



DEPARTMENT OF THE NAVY  
BASE REALIGNMENT AND CLOSURE  
PROGRAM MANAGEMENT OFFICE, NORTHEAST  
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20 July 2006

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NCBC DAVISVILLE  
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Ms. Christine Williams  
U.S. Environmental Protection Agency, Region I  
1 Congress Street Suite 1100 (HBT)  
Boston, MA 02114-2023

Mr. Louis Maccarone  
Office of Waste Management  
Rhode Island Department of Environmental Management  
235 Promenade Street  
Providence, RI 02908-5767

SUBJECT: RESPONSES TO COMMENTS - DRAFT SUPPLEMENTAL PHASE II  
REMEDIAL INVESTIGATION DATA PACKAGE REPORT, INSTALLATION  
RESTORATION PROGRAM SITE 16, FORMER NAVAL CONSTRUCTION  
BATTALION CENTER DAVISVILLE, RI

Dear Ms. Williams/Mr. Maccarone:

The Navy's responses to EPA and RIDEM comments on the subject document are provided as enclosures (1) and (2). Four copies of the response-to-comments (RTC) document are forwarded to U.S. EPA Region I, and one copy of the RTC document is forwarded to RIDEM.

As indicated in these responses, the Navy and U.S. EPA Region I/RIDEM are currently not in agreement regarding the hydrogeological conceptual site model for Site 16 or the potential impact of Site 16 on Allen Harbor surface waters and sediments. However, the Navy strongly agrees with the U.S. EPA Region I recommendation (May 31, 2006 technical teleconference) not to further engage in lengthy comment/response cycles, but to proceed with Phase III investigative work for Site 16. Consequently, the Navy plans to issue the final version of the Supplemental Phase II Remedial Investigation Data Package Report for IRP Site 16 based on the enclosed comments and responses. The Navy further recommends that technical teleconferences and/or meetings be held to discuss the hydrogeological conceptual site model for Site 16 and the potential impact of Site 16 on Allen Harbor so that these unresolved issues are not impediments to the successful completion of the Site 16 Remedial Investigation. The conclusions of the proposed technical

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teleconferences/meetings will be reflected in the final version of the Phase III Quality Assurance Project Plan (QAPP) for IRP Site 16. The draft of the Phase III QAPP for IRP Site 16 was mailed to U.S. EPA Region I and RIDEM on July 18, 2006.

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

Sincerely,



David Barney  
BRAC Environmental Coordinator

Enclosures:

1. Responses to EPA Comments, Draft Supplemental Phase II Remedial Investigation Data Package Report, IR Site 16, NCBC Davisville, March 2006 (EPA comments dated 15 May 2006)
2. Responses to RIDEM Comments, Draft Supplemental Phase II Remedial Investigation Data Package Report, IR Site 16, NCBC Davisville, March 2006 (RIDEM comments dated 30 May 2006)

Copy to:

Mr. Curt Frye, FEC Midlant (1 copy)  
Dr. Ken Finkelstein, NOAA (1 copy)  
Ms. Kathleen Campbell, CDW (2 copies)  
Mr. Steven King, Quonset Development Corporation (1 copy)  
Mr. Jon Reiner, Town of North Kingston (1 copy)  
Ms. Sue Licardi, Town of North Kingston (1 copy)  
Ms. Lee Ann Sinagoga, TtNUS Pittsburgh (1 copy)  
Mr. Steve Vetere, TtNUS Boston (1 copy)

**ENCLOSURE 1**

**Responses to EPA Comments  
Draft Supplemental Phase II  
Remedial investigation Data Package report  
IR Site 16  
NCBC Davisville  
(March 2006)  
(EPA Comments dated 15 May 2006)**

**RESPONSES TO EPA COMMENTS  
ON DRAFT SUPPLEMENTAL PHASE II REMEDIAL  
INVESTIGATION DATA PACKAGE REPORT,  
IR SITE 16, NCBC DAVISVILLE, MARCH 2006  
(COMMENTS DATED MAY 15, 2006)**

**NAVY GENERAL RESPONSE TO EPA COMMENTS:**

The Navy's purpose in preparing the Site 16 Supplemental Phase II Remedial Investigation Data Package was to:

- Summarize and evaluate, as necessary, existing information
- Preliminarily identify data gaps in information necessary for the completion of the Remedial Investigation.

The goal was to enable a cooperative development of the scope of work for the Phase III QAPP. In the Navy's opinion, the EPA's review went beyond that which would normally be expected as part of regulatory oversight. Additionally, and unfortunately, the tone of many of the EPA comments is overly dismissive and caustic, which is not helpful and a disservice to the public record and the community. For the sake of clarifying the administrative record, that Navy has found it necessary to expend considerable resources responding to these comments, which detracts from making real progress at the site. The Navy respectfully requests that future EPA reviews are more carefully edited before being submitted.

A review and evaluation of the general and specific comments provided by EPA in the May 15, 2006 correspondence, during the subsequent conference call on May 31, 2006, and during the BCT/RAB meeting held in North Kingstown on June 8, 2006 indicate that the Navy and the EPA have some fundamental disagreements concerning the hydrogeological conceptual site model for Site 16. Although the Navy appreciates the effort expended by EPA to assist in the refinement of the conceptual site model for Site 16, the comments submitted as a result of the EPA's review of the source document (the Draft Supplemental Phase II Remedial Investigation Data Package, March 2006) do not foster the goal of the cooperative development of a scope of work for the Phase III QAPP. Rather, the EPA used the document review and comment process to present and advance the reviewer's own theories of a conceptual site model for Site 16. However, in many cases, only minimal site-specific data are provided to support the theories presented. During our May 31 teleconference, the reviewer acknowledged that the conceptual model theories presented in the May 15 comments are just theories that may or may not be accurate for Site 16. However, the reviewer suggests that the Navy has not reached conclusions consistent with EPA because of a lack of analysis and understanding of all site data. This comment/response package provides responses to the EPA comments and also presents information

further supporting the Navy's conceptual site model for Site 16. The information presented in the Supplemental Phase II Data Package Report and the additional site-specific evaluations provided within this RTC document support the Navy's conceptual site model and demonstrate that some of the conceptual site model theories presented by reviewer are not supported by currently available information for Site 16.

Additionally, the Navy believes that EPA is inconsistent in its positions and recommendations regarding Site 16. For example, EPA states at the end of the second paragraph on page 1 of the General Comments that "This major disagreement...<referring to the conceptual site model>.... should be resolved before any additional work is proposed for Site 16." However, during the technical conference call of May 31 and the June 8/9 BCT/RAB meeting, EPA recommended that the Navy should not provide written responses to the May 15, 2006 comments and simply stated that "we should agree to disagree" regarding the conceptual site model, and continue with Site 16 work. Although the Navy appreciates EPA's recommendation to allow work to continue at Site 16 and will proceed accordingly, these EPA viewpoints are contradictory. Further discussions of a cooperative nature are needed between the EPA and Navy to assure that the RI process can proceed expeditiously.

Another inconsistency of concern to the Navy is EPA's position on the potential contribution of Site 3/Nike PR-58 sites to the groundwater contamination detected at Site 16. It is apparent based on the May 15 comments, the May 31 conference call, and the June 8 BCT/RAB meeting that the EPA believes the Site 3/Nike PR-58 sites are significantly impacting groundwater quality at Site 16, particularly in the general vicinity of the former Building 41. However, EPA stated previously at the December 2003 BCT/RAB meeting that "...EPA's position is that Site 16 has 3 separate source areas: the former Building 41 area, the former fire fighting training area, and the old railroad spur area; and that there is a de minimis contribution from the PR-58 Nike/Navy Site 03 areas....." The Navy requests that the EPA clarify its official position regarding the contribution of Site 3/Nike PR-58 to the groundwater contamination observed at Site 16. The Navy further recommends that the administrative record include the technical evaluation prepared by the EPA to support its position on this issue.

Another issue of particular concern to the Navy is the high degree of reliance that the EPA places in reviewer's theories proffered to explain the distribution of contaminants at Site 16 (i.e., the dipping silt layer; upward vertical flow around former Building 41), while also stating that such theories may or may not be totally accurate. In this regard, EPA pre-judged and dismissed the Navy evaluations and conclusions presented in the Supplemental Phase II Data Package because they differed with the EPA's theories and hydrogeological understanding of Site 16. As the EPA stated during the May 31 meeting, once the reviewer read that the Navy was again concluding that a significant contaminant release(s) likely occurred in the general vicinity of the former Building 41, the reviewer dismissed the analysis presented

as cursory and a simple re-hash of previously presented information. As indicated earlier, the EPA reviewer then focused on a presentation of EPA theories, and did not review and comment on the validity of the Navy's technical arguments. When the Navy questioned various aspects of the EPA theories during the May 31 teleconference, the EPA acknowledged that the reviewer's theories were just possible scenarios or hypotheses that may or may not be accurate. These conflicting positions and statements are confusing to the Navy because they do not present a clear picture of the EPA's position on the issues. It should be noted that it is not the intention of Navy's hydrogeological investigations to prove/disprove every possible theory that EPA or other reviewers develop regarding Site 16, but to be able to logically determine a coherent, unified conceptual site model that will effectively serve the RI and future feasibility study endeavors.

Due to the voluminous nature of the hydrogeological comments received from EPA, the incorporation of several different conceptual site model issues within both general and specific comments, and the general insistence of certain key hydrogeological interpretations by EPA as accepted fact, the Navy determined that the most effective approach for responding to the EPA comments was to address each of the major issues presented in the comments (See issues 1 through 18 presented below). Additional issues identified during the May 31 conference call and June 8 BCT/RAB meeting are also addressed for purposes of completeness. Every effort has been made to address all of the issues of contention between the EPA's and the Navy's hydrogeological conceptual site models for Site 16. As will be noted in the following narrative, some EPA comments are very similar in nature. The correlation to the issues presented to the general and specific comments from the May 15, 2006 letter is provided following each individual EPA comment. In most all cases, several issues are referenced in order to fully address the comment.

As EPA is well aware, several personnel changes have occurred at the Navy since the last submission of a document for Site 16. With the changing of the Navy CLEAN contractor from EA Engineering to Tetra Tech NUS, Inc. occurring in late 2004, the opportunity presented itself for a completely independent assessment of the site conditions based on the data collected to date. Consequently, the Navy performed a comprehensive site review and evaluation of all data collected to date to ensure that the appropriate hydrogeological conceptual model was being employed and to identify data gaps which would serve as an aid in developing a scope of effort for the upcoming Phase III RI. As detailed in the Supplemental Phase II Remedial Investigation Data Package Report, although many of the large-scale, site-wide conclusions concerning the hydrogeological conceptual model did not change from the previously developed CSM, many aspects of the supporting data did. For example, errors in the measuring point elevations at one monitoring well cluster have altered the interpreted direction of groundwater flow in several potentiometric zones; the calculated vertical hydraulic gradients were incorrect in all previous reports because a wrong equation was used in the calculation/determination; and,

the determined hydraulic conductivities were incorrect in all previous reports since baseline assumptions were inappropriately and inconsistently applied. These changes were not inconsequential. Only after all of the hydrogeological data was appropriately repaired was a full review and evaluation of the hydrogeological site conditions possible.

Given the breadth of the changes made to the fundamental aspects of the hydrogeological (and geological) conditions at the site and the comprehensive evaluation presented in the Supplemental Phase II Remedial Investigation Data Package Report, the Navy is confident in the conclusions presented therein. The Navy acknowledges that certain aspects still need to be investigated (see Section 7 of the source report). After all, a main objective of the Phase II Data Package Report was to identify data gaps. The Navy also acknowledges that other potential interpretations can and should be entertained as new data becomes available; however, the site conceptual model is built upon comprehensive analysis of the **currently** available site-wide and area specific data from multiple sources. The site conceptual model currently understood by the Navy is a sound, coherent interpretation of the geologic and hydrogeological conditions at the site that can accurately convey contaminant fate and transport. Contrary to the EPA position stated in the first sentence of the second paragraph on page one of the hydrogeological comments, it is not the goal of the environmental investigations to have the interpretations of the Navy coincide with the interpretations developed by the EPA. Rather, the Navy strives to accurately interpret the site data in a logical, coherent conceptual model whereby an effective understanding of source areas and contaminant transport is gained for application of appropriate remedial actions.

## **NAVY INTRODUCTION OF BASIC ISSUES RELATED TO GROUNDWATER:**

In general, the south-central portion of Rhode Island contains three major hydrostratigraphic units, stratified sand and gravel (i.e., glacial outwash deposits), glacial till, and crystalline and metamorphosed sedimentary bedrock (Rosenshein et al., 1968; Barlow and Dickerman, 2001). The outwash sands and gravels are considered to be the most permeable hydrostratigraphic unit in the area and most large capacity supply wells are screened in this unit. For example, the Hunt-Annaquatucket-Pettaquamscutt stream-aquifer system lies about 0.5 mile west of former NCBC Davisville. This aquifer consists of outwash sand and gravel and is an extremely productive source of groundwater. It serves as a source of potable water for the towns of North Kingston, Warwick, East Greenwich, Narragansett, and the Rhode Island Economic Development Corporation (RIEDC). While the outwash sand and gravel deposits are thinner at former NCBC Davisville, the overburden is still considered to be more permeable than the bedrock, and as such is the major transmitter of lateral groundwater flow in the area. Hydraulic conductivity values for the bedrock are not currently available for former NCBC Davisville; collecting data for bedrock permeability is scheduled during the Phase III field activities to fill data gaps. This new data will enable the Navy to better assess the hydraulic properties of the bedrock, and the ability of the bedrock to transmit groundwater and contaminants.

### **ISSUES:**

#### **Issue 1 – Can PID/FID data recorded during soil boring/groundwater monitoring well installation be used to accurately determine release areas and/or zones of high contaminant concentrations in soil?**

It was stated throughout many comments from the EPA and during the May 31 conference call that the lack of elevated PID/FID readings around the former Building 41 area supports EPA's fundamental conclusion that this area could not be a source area. Further, elevated PID/FID readings in boreholes located north of Davisville Road (e.g., FFTA) has led the EPA to conclude that the FFTA and other nearby areas are the prime contaminant source areas. This conclusion has prompted the theories presented by EPA concerning DNAPL migration from the FFTA along a silt layer and the upward discharging of contaminated groundwater impacted from the Site 3/Nike PR-58 sites (and previous theories that appear to be abandoned such as DNAPL migration along the bedrock surface from the FFTA to the former Building 41 area). These theories are discussed as separate issues below. The focus of this issue is to determine the usability of PID/FID readings to identify contaminated soil zones.

There are two apparent conclusions drawn by EPA regarding PID/FID readings at Site 16. The first is that PID/FID responses will be encountered from the release elevation (in most instances, ground surface

is assumed) and continue with depth. The second is that the PID/FID responses observed at Site 16 accurately correlate with impacted soil and groundwater and can therefore be utilized to identify contaminated soils.

Analysis of the site data indicates that both of these EPA conclusions are incorrect. Although the Navy believes that it is logical to initially assume that PID/FID responses will be encountered from the release elevation and continue with depth, it is important to examine surface and shallow subsurface lithologies, recharge patterns in potential source areas, the nature of release, and the time-frame of the release. The surface and shallow subsurface at Site 16 is dominated by fine- to coarse-sands and gravels and infrequent fill materials towards Allen Harbor. Infiltration is generally vertically downward through the unsaturated zone until the shallow water table is reached. The exact nature of the release(s) at the FFTA are not known, but are most likely point source style releases of small diameter (perhaps less than 30 feet) since there is no evidence to suggest a large disposal area. Even if the FFTA were considered as one large disposal area, individual releases from this area during its operation are consistent with multiple point source releases. The age of a release(s) at the FFTA is approximately 40 years. Given these additional considerations, it should be concluded that given the time, potential size of releases, and general nature of the lithology and recharge, impacted areas may have been flushed out to the point where inconsistent or no PID/FID responses may be reported.

Based on an analysis of Site 16 data, correlation of PID/FID responses to soil and groundwater analytical data is extremely poor. All soil samples with CVOC concentrations and PID readings are listed in Table 1. A graph of PID readings versus CVOC concentrations in soil samples (Figure 1) shows that elevated PID readings can be associated with low CVOC concentrations (e.g., well MW16-04S at 3 to 5 ft bgs) and very low PID readings can be associated with very high CVOC concentrations (e.g., MW16-14D at 57-59 ft bgs, MW16-22D at 59-61 ft bgs, and MW16-15R at 51-53 ft bgs). Groundwater data for MW16-14D was also consistent with soil data in that CVOCs were 4911 ug/L in March 2001 and 3003 ug/L in 2002. The soil boring log for MW16-14D indicates no response from the PID in the 57.5 to 59.5 ft bgs zone. There was a minor PID response in the soil interval just below (12.9 ppm) but a fixed-base lab sample was not collected from that zone.

All soil samples with CVOC concentrations and FID readings are listed in Table 1. A graph of FID readings vs CVOC concentrations in soil samples (Figure 2) shows that elevated FID readings can be associated with low CVOC concentrations (e.g., SB16-45 at 14-16 ft bgs and SB16-46 at 12-14 ft bgs) and low FID readings can be associated with very high CVOC concentrations (e.g., INJ16-01D at 48-50 ft bgs, SB16-32/MW16-32D at 56-58 ft bgs, MW16-62D at 55-57 ft bgs, and MW16-63D at 48-50 ft bgs).

A good example of false negatives for CVOCs based on FID data was observed at location MW16-32D which lies directly under the footprint of Building 41. The soil and groundwater analytical results for MW16-32D consistently showed elevated CVOCs. Soil samples for MW-32D were collected at depths of 36 to 38 and 56 to 58 feet bgs and had CVOC concentrations of 280 and 4570 ug/kg, respectively. Groundwater data for MW16-32D was consistent with soil data in that CVOC concentrations were 2712 ug/L during the 2002 sampling event. The soil boring log for MW16-32D shows that at 36 to 38 feet bgs, a FID reading of 5.0 ppm was obtained and at 56 to 58 feet bgs, a FID reading of 3.5 ppm was obtained. Thus, the FID data did not correlate well with the CVOC contamination around this well. Based on low FID readings in most of the soil intervals sampled from the injection pilot testing wells (wells with "INJ" prefix), the FID readings were consistently giving false negatives in and around Building 41. As an example, consider the analytical soil and groundwater results reported for injection well INJ16-07D compared to the FID readings obtained. The soil analytical data showed concentrations of 430 ug/kg and 1000 ug/kg for CVOCs at 54 to 56 and 60 to 62 ft bgs, respectively (the groundwater analytical data also indicate elevated CVOC concentrations). However, the soil boring log indicates that no responses were observed on the FID.

Based on the evaluation presented above, the historic PID and FID data have limited value in delineating areas of CVOC contamination. In the boreholes and monitoring wells installed south of Davisville Road, numerous soil samples have had moderate to high concentrations of CVOCs. The PID and FID readings for most of these samples have been zero or relatively low. It is incorrect to believe that CVOCs are not present in the soils based on the low PID and FID readings.

In summary, using the historic PID/FID responses to delineate contaminated soils or sources is of somewhat limited value. If the EPA continues to interpret the presence or absence of CVOCs in Site 16 areas (e.g., around Building 41, the FFTA, etc.) based on PID/FID data, the Navy recommends that the EPA provide a detailed correlation study between PID/FID responses and analytical data to demonstrate why the EPA thinks the PID/FID data are useful indicators of contamination.

The reason elevated PID/FID responses are commonly encountered north of Davisville Road may also be related to the layers of peat that are noted in many borings; the high FID readings appear to coincide with where peat is also observed. There are several key observations in PID/FID responses when peat is also observed. First, the responses are highest just above or at the peat contact; oftentimes the reading is nearly 10000 ppm. Second, responses are higher in the interval just above the peat contact than just below. In fact, in most instances, the responses quickly trail off to less than 50 ppm just 4 to 6 feet below the peat. Third, PID/FID responses appear to permeate upward from the peat to the ground surface, creating the appearance of an increasing with depth trend. The peat layers may be generating methane,

which could potentially be causing the elevated FID readings. Many wells at Site 16 are devoid of CVOCs in groundwater samples, but contain high concentrations of methane.

**Issue 2 - Does there exist a silt layer dipping southward which acts as a pathway for contaminant migration southward from the FFTA toward Building 41?**

Evidence for the existence of a silt layer dipping southward and acting as a pathway for contaminant migration from the FFTA south-southwest toward former Building 41 (in the upgradient direction) is presented by EPA in Comments 32 and 37 and Figures 2 and 5. In Comment 37, the EPA states that “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.” The EPA used this generated data posted on a site map to interpret a continuous, confining silt unit throughout the FFTA and former Building 41 area. Furthermore, Figure 5 presents likely contaminant migration pathways, interpreted based on the elevation of the southward dipping silt layer drawn by EPA.

Inspection and analysis of the boring logs presented on EPA Figure 5 shows that for much of the area presented in this figure, a continuous, dipping silt layer does not exist. In fact, based on the boring logs, there is no evidence of silt as defined by the EPA at the elevations assumed at three of the four monitoring wells at the FFTA (MW16-43, 45 and 46 have no silt layer at the elevations presented) and at two of the down-dip monitoring wells (MW16-23 and MW16-59). In addition to the monitoring wells in the FFTA and near former Building 41 where no silt layer as defined by EPA is observed, there is also no silt layer at MW16-41. Furthermore, the first encountered silt layer at MW16-43 is observed at approximately 33 feet below ground surface (-16 feet MSL). If this first silt layer from MW16-43 had been used in the construction of Figure 5 by EPA as well as the consideration of the absence of silt at the other locations cited above, the resulting top of silt map produced would be significantly different than the map presented. As presented, the top of silt map depicted in Figure 5 is inaccurate and therefore not useful.

Besides assigning the presence of a silt layer at locations where no silt layer occurs (based on the boring logs and the EPA definition of silt layer), the other erroneous assumption in the approach suggested by EPA is that the silt layer is laterally extensive to adjacent locations. Before the assumption of lateral continuity can be treated as a valid interpretation, the subsurface lithologies need to be examined in geologic cross sections. As evidence for the absence of the southward dipping silt layer, the Navy has prepared one geological cross section (Please see Attachment 1). The location of the cross section corresponds to the most direct potential contaminant migration pathway as presented on Figure 5.. In addition to this cross section, the previously presented cross section A-A”, Figure 3-2A of the Supplemental Phase II Data Package Report, also contains a portion of the potential contaminant migration pathway as presented on EPA Figure 5.

The geologic cross section from MW16-45 to MW16-59 shows that although definite silt layers occur, they are not laterally extensive. Silt is only encountered at MW16-43 and MW16-40. A laterally extensive peat layer is observed to extend from MW16-45 to MW16-41, decreasing in thickness from 3 feet thick to 1 foot thick and increasing in elevation. The lithologies depicted on MW16-40 are a conservative interpretation based on both the shallow and deep borings. As noted in these boring logs, interbedded silt and sand layers are encountered from approximately 0 feet MSL to -15 feet MSL. As observed in the boring log for MW16-40S, distinct silt layers are present. However, in the boring log for MW16-40D, only silt and sand layers are present. In general, the overall thickness of the interbedded silt and sand layers is thicker in MW16-40S with each layer being distinct as either sand or silt, while at MW16-40D, the overall thickness is thinner and the units are not distinct (rather, a mixture of sand and silt).

A portion of cross section A-A", Figure 3-2A in the source report, also depicts a portion of the potential contaminant migration pathway as presented on EPA Figure 5. As depicted in this cross section, there are no laterally extensive silt layers. In EPA Figure 5, the silt layer was assumed to be laterally continuous between MW16-02 and MW16-22. As detailed on this cross section, this assumption is not correct. Not only are the lithologies of the silt layers different, but they are separated by sands and sandy silts.

Perhaps the most noteworthy feature of the cross sections prepared by the Navy is the lack of the silt layer in the FFTA. Of further note is that the laterally extensive peat layer is generally lower in elevation in the FFTA than just south of the FFTA (near MW16-41). As depicted in Figure 2, prepared by the EPA, the confining silt layer is located just above this peat layer. Even if the silt layer was present in the FFTA, which it is not, based upon the cross sections provided, contamination would have to migrate both vertically upward and against the direction of groundwater flow as it moved southward from the FFTA to the former Building 41.

Based upon the boring logs and geologic cross sections, the Navy concludes the physical evidence does not support the presence of a laterally extensive silt layer dipping southward, funneling contamination from the FFTA to the former Building 41 area. In many areas, silt does not occur as a distinct layer. Where silt layers do occur in the area, they are of limited lateral extent and essentially horizontal (therefore, there is no driving force for the contaminants to overcome the flow of groundwater). Furthermore, the variability of encountered silt and sand layers within even the same well clusters attests to the general inter-bedded nature of the silts in this area and lack of their lateral extensive nature.

**Issue 3 – Is the area north of Davisville Road the source for CVOC contamination beneath Building 41 and in shallow groundwater?**

There are two principle conditions that must be met in order for the area north of Davisville Road to be the source of CVOC contamination beneath former Building 41. One, the chemicals comprising the contamination must be the same (or at least were present prior to applicable degradation processes in the source area via transport to the downgradient location) and two, there must be a physical route of contaminant transport present connecting the two areas. The second condition was discussed at length in Issue 2, so it will not be re-addressed here. Please refer to Issue 2 which concludes that there is no physical route of contaminant transport between the area north of Davisville Road to former Building 41.

Ordinarily, this would be enough evidence to conclude that the CVOC contamination beneath former Building 41 did not originate in the area north of Davisville Road. However, analysis of both soil and groundwater chemistry data also shows that although there are similar chemical constituents in each area, there are distinctions to each area, allowing one to conclude that each area is a unique source. For instance, for soil data in the FFTA, there is no TCE observed at any depths. CVOCs are composed entirely of TCE degradation products DCE and VC. In groundwater samples (collected either during the MIP stages or later groundwater sampling events) at the FFTA, only trace concentrations of TCE are observed (less than 4 ppb) in the shallow zone while elevated levels of TCE were observed in the deep overburden. Interestingly, at MIP16-17, which is located approximately in the same position as the MW16-42 well cluster, only DCE and VC are present in the shallow groundwater while modest concentrations of TCE with minor components of DCE and VC are observed in the deep groundwater [see Figure 2-6 of the Phase I Remedial Investigation Report of IR Program Site 16 (EA, August 2004)]. The same trends are observed in the MW16-42 well cluster data. Elevated TCE concentrations are observed throughout the area north of Davisville Road but only in the deep overburden. Soils and groundwater data in the former Building 41 area show that for most all locations, TCE is the only VOC observed. Only minor concentrations of other VOCs are observed in the groundwater data in the former Building 41 area.

If CVOC contamination beneath former Building 41 did originate in the area north of Davisville Road, there should be some residual TCE observed in the shallow zones in the FFTA. In general, TCE is consistently observed to occur in the deep overburden north of Davisville Road and beneath (and around) former Building 41. It more logical to conclude based on the evidence of the data that TCE was released at both areas.

Throughout the Response to Comments letter from EPA dated May 15, 2006, it was frequently asserted that extensive subsurface sampling in the former Building 41 area has been performed [soil borings, soil head space screening (during both monitoring well installations and MIP studies) and soil

collection/logging] and that no evidence of impacts have been found that would be consistent with a release or releases from within or adjacent to former Building 41. This conclusion is not supported by the data collected to date.

Figures 4-2 and 4-3 of the source report presents total CVOCs for the shallow subsurface (2 – 25 feet bgs) and subsurface (>25 feet bgs), respectively. As depicted in these figures, most of the shallow subsurface soil samples were collected north of Davisville Road while most of the deeper subsurface soil samples were collected around the former Building 41 area. Therefore, as summarized in Section 7.0, there is insufficient data for the shallow subsurface around the former Building 41 to conclude whether or not a release or releases have occurred. Inspection of the boring logs in the former Building 41 area and MIP data collected during the two stages of MIP activities at the site support the hypothesis that a release or releases have occurred in the former Building 41 area. However, this can only be concluded with further investigations in this area.

Analysis of soil borings in and around the former Building 41 area show that non-zero readings were obtained in soil head space analyses during split-spoon sampling. Even though most readings are obtained by FID/PID without a filter, these readings cannot be dismissed as meaningless. Many occur within the unsaturated portions of the soil boring and at locations where no vegetation/fill material is observed (for instance, see INJ16-05D and 07D). There are many locations where no readings above background are observed, but it should be remembered that FID/PID readings obtained in split-spoon sampling during soil borings is a qualitative field screening tool. Conclusions regarding the impacts due to releases should not be made based on these results.

Based on this discussion, it should be concluded that CVOCs have been detected in the shallow soils and groundwater around the former Building 41, and that Building 41 could be a contaminant source area.

**Issue 4 – Is former Building 41 the major source of contaminants at Site 16 or are there other contaminant source areas of greater potential significance? Does the contaminant plume actually consist of several coalescing plumes?**

There are many components of this issue, most of which are discussed as individual issues. For simplicity, the large-scale interpretations of source areas are the focus of this issue. By far, this issue involves the most cross-correlation of the comments provided by EPA, showing that this issue is a fundamental component of the EPA hydrogeological conceptual site model.

Based upon the evaluation of all site data collected to date, the Navy believes that the former Building 41 and/or surrounding area is a significant source of the contamination observed at Site 16. As stated

throughout the source report and response to comments for this issue, there are most likely several releases, perhaps both spatially and temporally, around the former Building 41 area. The Navy acknowledges that there are likely other source areas as well, particularly in the area north of Davisville Road (including most notably the former FFTA). According to the Navy's hydrogeological conceptual understanding of the site, there are multiple source areas that contribute to one large "plume". Individually, each source area may contribute different chemical constituents to the overall "plume". While there has been no concerted effort to assign percentage contributions from each source area to the overall observed mass of the coalesced "plume", evaluation of the "plume" in each of the hydrostratigraphic zones allows for conclusions to be made concerning where the apparent important source areas are located.

Based on the current and previous distribution of elevated VOCs, particularly TCE, within the various hydrostratigraphic zones, the direction of groundwater flow (which has remained relatively consistent throughout the monitored time frame), and the subsurface lithologies, the most logical conclusion to explain the observed distribution of the coalesced "plume" are primary source area(s) in the vicinity of the former Building 41 and north of Davisville road. As discussed in Issues 1 and 2, we believe that the source of contamination observed at the former Building 41 is not north of Davisville Road. Furthermore, other source areas as identified in the source report are also important to the understanding of the current coalesced "plume" observed at the site.

Based on the current data, it is difficult to ascertain where most of the mass in the current coalesced "plume" originated since much of the area north of Davisville Road is potentiometrically downgradient of former Building 41. Based on historically presented TCE concentrations, minor to no TCE was observed in shallow groundwater; TCE degradation products are observed. In the deep overburden and shallow bedrock, elevated TCE concentrations are observed in both the former Building 41 areas and north of Davisville Road. One important factor to note is that the highest elevated TCE concentrations observed historically (see Figures 4-2 through 4-18 of the Phase I Remedial Investigation, EA, August 2004) and currently (see the source report) are in the deep overburden and shallow bedrock zones along the primary groundwater flow direction between the former Building 41 and Allen Harbor. It is also important to note that concentrations are higher and generally centered further southwest toward the former Building 41 in 2002 versus 2004. The highest TCE concentrations north of Davisville Road are downgradient of the former Building 41, not near the FFTA. For instance, TCE concentrations are higher at MW16-02, 42, 29, and 05, which are all directly downgradient of former Building 41, versus MW16-43, 45, 46 which are at the FFTA.

Regardless of where the contamination originated, it would appear that the primary transport mechanism was downward migration through the permeable sand units to the deep overburden and shallow bedrock,

then transport with the groundwater flow northeast toward Allen Harbor. Whether or not DNAPL was present at any of the potential release points/source areas is unknown. During the various environmental investigations performed at Site 16, no DNAPL was identified. Furthermore, contaminant concentrations observed during the various environmental investigations are in general, too low to suggest a current DNAPL source. Based on all of the site data collected to date, the large-scale pattern of contamination suggests that contamination migrated vertically downward as a DNAPL through the permeable sand units to the deep overburden and shallow bedrock, with some minor components of lateral distribution due to discontinuous layers of lower permeability materials (silts, sandy silts and silty sands).

**Issue 5 – The EPA contends that the description of bedrock valleys is incorrect. There are several troughs and linear depressions, not just two.**

The Navy used the term “valley” loosely to describe large-scale bedrock surface features. This is why the word valley was enclosed in quotations in the original text, page 3-8, second paragraph. The Navy agrees with the EPA assessment that the areas are perhaps more accurately labeled as troughs or linear depressions. As stated in the original text, the Navy already identified this loose definition: “Additionally, there are two “valleys” or depressions in the bedrock surface.” The Navy agrees that when considered on a finer scale, more numerous linear depressions are identified throughout the site.

**Issue 6 – Long open holes in bedrock monitoring wells and short vertical separation of well screens has caused dampening and/or reversals of vertical hydraulic gradients measured in nested wells.**

There have been 33 monitoring wells installed in bedrock at Site 16 (see Table 3-1). Each of these 33 wells have 25 feet of open hole for their groundwater intakes (i.e., no well screens were installed because the bedrock is competent and does not collapse). It is true that an open borehole will allow mixing of groundwater from different fractures to occur, which will have the effect of averaging the hydraulic potential and the groundwater quality for the localized area. However, if the fractures are naturally interconnected, then some degree of natural mixing, averaging, and equalization occurs to the groundwater chemistry and hydraulic potential in the bedrock on a localized basis anyway.

If the hydraulic potential in the deep overburden is measurably different than the potential in the underlying bedrock, then the longer section of open bedrock may alter the calculated hydraulic gradient between the two zones by a small amount (i.e., may dampen the magnitude), but it should not change the direction of flow. Hence, the wells are adequate to evaluate vertical flow directions and average localized groundwater quality conditions.

The Navy believes that the 25 foot sections of open boreholes in bedrock were necessary to ensure that bedrock monitoring wells could produce sufficient water to allow low-flow purging and sampling. Shorter sections of open hole could have potentially resulted in wells that would not produce water or produce extremely low yields.

**Issue 7 - The EPA believes that there is vertically-upward groundwater flow between the bedrock and the deep overburden near Building 41.**

Based on the data presented in Table 3-4A and Figure 3-15, the Navy believes that there is **more evidence suggesting a downward flow** component between the deep overburden and the bedrock near Building 41. Specifically, there are eight well pairs that suggest downward flow, four well pairs that suggest upward flow, and two well pairs that suggest very little or mixed vertical gradients. In addition, the average downward gradient for the eight well pairs is 0.0124; whereas the average upward gradient for the four well pairs is approximately 0.00812 (based on 2004 data). Thus, the magnitude of the downward gradient in the eight well pairs showing downward flow is roughly 50 percent greater than the gradient for the four well pairs showing an upward gradient. The Navy believes that the **preponderance of data** suggest a downward gradient near Building 41, not upward as suggested by the EPA.

In their comments (specifically EPA Hydrogeology Comment Number 24), the EPA refers to the geophysical surveys performed on the open sections of bedrock monitoring wells as evidence that groundwater may be flowing upward from the bedrock to the deep overburden. Geophysical Applications, Inc., performed heat-pulse flowmeter tests on a total of 16 bedrock monitoring wells (Geophysical Applications, Inc., 2004a, 2004b). Of those 16 tests, 12 wells had no measurable vertical flow in the wellbores during ambient conditions, two wells displayed weak downward flow (MW-60R and MW16-66R), and two wells displayed weak upward flow (MW16-14R and MW16-68R). The upward flow in the two wells was very weak [ $<0.10$  gallons per minute (gpm); minimum detection limit = 0.02 gpm]. Because the wells are cased through the overburden, the vertical flow measurements do not reflect movement from the bedrock into the overburden, but simply suggest minor redistribution of water within the bedrock fractures. Overall, the data do not really suggest any vertical movement within the bedrock (i.e., no measurable flow was detected in 75 percent of the wells tested). Overall, the data does not support EPA's conclusion that there is an upward flow between the bedrock and the deep overburden.

It is interesting to note that the Phase II RI Report (EA, 2003, p. 3-16) stated that of the vertical gradients calculated for the deep overburden and shallow bedrock wells, nine of the eleven well pairs displaying upward vertical gradients are located in the Nike Site and Site 3 areas. These data do not support the EPA hypothesis that groundwater is moving from the overburden down into the bedrock at the Nike Site and moving laterally toward Building 41.

**Issue 8 – The EPA suggests that maximum CVOC concentrations in bedrock fractures can be diluted in 25-foot open boreholes in the bedrock wells, which may cause contaminant concentrations in bedrock to appear artificially low. Therefore, the Navy should not use concentration gradients to argue a vertically downward direction of contaminant migration near Building 41.**

The Navy agrees that open boreholes in bedrock wells would allow mixing of groundwater between different fractures. This will cause the overall measured water quality in the well to be an average water quality for that depth interval. Comparing that data to overlying and underlying monitored zones, however is still valid as samples from each zone are averages for that zone. Measured contaminant concentrations in the well will lie somewhere between the ranges of concentrations that might exist in individual fractures.

Secondly, if for the sake of argument, the bedrock fractures did contain higher contaminant concentrations than the deep overburden, the concentrations welling up from the bedrock into the deep overburden would be greatly diluted by clean groundwater moving laterally through the overburden. Thus, even if there was mixing and averaging of water quality in the open bedrock boreholes, one would still expect to see concentrations in the overburden to be much lower than the “averaged” concentrations in bedrock. However, this scenario was not supported by the data. Hence, the Navy still believes that concentration gradients observed between the deep overburden and the bedrock wells is strong evidence that contaminants are not migrating upward from the bedrock near Building 41, as discussed below in Issue 9.

**Issue 9 - The EPA believes that shallow bedrock is a source of CVOCs migrating upward into the deep overburden near Building 41.**

The TCE concentrations measured in each well nest around Building 41 in 2004 are listed below. As shown, the TCE concentrations in 11 of the 13 deep overburden wells are higher than the concentrations measured in the corresponding bedrock wells, and the highest concentrations overall were reported for groundwater samples collected from the deep overburden wells. In many cases, the TCE concentration in the deep overburden well is several orders of magnitude greater than the concentration in the corresponding bedrock well. TCE was slightly greater in the shallow bedrock wells in only two well nests (MW16-60 and MW16-71). If TCE and the other CVOCs were moving upward from the bedrock to the overlying overburden, then one should expect to see much higher concentrations appearing in the bedrock wells. This is clearly not the case near Building 41. Based on these data, in combination with the information presented for issues No. 6 through 8, the preponderance of data clearly indicates that a plume of TCE is not welling up from the bedrock into the deep overburden near Building 41.

Well Nests Near Building 41	TCE Concentration in 2004 (ug/L)		
	Deep Overburden	Shallow Bedrock	Deep Bedrock
MW16-01	6.04	4.92	-
MW16-14	2000	0.85	-
MW16-15	1400	705	210
MW16-25	415	0.445	-
MW16-32	290	110	-
MW16-59	2300	1500	-
MW16-60	1600	1800	-
MW16-66	18	3.45	-
MW16-67	980	610	-
MW16-68	780	240	-
MW16-69	970	240	-
MW16-70	730	59	-
MW16-71	790	1100	-

\* Note: Highlighted lines of data indicate that TCE concentrations measured in the bedrock were higher than the concentrations measured in the overlying overburden.

**Issue 10 - Is the Nike PR-58 Site and/or Site 3 potential sources of CVOCs migrating to Building 41?**

When considering the regional topography and potentiometric surfaces, it is apparent that the potentiometric surfaces, in general, mimic topography. Groundwater elevations are generally highest in the topographic high areas and generally lowest beneath the shoreline of the ocean (i.e., Narragansett Bay and Allen Harbor), major streams, and ponds. Hence, groundwater is expected to flow from topographic high areas to the ocean or stream valleys.

Site 3 and the Nike Site are located approximately 3500 to 4000 feet west-northwest of Building 41. In November 2004, groundwater elevations in the deep overburden at Site 3 and Nike Site ranged from approximately 20 to 22 feet amsl and ranged from 13 to 16 feet at Building 41 (see Figures 3-10A and 3-10B in the Supplemental Phase II Report). Hence, there is a lateral gradient, albeit small in magnitude, between Site 3/Nike Site and Building 41. As shown on Figure 3-10B, this lateral gradient has been calculated to be 0.00182, which is relatively small. Based on the potentiometric contours presented on Figure 3-10B of the Supplemental Phase II Report (TtNUS, 2006) and Figure 3-21 of the draft "Phase II Remedial Investigation Report of IR Program Site 16" (EA, June 2003), groundwater from the Nike Site and Site 3 is much more likely to be flowing as follows:

- (a) northeastward toward the western arm of Allen Harbor or the intermediate surface water bodies (pond, swamp, stream) that drain to the harbor, or
- (b) southeastward toward Davol Pond and the two unnamed ponds next to Davol Pond.

If groundwater from Site 3 is flowing toward Allen Harbor, then the drop in head would be approximately 21 feet across a distance of about 2400 feet, which equates to a hydraulic gradient of about 0.00875. If groundwater is flowing from Site 3/Nike Site toward Davol Pond, then the drop in hydraulic head would be approximately 3.5 feet over a distance of about 1600 feet which equates to a hydraulic gradient of about 0.00219. In either case, the lateral gradients are greater toward the two surface water bodies than towards Building 41. Based on hydraulic gradient data, it is **very unlikely** that there is flow from Nike Site or Site 3 towards Building 41. It should be noted that Allen Harbor appears to exert significant hydraulic control over groundwater migration in the area, as there is a strong hydraulic gradient from the Site 16 area northeast to the harbor. It is highly unlikely that groundwater originating at the former Nike Site would move laterally to Site 16, then bend north to the harbor as opposed to migrating towards the harbor or its northern tributaries for the Nike Site area.

Although no data are available at this time to draw detailed potentiometric contours in the vicinity of the Nike Site, it is also possible that groundwater at this site is flowing westward toward Sandhill Brook or Pine River, located west of the sites.

Twelve wells and seven MIP borings in the deep overburden, five wells screened in the shallow bedrock, and one well screened in the deep bedrock are located west or northwest of Building 41 (see Table below). PCE, TCE and degradation products have not been detected in ten of these wells and the seven MIP borings. **Very low concentrations** (< 1.5 ug/L) of the CVOCs have been detected in the other eight monitoring wells. Thus, **the groundwater analytical data from 25 different monitoring wells and MIP borings in deep overburden and bedrock do not show any evidence that a plume of contaminated groundwater is migrating from the Nike Site or Site 3 toward Site 16.**

Water-Bearing Unit	Well Number	Total CVOC Concentration <sup>(1)</sup> (ug/L)	Sampling Date
Deep Overburden	MW16-09D	0.236 J	10/8/2004
	MW16-10D	0.497 J	10/7/2004
	MW16-11D	ND	10/6/2004
	MW16-13D	0.326 J	10/7/2004
	MW16-26D	0.079 J	10/7/2004
	MW16-30D	0.072 J	10/12/2004
	MW16-55D	ND	9/29/2004
	MW16-65D	ND	10/28/2004
	EA-110D	ND	6/20/2005
	EA-111D	ND	6/23/2005
	MW-Z4-01	ND	9/28/2000
	MW-Z4-02	ND	10/3/2000
	MIP16-W02	NSR	
	MIP16-W04	NSR	
	MIP16-S06	NSR	
	MIP16-W07	NSR	
MIP16-W14	NSR		
MIP16-W16	NSR		
Shallow Bedrock	MW16-10R	0.092 J	10/7/2004
	MW16-55R	ND	10/7/2004
	MW16-65R	1.24	10/28/2004
	EA-110R	ND	6/20/2005
	EA-111R	1.5	6/23/2005
Deep Bedrock	MW16-55R2	ND	10/14/2004

Note: CVOCs include PCE, TCE, DCE isomers, and vinyl chloride.

The EPA has suggested that the Nike PR-58 and Site 3 locations are a major source for the TCE observed at and around the former Building 41. This hypothesis is noted in the EPA comments on the Site 16 Ground-Water Investigation Report (EA, June 2003) and other EPA comments (particularly the various HRC-Injection related submittals). The Navy has identified the following unresolved issues in regard to each EPA line of evidence:

- Sites 3/Nike PR-58 are hydraulically upgradient from Site 16 for all groundwater zones.
  - EPA has already stated that there are not enough wells to characterize groundwater flow directions, therefore the same standard should be applied to EPA's interpretation. The Navy disagrees with the EPA conceptual model.

- Groundwater recharge areas are located near the Site 3/Nike PR-58 Site and groundwater discharges are located within Site 16.
  - As stated in Issue 7, there are significantly more downward gradients than upward gradients near Building 41. There are also no apparent trends that would suggest that a discharge area exists.

**Issue 11 – The EPA contends that the trend analysis of contaminant concentrations over time is flawed and "prejudicial." Insufficient data have been collected to perform time-concentration trend analysis of analytical data in wells.**

The first paragraph on Page 5-10 of the Supplemental Phase II Data Package Report reads as follows:

*“One to three groundwater samples have been collected from each monitoring well at Site 16. Most of these samples were collected in 2002 and 2004. This temporal spacing provides limited information on which to assess temporal concentrations trends. However, an attempt is made in this section to evaluate whether contaminant concentrations in groundwater appear to be increasing, decreasing, or remaining steady over time. If a well had at least two samples collected and a contaminant was detected in at least one of those samples, a subjective determination was made as to whether the concentration increased, decreased, or remained unchanged over time. The results of this evaluation are summarized in Table 5-1. If a contaminant exhibited a change of 100 µg/L or more, the information on Table 5-1 was bolded. Twenty-eight wells displayed major changes (i.e., greater than 100 µg/L) in TCE concentrations over time. Of these, 21 wells displayed a decrease in TCE and seven wells displayed a increase. The wells closest to former Building 41 and south of Davisville Road include 14 of the 28 wells that underwent a major change in TCE concentration between 2002 and 2004. Of these 14 wells, 13 wells showed significant decreases in TCE. Only well MW16-37I showed a significant increase (1,100 to 1,700 µg/L). Because such a large majority of the wells close to the source decreased, it must be surmised that the mass of TCE in and around the source has declined significantly. If this is the case, it is unlikely that a large source still exists in this area. This does not preclude the possibility that some contamination may still reside in the soils around former Building 41.”*

This paragraph clearly states that the Navy considers the data to provide only “limited information” concerning temporal concentration trends at Site 16. However, the data were used to qualitatively evaluate whether concentrations are increasing, decreasing, or remaining steady around Building 41. Based on the qualitative evaluation, the Navy believes the data do suggest TCE concentrations are decreasing over time, **which should be expected given the time frame since the releases likely occurred** (approximately 40 years). Because such a large proportion of the wells have shown decreasing concentrations, it is “surmised” that the mass of TCE around Building 41 is declining over

time. The Navy did acknowledge that only a few samples have been collected from each well. The conditions of the plume were simply interpreted using the data that are available. Even though the interpretations are speculative, they are definitely not biased or prejudiced, and they certainly were not intended to be misleading. The data were interpreted in a manner that was as fair and objective as possible. The limitations of the data set were acknowledged in the text of the report. The last sentence of Section 5.5 states “If additional rounds of samples were collected from select existing monitoring wells, a more conclusive assessment could be made regarding the nature of the plume size and contaminant concentrations within the plume over time.” The Navy agrees that more data over time would be helpful to firm up a rigorous statistical evaluation of temporal trends, but the additional data are not currently available. Based on the data at hand, the Navy still believes that the data suggest that TCE concentrations in groundwater near Building 41 are decreasing over time.

**Issue 12 – Storm drains may cause significant diversion/rerouting of shallow groundwater and contaminants.**

The Navy agrees that storm sewers and drains may allow shallow groundwater to enter the drains (where drains are located below the water table) and move laterally through the drainage system, and/or possibly allow water and contaminants to enter the groundwater system through cracked or leaky sections of the drains. This was stated as a possible contaminant transport pathway in the “Data Package Report” (Section 5.1, p.5-2). There are little or no data currently available to substantiate any speculations concerning the location(s) where contaminants could be entering or leaving the sewer system, and the magnitude of transport that might be occurring now or in the past.

**Issue 13 – Water levels and stormwater discharge rates from Davol Pond, the Detention Basin, and other nearby ponds have not been quantified. Interactions/effects of surface water bodies on groundwater elevations and flow directions have not been measured or evaluated.**

The Navy believes that Davol Pond and the two adjoining ponds are connected hydraulically to the water table and are possibly interacting with groundwater; i.e., the ponds could be recharging groundwater, receiving groundwater discharge, or both. No data have been collected to date to quantify these possible interactions. Such data will be collected during the Phase III RI field effort.

**Issue 14 – The EPA does not completely agree with the groundwater potentiometric maps and/or the directions of groundwater flow presented in the conceptual model.**

Based on the data available, the Navy believes that the four potentiometric surfaces drawn for the shallow, intermediate, and deep overburden zones and the bedrock zone (Figures 3-8 through 3-12) are reasonable interpretations that are consistent with the available data and general hydrogeologic

principles.. The Navy agrees that the individual contours might be bent or curved slightly differently in localized areas where data are sparse (i.e., contouring is somewhat subjective in these areas), but the Navy does believe that the overall lateral flow directions depicted on these maps are generally correct. Flow arrows will be added to these figures to indicate general directions of groundwater flow.

**Issue 15 – There is not enough wells to adequately characterize groundwater flow directions.**

The Navy believes that there are an adequate number of wells installed at Site 16 to evaluate groundwater flowing in a north and northeasterly directions. However, more wells could be useful in defining/refining groundwater flow directions and gradients on the eastern and southern edges of the Site. Suggested locations for installing new wells during the additional RI field efforts are presented in the Phase III QAPP.

**Issue 16 – Groundwater divides should be added to potentiometric surface maps.**

The Navy agrees and will revise all potentiometric surface maps to include groundwater flow divides, when data support such interpretations.

**Issue 17 – Total CVOCs, not TCE, is a better way to present distribution of contaminants in soil and groundwater, because in some instances TCE is not the major component.**

The Navy agrees that the overall outline of contaminated groundwater and the magnitude of contamination at any given location should involve all CVOCs that are linked in the biodecay chain. However, looking strictly at total CVOCs for interpretation of flowpaths and flow directions is not appropriate. For example, it would be extremely difficult to envision how groundwater could contain mostly TCE in one area, mostly decay products a short distance downgradient, and then mostly TCE further yet downgradient. In other words, the distribution of individual compounds and knowledge of decay sequences should be included in the interpretation of plume movement. The upcoming RI work will include evaluation of all pertinent CVOCs, not just TCE.

**Issue 18 – Shallow bedrock groundwater potentials and chemistry have not been characterized very thoroughly around the site, particularly on the west side of the site.**

There have been 33 monitoring wells installed in bedrock at Site 16 (see Table 3-1 of the Data Package Report). The Navy believes that hydraulic potentials and chemistry in shallow bedrock have been adequately characterized over most of Site 16. The data indicates a northeast-trending plume across Site 16 with the lateral edges reasonably well-defined, and the data also indicates that concentrations decline with depth within the bedrock flow system. The Navy has prepared a Phase III Work Plan for the collection of additional data to fill data gaps. Hydraulic testing (e.g., slug tests and/or packer tests and/or

multiple well pumping tests) of the open sections of bedrock wells is included in the Phase III Work Plan, as well as the possible installation of another bedrock well cluster on the western side of Site 16.

#### RESPONSES TO EPA GENERAL COMMENTS:

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

**Navy Response:** See responses below. Responses will reference appropriate issue(s) presented earlier and also may contain additional comment specific responses.

#### RESPONSES TO EPA SPECIFIC COMMENTS:

2. **Specific Comment:** 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.

**Navy Response:** The Navy agrees that Method SW 846 Method 3810 is screening method only. Method RSK SOP 147/175 is recommended as a more quantitative method for monitored natural attenuation (MNA) parameters and will be used in any future investigations suggested to demonstrate that MNA is occurring

3. **Specific Comment:** 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.

**Navy Response:** The ecological screening levels presented in the text and tables of the Phase II Supplemental Data Package Report are those that would be used to select chemicals of potential concern (COPCs) in a screening level ecological risk assessment (SLERA). The ambient water quality criterion (AWQC) **was selected** as the screening level for a chemical if it was available.

4. **Specific Comment:** 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.

**Navy Response:** The reviewer is correct. The referenced text discussing the correlation between groundwater and seeps will be changed accordingly. However, please note that PAHs reported for the referenced seep and groundwater samples are noncarcinogenic PAHs. With one exception (naphthalene; Seep 16-01), the maximum detected concentrations of these non-carcinogenic PAHs in the seep samples do not exceed current EPA preliminary remediation goals (PRGs) for tap water (a very conservative screening level for the surface water of Allen Harbor). Also, as summarized in Table 4-18, these non-carcinogenic PAHs were detected infrequently in the shallow groundwater underlying Site 16. Few were detected in the shallow groundwater at concentrations exceeding PRGs for tap water. Only the sample from monitoring well (28-GW-07S; sampled in 1998) demonstrated significant levels of PAHs (see Table 4-18). PAHs were not detected (MW16-03S and MW16-05S) or only detected at low concentrations (MW16-04S) in the three shallow shoreline wells sampled in 2001 (MW16-03S, MW16-04S, and MW16-05S). The PAH concentrations detected in samples from 28-GW-08S (1998) and MW16-04S (2001) were less than the detected concentrations of PAHs in the seep samples. Based on the currently available data, there does not appear to be a PAH contaminant plume in the groundwater underlying Site 16. However, the PAHs in the groundwater at location 28-GW-07S may be contributing to the PAHs detected in at seep location 16-01. 28-GW-07S is located at the southeastern corner of Building E 107. As detailed in the Phase III Quality Assurance Project Plan for IRP Site 16 (July 2006), additional soil borings are planned in the general vicinity of 28-GW-07S to further investigate residual PAH contamination of soils. (Note that an UST was previously located in this general area)

5. **Specific Comment:** 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.

**Navy Response:** The Navy agrees that dioxins and furans are chemicals of potential concern (COPCs) for the Site 16 soils and these chemicals will be evaluated in the baseline risk assessment for Site 16. This Phase II Supplemental Data Package Report only presents numerical comparisons of site concentrations to available standards and criteria including the referenced EPA risk management criteria of 1 ug/kg. The report does not present risk assessments or conclusions regarding risks. Risk assessments will be presented in the RI report.

6. **Specific Comment:** 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.

**Navy Response:** See response to EPA Comment No. 4.

7. **Specific Comment:** 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.

**Navy Response:** The Navy agrees that the surface waters (seeps) and sediments of Allen Harbor should be evaluated in the baseline human health risk assessment for Site 16. The assessment would include the evaluation of incidental ingestion and dermal contact with surface waters (seeps) and sediment during wading or swimming activities. However, based on the currently available data, non-site related sources appear to be the *primary* contributors to the predominant chemicals detected in the sediments (i.e., the polycyclic aromatic hydrocarbons). This issue will be further discussed during technical teleconferences/ meetings tentatively scheduled by the Navy, EPA, and State of Rhode Island during the June 2006 BCT meeting. These discussions will consider the analyses presented in the July 2004 Screening Level Ecological Risk Assessment at IR Program Site 16 (Former Creosote "Dip Tank and Fire Fighting Training Area).

8. **Specific Comment:** 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.

**Navy Response:** Trace levels of PCE, DCE and vinyl chloride can be present in the original TCE solvent. However, the level of daughter products (specifically cis-1,2-DCE and vinyl chloride) are far greater than what should be expected in the original solvent(s), so it would be very difficult to distinguish what amount of contamination was present in the original solvent(s) and what amounts are due to biodegradation.

9. **Specific Comment:** 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.

**Navy Response:** Please see response presented for Hydrogeological Comment No. 1

10. **Specific Comment:** Section 7.0, Preliminary recommendations for resolving data gaps: include PCBs as analytes of concern in the soil sampling.

**Navy Response:** Please provide the EPA's rationale for inclusion of polychlorinated biphenyls (PCBs) in the Phase III Work Plan. The soil sampling conducted to date and summarized in the Phase II Supplemental Data Package Report indicates that these parameters are not significant soil contaminants at Site 16. See Table 4-10, 4-12, and 4-14.

11. **Specific Comment:** Section 7.0, Preliminary recommendations for resolving data gaps: include BTEX for groundwater monitoring plans.

**Navy Response:** BTEX will be included on the analyte list for the Phase III sampling of Site 16 monitoring wells.

12. **Specific Comment:** 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.

**Navy Response:** There are over 200 monitoring wells installed at Site 16. In a few areas, the density of the wells is very high. For example, sampling *all* of the remedial investigation and injection wells located at the northeastern end of Building 41 would be redundant given the primary objectives of a remedial investigation (e.g., characterization of the nature and extent of groundwater contamination necessary to support remedial decisions) and the known hydrogeology of the site. Consequently, a subset of the monitoring/injection wells installed at Site 16 will be sampled during the Phase III groundwater sampling event. The rationale for the wells selected for monitoring is provided in the Phase III Quality Assurance Project Plan (QAPP) for Site 16.

## EPA HYDROGEOLOGICAL COMMENTS

### NCBC SITE 16 SUPPLEMENTAL PHASE II RI DATA PACKAGE

#### GENERAL HYDROGEOLOGICAL COMMENTS

**General Comment:** 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

**Navy Response:** The main objectives of the Supplemental Data Package Report was to present the state-of-knowledge for Site 16 and identify data gaps, which would then be used to develop a scope of effort for the Phase III RI. The Navy agrees that not all of the interpretations and aspects of the conceptual model are 100 percent conclusive; there are some data gaps and aspects of the site that warrant further investigations. However, the Navy firmly believes that the conceptual model and the interpretations presented in this document are fair and objective interpretations that were developed consistent with the data available. There has been no effort to bias or prejudice the interpretations toward a preconceived notion of the site. Rather, interpretations of the data have been based on the **preponderance of data**, not individual exceptions or **selective data** as it appears the EPA has done when formulating their conceptual understanding of the site. For example, the EPA has suggested that a DNAPL of CVOCs have migrated from the FFTA southward against the hydraulic gradient toward Building 41. There are no data indicating that a DNAPL is present or ever was present at Site 16 (although it also cannot be completely discounted at this time), but this theory is used to argue for southward migration, when the hydraulic gradient supports a northeastward flow direction. The EPA argues that the Nike Site/Site 3 "might" be a source for contaminants present at Building 41, when 18 or more wells that lie between the two sites are clean or nearly clean (CVOCs less than 1.5 ug/L). The Navy believes the **preponderance of evidence** argues against Nike Site/Site 3 being a source of contaminants

at Building 41. The Navy does not understand the basis for EPA's continued support of such speculative theory, which has little or **no supporting data**.

The Navy agrees there is uncertainty regarding source areas (either current or historical) that might exist within Site 16. These data gaps have been pointed out in the subject document and are being addressed in the Phase III Work Plan.

**General Comment:** 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.

**Navy Response:** The Navy disagrees that the EPA has a well-founded conceptual model of the site. The "theories" presented by the EPA are not supported by the **preponderance of data**. The Navy does agree with the last sentence of the above paragraph; the disagreements should be resolved before meaningful progress can be made for this site.

**General Comment:** 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.

**Navy Response:** The Navy repeatedly stated in the source document that several contaminant sources (size and magnitude unknown) may be or may have been present within the Site 16 area. The Navy specifically included the FFTA and the area north of Davisville Road as a likely source of contaminants. However, the Navy believes that, based on the available data, it is much more likely that contamination in

the general Building 41 area is from local releases rather than the migration of contaminants from north of Davisville Road against the hydraulic gradient southward to Building 41. Because there are unknowns concerning shallow soil contamination around Building 41, the FFTA, the area north of Davisville Road, and the rail spur area, the Navy will propose to perform additional soil investigations in those areas in the upcoming phase of field investigations. The Navy is leery of using PID/FID data to conclude which soil areas are contaminated and which are not, in particular with older source areas. Thus, many of the theories and conclusions presented by EPA concerning source areas are questioned if they are based solely on PID/FID data. Please see also Issues 1, 3, and 4 above.

**General Comment:** 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.

**Navy Response:** See comment response above and Issues 1 through 4 above.

**General Comment:** 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.

**Navy Response:** The Navy has stated repeatedly in the subject document that the FFTA is a suspected source of contaminants that needs to be investigated further. The Navy also has stated that the FFTA is the likely source of contaminants that has contributed to groundwater contamination in the intermediate and deep overburden zones near well cluster MW16-45 and to the northeast of well cluster MW16-45. See also Issues 1, 3, and 4 above.

**General Comment:** 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.

**Navy Response:** See Issues 6-10 above.

**General Comment:** 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.

**Navy Response:** A comprehensive evaluation of the contamination in Allen Harbor is presented in the Phase II Screening Level Ecological Risk Assessment (SLERA) of IR Program Site 16, Naval Construction Battalion Center Davisville, North Kingston, Rhode Island (EA, November 2004). The analyses presented within that document are referenced in the draft Supplemental Phase II RI Data Package Report and support the conclusion that activities at Site 16 have not contributed **significant** quantities of chemicals to the sediments of Allen Harbor. The reviewer does not appear to be considering the results of the Environmental Forensic Investigation conducted for Site 16 (Appendix B of the SLERA report) or the evaluation of the spatial distribution of the PAH concentrations in the Allen Harbor

sediments also included in the SLERA. The reviewer is referred to the Phase II SLERA and the response-to-comments (RTC) document contained within Appendix E of the SLERA.

The Navy recognizes that the resolution of site characterization and risk issues for the Allen Harbor is very important to the remedial investigation efforts for Site 16. Consequently, the Navy is recommending a technical teleconference or meeting to review and discuss the results presented in the Phase II SLERA. It is recommended that the discussions include the author of the aforementioned Environmental Forensics Investigation.

**General Comment:** 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.

**Navy Response:** The Navy performed a qualitative evaluation of time-concentration graphs in order to see whether any kind of trend in groundwater contaminant concentrations could be discerned. The Navy believes there is evidence that concentrations are decreasing; but concedes that the interpretations are qualitative and based on only two or three rounds of sample data. However, the Navy never attempted to bias or portray the interpretations in any other than an objective manner. Using meager data to make speculations is not incorrect as long as the interpretations are presented in a fair manner. The Navy clearly stated that the “temporal spacing provides limited information on which to assess temporal concentration trends.” The Navy questions why the EPA considers these interpretations to be biased, prejudiced, or meaningless. See also Issue 11 above.]

**General Comment:** 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.

**Navy Response:** See response to preceding EPA Comment No. 5. The dioxins and furans are not being dismissed even though the maximum detected concentration does not exceed the EPA risk management level of 1 ug/kg. These chemicals will be evaluated in the risk assessments to be completed after the implementation of the Phase III QAPP. With regard to the referenced text, please note that a recent conversation with a retired Seabee at the June 2006 BCT/RAB meetings indicates that the accelerant of choice during the fire protection training exercises was diesel fuel. Spent solvents (or other sources of chlorine) may or may not have been applied to fires generated during a fire training exercises. The frequency of such activity is unknown. However, significant levels of trichloroethene (greater than 500 ug/L) have been detected in the groundwater underlying the fire training area indicating that chlorinated solvents (chlorine contributors) may have been released in this area. The referenced text will be amended to reflect this information.

**General Comment:** 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.

**Navy Response:** The Navy has stated repeatedly in the subject document that the FFTA is a suspected source of contaminants that needs to be investigated further. The Navy also has stated that the FFTA is a likely source of contaminants that has contributed to groundwater contamination in the intermediate and deep overburden zones near well cluster MW16-45 and to the northeast of well cluster MW16-45.

**General Comment:** 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.

**Navy Response:** The Navy agrees that storm drains could provide a means by which contaminants could have migrated from one area to another via leaky pipes. This potential pathway was presented in the subject document (Section 5.1, p. 2). Please see also Issue 12. The Navy planning to perform additional investigations regarding storm drain pathways for contaminant migration.

## **SPECIFIC COMMENTS**

1. **Specific Comment:** *Page 1-5, Section 1.3, 1<sup>st</sup> 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.

**Navy Response:** The Navy agrees with this overall theory, however, examination of the potentiometric surfaces, particularly in the shallow groundwater zone, does not suggest preferential groundwater flow in the vicinity of the drains. Additionally, it would appear that the EPA is suggesting that significant volumes of water are infiltrating into the area east of former Building 41. This would suggest a large degree of flushing and also hydraulic effects in an area where EPA theorizes that contaminants from the FFTA and the Nike PR-58/Site 3 sites are coalescing. It would appear that the EPA believes that the former Building 41 is a source of contamination to the subsurface based on the concern over the storm drains.

2. **Specific Comment:** 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.

**Navy Response:** Investigations of the storm drain system near the former Building 41 (CVOC screening of sewer water and sediment samples) are recommended in the Phase III QAPP for

Site 16. Additionally many of the proposed soil boring locations for the former Building 41 area are situated in close proximity to the referenced storm drain system. However, the Navy does not agree to performing video camera inspections at this time because there is no continuing source of CVOC release near the surface. Such a detailed inspection of the current conditions of the storm lines would be of little value. If the EPA is suggesting that contamination may be originating in the former Building 41 and is being transported to the subsurface, this position conflicts with other EPA statements that the area around former Building 41 has been adequately investigated

There is no need to conjecture that “this storm drain has the potential for impacting groundwater flow and contaminant migration due to its elevation relative to groundwater.” There is ample site specific data to analyze this theory. As noted above, an examination of the potentiometric surfaces, particularly in the shallow groundwater zone in the referenced area, does not suggest preferential groundwater flow in the vicinity of the drains.

The location of the new storm water detention basin will be added to the figures in the Supplemental Phase II Data Package Report.

- 3. Specific Comment:** *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.

**Navy Response:** Please refer to the Navy’s response to the previous two comments. As noted above, a detailed survey of the system is not considered necessary at this time. While it is very plausible that the storm sewer lines could have been a significant CVOC migration pathway in the past, it is unlikely that they are currently a significant CVOC migration pathway. However, the Phase III QAPP for Site 16 does propose an investigation of the waters and sediments of the storm sewer lines in the referenced area as well as surface and shallow subsurface soil sampling in the general Building 41 area to address this issue.

- 4. Specific Comment:** *Page 2-17, Section 2.8, 4<sup>th</sup> 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.

**Navy Response:** EPA’s contention that the Navy believes that there is only one plume at the site is in error. It is stated several times in the source text that the Navy believes that multiple source areas may exist and are contributing to an appearance of a large coalesced plume migrating dominantly northeast across the site. The issue appears to be a question of semantics – continued debate would not be productive.

5. **Specific Comment:** *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.

**Navy Response:** The Navy disagrees. The reviewer has not provided any sound technical argument for disagreeing with the conclusions of the Navy’s Forensics Investigation. See information presented in the responses prepared for preceding comments.

6. **Specific Comment:** *Page 2-24, 2<sup>nd</sup> 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.

**Navy Response:** The Navy agrees with EPA on the importance of water level measurements and flow measurements in Davol Pond and the Detention Basin. These data will be collected during the Phase III Investigation.

7. **Specific Comment:** 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.

**Navy Response:** Based on the comment, the reviewer misunderstands the intent of Section 2 - this was a brief discussion of previous work performed. Also, based on a review of the associated Quality Assurance Project Plan (QAPP), the soils were collected at greater than 40 feet below ground surface by design. The referenced text will be amended to include this information. Additionally, the Navy agrees that the deep soils underlying the northeastern portion of Building 41 have been sampled extensively for the presence of CVOCs. However:

- For purposes of further investigative work, the Navy is defining the Building 41 area as including the footprint of the former building, the area to the northeast of Building 41 (but south of Davisville Road), the area to the southwest of Building 41 (but northeast of the Building 318/319 area, and the area south/southeast of Building 41 (and including the monitoring well MW16-37 and MW16-38 area). (see attached figure) The EPA has expressed concerns regarding potential source areas within this general area (but outside the actual Building 41 footprint) in previous comments submitted to the Navy and regarding the stormwater system which served the former Building 41 during the technical teleconference that occurred between the EPA and the Navy on May 31, 2006.
- No surface soil samples and a limited number of shallow subsurface soil samples only have been collected in the Building 41 area. Sampling of surface and shallow subsurface soils is necessary to support the RI risk assessments. The current plan is to include surface and

shallower subsurface soil sampling in future field work.

- While the sampling of deep subsurface soils for CVOC contamination has been extensive in the northeastern corner of the Building 41 footprint, deep subsurface soil sampling (particularly fixed base lab sampling) has also been somewhat limited outside this northeastern corner.

It should be noted that CVOCs may indeed no longer be present in the shallow soils within the Building 41 area. The releases potentially contributing to the CVOC contamination underlying Site 16 likely occurred in the 1950/1960 timeframe. Thus, the majority of the CVOC mass may have migrated to the deep subsurface soils and groundwater. The field screening sampling (CVOC) and fixed-base lab sampling in the Phase III QAPP are recommended to determine whether there are significant CVOC soil source areas within the Building 41 area that may need to be evaluated in the feasibility study for Site 16 and to collect data to support the RI risk assessments. It is anticipated that the sampling will also address EPA concerns regarding the general Building 41 area expressed in previous comments to the Navy and during the aforementioned May 31, 2006 technical teleconference.

8. **Specific Comment:** *Page 2-25, 2<sup>nd</sup> 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?

**Navy Response:** These data are not available at this time. These questions will be addressed in the Phase III Investigation.

9. **Specific Comment:** *Table 2-3, Page 2 of 6, Phase II Conclusions, 6<sup>th</sup> 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.

**Navy Response:** As discussed in Issue 7, groundwater elevation data indicate that vertical hydraulic gradients between the deep overburden and bedrock for the Building 41 area are downward, not upward as the EPA theorizes. In addition, the Phase II RI Report (EA, 2003) presents data showing that most of the vertical gradients between bedrock and deep overburden measured at the Nike Site show upward flow, not downward flow as suggested by the EPA. The theory promoted by EPA is unsubstantiated by the majority of available hydraulic data and dismissive of other, more likely interpretations that better fit the data. See also Issues 7 and 10.

10. **Specific Comment:** *Table 2-3, Page 2 of 6, Phase II Conclusions, 7<sup>th</sup> 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.

**Navy Response:** The Navy acknowledges and has stated several times in the subject document that we believe several contaminant sources may exist in the Site 16 area, although the number of sources, the precise locations of the sources, and the magnitude of each release are not known. When the Navy uses the term “plume”, it is referring to the elongate volume of contaminated groundwater that extends from Building 41 northeastward up to Allen Harbor. The Navy believes that Building 41 area (former building footprint plus nearby areas south of Davisville Road) is a likely source of contamination in the southwestern end of the “plume”, but the Navy agrees with the EPA that other source areas may be contributing to the plume north of Davisville Road. The Navy considers the “plume” to consist of several coalescing plumes that all flow in a northeastward

direction. The Navy does not mean to imply that the “plume” is attributable to only one source area. This problem of semantics can be easily clarified.

11. **Specific Comment:** *Page 3-3, Section 3.4, 1<sup>st</sup> 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.

**Navy Response:** Note that per discussions occurring at the June 8 and 9 BCT meeting, the referenced area is no longer within the Site 16 boundary.

12. **Specific Comment:** *Page 3-5, Section 3.6.2, 3<sup>rd</sup> Paragraph, 3<sup>rd</sup> 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.

**Navy Response:** See responses to comments above.

13. **Specific Comment:** *Page 3-6, 2<sup>nd</sup> 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.

**Navy Response:** See Issues 1 and 2. After thorough review of all boring logs that are located between the FFTA and Building 41, **the Navy does not agree that a continuous, southward-dipping silt layer exists between the two areas.**

Further, if there was a continuous, southward-dipping silt layer, the EPA “theory” of southward contaminant migration also requires that DNAPL once existed in the FFTA. There is no concrete evidence for DNAPLs to support such a theory.

14. **Specific Comment:** *Page 3-6, 4<sup>th</sup> Paragraph, 1<sup>st</sup> 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.

**Navy Response:** See response to Comment 10.

15. **Specific Comment:** *Page 3-7, 3<sup>rd</sup> Paragraph, 1<sup>st</sup> Sentence:* See Specific Comment 14.

**Navy Response:** See response to Comment 10.

16. **Specific Comment:** *Page 3-8, 2<sup>nd</sup> 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.

**Navy Response:** See Issue 5.

17. **Specific Comment:** *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.

**Navy Response:** In what ways is the assessment of groundwater flow incomplete? In what areas does EPA believe additional groundwater monitoring wells are required? The Navy believes that more than adequate spatial and temporal coverage exists to understand groundwater flow in the shallow zone in most areas. Regarding storm drains, see Issue 12.

18. **Specific Comment:** *Page 3-16, 2<sup>nd</sup> Paragraph, Summary of Groundwater Flow:* EPA believes there is insufficient data to describe the direction of groundwater flow.

**Navy Response:** Please be specific as to what is meant by insufficient data. The Navy believes there is more than adequate spatial and temporal coverage to describe the overall direction of groundwater flow. Though minor inflections could be interpreted several ways, the Navy believes that overall directions of flow are reasonably well defined except for the eastern and southern edges of Site 16.

19. **Specific Comment:** *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.

**Navy Response:** The Navy agrees with EPA in this analysis. Additional wells are proposed in the southern and eastern portions of Site 16 during the Phase III Investigation to refine the understanding of potentiometric water levels and contaminant concentrations in those areas. The Navy also agrees that based on the elevation contours of the shallow groundwater presented in Figure 3-8, the shallow groundwater flowing beneath the in the FFTA and the creosote dipping tank is migrating north/northeastward (i.e., toward Allen Harbor). As detailed in the Phase III Quality Assurance Project Plan for IRP Site 16 (July 2006), additional soil borings are planned in the general vicinity of 28-GW-07S (located just upgradient of the referenced seep at Allen Harbor) to further investigate residual PAH contamination of soils in this area. (Note that an UST was previously located in this general area). Additional investigation of the residual PAH contamination in the FFTA and the creosote dipping tank area is also planned. However, please also note the discussion regarding the significance of the PAH concentrations detected at 28-GW-07S and the seeps presented in the response prepared for EPA Specific Comment No. 2.

20. **Specific Comment:** *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.

**Navy Response:** See responses to Comments 18 to 20. Minor inflections are described in the text.

- 21: **Specific Comment:** *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.

**Navy Response:** Small-scale convolutions in potentiometric surfaces are not uncommon in heterogeneous groundwater flow systems. Trying to discern the exact cause(s) for such small-scale anomalies is difficult, and given the well-defined overall flow pattern across the site the Navy feels that the benefits gained through small-scale studies of localized anomalies would not be productive. The Navy believes that interpretations of potentiometric contours and flow directions are relatively well characterized and understood.

The exact locations and curvature of contours mentioned in paragraph 2 of the comment might be debated, but the overall directions of groundwater flow in the Site 16 area is readily apparent, except on the far eastern and southern sides of Site 16.

Based on the potentiometric contour maps and groundwater quality data, as discussed in Issues 7-10, the Navy believes that the Nike Site and Site 3 are not potential sources contributing contaminants to the Building 41 area. Rather, groundwater from the Nike Site and Site 3 is more likely flowing northeast toward intermediate surface water drainages (swampy area, pond, stream) and Allen Harbor, southeast toward Davol Pond, or westward to another large swampy area. Note that the strong hydraulic gradient (10+ feet elevation difference over a lateral distance of approximately 1,000 feet) across Site 16 to the northeast is evidence of the strong hydraulic control Allen Harbor and it's associated tributary water bodies exert over groundwater flow in the area.

22. **Specific Comment:** *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.

**Navy Response:** The analysis of MW16-15R2 by EPA is incorrect. The R2 wells were only posted on the map, but were not considered part of the data set when constructing the potentiometric surface. The Navy acknowledges that local-scale groundwater flow may vary somewhat from what is shown, however, for Site 16 where contamination is observed, it is dominantly flowing northeast.

23. **Specific Comment:** *Page 3-16, 3<sup>rd</sup> 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).

**Navy Response:** See Issue 5.

24. **Specific Comment:** *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.

**Navy Response:** The Navy disagrees. The preponderance of evidence suggests that the vertical flow direction near Building 41 is downward. See Issues 6 through 10

25. **Specific Comment:** *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.

**Navy Response:** The Navy agrees. Geometric means will be used rather than arithmetic means for groundwater velocity calculations. A range of times can and will be provided in later investigations.

26. **Specific Comment:** *Page 4-7, Section 4.2.1, 7<sup>th</sup> 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.

**Navy Response:** See Issue 17. Please also note that the narrative presented in Section 4.2.1 is not restricted to a discussion of TCE. For example, please note the discussions regarding vinyl chloride and cis-1,2-dichloroethene presented in the second and third paragraphs of page 4-8. More importantly, the presence of the TCE daughter products referenced by the reviewer is the primary reason that additional investigative work is being suggested for the southern portion of the north-central area of Site 16.

27. **Specific Comment:** Page 4-8, 3<sup>rd</sup> Paragraph, 1<sup>st</sup> 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.

**Navy Response:** The Navy agrees that there is soil contamination and other potential source areas to the north and northeast of Building 41 (see also response to Hydrogeology Comment 10).

However, the Navy does not believe that groundwater or contaminants are welling up from bedrock near Building 41 (see Issues 7-10)

Also note that the Navy *is defining* location SB16-59 as within the general former Building 41 area. The Navy believes that a release(s) likely occurred within the general vicinity of the former Building

41. (The Navy also believes that releases occurred at other Site 16 locations.) A release(s) may or may not have occurred within the building proper, but, may have occurred during transport or staging of materials in the general vicinity of the building. Also, please note that the referenced text is specifically discussing TCE. While TCE daughter products were indeed detected in the soil samples collected from boring locations 41 and 44, TCE was not detected in soil samples from either boring. As noted above, the presence of the TCE daughter products referenced by the reviewer is the primary reason that additional investigative work is being suggested for the southern portion of the north-central area of Site 16.

28. **Specific Comment:** *Page 4-8, 3<sup>rd</sup> Paragraph, 3<sup>rd</sup> 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.

**Navy Response:** See Issue 4 and Response to Hydrogeology Comment 10.

29. **Specific Comment:** *Page 4-8, 5<sup>th</sup> 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.

**Navy Response:** See information presented in the responses prepared for the General EPA comments. Also, please note that the referenced text is actually discussing surface and shallow subsurface soils, and specifically indicates that there is “insufficient data available for soil in this area to delineate VOC contamination in surface soil or shallow subsurface soil relative to screening

criteria.” A review of the available data indicates that no surface soil samples (0 to 2 feet bgs) have been collected in the Building 41 for fixed-base lab analysis and shallow subsurface soil samples (2 to 25 feet bgs) for fixed-base lab analysis have been collected at five locations only. For purposes of direct contact risk assessment (if no other), these datasets are inadequate.

30. **Specific Comment:** *Page 4-13, 1<sup>st</sup> Paragraph, 3<sup>d</sup> 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.

**Navy Response:** Comment already addressed. See information presented in the responses prepared for the General EPA comments.

31. **Specific Comment:** *Page 4-16, Section 4.3, 2<sup>nd</sup> 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.

**Navy Response:** See Issue 17. Also, see detailed daughter product information table (Table 4-20). Also, see information in text presented Section 4.3 and Section 5 daughter-product figures.

32. **Specific Comment:** *Page 4-17, 2<sup>nd</sup> Paragraph, 3<sup>rd</sup> 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 shows 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.

**Navy Response:** Comment already addressed. There is no evidence of a laterally-continuous dipping silt layer as described by EPA. Furthermore, the referenced elevated FID/PID readings north of Davisville road only positively correlate to the presence of peat, not CVOCs.

33. **Specific Comment:** 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.

**Navy Response:** See response to Hydrogeology Comment 32.

34. **Specific Comment:** *Page 4-18, 3<sup>rd</sup> 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.

**Navy Response:** Comment already addressed. There is no convincing evidence of a continuous, southward dipping silt layer or DNAPL. See Issues 1-4 and Response to Hydrogeology Comment 10.

35. **Specific Comment:** *Page 4-18, 4<sup>th</sup> 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.

**Navy Response:** Comment already addressed. There is currently no evidence to suggest that either theory proposed by EPA is occurring.

36. **Specific Comment:** *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 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.

**Navy Response:** Comment already addressed.

37. **Specific Comment:** *Page 4-19, Section 4.3.1.3, 2<sup>nd</sup> 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.

**Navy Response:** Comment already addressed. Again, there is no evidence of a continuous silt layer as described by EPA. Please provide evidence in the boring logs for all data points used to construct Figure 5. If no silt is present at the silt layer horizon, gaps must be incorporated in the figure to show where no silt occurs.

38. **Specific Comment:** *Page 4-21, 3<sup>rd</sup> Paragraph, 2<sup>nd</sup> 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

**Navy Response:** Comment already addressed. EPA has not provided any evidence other than conjecture for a hydraulic connection between Nike PR-58 site and Site 16. Please provide detailed, site-specific data to support this position. See also Issues 7-10.

39. **Specific Comment:** *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 EPA 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.

**Navy Response:** See Issues 6-10. The EPA is correct that some “averaging” of water quality from different fractures will occur in the open rock intakes of bedrock monitoring wells. However, if a plume of contaminated groundwater has migrated from the Nike Site (which the Navy strongly believes has not happened), then averaging and dispersion between adjacent fractures would have occurred all along the 4000 feet of travel distance. Secondly, averaging in the open well bore can just as easily increase the perceived concentration in each well thereby overestimating the amount of contaminated groundwater in the bedrock. Thirdly, the concentrations observed in the deep overburden are greater than in the bedrock (see Issue 9), thus there is stronger evidence that the contaminants are moving downward and not the reverse scenario.

40. **Specific Comment:** *Page 4-21, 3<sup>rd</sup> Paragraph, 2<sup>nd</sup> Sentence:*

**Navy Response:** Please see response to Hydrogeology Comment 39.

41. **Specific Comment:** *Page 4-22, 2<sup>nd</sup> 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.

**Navy Response:** This issue will be addressed in the Phase III Investigation.

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

**Navy Response:** This issue will be addressed in the Phase III Investigation.

43. **Specific Comment:** *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.

**Navy Response:** The evaluation of the metals concentrations that begins on page 4-30 is not intended to be the comprehensive type of evaluation that typically appears in a remedial investigation (RI) report. It was intended to provide the reader with a summary of the available data and assist in the determination of whether or not additional data is necessary for the completion of an adequate environmental data set for the RI. While simple numerical comparisons of Site 16 data to facility background data are presented in the Supplemental Phase II RI Data Package report, more comprehensive statistical comparisons are planned for the up-coming RI report to be prepared for Site 16. Additionally, at a minimum, analytical results for the metals considered significant from a risk assessment perspective will be displayed on figures included in the RI report. Based on the evaluation of both soils and groundwater conducted to date, it is not clear that the metals concentrations detected are site related. As currently stated in the text, the spatial distribution of metals in groundwater (particularly in the deep overburden and shallow bedrock) does not suggest that the metals are present as a consequence of Site 16-related contamination. In many cases, the elevated metals concentrations are noted in the wells distal to the primary Site 16 source areas. However, it should be noted that groundwater samples collected during the Phase III sampling event will be analyzed for metals; unfiltered and filtered groundwater samples will be collected. Consequently, this issue will be more thoroughly evaluated in the Phase III RI report.

44. **Specific Comment:** *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.

**Navy Response:** The CVOC concentration detected in the referenced seep does not exceed 2 ug/L, while the total CVOC concentration at AH-47 is 886 ug/kg. Therefore, the Navy does not believe that the seep is the source of the CVOCs at location AH-47. However, please note that the Phase III QAPP for Site 16 (July 2006) does recommend that collection of pore water/groundwater samples from the Allen Harbor area to help determine impacts, if any, to the harbor from the groundwater CVOC plume(s) underlying Site 16.

Please also note that PAHs (not CVOCs) are the primary organic contaminants in the sediments underlying Allen Harbor. Based on the previously referenced forensics analysis of sediments collected from Allen Harbor, the Navy does not believe that Site 16 source areas (i.e., the FFTA, the creosote dip tank area) are significant sources of the PAH concentrations detected in the sediments of Allen Harbor.

45. **Specific Comment:** Page 4-38, 2<sup>nd</sup> 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.

**Navy Response:** Regarding the first part of the comment, the reviewer has mis-read the referenced text. The author *is not* comparing seep **water** samples to harbor **sediment** samples. The author is comparing the PAH concentrations noted in **sediment** samples collected at seep/shoreline locations to **sediment** samples collected from the harbor, and noting that: “Concentrations of PAHs were higher overall in the **sediment** samples from Allen Harbor than in the samples ( ...again the author is referring to sediments....) at the locations of the seeps on the shoreline.” The referenced text will be revised to clarify this comparison. The text will also be amended to note this comparison is in reference to the carcinogenic PAHs concentrations in particular.

The text of the second paragraph will be further clarified to note that (as reported in the Phase II SLERA)... “when concentration variability is taken into account, there is no real difference in concentrations close to shoreline area relative to other areas of Allen Harbor.”

See Figure 4-13, very low PAH concentrations only were detected in the seep samples located in the vicinity of the outfall. Also, there is no PAH plume in the groundwater underlying Site 16. Please see response to EPA Comment No. 4. The only significant PAH contamination detected in the groundwater under Site 16 was reported for location 28-GW-07S.

Please review the PAH data for soils in the eastern half of the north-central section of Site 16 (See Figure 4-4). The PAH data in this area (albeit limited) does not suggest a significant potential for contaminant (PAH) migration in surface water run-off.

The north-central area of Site 16 was selected for environmental investigation primarily because of the former creosote dip tank area and former fire training area. It is very unlikely that such an area would have been selected for investigation because of the presence of paving or because of past heavy vehicular traffic.

46. **Specific Comment:** *Page 4-39, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> 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.

**Navy Response:** Re-read the aforementioned detailed forensic analysis for PAHs presented in the Phase II SLERA. Also, please see information presented in the responses prepared for the General EPA comments.

Please note that the referenced creosote dipping operation area, the most significant source of PAH contamination at Site 16, is actually several hundred feet from the southern edge of Allen Harbor (Please see Figure 4-13). Whereas this operation was indeed a candidate for investigation as the source of offshore sediment PAHs, the surface soil samples located **between** the former creosote dipping operation and Allen Harbor (a limited number of samples only have been collected to date) do not suggest that over land contaminant run-off from the dip tank area was a significant contributor to offshore sediment contamination. Additionally, based on the currently available data, it is not clear that metals are significant site-related contaminants for Site 16. Please see the evaluation of the metals concentrations detected in the Site 16 soils and groundwater presented in Section 4 of the Supplemental Phase II Data Package Report.

There is no significant depositional PAH plume emanating from the Former Location of the Creosote Dip tanks or Seep 16-01. In addition to the evaluations presented in the aforementioned Phase II SLERA, please note that only relatively low concentrations of non-carcinogenic PAHs were detected in the groundwater underlying Site 16 and seeps along the southern shoreline of Allen Harbor. The groundwater/seep contribution to the PAH concentrations noted in the sediments of Allen Harbor is likely to be both low-level and low-risk. This will be addressed in the risk assessments of the RFI report.

47. **Specific Comment:** *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.

**Navy Response:** The Navy concurs with this statement, as already presented throughout the text.

48. **Specific Comment:** *Page 5-1, Section 5.1, 5<sup>th</sup> 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.

**Navy Response:** As indicated above, the Navy agrees that a CVOC release likely occurred in the north-central area of Site 16. The adjective “some” reflects the fact that an ***undetermined*** quantity was released over time (not a judgment as to whether the release was large or small). The sentence will be reworded to state, “Based on the currently available information, CVOCs were likely released in the north central area of Site 16. The exact quantity of the release is unknown.” Please note that additional investigation of the north-central portion of Site 16 will be recommended the Phase III QAPP to further evaluate this issue.

49. **Specific Comment:** *Page 5-2, 2<sup>nd</sup> Paragraph, 1<sup>st</sup> 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.

**Navy Response:** Sampling related to the storm drains is under consideration for the upcoming site investigation to evaluate this possibility.

50. **Specific Comment:** *Page 5-2, 2<sup>nd</sup> Paragraph, Starting at 5<sup>th</sup> 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.

**Navy Response:** See responses to EPA Specific Comments No. 45 and 46.

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

**Navy Response:** The Navy is aware of this fact, but it is not of consequence at Site 16. 1,1,2,2 PCA has not been detected in any groundwater, seep, or soil samples collected at Site 16.

52. **Specific Comment:** *Page 5-4, Section 5.2, 5<sup>th</sup> 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.

**Navy Response:** The Navy agrees that there is soil contamination and other potential source areas to the north and northeast of Building 41 (see also response to Hydrogeology Comment 10), however, the Navy does not believe that groundwater or contaminants are welling up from bedrock near Building 41 (see Issues 7-10).

53. **Specific Comment:** *Page 5-56, 4<sup>th</sup> 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.

**Navy Response:** The Navy agrees that there is soil contamination and other potential source areas to the north and northeast of Building 41 (see also response to Hydrogeology Comment 10). However, the Navy does not believe that groundwater or contaminants are welling up from bedrock near Building 41 (see Issues 7-10).

54. **Specific Comment:** *Page 5-7, 1<sup>st</sup> 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.

**Navy Response:** MW16-59 may not be any closer to former Building 41 than the area north of Davisville road, but it is downgradient. It is apparent that EPA is confusing PID/FID responses from peat with CVOC responses. Please see Section 5 figures.

55. **Specific Comment:** *Page 5-7, 2<sup>nd</sup> 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.

**Navy Response:** See Issues 1-4.

56. **Specific Comment:** *Page 5-7, 3<sup>rd</sup> 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.

**Navy Response:** See Issues 6-9.

57. **Specific Comment:** *Page 5-7, 4<sup>th</sup> 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.

**Navy Response:** The first sentence of the referenced paragraph indicates that the author is specifically referring to the TCE concentrations in the **shallow** groundwater zone in the immediate vicinity of Allen Harbor. The paragraph also states that the [VOC] plume has reached the southern boundary of Allen Harbor in deeper zones. The paragraph goes on to state that the VOCs may be discharging into harbor sediments under the harbor or it may pass under the harbor into deeper water. However, the referenced paragraph would be more complete and informative if it was noted that a daughter product (cis-1,2-DCE) had been detected in the sediment samples of Allen Harbor. These detections are an indication that CVOCs may have migrated from the Site 16 groundwater to the sediments of Allen Harbor. However, as noted above, CVOCs have been detected infrequently and at low concentrations in the sediments of Allen Harbor. So this conclusion may be premature.

58. **Specific Comment:** *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.

**Navy Response:** At this point, the Navy has the same reservations regarding the conceptual model presented by the EPA project team.

59. **Specific Comment:** *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.

**Navy Response:** Please see Issue 11. This document is intended to define the state-of-knowledge for Site 16, develop a conceptual site model for Site 16, and to identify data gaps that need to be addressed. The Navy made no claims that the time concentration evaluation was conclusive or statistically based. While the Navy has attempted to develop a conceptual model in line with the data. EPA has developed conceptual “theories” that are largely unsupported.

60. **Specific Comment:** *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.

**Navy Response:** See response to Hydrogeology Comment 10.

61. **Specific Comment:** *Page 6-1, 1<sup>st</sup> 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.

**Navy Response:** The phrase “relatively small” will be deleted from the referenced text; the **exact** quantities of CVOCs released at the former FFTA are not known. Also, until laboratory-based soil analysis can further characterize the FFTA, there is no way of concluding if the FFTA is a relatively large source area for CVOCs. However, the Navy does not believe that the existing PID/FID data are useful for definitively assessing the CVOC contamination. See Issue 1.

62. **Specific Comment:** *Page 6-2, 2<sup>nd</sup> 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.

**Navy Response:** See information presented in the responses prepared for the General EPA comments. Also, the practices followed at other installations are interesting but not particularly relevant to Site 16. To our knowledge, the fire training area was not a constructed facility built for the expressed purpose of conducting fire training, as was found at many other Navy bases – with fuel delivery systems, installed drain lines, oil-water separators, etc. Instead, it appears this area may have been an “ad hoc” fire training area, i.e., open paved space that the base personnel used for fire training. Please note that a recent conversation with a retired Seabee at the June 2006 BCT/RAB meetings indicates that the accelerant of choice during the fire protection training exercises was diesel fuel. Spent solvents (or other sources of chlorine) may or may not have been applied to fires generated during fire training exercises. The frequency of such activity is unknown. The Navy does not believe that further debate of this issue is productive. The soils at the FFTA have been tested for the full suite of TAL/TCL compounds (including dioxins/furans) regardless of the materials assumed to be disposed in this area. The analytical results from the Phase I, Phase II, and Phase III RI sampling events will be evaluated in the upcoming RI risk assessments for Site 16.

63. **Specific Comment:** *Page 6-2, 3<sup>rd</sup> 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.

**Navy Response:** See Issue 12.

64. **Specific Comment:** *Page 6-2, 4<sup>th</sup> Paragraph:* This is a very biased and subjective paragraph that is not supported by facts and data. See Specific Comment 46.

**Navy Response:** Comment already addressed. Also, please note that the referenced text presents a brief discussion of non-site-related chemical release pathways that ***typically*** impact the chemical profile of the surface waters and sediments in harbors/bays where boats are used and/or docked. References will be added as requested to support the information presented. Please also see response to Hydrogeology Comment 46.

65. **Specific Comment:** *Page 6-3, 5<sup>th</sup> 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.

**Navy Response:** See Issues 1-4.

66. **Specific Comment:** *Page 6-3, 6<sup>th</sup> 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.

**Navy Response:** Comment already addressed. Also see responses to EPA Hydrogeology Comments No. 45 and 46.

67. **Specific Comment:** *Page 6-4, 4<sup>th</sup> 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.

**Navy Response:** See Issues 1 through 4 and response to Hydrogeology Comment 10.

68. **Specific Comment:** *Page 6-4, 5<sup>th</sup> 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.

**Navy Response:** The Navy disagrees. See Issues 6-10.

69. **Specific Comment:** *Page 6-5, 1<sup>st</sup> 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.

**Navy Response:** Disagree, comment already addressed. Deep soils in general have the highest CVOC contaminant levels. The samples from MW-16-59I (taken at depths of 44-48 feet) are deep samples per the shallow (<25 ft)/deep (>25 ft) soils breakout specified in the report. Also see response to EPA Hydrogeology Comment No. 27.

70. **Specific Comment:** *Page 6-6, Section 6.2, 2<sup>nd</sup> 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.

**Navy Response:** Comment already addressed. Based on actual site (boring log) data, the continuous silt layer as described by EPA does not exist. See Issue 2.

71. **Specific Comment:** *Page 6-7, 2<sup>nd</sup> Paragraph, 1<sup>st</sup> 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.

**Navy Response:** Comment already addressed.

72. **Specific Comment:** *Page 6-7, 3<sup>rd</sup> through 6<sup>th</sup> 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.

**Navy Response:** Comment already addressed.

73. **Specific Comment:** *Page 6-8, 4<sup>th</sup> 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.

**Navy Response:** See Issue 11 and response to Hydrogeology Comment 59.

74. **Specific Comment:** *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.

**Navy Response:** Comment already addressed.

TABLE 1

PID READINGS, FID READINGS, AND CVOC CONCENTRATIONS FOR SOIL SAMPLES  
 NCBCD SITE 16  
 PAGE 1 OF 3

Boring/Well No.	Sample Depth (ft bgs)	PID ppm	FID ppm	FID W/ FILTER ppm	CVOCs ug/kg
North of Davisville Road - Shallow Soils (2-25 ft bgs)					
28-SB-01	8-10	ND	ND	ND	0
28-SB-02	8-10	ND	ND	ND	0
28-SB-03	6-8	ND	ND	ND	0
28-SB-04	2-4	ND	ND	ND	0
28-SB-05	6-8	ND	ND	ND	0
28-SB-06	8-10	ND	ND	ND	0
28-SB-07	2-4	ND	ND	ND	0
28-SB-08	2-4	ND	ND	ND	0
28-SB-09	2-4	ND	ND	ND	0
28-SB-10	4-6	ND	ND	ND	0
28-SB-11	2-4	ND	ND	ND	0
28-SB-12	6-8	ND	ND	ND	0
28-SB-13	2-4	ND	ND	ND	0
28-SB-16	14-16	ND	ND	ND	0
28-SB-17	8-10	ND	ND	ND	0
28-SB-18	10-12	ND	ND	ND	0
28-SB-19	8-10	ND	ND	ND	0
28-SB-20	8-10	ND	ND	ND	0
EBS85-SB01	2-4	ND	ND	ND	0
EBS85-SB02	2-4	ND	ND	ND	0
MW16-01S	19-21	0	ND	ND	0
MW16-02S	10-12	0	ND	ND	6
MW16-03S	3-5	0	ND	ND	0
MW16-04S	3-5	19.8	ND	ND	0
MW16-05S	5-7	15	ND	ND	0
MW16-06S	10-12	0	ND	ND	4
MW16-07S	5-7	235	ND	ND	210
SB16-07	4-6	ND	ND	ND	6
SB16-07	10-12	ND	ND	ND	1
SB16-21	8-10	ND	ND	ND	0
SB16-22	6-8	ND	ND	ND	0
SB16-23	3-5	ND	ND	ND	0
SB16-24	7-9	ND	ND	ND	7
SB16-25	7-9	ND	ND	ND	0
SB16-26	2-4	2.5	ND	ND	3
SB16-27	2-4	ND	ND	ND	2
SB16-28	4-6	ND	ND	ND	0
SB16-41	16-18	ND	213.5	439.4	1896
SB16-44	14-16	ND	1330	577.9	1342
SB16-45	14-16	ND	2642	1841	332
SB16-46	12-14	ND	526	568	2

TABLE 1

**PID READINGS, FID READINGS, AND CVOC CONCENTRATIONS FOR SOIL SAMPLES  
NCBCD SITE 16  
PAGE 2 OF 3**

Boring/Well No.	Sample Depth (ft bgs)	PID ppm	FID ppm	FID W/ FILTER ppm	CVOCs ug/kg
North of Davisville Road - Deep Soils (>25 ft bgs)					
28-SB-14	42-44	ND	ND	ND	0
28-SB-15	30-32	ND	ND	ND	0
MW16-01D	48-50	0	ND	ND	6
MW16-02D	64-66	15.1	ND	ND	19
MW16-03D	46.5-48.5	ND	ND	ND	0
MW16-04D	52-53	ND	ND	ND	76
MW16-05D	54-56	46.6	ND	ND	800
MW16-06D	40-42	0	ND	ND	4
MW16-07D	36-38	ND	ND	ND	0
South of Davisville Road - Shallow Soils (2-25 ft bgs)					
EBS81-01	9-11	ND	ND	ND	0
EBS81-02	9-11	ND	ND	ND	0
SB16-29	20-22	4	ND	ND	58
SB16-31	14-16	ND	ND	ND	0
SB16-32	10-12	ND	ND	ND	150
South of Davisville Road - Deep Soils (>25 ft bgs)					
INJ16-01D	48-50	ND	0	ND	1300
INJ16-01D	56-57.4	ND	0	ND	840
INJ16-02D	44-46	ND	5.7	0	0
INJ16-02D	52-54	ND	0.7	0	17
INJ16-03D	46-48	ND	10	0	690
INJ16-03D	52-54	ND	0.4	0	110
INJ16-04D	44-46	ND	12.5	0	76
INJ16-04D	46-48	ND	5.5	0	19
INJ16-05D	44-46	ND	4.8	0	2400
INJ16-05D	46-48	ND	1.9	0	2600
INJ16-06D	50-52	ND	0	ND	11
INJ16-06D	58-60	ND	5.6	0	54.5
INJ16-07D	54-56	ND	0	ND	430
INJ16-07D	60-62	ND	0	ND	1000
INJ16-08D	56-56.8	ND	0	0	71
INJ16-08D	62-64	ND	0	0	87
INJ16-09D	54-55.9	ND	0	ND	130
INJ16-09D	58-58.4	ND	0	ND	32
INJ16-10D	51-53	ND	0	ND	43
INJ16-10D	57-59	ND	0	ND	74
INJ16-11D	56-58	ND	1.4	0	520
INJ16-11D	58-60	ND	0.4	0	430
INJ16-12D	48-50	ND	25.7	0	35
INJ16-12D	52-54	ND	9.8	0	780
MW16-13D	58-60	0	ND	ND	0
MW16-14D	57.5-59.5	0	ND	ND	5400
MW16-15R	51-53	6.9	ND	ND	1200

TABLE 1

**PID READINGS, FID READINGS, AND CVOC CONCENTRATIONS FOR SOIL SAMPLES  
NCBCD SITE 16  
PAGE 3 OF 3**

Boring/Well No.	Sample Depth (ft bgs)	PID ppm	FID ppm	FID W/ FILTER ppm	CVOCs ug/kg
MW16-22D	59-61	1.6	ND	ND	1030
MW16-23D	54-56	ND	ND	ND	800
MW16-59I	44-46	ND	219	0	4700
MW16-59I	46-48	ND	248	4.5	7800
MW16-59D	64-66	ND	67.8	3.9	1800
MW16-59D	66-68	ND	65.6	3.2	3300
MW16-60D	52-54	ND	20.5	0	350
MW16-60D	56-58	ND	22.5	0	420
MW16-61D	44-46	ND	8.4	1.4	55
MW16-61D	48-50	ND	2.3	0	4
MW16-61D	50-52	ND	3.9	1.6	33.5
MW16-62D	51-53	ND	0	ND	6
MW16-62D	55-57	ND	0	ND	1200
MW16-63D	48-50	ND	0	ND	1000
MW16-63D	54-54.3	ND	3.7	0	180
MW16-64D	51-53	ND	1.4	0	400
MW16-64D	55-57	ND	1.4	0	670
MW16-66D	46-48	ND	0.7	0	4
MW16-66D	48-50	ND	0.5	0	2
MW16-67D	56-58	ND	0	ND	46
MW16-67D	60-62	ND	0	ND	63.5
MW16-68D	54-56	ND	0	ND	89
MW16-68D	56-58	ND	0	ND	850
MW16-69D	54-56	ND	13.9	0.4	101
MW16-69D	56-58	ND	7.9	0	33
MW16-70D	46-48	ND	2.7	0	9
MW16-70D	54-56	ND	3.6	0	96
MW16-71D	46-48	ND	3.8	0	26
MW16-71D	56-57.25	ND	2.5	0	810
SB16-29	32-34	1.4	ND	ND	280
SB16-30	34-36	ND	ND	ND	39
SB16-30	44-46	ND	ND	ND	0
SB16-30	57-59	ND	ND	ND	0
SB16-31	36-38	ND	ND	ND	0
SB16-31	56-58	ND	ND	ND	881
SB16-32	36-38	ND	ND	ND	280
SB16-32	56-58	ND	ND	ND	4570

ND = No data recorded.

PID = Photoionization Detector

FID = Flame Ionization Detector

CVOC = Chlorinated Volatile Organic Compound

Figure 1. PID Readings vs CVOC Concentrations in Soil

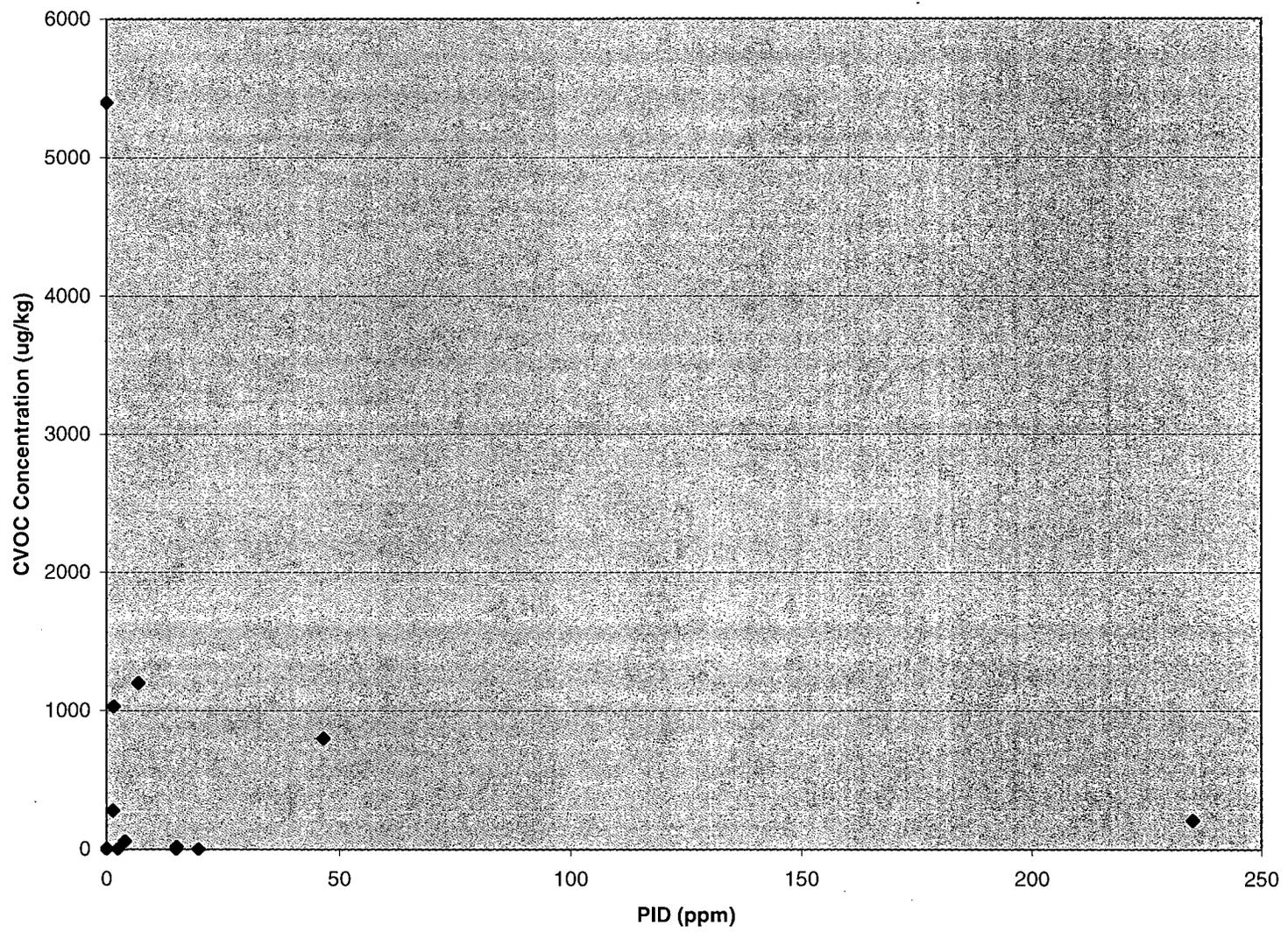
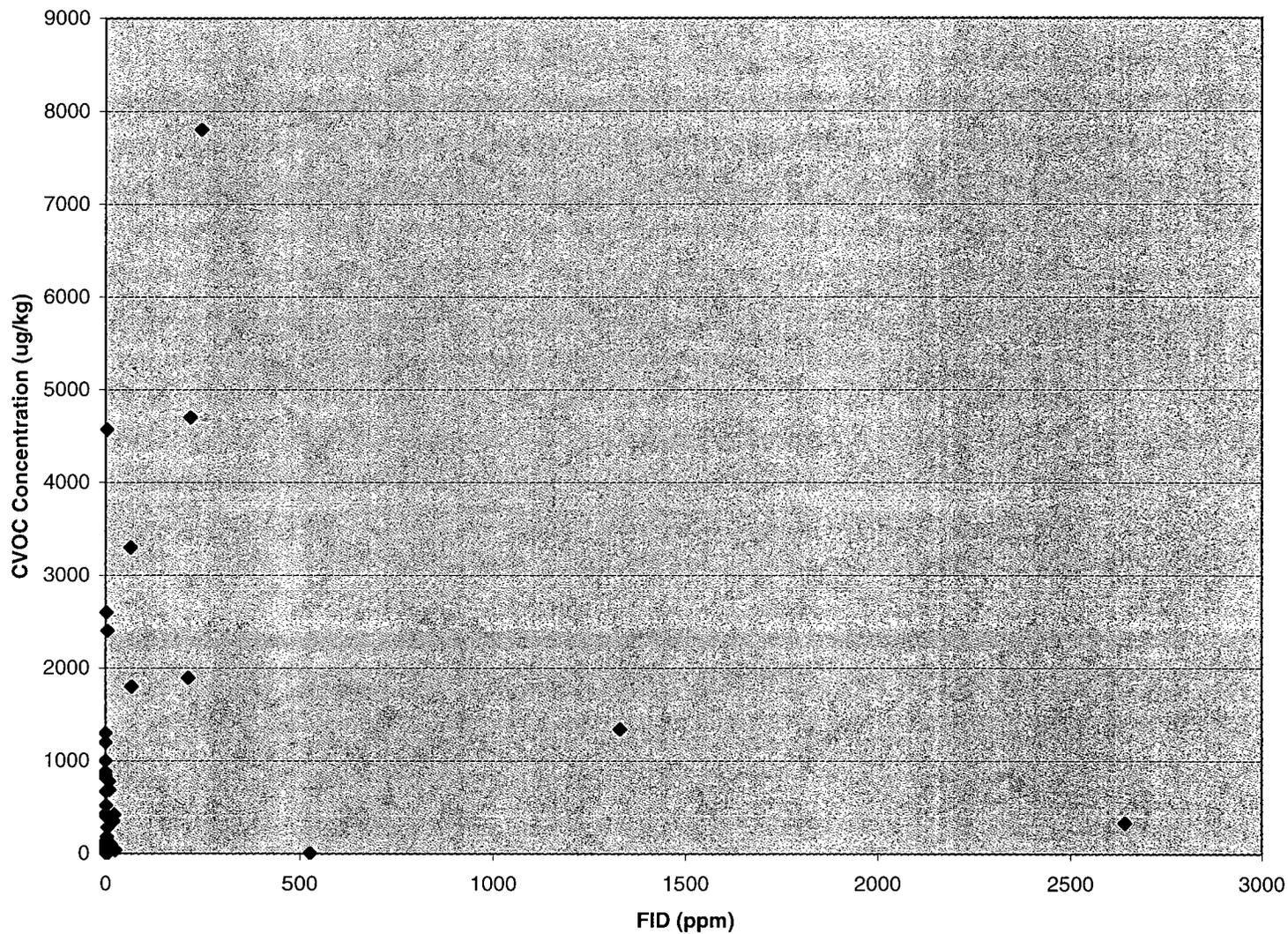
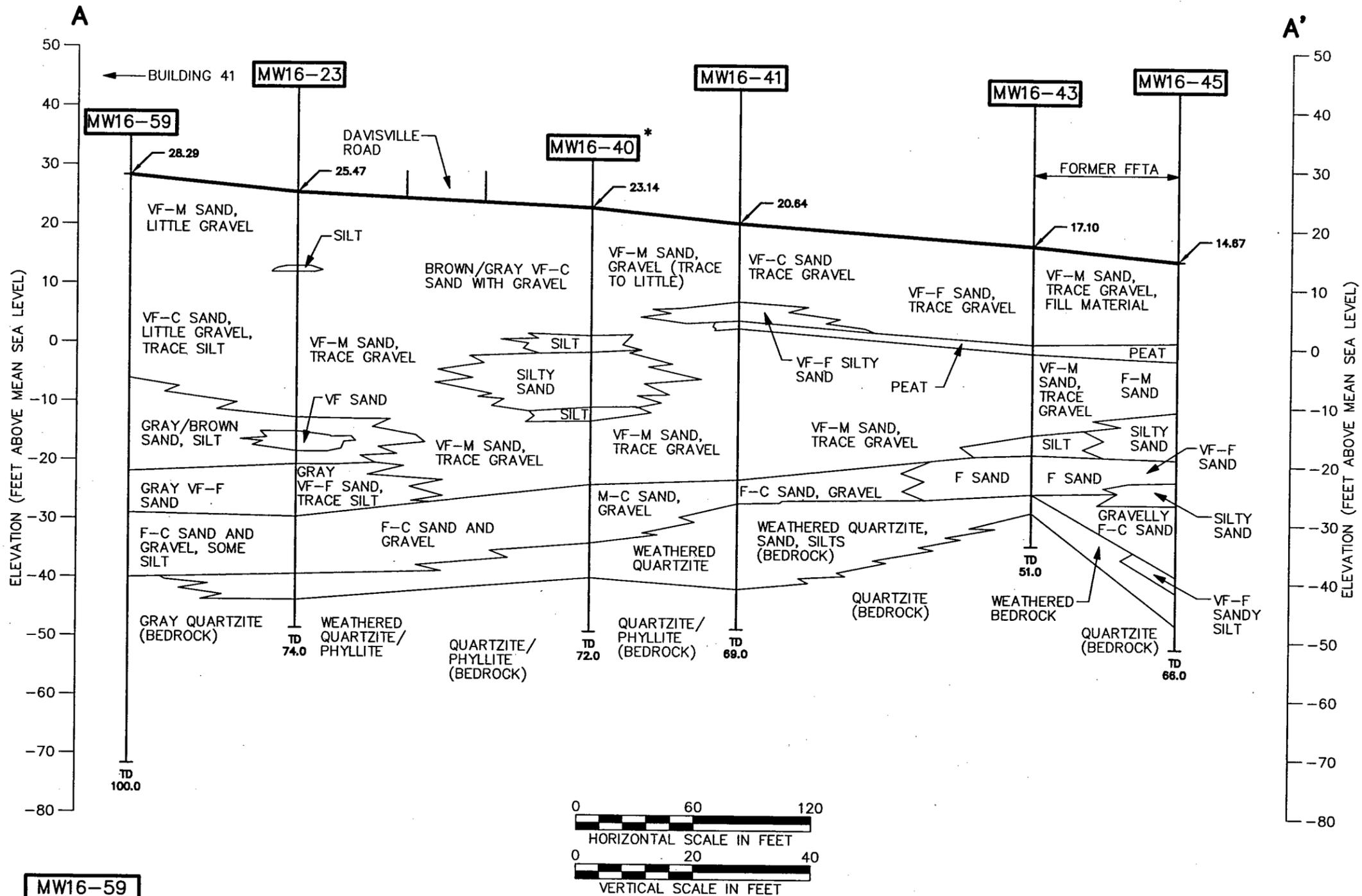


Figure 2. FID Readings vs CVOC Concentrations in Soil



**ENCLOSURE 1,  
Attachment 1  
Geologic Cross Section A-A'  
Davisville Road/FFTA Area  
IRP Site 16  
NCBC Davisville**



**LEGEND:**

- MONITORING WELL OR BORING NUMBER
- GROUND SURFACE ELEVATION
- GROUND SURFACE
- LITHOLOGIC CONTACT (INFERRED BETWEEN BORINGS)
- TOTAL DEPTH OF WELL OR BORING (FT BGS)

**NOTES:**

WELL SCREENS NOT SHOWN IN ORDER TO EMPHASIZE SUBSURFACE LITHOLOGIES.  
 R BORING/WELL PRESENTED FOR MW16-59  
 \* BASED ON BOTH MW16-40S, 40D SOIL BORING LOGS

DRAWN BY DT	DATE 7/11/08
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	



**Tetra Tech  
NUS, Inc.**

**GEOLOGIC CROSS-SECTION A-A'**  
 DAVISVILLE ROAD / FFTA AREA  
 RP SITE 18  
 FORMER DAVISVILLE NAVAL  
 CONSTRUCTION BATTALION CENTER  
 NORTH KINGSTON, RHODE ISLAND

CONTRACT NO. 0234	
OWNER NO. 0000	
APPROVED BY	DATE
DRAWING NO. FIGURE 1	REV. 0

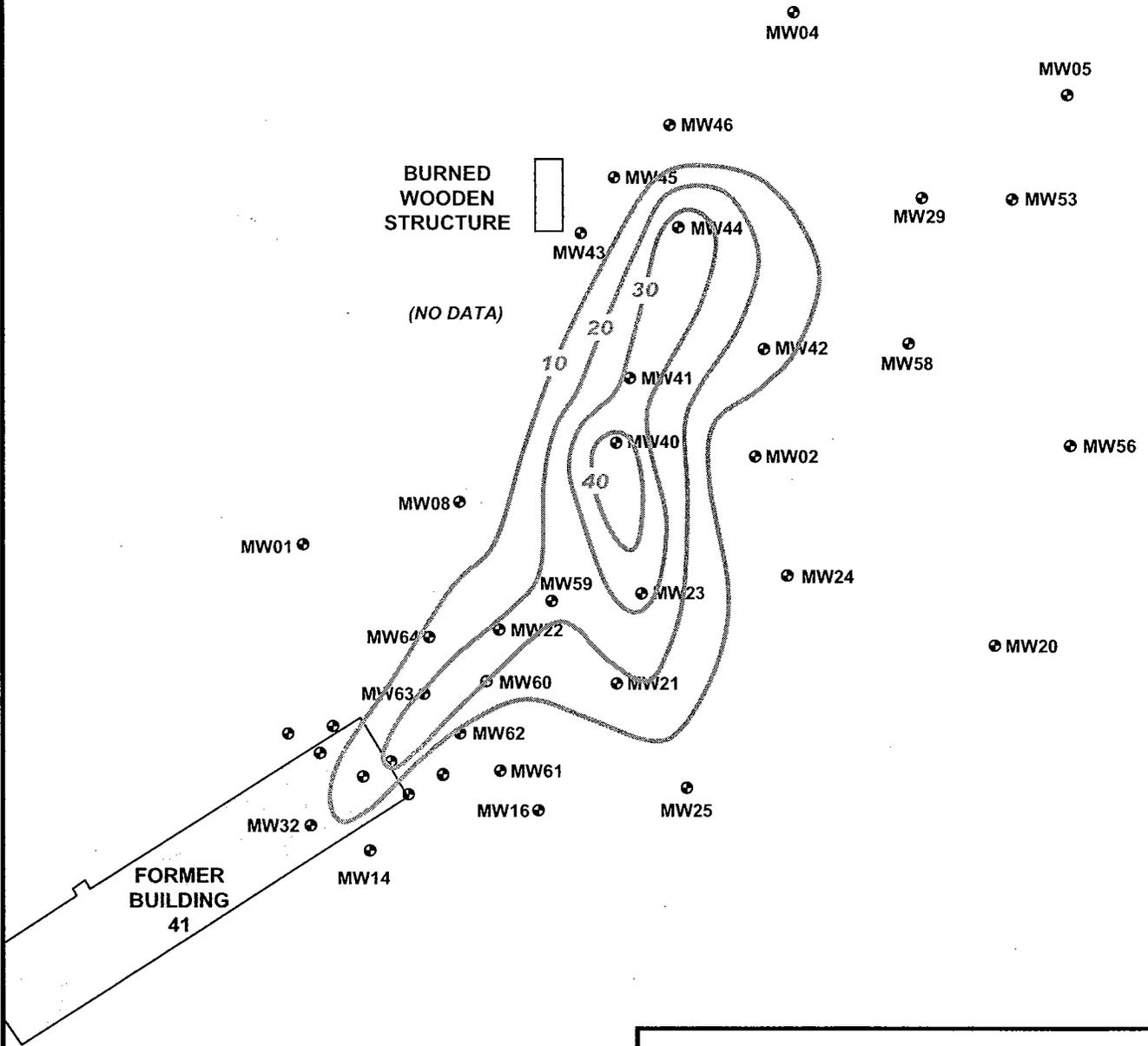
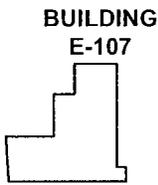
**ENCLOSURE 1,  
Attachment 2  
EPA Figures Referenced  
in May 15, 2006  
Comments**

**LEGEND**

 CVOC (ppb)

 Monitoring Well

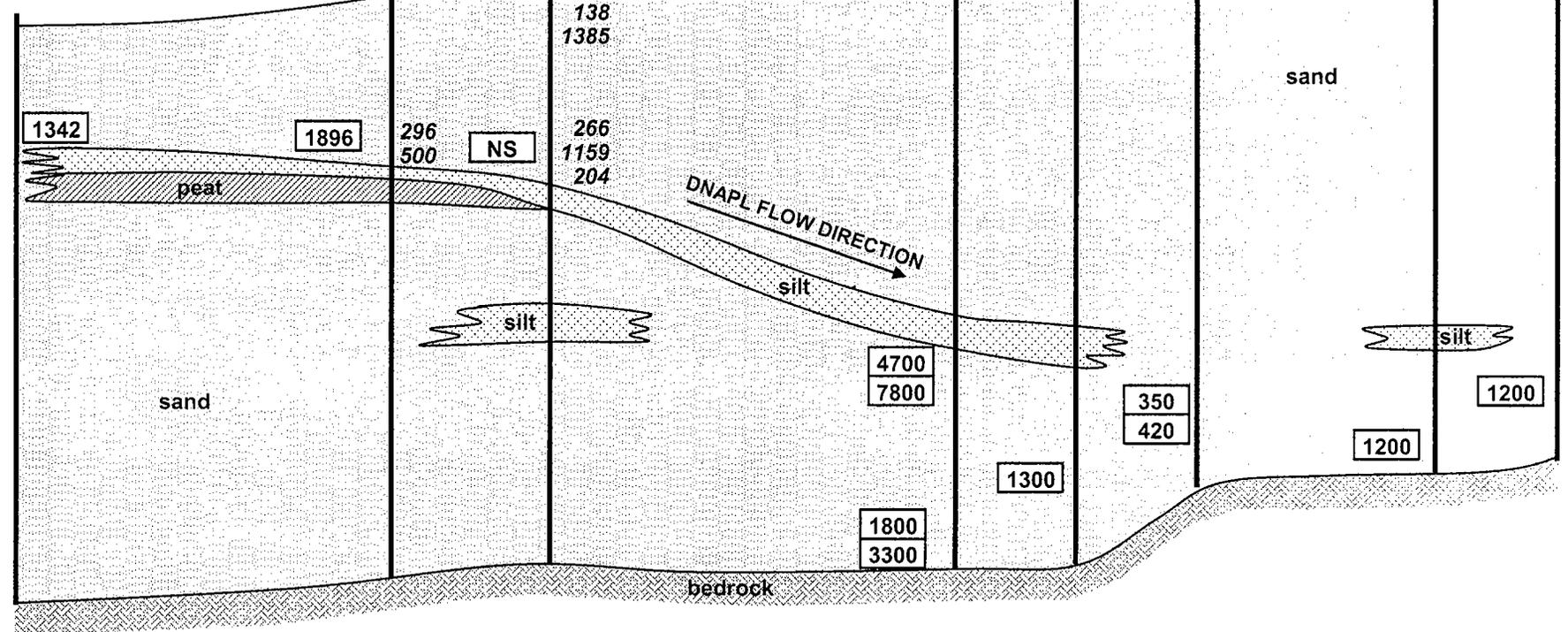
MW04 Monitoring Well



<b>NCBC SITE 16 DAVISVILLE, RHODE ISLAND</b>		
<b>SHALLOW CVOC ISOPLETHS</b>		
	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
	<b>FIGURE 1</b>	

FIRE  
FIGHTING  
TRAINING  
AREA

MW16-44



**LEGEND**

**1896** Soil Sample TCVOC

**NS** No Sample

**138** Filtered FID Reading

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

CHECKED: CGL

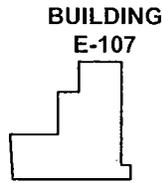
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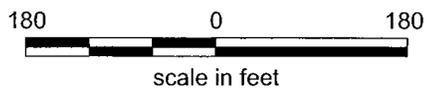
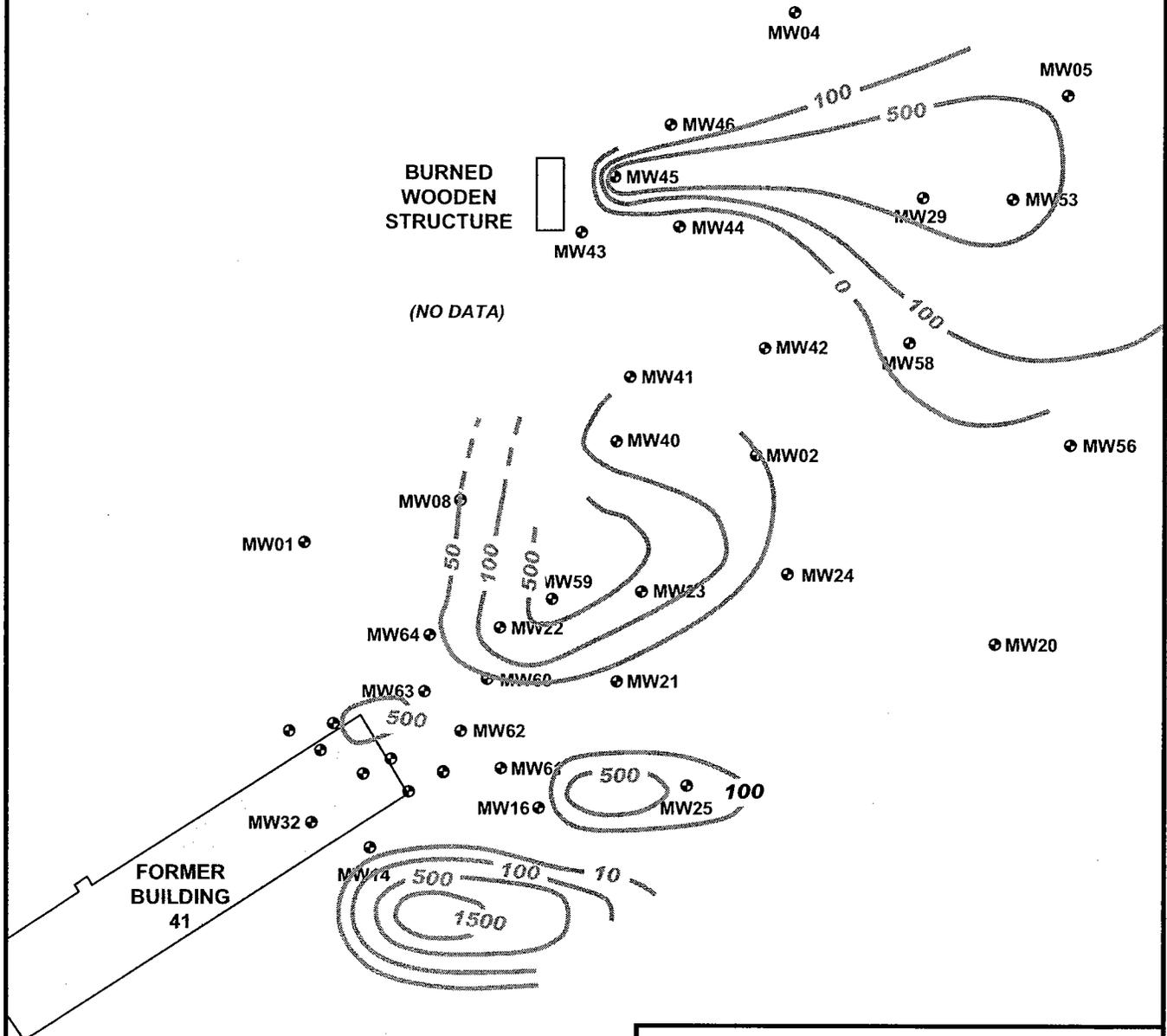
**FIGURE**  
**2**

**LEGEND**

-  CVOC (ppb)
-  MW04 Monitoring Well



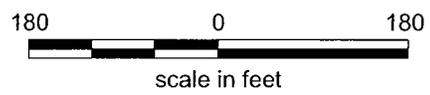
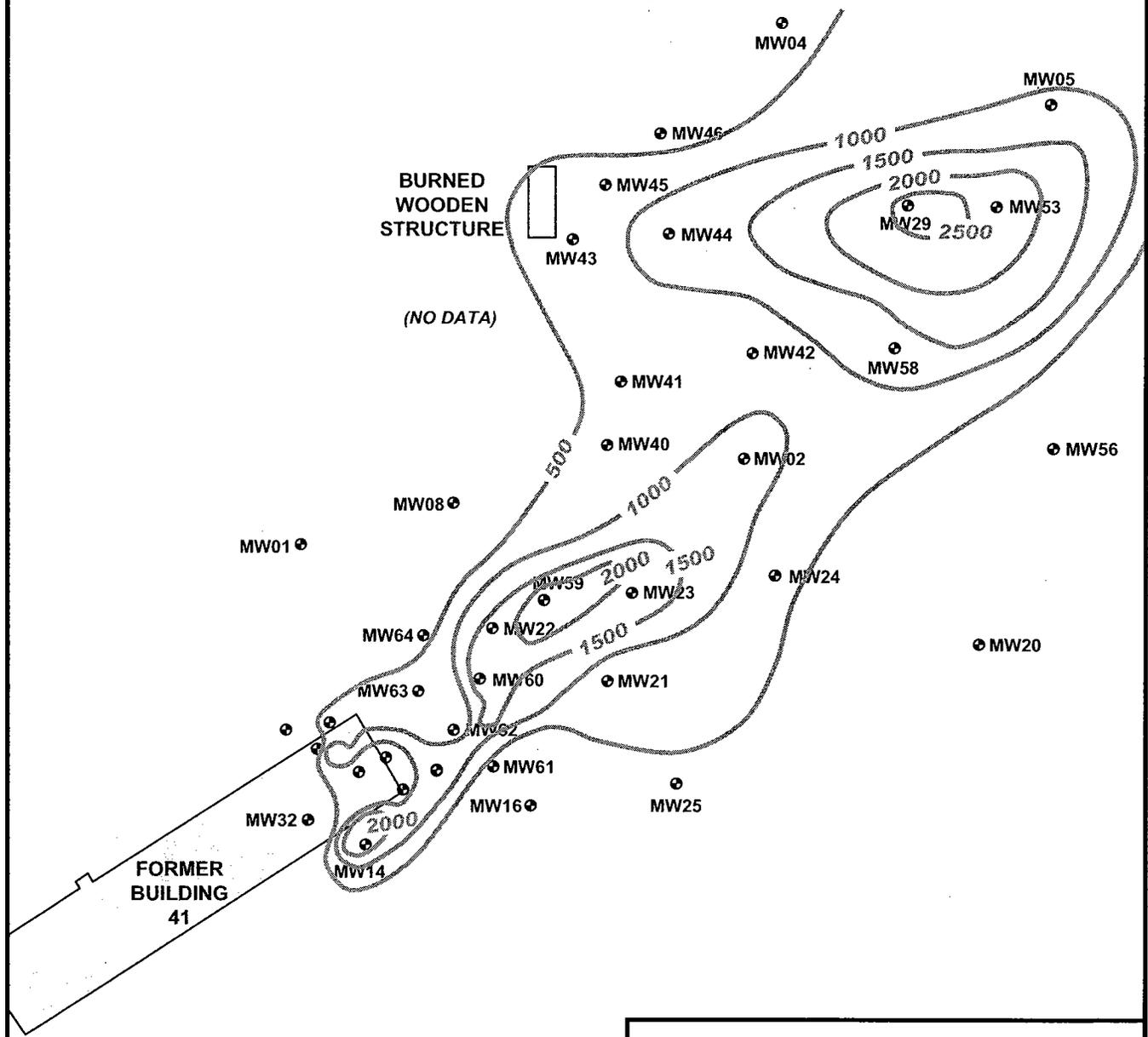
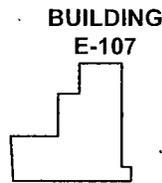
(NO DATA)



<b>NCBC SITE 16 DAVISVILLE, RHODE ISLAND</b>		
<b>INTERMEDIATE CVOC ISOPLETHS</b>		
	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
	<b>FIGURE 3</b>	

**LEGEND**

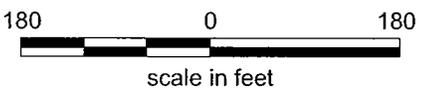
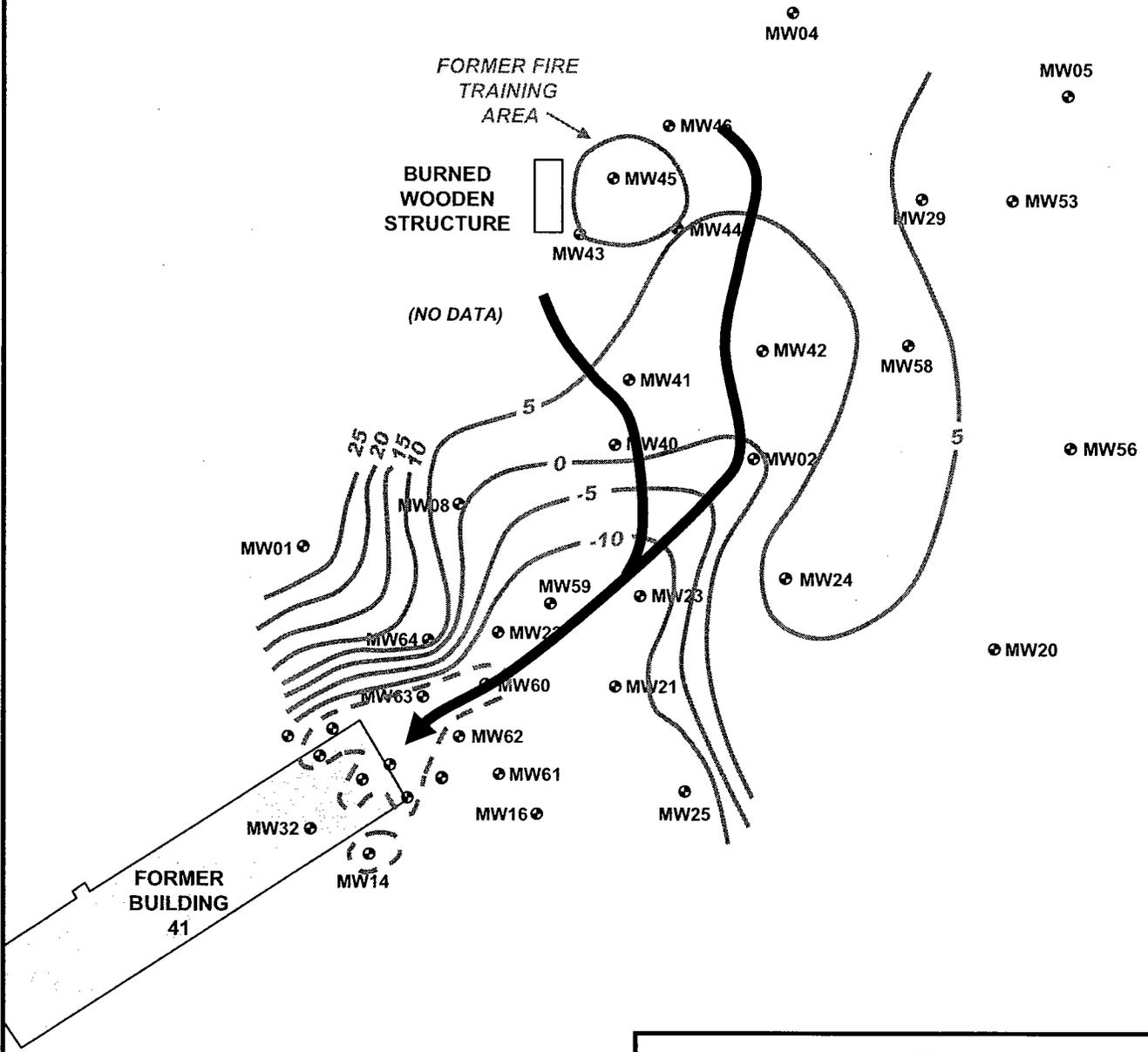
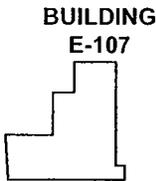
-  CVOC (ppb)
-  MW04 Monitoring Well



<b>NCBC SITE 16 DAVISVILLE, RHODE ISLAND</b>		
<b>DEEP OVERBURDEN CVOC ISOPLETHS</b>		
	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
	<b>FIGURE 4</b>	

**LEGEND**

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



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

**ENCLOSURE 2**  
**Response to RIDEM Comments**  
**Draft Supplemental Phase II**  
**Remedial Investigation Data Package**  
**IR Site 16**  
**NCBC Davisville**  
**(March 2006)**  
**(RIDEM Comments dated 30 May 2006)**

**RESPONSES TO RIDEM COMMENTS  
ON DRAFT SUPPLEMENTAL PHASE II REMEDIAL  
INVESTIGATION DATA PACKAGE REPORT,  
IR SITE 16, NCBC DAVISVILLE, MARCH 2006  
(COMMENTS DATED MAY 30, 2006)**

**RIDEM COMMENT:**

*In the interest of preventing duplication of EPA's efforts, this office stands firmly behind the EPA in their comments. Of particular concern is the lack of a coherent conceptual model, the dismissal of creosote dipping operations as the most likely source of PAH contamination in Allen Harbor and the lack of attentiveness to dioxins and furans, which are known to present significant human health and ecological risk in extremely small quantities.*

**NAVY RESPONSE:**

Please see response-to-comments (RTCs) document prepared for U.S.EPA Region I comments (Enclosure No. 1).

As noted in Enclosure No. 1, the Navy does believe that a coherent conceptual site model (CSM) has been presented in the Phase II Supplemental Phase II Remedial Investigation Data Package Report for Installation Restoration Program (IRP) Site 16. However, the Navy and RIDEM/U.S.EPA Region I are currently not in agreement regarding the CSM or the potential impact of Site 16 on Allen Harbor surface waters and sediments. Consequently, the Navy recommends that technical teleconferences/meetings be held to discuss the CSM for Site 16 and the potential impact of Site 16 on Allen Harbor so that these unresolved issues are not impediments to the successful completion of the Site 16 remedial investigation. Also, per EPA risk assessment guidance (Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part A, December 1989), please note that CSMs evolve over time and that the CSM for Site 16 may change based on the data to be collected as a result of the implementation of the Phase III Quality Assurance Project Plan (QAPP) for Site 16. The Phase III QAPP is designed to address data gaps identified in the Phase II Supplemental Phase II Remedial Investigation Data Package report.

The dioxins/furans detected in the soils at Site 16 will be evaluated in the upcoming human health and ecological risk assessments for Site 16. However, the text of the Phase II Supplemental Phase II Remedial Investigation Data Package Report does correctly note that the dioxin/furan concentrations detected in the soil samples at Site 16 do not exceed the U.S.EPA benchmark of 1 ug/kg (expressed as 2,3,7,8-TCDD equivalents) presented in the Office of Solid Waste and Emergency Response (OSWER) Directive 9200.4-26 (U.S. EPA, April 1998).