 4-3 show that in addition to SB16-41 noted in Specific Comment 26, SB16-44 had total CVOC of 1,342 µg/L (DCE and VC) at 16 to 18 feet below grade; SB16-59I had total CVOC of 4,700 µg/L at 44 to 46 feet, and 7,800 µg/L at 46 to 48 feet; and SB16-59D had total CVOC of 1,800 µg/L at 64 to 66 feet, and 3,300 µg/L at 66 to 68 feet. These locations cannot be considered part of the former Building 41 area. Additionally, the concentrations of CVOC are found at higher elevations than those at the former Building 41 area. This suggests that since significant concentrations of CVOC are detected in the soil at higher elevations than those at the former Building 41 area that a source area other than the former Building 41 area is contributing to CVOC contamination along the axis of the inferred single “plume” migrating to the northeast.

Further, the highest CVOC detected in the deep saturated overburden in the former Building 41 area is at MW16-14D. As noted in Specific Comment 24, while the vertical gradients were assessed to be downward at this location based upon elevations, the geophysical survey results show that there was an upward flow of groundwater from

the shallow bedrock at this location. Therefore, the elevated CVOC at MW16-14D may be consistent with CVOC discharge from the shallow bedrock to the deep overburden at this location.

MW16-68 and MW16-70 were interpreted to have upward vertical gradients from the shallow bedrock to deep overburden. This along with the groundwater elevation anomalies that appear to exist in this area as mentioned in Specific Comments 21 and 22 suggests that in addition to contribution of CVOC from the area north of Davisville Road, there remains uncertainty as to whether there is a contribution of CVOC from discharging groundwater from an up gradient source at the former Building 41 location. This is a major data gap that needs to be addressed. This can be especially problematic since if there is a continuing discharge at this location from an up gradient source, it is likely to persist no matter what remedial alternative is selected in the feasibility study.

28. *Page 4-8, 3rd Paragraph, 3rd Sentence:* EPA agrees with this sentence insofar as it should preclude statements to the effect that there is a “plume” emanating from the former Building 41 area as are made in this report. However, because a specific source in the overburden soil at the former Building 41 area has not been found, even with the substantial amount of soil boring work that has been performed at this area other possible source should be more strongly considered. See Specific Comment 27 above.

29. *Page 4-8, 5th Paragraph:* EPA disagrees that insufficient CVOC soil data has been collected at the former Building 41 area. There is a large amount of data including soil head space screening during installation of numerous boreholes. However, EPA does agree that additional surface and near surface soil data is needed to determine protectiveness at this site. The statement that “all VOC releases appear to be relatively old because the majority of CVOC mass is deep in the soils” should be explained. The concentrations of CVOC detected do not suggest a nearby DNAPL release in the deep overburden or shallow bedrock, and if a DNAPL release had occurred in the soil at the eastern end of the former Building 41 area, there should be significantly elevated head space readings in one or more of the many soil borings. Elevated head space readings were recorded for soil borings noted north of Davisville Road (SB16-41 and SB16-44 as well as SB16-59I/D just south of Davisville Road). It appears that the CVOC in deep overburden soils at the former Building 41 area have migrated to that location from other locations, either the area north of Davisville Road or from the documented DNAPL release at the former Nike PR-58 area.

30. *Page 4-13, 1st Paragraph, 3rd Sentence:* The statement that “Caution is advised, however, because a source of chlorine is required to generate dioxins, and commonly used fire accelerants such as kerosene are not chlorinated” is prejudicial and subjective. It presumes that the investigator has detailed knowledge that chlorine was never disposed of at this location. Chlorine or chlorinated compounds could have been disposed of and burned at Site 16. In fact, certain decontaminating agents used by the military contain chlorine. One decontaminating agent known as Decontaminating Agent Non-Corrosive (DANC) is a reactive, chlorinated material reportedly comprised of bleach (chlorine) and 1,1,2,2-tetrachloroethane (PCA). Releases of significant quantities of DANC have

occurred at Site 07, Site 09, and the Nike PR-58 area. PCA has also been shown to degrade abiotically to TCE. Therefore, this entire paragraph is inappropriate.

31. *Page 4-16, Section 4.3, 2nd Paragraph:* Why is only TCE presented on Figures 4-7 through 4-10? Although TCE is the predominant CVOC, the presence of daughter products where present should not be discounted when evaluating the distribution of CVOC mass.

32. *Page 4-17, 2nd Paragraph, 3rd Sentence:* The text implies origin of the shallow CVOC contaminated groundwater from the former Building 41 area. This has not been established based upon the data collected, to date. Analyses performed by EPA indicate that at least a component of the contamination observed in the shallow groundwater at the location down gradient from the former Building 41 (not necessarily a plume originating from the former Building 41 area) originates from the area north of Davisville Road. Figure 1 show the EPA Contractor (GF-CDW) interpreted total CVOC distribution for the shallow groundwater using the total CVOC data supplied in this report. The highest concentrations originate from the vicinity of MW16-40 and appear to extend to the north to MW16-44 and south to MW16-23 and MW16-21. While shallow soil CVOC contamination has not been found in the vicinity of the eastern end of the former Building 41 area, significant shallow soil CVOC contamination has been detected in the area north of Davisville Road.

There are two possible explanations for this distribution. The first has been commented on in Specific Comments 1 through 3. There is a storm drain line that appears to have inverts (pipe) below the groundwater table. Infiltration into these storm drain pipes may have pulled contamination in that direction. The second explanation was briefly referenced in Specific Comment 13 which describes the middle lithologic unit and in Specific Comment 27 which discusses the CVOC concentrations noted in the soil column. Figure 2 shows a generalized depiction of the soil stratigraphy and CVOC concentrations in soil (along with filtered FID or PID readings) developed by EPA Contractor (GF-CDW). The information on this figure strongly suggests that CVOC contamination in the area north of Davisville Road has migrated down dip along the top of the silt layer to the area of MW16-59, i.e. south of Davisville Road. Therefore, the distribution of CVOC contamination in the shallow groundwater appears to be a plume emanating from the area north of Davisville Road, not the former Building 41 area.

Insert Figure 1: Shallow Total CVOC Contaminant Distribution.

Insert Figure 2: Generalized Cross Section

33. *Page 4-17, Last Paragraph, 2nd Sentence:* The source of the CVOC contamination in shallow groundwater does not appear to be the former Building 41 area. See Specific Comment 32.

34. *Page 4-18, 3rd Paragraph:* A somewhat different interpretation of the distribution of CVOC in the intermediate overburden was developed by EPA Contractor (GF-CDW) as shown on Figure 3. This interpretation indicates that there are likely multiple source areas that move in one or more directions to contribute CVOC contamination to groundwater. While there is a pocket of elevated CVOC southeast of the former Building 41 footprint, there are at least two additional source areas. The first appears to be related to the area that appears to be contributing CVOC contamination to the shallow groundwater south of Davisville Road originating north of Davisville Road.

A second source area clearly appears to be located in the vicinity of the former fire training area (FFTA) and/or the burned wooden structure. It is not clear, due to insufficient data, whether the CVOC contamination noted in the area immediately north of Davisville Road also emanates from the FFTA or the area to the west of that location, as a result of down dip migration of DNAPL along the top of silt layers. The distribution of CVOC in the intermediate zone may provide the true indicator of the origin of CVOC since the intermediate zone has lower permeability soil with greater capillary force. That is, while contamination released to the surface may volatilize or be transported to the deeper intervals due to infiltration, there is potential for more residual to remain in the intermediate zone.

35. *Page 4-18, 4th Paragraph:* EPA does not concur with the general statement in the first part of this paragraph. That is, “there does not appear to be a single distinct groundwater plume in the intermediate zone, but rather small pockets of elevated total CVOC and TCE concentrations and possibly multiple smaller overlapping contaminant plumes or release area.” However, EPA does not necessarily agree that the magnitude (small). Also, this interpretation likely applies to the deep overburden aquifer as well as the shallow overburden aquifer. Also, EPA does not concur with the latter part of this paragraph, “The elevated TCE concentrations in the deep subsurface soil samples in the northeastern corner of former Building 41 indicate a significant VOC source underlying or in the immediate vicinity of the former Building 41.”

This disagreement is with the interpretation of a surface release. However, as discussed in a subsequent comment, elevated CVOC may be “originating” from this area, but not for the reasons given by the Navy. That is, there does not appear to be a major release to the surface soils in the immediate vicinity of the eastern end of the former Building 41 area. CVOC may be originating from this area due to having migrated to that location from the area north of Davisville Road first, or also possibly, be continually discharging from the shallow bedrock such as appears to be occurring at MW16-14D/R.

36. *Page 4-19, 3rd Paragraph, 2nd Sentence:* EPA does not concur that the Building 41 area is the primary origin of the CVOC in the intermediate aquifer. As shown on Figure 3, elevated CVOC is in the soil profile north of Davisville Road and not at the

Insert Figure 3: CVOC Distribution in the Intermediate Overburden Aquifer.

former Building 41 area. There is also a silt layer that dips toward the Building 41 area with a topography that suggests funneling to that location. Further as discussed in the next comments, the silt layer becomes absent in the former Building 41 area that would allow CVOC to drop into this area.

37. *Page 4-19, Section 4.3.1.3, 2nd Paragraph:* The highest CVOC in soils detected, to date, were found at MW16-59I (7,800 µg/L) at a depth of 44 to 46 feet below ground surface. This elevation is higher than that for CVOC detected in the deep overburden around the eastern end of the former Building 41 footprint. This in conjunction with other data suggests that CVOC has originated from the area north of Davisville Road (and/or from discharge from the shallow bedrock such as at MW16-14D/R originating from further up gradient to the west). As shown on Figure 4, the interpreted distribution of CVOC developed by EPA Contactor (GF-CDW) would support this as it closely resembles the distribution of CVOC in the intermediate zone. There is also a localized elevated CVOC concentration in the area of MW16-12 down gradient from MW16-14.

A further indication for the origin of CVOC at a location other than the eastern end of the former Building 41 area is the distribution of the top of silt elevations for Site 16. A generalized depiction of the top of silt was prepared by EPA Contractor (GF-CDW) and is shown on Figure 5. The top of silt was interpreted from soil boring logs with silt being defined as a definite silt unit as opposed to sandy silt or silty sand. While the figure is generalized and interpretation of the soil boring logs may result in some minor variations of specific top of silt elevations, there clearly appears to be a trough of silt that dips from the area north of Davisville Road toward the former Building 41 footprint. Of special note is the absence of a silt layer entirely in the area of the eastern end of the former Building 41 area. As depicted by the arrows, the likely pathway for DNAPL released in the area north of Davisville Road would be counter to the general groundwater flow direction down the dipping silt layer to the area where the silt disappears. However, this is a characteristic physical feature of DNAPL migration.

This contaminant pathway correlates with the distribution of CVOC noted in the shallow overburden groundwater distribution and the intermediate groundwater CVOC distribution. It also correlates with the stratigraphy of dipping silt, disappearance of the silt layer, and the distribution of CVOC in soil and from head space readings recorded during conduct of soil borings as depicted on Figure 2. There may be other contributing source areas to the observed CVOC contamination such as an undefined release at a loading dock opposite the former CVOC still, the area of the railroad yard, or as discharging groundwater from the shallow bedrock from a source further up gradient (former Nike PR 58 site). However, the major point is that the repetitive statement in this study that the source area for the CVOC “plume” is the former Building 41 area suggests that this investigation and future investigative work is focused on this area as the source to the exclusion of seriously considering other areas as potential major contributing sources, rather than just minor “small” source area additions.

Insert Figure 4: Distribution of Deep Overburden CVOC

Insert Figure 5: Top of Silt and DNAPL Pathway.

38. *Page 4-21, 3rd Paragraph, 2nd Sentence:* It is not clear that CVOC contamination in the shallow bedrock is only a function of contribution from the deep overburden aquifer. As noted in Specific Comments 21, 22, and 24, there is reason to suspect contribution from an up gradient source area such as the former Nike PR-58 area contributing to CVOC contamination as discharging groundwater in the vicinity of the former Building 41 area

39. *Page 4-21, Last Sentence:* It is noted that concentrations of CVOC in the shallow bedrock were less than those for the deep overburden groundwater. However, a couple of points should be made. First, the bedrock well that was sampled for all cases appeared to be an open 25 foot borehole. The interval sampled for the deep overburden was a 10 foot well screen at most. Second, flow into the bedrock well will be through discrete fractures some of which are likely to carry higher CVOC concentrations than others. Once in the borehole, this CVOC mass will be diluted over the larger water column as compared to groundwater flow through the unconsolidated deep overburden groundwater. Third, while an attempt was made to isolate these zones by placement of the intake of low flow sample pumps at specific intervals within the borehole, this does not guarantee that the CVOC contributing fracture zone was targeted. Further, some of the pump installation locations recommended by USEPA were not implemented. Therefore, the concentrations of CVOC in bedrock groundwater has to be viewed in this context and direct comparison of CVOC concentrations from the bedrock wells to the deep overburden wells may not result in realistic assessment of the contribution of CVOC from the bedrock, versus assuming that the contaminant migration pathway was from the overburden to the bedrock only.

40. *Page 4-21, 3rd Paragraph, 2nd Sentence:* See Specific Comment 39.

41. *Page 4-22, 2nd Paragraph:* Shallow bedrock groundwater has also not been characterized to the west. Also, it should be noted that the distribution of CVOC in the bedrock is controlled by the relatively limited number of bedrock wells compared to deep overburden wells. This limits spatial distribution analysis of CVOC in the bedrock.

42. *Page 4-23, 2nd Paragraph, 2nd Sentence:* It should also be noted that the shallow bedrock has not been adequately characterized to the west of Site 16.

43. *Page 4-30, Section 4.3.4:* The discussion provided on metals needs to assess the distribution of metals at Site 16 further including depiction visually and be related to actual site background concentrations. Since there is fill in the area north of Davisville Road, some of the metals in groundwater may be a function of the release of metals including arsenic, iron, cadmium, chromium, lead, etc. from buried refuse. While some fraction may be from background soil concentrations, it is not clear what the relative concentrations mean, whether filtered or unfiltered. If the distribution of metals tracks with the distribution of total CVOC it may be useful as a confirmatory tracer of the origin of the CVOC contamination.

44. *Page 4-37, Last Paragraph, Last Sentence*; Although “the detection of cis-1,2-DCE at AH-47 is an indication that biodegradation of TCE occurs between SEEP 16-02 and AH-47” it is also an indication that contamination from Site 16 has migrated 40 feet down gradient of the seep. This is in contrast to the statements that the majority of contamination in Allen Harbor is the result of marina activity, dock pilings, and storm water runoff.

45. *Page 4-38, 2nd Paragraph*: The text of this paragraph implies that because the concentrations of PAHs were higher in the sediment than in the seeps at Site 16, there is no significant contamination from Site 16. This statement is incorrect. PAHs are likely to accumulate in the sediments due to organic fraction, etc. and can be much higher than the soluble or adsorbed suspended fraction emanating from a seep. As such, this is not “an indication that a major contaminant source for shoreline sediments is from off shore source, most likely boat traffic and organic preservatives used on docks.”

This also conflicts with the following sentence in this paragraph “PAH concentrations were higher in sediment samples collected close to the shore of Allen Harbor as compared to PAH concentrations in samples collected away from the shoreline. This is an indication that onshore contamination is also contributing to the observed sediment concentrations.” This actually suggests a concentration gradient where PAHs released from Site 16 absorbed and accumulate to organic material, etc. as the seeps discharge into the harbor.

Further, while highest PAH samples were found in sediment near the outfall, it cannot be concluded that these are from distal sources only. It is likely that at least some fraction is from runoff and seeps from Site 16 adjacent to the storm drain pipe. Further, as noted in Specific Comments 1 through 3, it appears that there may be infiltration of water into the storm drains if the inverts are located below the groundwater table. Also, it cannot be categorically stated that the PAHs represent some distal parking lot runoff given the use of heavy vehicular use of Site 16 in the past as well as a large paved area in the vicinity of the FFTA.

46. *Page 4-39, 2nd, 3rd, and 4th Paragraphs*: EPA does not concur with the conclusion presented in these paragraphs. Much of what has been interpreted and presented is subjective. While there is possible contribution to sediment contamination by roadway runoff, dock pilings, and boat traffic, there is a significant source area for PAH and metal contamination at Site 16. A creosote dipping operation in the immediate vicinity of the shoreline and the marina docks is a highly likely candidate for PAH contribution. Buried waste material (not just clean fill) is also a highly likely candidate for metals contamination of the harbor. Likewise, it is not clear what fraction of contaminants near the storm drain are from distal parking lots and what fraction is from seepage around the storm drain or into the drain from Site 16.

Inspection of the distribution of PAHs on Figure 4-13 would strongly suggest that Site 16 is at least a major contributor of PAH to Allen Harbor. The distribution of elevated PAH at AH-35 and AH-29 as well as surrounding AH-23, AH-33, AH-26, etc.

clearly suggest a depositional plume emanating from the Former Location of the Up-Ended Creosote Dip tanks and Seep 16-01. This is also indicated by the shallow groundwater contours presented on Figure 3-8 that show groundwater funneling to the seep discharge area. Further, if PAH was primarily from the dock pilings, there would be a uniform distribution of PAH in sediment around the dock that would suggest “background” conditions, which there is not. Therefore, even if the PAH in AH-28 and AH-49 can be attributed to solely roadway runoff from a distant location, it does not account for the equally high PAH concentrations at the other locations.

47. *Page 4-42, Last Bullet, Last Two Sentences:* EPA does not concur with the statement that the plumes extend from the northeastern corner of the former Building 41. While there is contaminated groundwater distributed in an elongated pattern from the southwest to the northeast, this distribution actually appears to be from several source areas and consists of several intermingling plumes with complex flow paths, not one plume.

48. *Page 5-1, Section 5.1, 5th Sentence:* The conclusion of “some CVOC may have also been released in the north central area is incorrect. While some additional information and data collection is warranted, there is sufficient information to establish that significant CVOC has been released in this area (unlike the eastern end of the former Building 41 footprint). This interpretation is based on documented past site activities, soil boring descriptions, soil gas head space results, membrane interface probe sampling (head space and water), soil sampling results, and groundwater sampling results. How much mass and the extent of that mass that is left may be debatable in light of insufficient information, but the fact that this is a major release area is not.

49. *Page 5-2, 2nd Paragraph, 1st Sentence:* This sentence is correct and supports the previous contention in Specific Comment 46 that contaminants from Site 16 can infiltrate into the storm sewer and then into Allen Harbor, not just from distal parking lots, but from breaks and gaps in storm sewer piping when at least part of that piping lays below the groundwater table. This may also occur where the storm drain passes Site 16 adjacent to the harbor.

50. *Page 5-2, 2nd Paragraph, Starting at 5th Sentence:* The inferences made in this and following sentences about the lack of impact from the adjacent Site 16 to Allen Harbor sediments is totally unfounded and unsupported. While contributions of PAH contamination may reach Allen Harbor sediments from storm water runoff from distal locations, the data presented clearly shows an impact from the adjacent Site 16 area and not dock pilings. The comments made in this paragraph are almost totally subjective. See Specific Comments 45 and 46. There clearly appears to be a sediment depositional area related to Seep 1, if not from the entire adjacent shoreline.

51. *Page 5-4, Section 5.2, 1st Paragraph, 3rd Sentence:* It should also be acknowledged that TCE can be derived as an abiotic degradation product of 1,1,2,2-TCA (PCA).

52. *Page 5-4, Section 5.2, 5th Paragraph:* The statement in this paragraph is totally unsupported and is contradictory to the lines of evidence supplied in this report. See Specific Comments 34, 35, 36, and 37. If CVOC originates at this location or nearby, it is likely due to discharges from shallow bedrock from source area(s) further up gradient. The most likely explanation for CVOC at this location with the available data is the down dip migration of CVOC from the FFTA and areas north of Davisville Road.

53. *Page 5-56, 4th Paragraph:* The interpretation provided in this paragraph that the TCE plume starts at the former Building 41 area and migrates to the northeast is not supported by the data. There may be an area of CVOC contaminated groundwater that extends over the area described, but this cannot be called a plume (with the available information unless it is derived from CVOC discharging from the shallow bedrock from up gradient source areas). Where is the evidence for this distribution which “strongly suggests that the former Building 41 area was a primary release point and that groundwater is flowing in a northeast direction?” This is not what is seen in the data in this report and as described in previous comments. It appears that there is an inordinate focus on the former Building 41 soils such that other potential areas are not receiving the detailed assessment that is warranted. This theme has been consistently obvious throughout review of this document and is a major concern.

54. *Page 5-7, 1st Paragraph:* The statement that “In the shallow and intermediate zones, the bulk of the TCE mass appears to be close to former Building 41” is misleading. MW16-59I is not any closer to Building 41 than the area north of Davisville Road and lies down gradient of the former Building 41. Further, when considering total CVOC and soil gas results from soil borings it is clear that the most CVOC mass in the shallow and intermediate zones lies to the north of Davisville Road and at MW16-59I.

55. *Page 5-7, 2nd Paragraph, Last Sentence:* The conclusion contained in this statement is incorrect and not supported by the data. The data points to the major release areas north of Davisville Road. See Specific Comment 54. The Navy does not appear to be taking a completely thorough reassessment of the data, but rather parroting what has been postulated previously, even in the face of new data.

56. *Page 5-7, 3rd Paragraph:* The conclusion that CVOC is migrating from the overburden to the bedrock only is not supported, certainly not by comparing CVOC concentrations, for the reasons mentioned previously including excessive open boreholes in rock with likely preferential flow in discrete fractures with subsequent muting of the influent concentrations. See Specific Comments 24.

57. *Page 5-7, 4th Paragraph:* What is the basis for the statement that TCE has not migrated to Allen Harbor? Approximately 880 µg/Kg of cis-1,2-DCE has been found in sediment at AH-47, located 40 feet down gradient of Site 16 in the harbor. This statement is misleading since the degradation product most likely occurred from TCE. In any event, CVOC has migrated from Site 16 to Allen Harbor.

58. *Page 5-7, Section 5.4:* EPA does not concur with this entire section. This is based primarily upon an apparent lack of understanding of the fate and transport mechanisms of contaminants at Site 16.

59. *Page 5-9, Section 5.5:* This section is totally meaningless and appears to be an attempt at making a legalistic argument. The limited numbers of samples that have been collected at this point make any statistical analysis meaningless. The discussion presented is entirely subjective. While the Navy is free to perform whatever assessment they chose internally, at least 8 sampling rounds are needed to assess trends. This is the standard protocol for monitored natural attenuation, monitoring of landfill leachate, etc.

60. *Figures 5-1 through 5-12:* Review of these figures indicates multiple source release areas for CVOC, not just, if at all, the former area of Building 41. In particular, they can be interpreted as releases as described in previous comments with migration from the area north of Davisville Road and possibly discharges from the shallow bedrock. As such, EPA does not concur with the fate and transport assessment developed by the Navy to this point. It appears that too simplistic an approach was taken by the Navy with little in- depth, detailed analysis of the available data.

61. *Page 6-1, 1st Paragraph:* This paragraph appears to underplay the potential for a chlorinated solvent release in and around the FFTA. The statement that “relatively small amounts of chlorinated solvents is likely but cannot be demonstrated conclusively” is subjective and prejudicial. The Navy has no basis to assume that larger quantities of solvents were not burned or dumped. This has been documented at Site 07, Site 09, and the former Nike PR-58 sites, in particular.

62. *Page 6-2, 2nd Paragraph:* This paragraph shows a lack of knowledge of fire fighting training operations. At many installations where fire fighting training has been conducted it has been practice to dispose of waste solvents, off specification fuels, etc. along with other accelerants. During fire fighting training the objective is to put out the fire as rapidly as possible and not to let it burn. The result is un-combusted fuels, liquids, and materials that have been mixed with prodigious volumes of water. This means that waste liquids including potentially solvents, would have a large potential driving head to allow infiltration of the residual solvents into the subsurface. The fact that waste solvents were reported to have been transported to the Allen Harbor landfill does not rule out the possibility that the “practical” approach had been taken by base personnel to dispose of these waste solvents in the nearby FFTA, thereby saving time, effort, and providing potential additional combustible materials rather than hauling them to the Allen Harbor landfill.

63. *Page 6-2, 3rd Paragraph:* While storm sewers are likely to collect and transport material washed into them from the ground surface, the invert elevation data provided suggests that there is a potential that storm sewers have also intercepted groundwater with potential transport of CVOC to storm drain discharge locations.

64. *Page 6-2, 4th Paragraph:* This is a very biased and subjective paragraph that is not supported by facts and data. See Specific Comment 46.
65. *Page 6-3, 5th Paragraph:* While the Navy notes that the area near SB16-41 may contribute CVOC it appears to have missed the bigger overall picture of contaminant fate and transport from several source areas at Site 16 and has not tied the information available into a coherent, logical conceptual site model.
66. *Page 6-3, 6th Paragraph:* EPA does not concur with the interpretation of insignificant impact of Site 16 on Allen Harbor. The data states otherwise. See Specific Comment 46.
67. *Page 6-4, 4th Paragraph:* EPA does not concur with the interpretation that the former Building 41 area is the area from which “the plume” emanates. This is too simplistic and mostly incorrect assessment of the source area(s) and the several plumes that actually exist at Site 16.
68. *Page 6-4, 5th Paragraph:* While it is agreed that there is “uncertainty” in the groundwater flow directions around Building 319, there is also significant uncertainty of groundwater flow patterns from up gradient to the west that ultimately pass through the Site 16 area. That is, there appears to be a major pathway for groundwater from the former Nike PR-58 and Site 03 areas straight through the Site 16 area of most concern. However, this is not addressed or discussed in this conceptual site model. This is a major data gap.
69. *Page 6-5, 1st Bullet:* The statement that deep soils exhibit the most significant CVOC concentrations is not correct. Actually, the soils with the most significant CVOC concentrations are in the shallow and intermediate zones. This is documented by the results for MW16-40S, MW16-41S, MW16-44S, and MW16-59I.
70. *Page 6-6, Section 6.2, 2nd Paragraph:* The Navy notes that DNAPL can migrate down dip of low permeability zones and also observes that the silt layer is missing around the eastern portion of the former Building 41 area. However, they do not appear to have analyzed the site stratigraphy sufficiently and/or developed a representative conceptual site model since there is no discussion of what has been presented by EPA from reviewing and analyzing the same data. See Specific Comments 36 and 37.
71. *Page 6-7, 2nd Paragraph, 1st Sentence:* The statement that “the predominant plume of TCE emanates from former Building 41 or nearby the building and has migrated northeastward toward Allen Harbor” is incorrect, or at best, not supported by the data. The fact that this simplistic conclusion has been arrived at by the Navy suggest that a thorough analysis of the available site information has not been done and therefore, the conceptual site model cannot be accepted as developed.
72. *Page 6-7, 3rd through 6th Paragraphs:* The focus on the former Building 41 area is unfounded and appears to indicate a biased focus on what might appear to be an

obvious origin for the distribution of CVOC at Site 16. However, detailed inspection of the available data suggests clear evidence of other source areas. While the area of the former Building 41 might still contribute CVOC, especially through possible discharge of CVOC from the bedrock in this vicinity, the major source area appear to be north of Davisville Road. As such, based upon the available information, EPA does not concur with the hydrogeological conceptual site model developed by the Navy.

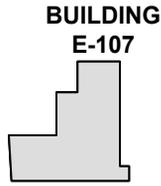
73. *Page 6-8, 4th Paragraph:* The statement that “the evaluation of concentration-time trends for each well and the primary chlorinated ethene compounds in Section 5.0 strongly suggests that TCE and 1,2 DCE mass in the plume is declining quickly over time” is highly subjective, unsupported by the data, and inappropriate for this document. Any trends inferred are statistically insignificant and certainly do not rise to the “declining quickly over time” status. Statements such as this detract from the objective credibility of the report reviewed.

74. *Section 7.0:* Specific comments on elements of this section are not provided in this hydrogeological review since there appears to be a significant disagreement between EPA and the Navy over the interpretation of the hydrogeological conceptual site model. In particular, the Navy appears to be continuing to focus on the eastern end of the former Building 41 area as the source of the observed CVOC in groundwater at Site 16, interpreting that distribution as being primarily from an as yet, undocumented surface release of CVOC there. This view is held by the Navy even after extensive soil borings in that area have not shown any indication to support that interpretation.

Additionally, there is significant data to support the interpretation that the area north of Davisville Road is a major source area for the contamination beneath the former Building 41 area which the Navy has not adequately considered in the conceptual site model. Also, the Navy discounts the possibility that up gradient sources to the west may be contributing CVOC via discharging groundwater from the shallow bedrock even though the available data does not rule this out and, in fact, can be interpreted to support this additional source contribution.

LEGEND

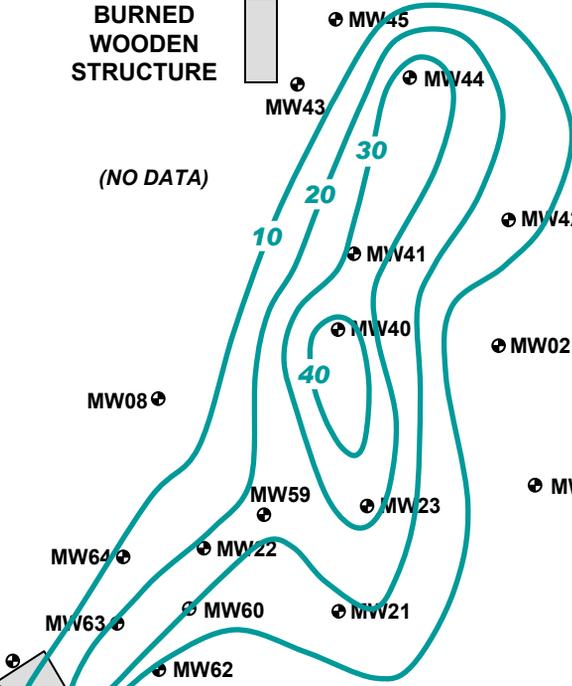
-  CVOC (ppb)
-  MW04 Monitoring Well



BURNED
WOODEN
STRUCTURE



(NO DATA)



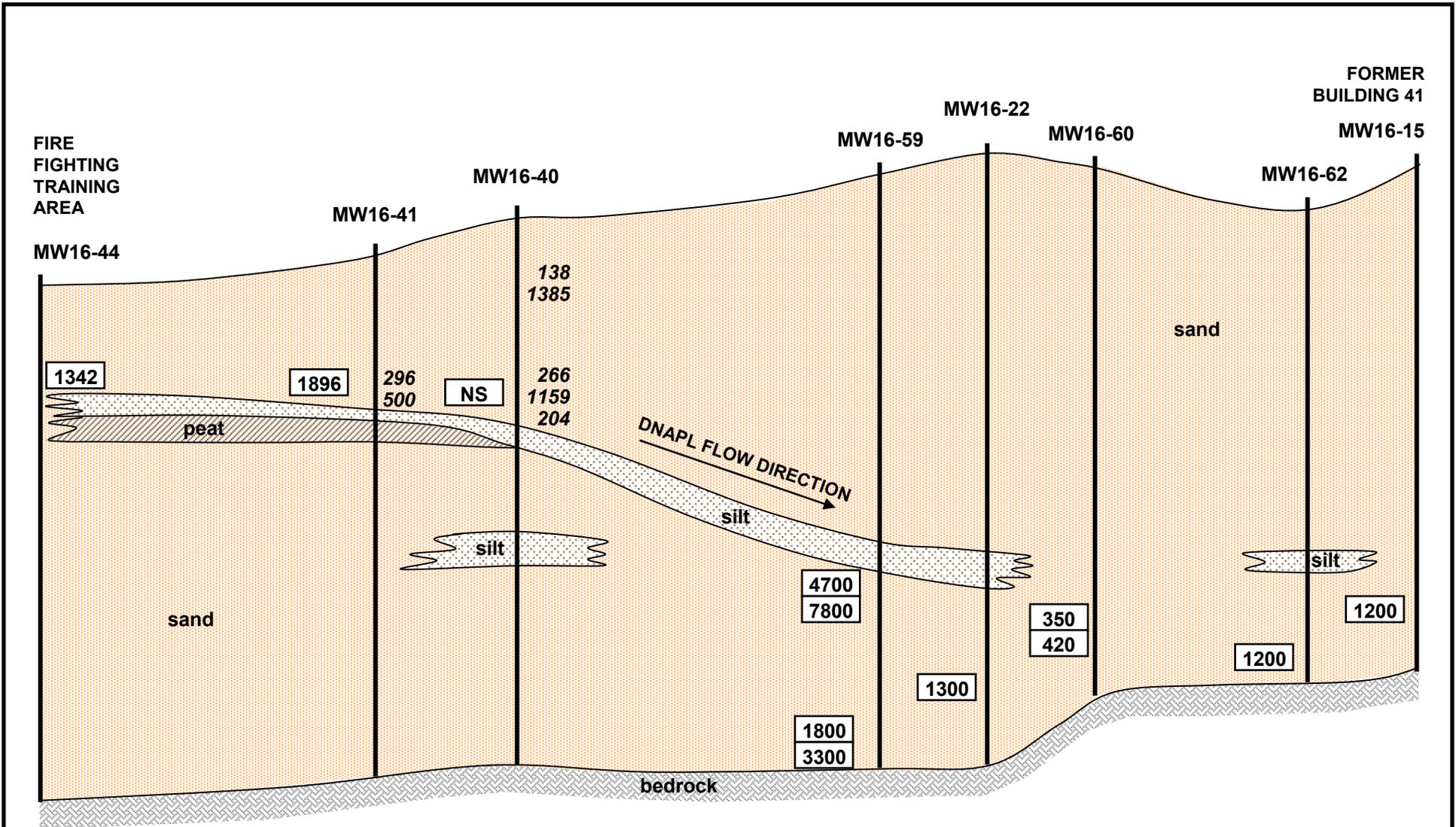
**NCBC SITE 16
DAVISVILLE, RHODE ISLAND**

SHALLOW CVOC ISOPLETHS

 CDW CONSULTANTS, INC.
40 SPEEN STREET
SUITE 301
FRAMINGHAM, MA 01701
TEL. (508) 875-2657

DRAWN: JEL
CHECKED: CGL
DATE: 05/07/06
SCALE: AS SHOWN

**FIGURE
1**

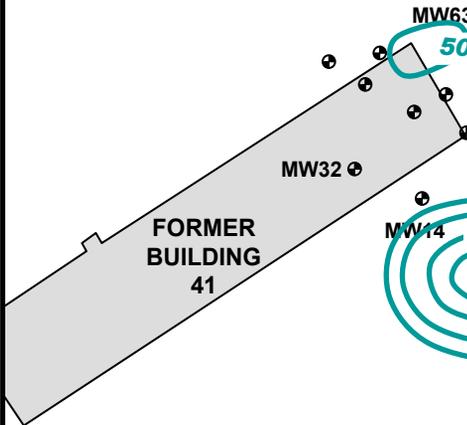
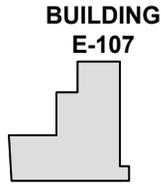


LEGEND	
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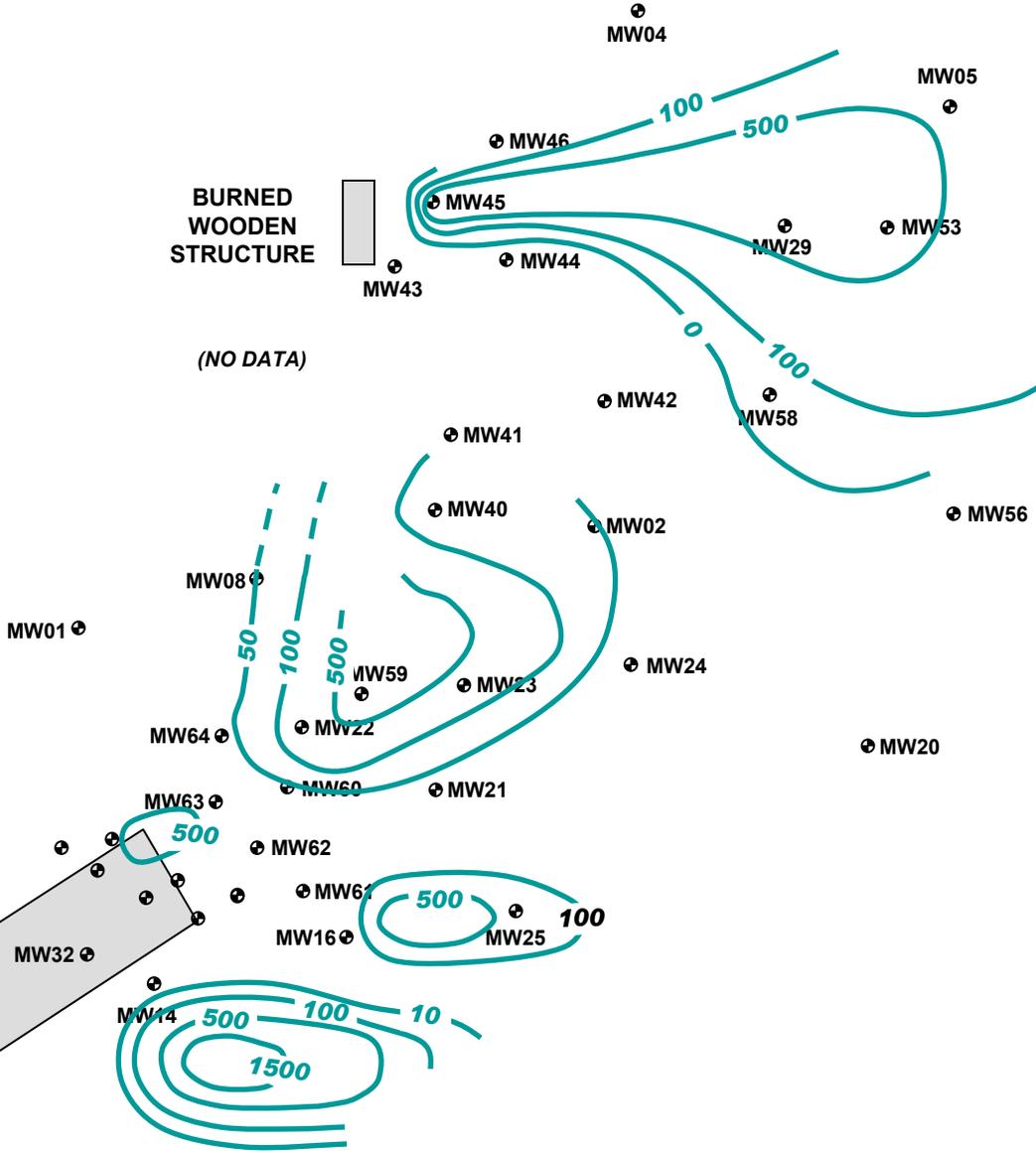
NCBC SITE 16			
DAVISVILLE, RHODE ISLAND			
GENERALIZED STRATIGRAPHY AND TCVOC			
	CDW CONSULTANTS, INC. 40 SPEEN STREET SUITE 301 FRAMINGHAM, MA 01701 TEL. (508) 875-2657	DRAWN: JEL	FIGURE 2
		CHECKED: CGL	
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LEGEND

-  CVOC (ppb)
-  MW04 Monitoring Well



(NO DATA)



**NCBC SITE 16
DAVISVILLE, RHODE ISLAND**

INTERMEDIATE CVOC ISOPLETHS

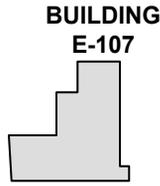
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D 40 SPEEN STREET
W SUITE 301
FRAMINGHAM, MA 01701
TEL. (508) 875-2657

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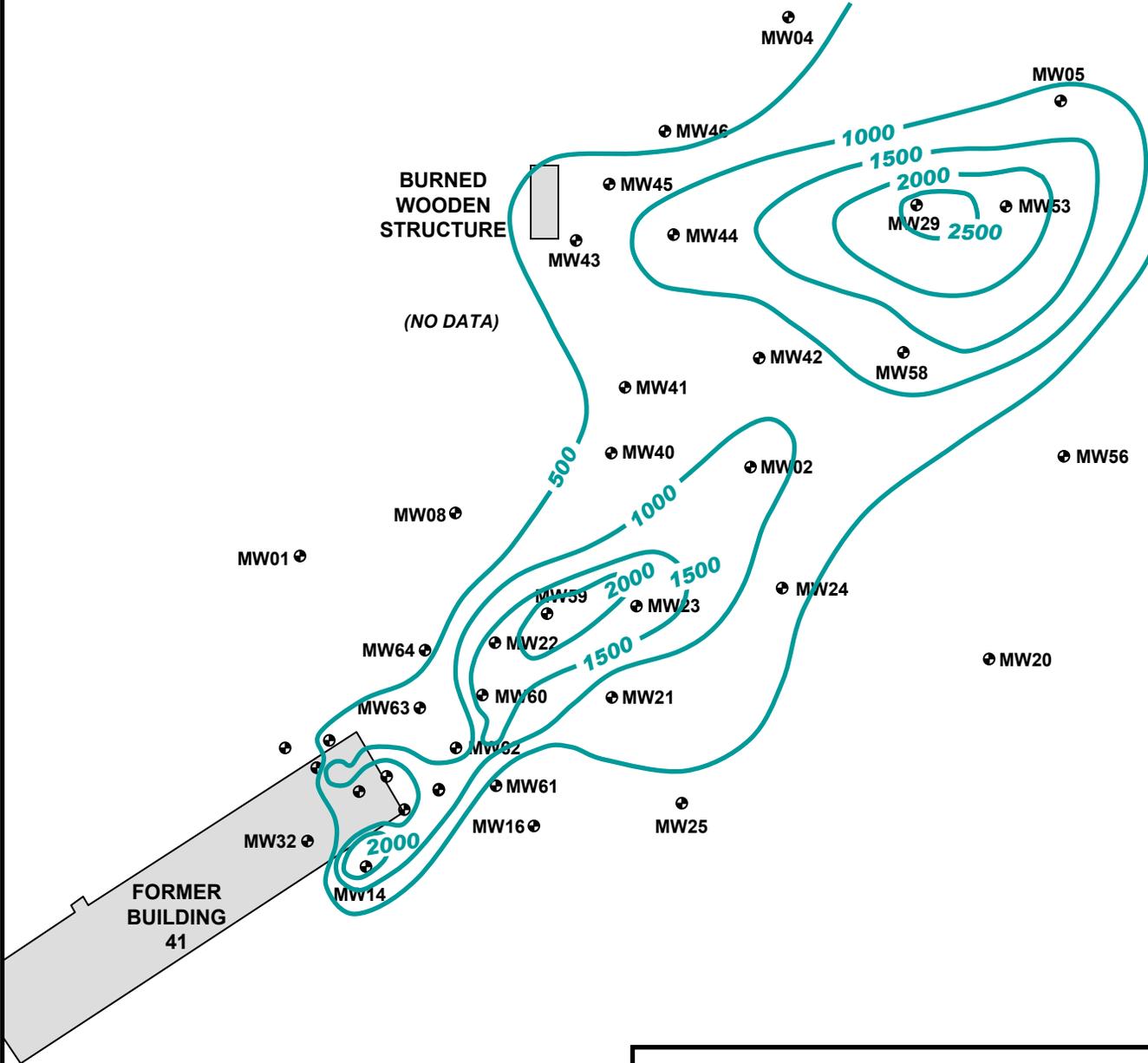
FIGURE
3

LEGEND

-  CVOC (ppb)
-  MW04 Monitoring Well



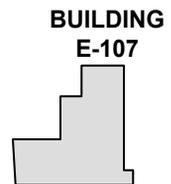
(NO DATA)



NCBC SITE 16 DAVISVILLE, RHODE ISLAND		
DEEP OVERBURDEN CVOC ISOPLETHS		
	CDW CONSULTANTS, INC. 40 SPEEN STREET SUITE 301 FRAMINGHAM, MA 01701 TEL. (508) 875-2657	DRAWN: JEL
		CHECKED: CGL
		DATE: 05/07/06
		SCALE: AS SHOWN
		FIGURE 4

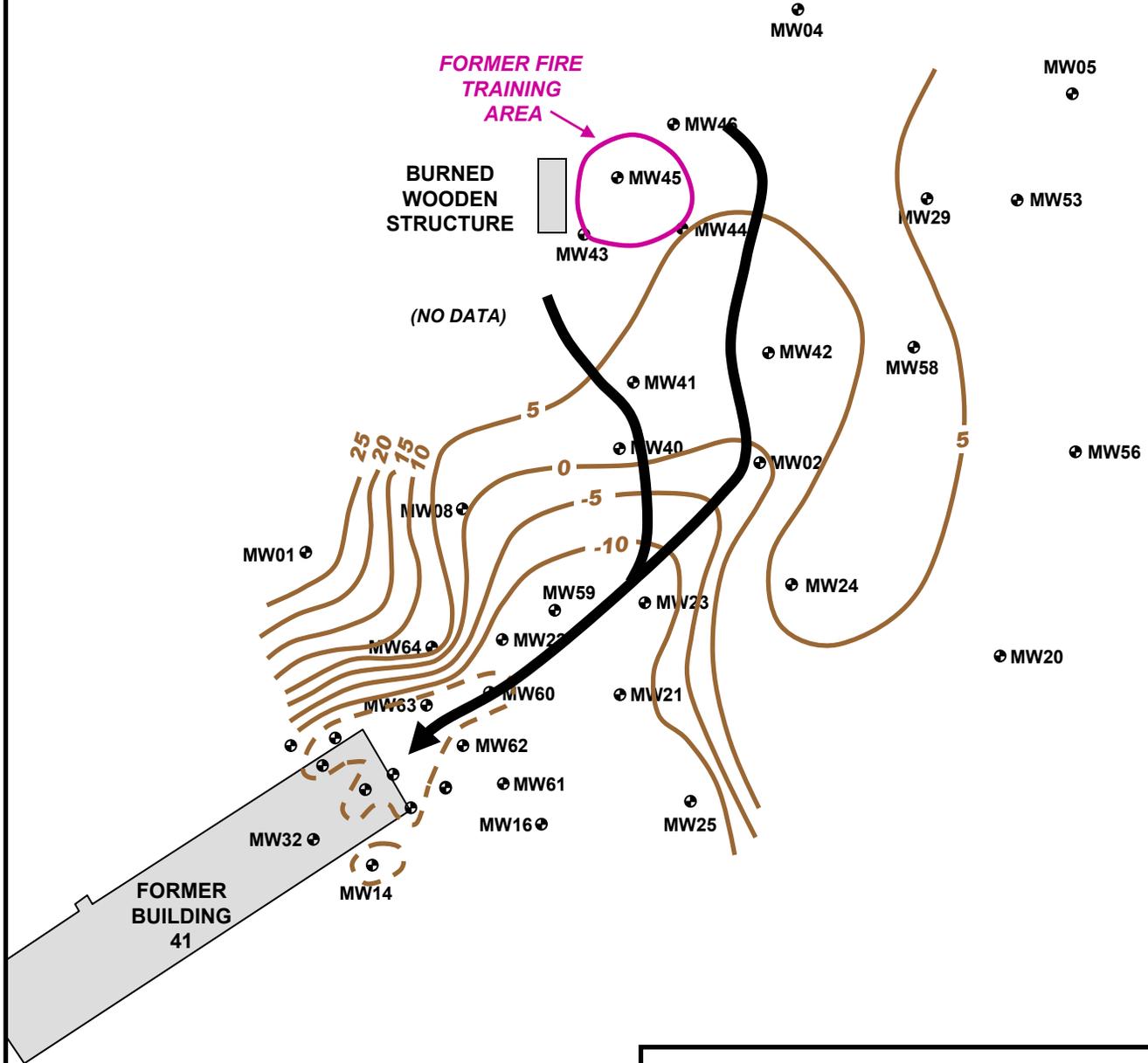
LEGEND

-  Top of Silt Elevation (MSL)
-  No Silt
-  Monitoring Well
-  Potential DNAPL Down Dip Flow



FORMER FIRE TRAINING AREA

BURNED WOODEN STRUCTURE



(NO DATA)



NCBC SITE 16 DAVISVILLE, RHODE ISLAND		
TOP OF SILT		
	CDW CONSULTANTS, INC. 40 SPEEN STREET SUITE 301 FRAMINGHAM, MA 01701 TEL. (508) 875-2657	DRAWN: JEL
		CHECKED: CGL
		DATE: 05/07/06
		SCALE: AS SHOWN
		FIGURE 5

Individual PAHs in GW and Seep

