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LETTER AND U S NAVY RESPONSE TO U S EPA REGION I AND RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT COMMENTS REGARDING REVISED DRAFT FEASIBILITY STUDY FOR SITE 16 NCBC DAVISVILLE RI

08/15/2011

BASE REALIGNMENT AND CLOSURE PROGRAM MANAGEMENT OFFICE NORTHEAST

DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE, NORTHEAST
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BPMO NE/DB
Ser 11-116
August 15, 2011

Ms. Christine Williams
Mail Code: OSRR07-03
U.S. Environmental Protection Agency, Region I
5 Post Office Square, Suite 100
Boston, MA 02109-3912

Mr. Richard Gottlieb
Office of Waste Management
Rhode Island Department of Environmental Management (RIDEM)
235 Promenade Street
Providence, RI 02908-5767

Dear Ms. Williams and Mr. Gottlieb:

Enclosed is the response-to-comments (RTCs) document for comments received from EPA Region I and RIDEM on the Revised Draft Feasibility Study (FS) for Installation Restoration Program (IRP) Site 16 at the Former Naval Construction Battalion Center (NCBC) Davisville, Rhode Island. The EPA comments were received in correspondence dated May 5, 2011. The RIDEM comments were received in correspondence dated June 14, 2011.

The Revised Draft FS for Site 16 is based on a significant amount of environmental data collected during the Environmental Baseline Survey (EBS) investigations, several field investigations conducted to support the Phase I, II, and III Remedial Investigations (RIs), and one field investigation conducted to support the FS. Much of this data was collected on the basis of technical meetings and discussions conducted by Navy, EPA Region I, and RIDEM over the past 15 years. In fact, the Site 16 schedule has been extended several times to allow for the collection of additional data to resolve technical issues. Consequently, the Navy believes that adequate information is now available to allow us to select an appropriate remedy and to bring that remedy to the community. We look forward to resolving any remaining EPA Region I/RIDEM concerns regarding the Revised Draft FS and the preferred alternative during the next two months so that a Draft Proposed Plan can be published in November 2011.

If you have any questions, please do not hesitate to contact me at 617-753-4656.

Sincerely,

David Barney
BRAC Environmental Coordinator
By direction of BRAC PMO

Enclosure:
Navy Response to Comments (RTCs) Received from EPA, Region I & RIDEM on the Revised Draft FS for IRP Site 16 at former NCBC Davisville, RI

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ENCLOSURE 1

NAVY RESPONSE TO EPA REGION I COMMENTS ON
THE REVISED DRAFT FEASIBILITY STUDY FOR SITE 16 OF
THE FORMER NAVAL CONSTRUCTION BATTALION CENTER, DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND
(EPA REGION I CORRESPONDENCE DATED MAY 5, 2011)

August 15, 2011

Navy Response to United States Environmental Protection Agency (USEPA) New England - Region I Comments on Revision 1 Feasibility Study Report for IRP Site 16 Former Naval Construction Battalion Center Davisville Davisville, Rhode Island (USEPA Region I Correspondence Dated May 5, 2011)

EPA General Comments (Presented in EPA Cover Letter)

EPA Comment No. 1: As was discussed at the BCT meeting on March 17, 2011, EPA cannot accept this document with the language in the Alternative G-5 concerning the Navy's internal issue with pump & treat alternatives. At that meeting Navy agreed to remove the internal issue language. Navy has subsequently provided meeting notes that confirm the removal of the internal language.

Navy Response to Comment No. 1: Agree that the referenced language will be removed from the document.

EPA Comment No. 2: During the same meeting, a discussion of the use of a waste management unit at this time resulted in many ideas being tossed into the mix. Please provide either the Navy's acceptance and new proposal or rejection of these ideas as soon as possible.

Navy Response to Comment No. 2: A Waste Management Unit (WMU) alternative for soil as discussed at the March 17, 2011 BRAC Clean-up Team (BCT) meeting will be considered. The WMU alternative reflects the U.S. Environmental Protection Agency (EPA) recommendation that the undeveloped northern portion of Site 16 (referred to as the North Central Area [NCA]) be covered with 2 feet of clean soil. [Note that RIDEM has indicated that 1 foot of soil with a geo-fabric would be acceptable.] Institutional controls would prohibit direct human contact with subsurface soils, prohibit the utilization of the groundwater resource for any purpose, and require that any structure placed atop the area would be constructed with adequate means to mitigate the potential for vapor intrusion. The soil cover was recommended because, while the NCA was not used/operated as a solid/hazardous waste landfill, subsurface debris (often intermixed with soils) has been found throughout a significant portion of the NCA. Based on site history, the debris is most likely present as a consequence of the Seabee training exercises (involving equipment such as bull dozers) conducted in the area and as a consequence of the "filling in" of wetland areas to increase the amount of land available for training exercises. The ARARs for the alternative would not include all of those typically identified for the closure of solid or hazardous waste landfills because the NCA is not being "closed" as a solid/hazardous waste landfill. The ARARs would be similar to the other soil alternatives except a "point of compliance" regulation from the federal and/or state solid waste regulations would also be added.

Groundwater PRGs would not need to be met within the points of compliance of the WMU. One or more of the groundwater alternatives could be modified to reflect this. For example, a significant number of injection wells in Alternative G-3 (ISCO) could be eliminated, or a significant number of extraction wells in Alternative G-5 (extraction and Treatment) could be eliminated. However, the timeframe for groundwater remediation would not change significantly because only the high-concentration areas in the groundwater alternatives (except Alternative G-6) would be treated. The time frame for the remainder of the plume to meet MCLs through natural attenuation processes would be in excess of 100 years.

Please note that in their June 14, 2011 comment letter, RIDEM indicated that where direct contact only is an issue, RIDEM could accept 6 inches of clean soil with a minimum of 4 inches of asphalt or concrete or 1 foot of clean soil underlain with a geo-fabric material and an appropriate ELUR to maintain said covers. The Navy agrees that a cap thickness would adequately mitigate exposure pathways because most of the soil posing adverse risk due to direct exposure is already "deep".

EPA Comment No. 3: Also discussed in the March meeting was the location of the new monitoring wells and soil gas samples outside the Sea Freeze Building. While EPA was concerned with the possible masking of shallow groundwater contamination due to ground water mounding from the storm water trench, Navy mentioned that the trench could be protecting the building from vapor intrusion. EPA agrees that, if verified, this feature may help contribute to the overall effectiveness of an overall remedy. If this is the case, it will be necessary for the Navy to include the storm water trench maintenance in the remedy until such time as it can be proven that either there is no plume moving toward or located under that building or Navy cleans up the plume. In all cases, a more comprehensive understanding of shallow ground water flow and its relationship to the engineered storm water drainage system will be needed.

Navy Response to Comment No. 3: Please see responses to **Additional General Comments Nos. 1 and 2.**

EPA Comment No. 4: Another issue that was not mentioned at the meeting is that EPA is concerned that the temporary wells outside of both the NORAD and Sea Freeze buildings were developed and sampled on the same day (within 10 to 25 minutes). It is customary to wait at least 48 hours, if not a week, after development to sample for VOCs that may have been stripped out of the water column during development. Navy must resample wells designated as: TW-19 through TW-29 prior to ROD signature. If the plume boundaries change due to the new data, additional VI sampling may be needed before ROD signature.

Navy Response to Comment No. 4: The development and sampling of the temporary wells was conducted per the United Federal Programs-Sampling and Analysis (UFP-SAP) dated April 2010. The document was reviewed by USEPA and all comments provided by the Agency were addressed (see USEPA correspondence dated May 6, 2010 [Attachment A]).

From a technical perspective, the Navy believes that the well development/groundwater sampling at the temporary wells conducted was adequate and appropriate because the volume of groundwater purged during the development of these small diameter temporary wells (1 inch diameter) was several times larger than the standing casing volume (approximately 4 to 5 times) and sampling occurred under low-flow conditions with groundwater geochemistry within anticipated ranges. Additionally, there was no potential for the introduction of water into the formation during well installation. Therefore, it is expected that the water sampled was representative of the formation and any contamination therein.

However, in order to resolve this issue, the Navy did resample the following monitoring wells on June 8, 2011: TW16-24, TW16-25, TW1-26, TW16-27, and MW16-93S. A copy of the unvalidated, analytical results was forwarded by Mr. Jeff Dale (via electronic mail) on July 11, 2011. It is the Navy's understanding that the EPA has reviewed the results and has no further comments on this issue. (A copy of the validated analytical results is enclosed as Attachment B.)

EPA Comment No. 5: EPA is also concerned that the current soil gas data may be biased low due to the fact that the probe may have been located within the capillary fringe of the water table. In addition, soil gas outside of buildings is not a reliable indicator of a vapor intrusion problem. In conclusion, we believe if the plume is found to be close to Sea Freeze above screening levels, more effort should be spent to get access to the building for sub slab VI measurements.

Navy Response to Comment No. 5: Please *see responses to* ***Additional General Comment No. 1.***

EPA Comment No. 6: Future efforts should seek to perform higher resolution mapping of water-table surface in the greater area encompassing the Sea Freeze building. This information may be used to inform a more representative sampling program for soil gas and shallow groundwater. It is recommended that future soil gas sampling efforts are conducted during a lower water table condition and that depth of the water table in the area of the sampling probes is confirmed in the field in order to maximize usable data, preferably at a time when no standing water is present in the drainage ditches. The casing elevations for the temporary wells should be surveyed to common datum using standard protocols (i.e., to nearest 0.1 foot laterally, and to nearest 0.01 foot vertically) and tied into the well network. Invert elevations and locations for pertinent drain pipes, catch basins and manholes in the Sea Freeze area should also be tied into the survey grid. The elevation of the open drainage ditch profile should also be surveyed and a staff gauge should be installed so that the relationship of surface water levels in the ditch may be better understood in relation to local ground water levels. Depending on the results of the resampling of the temporary wells requested in the comments below, soil gas may need to be re-sampled at shallower depths and/or different locations. Once the shallow ground water flow system is better understood, an LTM strategy may be formulated with an appropriate

Navy Response to Comment No. 6: Given the number of wells advanced within the Site 16 volatile organic chemical (VOC) plume, the multiple rounds of water level measurements collected overtime, and the proximity of the referenced temporary wells to Narragansett Bay, it is unlikely that additional water level surveys in the vicinity of the Sea Freeze building would change the existing conceptual site model (CSM) for Site 16 or alter our understanding of the hydrogeologic system.

Additionally, it is anticipated that, given the small area and shallow depth of the referenced drainage ditch and the high transmissivity of the subsurface soils, rain events would not dramatically impact groundwater flow patterns or VOC concentration in the groundwater. Please also see Navy response to EPA General Comment No. 4.

EPA Comment No. 7: In the new data presented to EPA in November, EPA notes the lack of sampling for the AFFF emerging contaminants. It has come to our attention that PFOA/PFOS may be toxic to the benthic community. Chronic effects were observed at concentrations as low as 10 ug/l in fish larvae and about 90 ug/l in midge larvae. Since toxicity might occur at the site that abut surface water (i.e. with little or no groundwater dilution), EPA recommends that PFOS and PFOA be analyzed for in groundwater prior to ROD signature. Navy must sample the groundwater at the FFTA to determine the concentration of PFOS and PFOA in the groundwater that may discharge to Allen Harbor.

Navy Response to Comment No. 7: The SAP did not include sampling or analysis for PFOS/PFOA. To resolve this issue, the following wells were sampled for the presence of PFOS/PFOA during the last week of July: MW16-45S, MW16-45I, MW16-46S, and MW16-46I. Analytical results will be transmitted to EPA/RIDEM as requested.

EPA Comment No. 8: Lastly, EPA is concerned that the approaches used in the FS to determine contaminant mass which we believe contain a number of inaccuracies and inappropriate assumptions which effectively skew the mass estimates. Total contaminant mass is biased high, which results in higher-than-reasonable costs for all of the active remedial options considered. Ironically, MNA is favored in this artificial "non-representative" environment, primarily due to cost advantage. However, this does not appear to be an effective solution for the site either due to the lack of appreciable evidence of widespread biodegradation interpreted from several other lines of evidence. The basis for EPA's assessment is included in the comments below. Revisions to the FS appear to be needed in order to develop a more realistic series of alternatives, which more closely match the observed site conditions. Since MNA alone appears to be inadequate some combination of technologies which includes active approaches is needed.

Navy Response to Comment No. 8: Please see responses to **Specific Comments Nos. 125, 126, 127, and 128**. Please note that active remediation is included in the evaluation of all other groundwater alternatives evaluated in the Revised Draft Feasibility Study (FS).

ADDITIONAL EPA GENERAL COMMENTS

Additional EPA General Comment No 1: Inspection of the soil gas canister placements show that the canisters were situated close to the groundwater table (BTOR). This would place some of the canisters in the capillary fringe of the groundwater table. At that location, there would be significant water and moisture that could interfere with measurement of volatiles by reducing the mobility of contaminant vapors. Therefore, results from sampling in moist soils can be unreliable. The table below provides a comparison of the depth of the Summa canister placement and the top of the water table (BTOR) at the beginning of well development.

Soil Gas Canister Placement Relative to Water Table and Capillary Fringe

Well	Water Table (BTOR)	Soil Gas Probe	Depth	Clearance	Comment
TW16-19	8.15 feet	SG16-008-001	5 to 6 feet	2.15 feet	OK
TW16-20	7.51 feet	SG16-008-002	5 to 6 feet	1.51 feet	OK
TW16-21	7.90 feet	SG16-008-005	6 to 7 feet	0.90 feet	In Fringe
TW16-22	8.64 feet	SG16-008-004	6 to 7 feet	1.64 feet	OK
TW16-23	8.50 feet	SG16-008-003	6 to 7 feet	1.50 feet	OK
TW16-24	4.39 feet	SG16-009-001	4 to 5 feet	-0.61 feet	Below GWT
TW16-25	5.03 feet	SG16-009-002	4 to 5 feet	0.03 feet	On GWT
TW16-26	6.69 feet	SG16-009-005	5 to 6 feet	0.69 feet	In Fringe
TW16-27	7.39 feet	SG16-009-003	5 to 6 feet	1.39 feet	OK
TW16-28	6.30 feet	SG16-009-004	4.5 to 5.5 feet	0.80 feet	In Fringe
TW16-29	6.31 feet	SG16-006-001	5 to 6 feet	0.31 feet	In Fringe

The capillary fringe can be just under a foot (10 inches) for medium sand and over a foot (16 inches) for fine sand. For the Sea Freeze and NORAD Building areas, the capillary fringe is estimated to be approximately 1 foot based on the soil boring log descriptions of fine to medium sand in the upper 10 feet

of the soil column. As can be seen in the table above, several of the soil gas samples are probably located above the capillary fringe. However, four appear to be in the capillary fringe and two are actually on top of or in the water table. Data/results from those soil gas canisters are considered to be underestimates, at best.

The basis for these concerns is presented in the New Jersey field sampling procedures manual: http://www.nj.gov/dep/srp/guidance/fspm/, among other sources.

Depending on the results of the re-sampling of the temporary wells requested in the comment below, soil gas may need to be re-sampled at a shallower depth. It is recommended that future soil gas sampling efforts are conducted during a lower water table condition and that depth of the water table in the area of the sampling probes is confirmed in the field in order to maximize usable data, preferably at a time when no standing water is present in the drainage ditches. The casing elevations for the temporary wells should be surveyed to common datum using standard protocols (i.e., to nearest 0.1 foot laterally, and to nearest 0.01 foot vertically). Invert elevations and locations for pertinent drain pipes, catch basins and manholes in the Sea Freeze area should also be tied into the survey grid. The elevation of the open drainage ditch profile should also be surveyed and a staff gauge should be installed so that the relationship of surface water levels in the ditch may be better understood in relation to local ground water levels. Future efforts should seek to perform higher resolution mapping of water-table surface in the greater area encompassing the Sea Freeze building. This information may be used to inform a more representative sampling program for soil gas and shallow groundwater.

Response to Additional EPA General Comment No. 1: With regard to the actual soil gas sampling, please note the following:

- The soil gas sampling was performed in accordance with the UFP-SAP, with the exception that sample intervals were adjusted to account for field conditions (i.e., higher than anticipated groundwater levels). No soil gas samples were collected within the water table. Water levels were specifically measured in temporary wells at soil gas locations (prior to soil gas sampling) in order to avoid setting the soil gas sample intake in groundwater. Although the UFP-SAP stated that the bottom of the sample interval should be at least 1 foot above the capillary fringe, the sample intervals were set to be as high above it as possible but within the target depth of below 5 feet. Regardless, the soil gas results are considered valid and defensible as further indicated in the following two bullets.

- The EPA's assertion that capillary fringe will reduce contaminant mobility is incorrect. The opposite (i.e., increased outgassing in the capillary fringe with higher measured soil gas concentrations) would be correct, as per NJ Vapor Intrusion (VI) Guidance (2005). (See Attachment C.)

- No water (or any moisture whatsoever) was observed being drawn into or reported by the lab in the sampling canisters. Therefore, the assertion that some of the sampling intakes (not the canisters themselves, as indicated in the comments) may have been below the water table is not correct.

- EPA's estimate of a capillary fringe thickness of 1 foot is an overestimate. Calculations prepared by Tetra Tech estimate the capillary fringe to be conservatively 7 to 8 inches; this is confirmed by the ranges provided in the NJ VI Guidance, based on the site lithology (See Attachment C).

The thickness of the unsaturated zone is dictated primarily by the water level in Narragansett Bay and is

not likely to be seasonally influenced. Additionally, based on the constructed shoreline/pier at the Sea Freeze area and distances from the shoreline to the sampling locations, only limited tidal influences would be anticipated.

With regard to the re-sampling of the temporary wells and the survey data, please see response to EPA Cover Letter Comment No. 4 and 6.

Additional EPA General Comment No 2: The virtual non-detect of CVOC and BTEX in the shallow groundwater may be a function of the location of the shallow Temporary Wells and possibly other issues. Although it is not specifically shown on Figures 1-4 and 1-10 the wells TW16-24, TW16-25, and TW16-26 are located on the down gradient side of a storm water discharge/drainage ditch that parallels the roadway that is shown to run southwest to northeast. This feature was not known until a site reconnaissance was conducted by EPA and GF-CDW after installation of the wells by the Navy. During that visit, significant standing water was observed in a storm water manhole that was located between TW16-25 and TW16-26.

The drainage ditch and likely storm drain that lies beneath the ditch are problematic in that they are designed to accept storm water runoff, precipitation, and wash water from a broad area, which will infiltrate into the shallow groundwater table. This infiltration will potentially result in two problems.

The first issue is that inflow of cleaner precipitation or wash water will dilute the concentrations of contaminants in the shallow groundwater in the general region of the ditch or underground drain. Unless there has been a significant period of no precipitation or runoff into the ditch/drain, the concentrations of contaminants in the down gradient monitoring wells will potentially be significantly diluted. It should also be noted that pollutants from the paved parking lot areas, such as BTEX compounds, could also be introduced into the shallow groundwater. This would make differentiation of where the BTEX originated more difficult. However, other constituents such as PCE, TCE, and cis-1, 2 DCE are likely to be derived from up gradient groundwater source areas.

A second issue is that the infiltrating surface water will tend to create a ground water mound along the length of the ditch/drain that will at least temporarily impede shallow groundwater flow patterns in the general area of the ditch and drains. Infiltrating surface water will create a locally higher shallow groundwater table along the length of the ditch/drain. The groundwater table does not have to be significant greater than the ambient condition in order to impede shallow groundwater flow, particularly given the observed flat hydraulic gradients in the area.

While there were no surface elevations provided for the temporary wells in the well construction logs, all of the temporary wells were installed with road boxes. Therefore, since the parking lot area is relatively flat, an approximate water table elevation may be interpreted on a relative basis based on the recorded depth to the water table measurements (i.e. the below top of riser – BTOR) at the beginning of well development and sampling; relative surface elevations may be assumed to be within ½ foot or less of each other). The following table summarizes the measured depths BTOR.

Measured Depth to the Water Table (BTOR) Before Well Development

Well	Location	Water Table (BTOR)	Comment
TW16-19	NORAD	8.15	
TW16-20	NORAD	7.51	
TW16-21	NORAD	7.90	
TW16-22	NORAD	8.64	
TW16-23	NORAD	8.50	
TW16-24	Sea Freeze - Ditch	4.39	Located along NE-SW ditch
TW16-25	Sea Freeze - Ditch	5.03	Located along NE-SW ditch
TW16-26	Sea Freeze	6.69	Located at head of NW-SE ditch
TW16-27	Sea Freeze	7.39	Away from ditch
TW16-28	Sea Freeze	6.30	Away from ditch

In the absence of a reliable elevation survey for the temporary monitoring wells, a definitive water table map cannot be made using the above data. However, qualitative interpretations can be made. Near the NORAD Buildings the depth to the water table is relatively consistent at around 7.5 to 8.5 feet below the pavement. Some of the variation is due to different water table elevations, and some may be due to variations in the top of the pavement elevation. However, the variation in depths is approximately 1 foot.

For the Sea-Freeze Building area there is a distinct difference in elevation of the water table between the two temporary wells near the Southwest to Northeast drainage ditch (TW16-24 and TW16-25) and TW16-27 which is located further away from the ditch in the down gradient_direction. The water table elevation in TW16-24 is 3 feet higher (i.e. 3 feet less to the water table from BTOR). The water table elevation in TW16-25 is 2.36 feet higher than in TW16-27. Although less pronounced, the water table elevation in TW16-26 which is located across the entrance road at the head of another drainage ditch is 0.70 feet higher than at the down gradient TW16-27 location where SG16-009-003 is located. Therefore, from qualitative interpretation of the water table elevations, it appears that the water table along the southwest to northeast trending drainage ditch is recharged by the ditch, artificially raising the water table in that area, and creating a groundwater mound at least on a temporary basis.

Both of these effects may be ameliorated after a period of dry weather or no wash water runoff into the ditch/drain. When the shallow groundwater table drops to its ambient level and gradient when the effects of infiltration have subsided, the shallow groundwater with any associated contaminants will continue to migrate down gradient under the ambient gradient and flow direction. This is one potential explanation for the elevated concentrations of TCE, as well as cis-1, 2 DCE and PCE detected in the soil gas at SB16-009-003 while in the temporary wells, there was no detection of CVOC or BTEX.

Future confirmatory sampling efforts should seek to collect samples in the area upgradient of the Sea Freeze building at a condition where no standing water is present in the drainage ditch. The casing elevations for the temporary wells should be surveyed to common datum using standard protocols (i.e., to nearest 0.1 foot laterally, and to nearest 0.01 foot vertically). It may be useful to survey invert elevations for pertinent drain pipes, catch basins and manholes in the Sea Freeze area. The elevation of the open drainage ditch profile should also be surveyed and a staff gauge should be installed so that the relationship of surface water levels in the ditch may be better understood in relation to local ground water levels. Future efforts should seek to perform higher resolution mapping of water-table surface in the greater area which encompasses the Sea Freeze building. This information may be used to inform a

more representative sampling program shallow groundwater and possibly, at a later time, soil gas.

Response to Additional EPA General Comment No. 2: The Navy believes the data and results are valid and this was confirmed by the re-sampling of the TW series wells in June 2011.

The Navy believes that the most plausible scenario, shown by multiple lines of evidence, is that shallow groundwater does not pose a significant vapor intrusion issue. This is because the plume in the area of the Sea Freeze building is at a depth of 35 feet below mean sea level and does have a pathway to the water table that would allow vapors to migrate into the unsaturated zone.

The Navy believes that the results obtained from the temporary wells are accurate and reflective of the shallow groundwater system in both the NORAD and Sea Freeze areas. This conclusion is based on multiple lines of complimenting evidence outlined in Section 5 of the Data Package for 2010 FS Support Investigation. Key observations from that section are as follows:

- PID readings below background at all soil boring locations and depths except at SB16-108 (TW16-26) and SB16-109 (TW16-27).
    - Elevated PID reading of 14.8 ppm from 15-20 feet bgs at SB16-108, all other depths at or below background.
    - Low level PID readings (less than 5 ppm) in all depth zones at SB16-109.
- Only trace to low-level Color-Tec® results at SB16-104 (TW16-22), SB16-107 (TW16-25) and SB16-108 (TW16-26).
- No CVOCs were detected in vadose zone soil samples and low-level CVOC concentrations (maximum of 19 ug/kg) were only found at three saturated soil boring locations – SB16-104, SB16-107 and SB16-108 (locations consistent with Color-Tec® screening results).
- Low-level concentrations of CVOCs were only found at TW16-24 (8.3 ug/L) and TW16-25 (0.7 ug/L).

While minor discrepancies could be found between soil screening, soil samples and temporary well results (e.g. no screening or soil results identified at TW16-24 but low level results in the groundwater), generally, all results reported are either non-detect or near non-detect levels.

Taken as a whole, it would not be assumed that significant CVOC concentrations were missed since all three investigatory phases (soils screening, soil samples and temporary well samples) conclude that only low-level CVOC contamination is present in the shallow zone.

While the Navy did not observe any standing water during the soil boring and temporary well installation process or even when the TWs were sampled, the Navy does agree that seasonal affects occur throughout the NCBC Davisville Site. While it is not known for certain whether mounding occurs as hypothesized by EPA, (though it is unlikely – see following paragraph), it should be noted that based on the development and purging data for the TWs, hydraulic conductivity is generally quite high (likely to be high single or double digit feet/day). This is based on the high volumes of water removed coupled with minimal drawdown in the pumped wells. Generally, surface water does not pond at any area of Site 16

very long (usually a day or so after a large storm) and any mounding of groundwater is likely more a reflection of the overall system and not a temporary precipitation based event.

After installation and sampling occurred in 2010, Navy surveyed the elevation of the ground surface and measuring points (top of casing) for all the temporary monitoring wells. An updated well construction table is summarized in Attachment D and includes all new wells (both temporary and permanent). As can be observed from this table, the measuring point elevation of TW-24 and TW-25 is approximately 2 feet lower than TW-26, indicating that no (or very minimal) mounding actually occurs in the drainage ditch near the Sea Freeze building.

On June 8 and 9, 2011, the Navy re-sampled TW16-24, -25, -26, -27 and MW16-93s (TW-28 is buried under gravel). Localized synoptic water levels were also collected pre- and post-precipitation (rainfall received on evening of June 9). Preliminary groundwater sampling results are consistent with June 2010 results since only low-level cis-1,2-DCE was observed at TW16-24 and -25 at 0.62 ug/L and 0.28 ug/L, respectively, in June 2011 sampling.

Please also see response to EPA Cover Letter Comment No. 6.

Additional EPA General Comment No. 3: Inspection of the groundwater development and sampling logs for the Temporary Wells up gradient of the Sea Freeze and NORAD Buildings also shows other issues of concern. The wells were all developed on the same day the well was sampled. In fact, comparison of the well development logs and the groundwater sample logs shows that only 10 to 25 minutes elapsed between the end of well development (including surging) and the collection of the sample. That is, they were developed and sampled the same day without any pause in between, with no period of well stabilization.

The simultaneous development (which includes surging) of a well immediately followed by collection of the groundwater sample will almost certainly result in a non-representative groundwater sample since volatiles will have been aerated out of the groundwater. The logs also show that for some wells there were only a few days between well construction and development/sampling. The table below shows a summary of the construction, development, and sampling dates.

Temporary Wells

Well	Construction Date	Development Date	Sampling Date	Elapsed Time End Development to Sample Collection
TW16-19	June 17, 2010	June 23, 2010	June 23, 2010	15 minutes
TW16-20	June 22, 2010	June 23, 2010	June 23, 2010	25 minutes
TW16-21	June 15, 2010	June 23, 2010	June 23, 2010	15 minutes
TW16-22	June 17, 2010	June 23, 2010	June 23, 2010	15 minutes
TW16-23	June 15, 2010	June 23, 2010	June 23, 2010	15 minutes
TW16-24	June 16, 2010	June 24, 2010	June 24, 2010	15 minutes
TW16-25	June 11, 2010	June 24, 2010	June 24, 2010	15 minutes
TW16-26	June 15, 2010	June 24, 2010	June 24, 2010	15 minutes
TW16-27	June 14, 2010	June 24, 2010	June 24, 2010	10 minutes
TW16-28	June 16, 2010	June 24, 2010	June 24, 2010	20 minutes
TW16-29	June 17, 2010	June 23, 2010	June 23, 2010	15 minutes

Response to Additional EPA General Comment No. 3: Please see response to EPA Cover Letter Comment No. 4.

As stated in the previous comment, the Navy believes that the results obtained from the temporary wells are representative of the shallow groundwater system. The development and sampling procedure is summarized as follows:

- First, a Waterra foot valve was used to purge the well of highly turbid water, generally removing approximately 3 to 4 gallons.
- Second, a peristaltic pump was set to a high discharge rate (approximately 800 ml/minute) and ran until turbidity was low (less than 50 NTU) and/or visually clear. Discharge volumes ranged from 8 to 16 liters (most being 8 to 12 liters).
- Finally, the rate was turned back to 150 ml/minute and ran until parameters stabilized (usually 10 minutes). Once parameters were stable, a groundwater sample was collected.

All temporary wells are 1-inch in diameter (TW16-19 inappropriately marked as 0.75-inch in development log) and generally had about 8 feet of standing water under static conditions. This results in a standing well volume of approximately 2.4 liters. Based on the above outlined process, approximately 5 to 10 well volumes were removed during initial development (with Waterra foot valve). While this process could greatly aerate the water column, an additional approximately 5 well volumes or more was removed during the high rate pumping that followed the initial surging (there were minimal to no disturbances to the water column during this time as intake tubing was not moved). Therefore, while sampling was performed immediately following development and purging, due the enormous water volumes removed (with little to no drawdown also observed), it is highly unlikely that any aerated water remained. This is exemplified by the low DO observed during purging and sampling (most readings less than 1.0 mg/L, maximum approximately 2.5 mg/L). If the water column had been significantly aerated, DO should have been observed to be much higher (likely higher than 5 mg/L and probably near atmospheric levels near 9 mg/L). Further, based on the additional geochemistry of the groundwater under the low-flow rate setting, the groundwater obtained is indicative of the shallow groundwater system. Interestingly, ORP is negative at all but TW16-24 to -28, indicating a reducing environment and slightly positive at TW16-24 to -28 where the environment is less likely reducing.

Essentially, the sampling technique is similar to pre-low-flow sampling methodologies when 3 to 5 standing well volumes would be removed prior to groundwater sampling (a standard operating procedure prior to the mid-1990s). Additionally, the sampling procedure followed is comparable to standard hydro-punch groundwater sampling (only initial Waterra foot valve phase is extra). Based on the screening and soil data for the temporary wells, the Navy is confident that contaminants will not be detected or will be detected at low concentrations in the shallow groundwater system in the NORAD and Sea Freeze areas. This is based on the conceptual site model that concludes VOC contamination occurs at depth, and the plume is overlain by groundwater not impacted with VOCs.

Additional EPA General Comment No. 4: It is noted that an additional CVOC (PCE) is found in the soil gas in SG16-009-003 as well as the Crawl Space of the Sea Freeze Building (SG16-009-006) at relatively elevated concentrations of 19 µg/l and 58 µg/l, respectively. Although not a widespread CVOC

contaminant detected at Site 16, PCE has been detected in a number of monitoring wells at the up gradient end of the interpreted preferential groundwater flow path shown on Figure 1. The following table shows detections of PCE in groundwater along the interpreted preferential groundwater flow path.

Detections of PCE in Up Gradient Monitoring Wells Near the Former Building 41

Monitoring Well -2004	PCE - 2004	Monitoring Well -2007	PCE - 2007
MW16-13I	0.47 (µg/l)	**MW16-10I**	0.37 (µg/l)
MW16-17I	0.77 (µg/l)	**MW16-18I**	**1.40** (µg/l)
MW16-18I	**2.02** (µg/l)	MW16-19I	0.11 (µg/l)
MW16-33S	0.32 (µg/l)	MW16-33S	0.21 (µg/l)
MW16-33I	**18.0** (µg/l)	**MW16-33I**	**15.0** (µg/l)
MW16-34I	**3.90** (µg/l)	**MW16-34D**	**10.0** (µg/l)
MW16-34D	**7.91** (µg/l)	**MW16-37I**	**1.60** (µg/l)
MW16-35I	**3.81** (µg/l)	**MW16-37D**	**1.20** (µg/l)
MW16-37D	**1.58** (µg/l)	MW16-76I	0.28 (µg/l)
		MW16-87I	0.58 (µg/l)
		TW108S	0.57 (µg/l)
		MW16-86D	0.10 (µg/l)

It can be seen from the table that there have been notable detections of PCE in up gradient monitoring wells, especially around the MW16-33I and MW16-34I/D area. The detections also extend down along the interpreted groundwater flow path through MW19-35I, MW16-37I, MW16-18I, and MW16-19I. There are even low concentrations of PCE in wells further down gradient at MW16-76I and MW16-87I along the intermediate groundwater flow path interpreted and presented in the attached Figure 1.

While not confirming that contamination is derived from that up gradient location solely, the presence of PCE at those up gradient locations and in the soil air at the Sea Freeze Building may be related. That is, PCE may be a tracer for contaminant migration from up gradient along the inferred groundwater flow path. As such, there is an indication in the groundwater data that a CVOC release likely migrated along the intermediate groundwater and potentially the shallow groundwater from near the former Building 41 to the Sea Freeze Building.

The expected time for groundwater to reach the Sea Freeze Building from the vicinity of the western end of the former Building 41 can be calculated using the following equation:

$$V_{gw} = \frac{K * \Delta h/L}{\varnothing_e}$$

K = hydraulic conductivity (feet/day)
Δh = change in groundwater elevation along flow path (feet)
L = length of groundwater flow path (feet)
$\varnothing_e$ = effective porosity of soils

The distance (L) from a potential release area outside of the former Building 41 area near MW16-33I or MW16-34I to the Sea Freeze Building is approximately 1,750 feet. Using the November 2007 Phase III intermediate groundwater elevations provided for MW16-34I and MW16-88I (9.90 feet) the horizontal hydraulic gradient is approximately 0.0057 feet/foot. The geometric mean of hydraulic conductivity values from several intermediate monitoring wells along the interpreted flow path that is provided in the Site 16 Phase III report is approximately 4.0 feet/day (no evaluation of the accuracy of the slug tests was made). An effective porosity of 0.20 was assumed for the intermediate zone soils. Using the above values as input and using the basic groundwater velocity equation, the groundwater will travel approximately 41.6 *feet per year*. It should be noted that the hydraulic conductivity of the shallow groundwater appears to be higher than that for the intermediate zone, therefore, the calculated rate is considered conservative. That is, shallow groundwater may migrate at a faster velocity than that in the intermediate groundwater.

Therefore, groundwater may be able to reach the Sea Freeze Building in approximately 42 years. This estimate does not take into account any retardation or longitudinal dispersion and makes no estimate at to what an initial source area concentration may have been. However, data from Site 16 (unlike Site 07) shows that there is very little organic carbon in the site soils such that retardation would not be expected to be significant. Also, longitudinal dispersion would, in effect, allow dissolved phase contaminants to migrate faster than the calculated Darcy groundwater velocity. For Site 16, contaminant retardation and contaminant longitudinal dispersion may cancel each other out such that the contaminant migration rate may be similar to the Darcy velocity. Therefore, a release of contaminants near the former Building 41 area around 1970, or thereafter, could reach the Sea Freeze Building by 2010, or earlier. If groundwater velocities are on the slow end of the estimated velocity range, the low-level detections in groundwater may signal the approach of higher, more problematic levels. A robust LTM program will need to be designed to address this issue moving forward. In conclusion, we believe if the plume is found to be close to Sea Freeze above screening levels, more effort should be spent to get access to the building for subslab VI measurements.

Response to Additional EPA General Comment No. 4: The Navy strongly disagrees that PCE contamination observed near former Building 41 in the shallow and intermediate groundwater zones is related to PCE observed in the shallow zone near the Sea Freeze Building. Further, the Navy does not believe that the use of PCE as a "tracer" is valid or appropriate (tracers should not be susceptible to biological/chemical degradation and should flow at the advective flow rate). There are numerous variances to site-specific data and conclusions that do not allow for the two sites to be linked. The following summarize the key reasons these two areas should not be linked:

- As outlined in Section 3 of the Phase III RI report (March, 2009), groundwater flow is not isolated in any one groundwater zone across large distances of the site. Groundwater is observed to flow downward and upward through the various zones depending on position within the site and specific groundwater flow path. Confinement of flow to a specific zone does not occur over large distances (generally greater than 500 feet) at Site 16.

- There are numerous locations (i.e., monitoring wells) between former Building 41 and the Sea Freeze area along the primary flow path that do not contain PCE (MW16-88I, -93I, -93S, -39 and -57).

- There is significant TCE contamination (generally and with respect to PCE) between former Building 41 and the Sea Freeze area that does not appear to be effectively migrating since concentrations are decreasing with distance (TCE concentrations high near former Building 41

yet at relatively low-concentrations near the Sea Freeze area). The assumption and use of non-advective transport terms need to be applied consistently for all constituents.

- The significant TCE contamination observed between former Building 41 and the Sea Freeze area is generally located in the intermediate and deep overburden zones – typically at least approximately 30 feet bgs to 60 feet bgs or deeper.

With regards to the tetrachloroethene (PCE) concentrations in the soil gas and groundwater, please note that:

- The PCE soil gas concentrations reported for locations SG16-009-003 and the Crawl Space of the Sea Freeze Building (SG16-009-006) are 19 **ppbv** and 58 **ppbv**, respectively (not 19 **µg/l** and 58 **µg/l**, respectively).

- While the Navy agrees that there are multiple Site 16 source areas contributing to the CVOC contamination observed in the groundwater and that the CVOC plume does extend to the Sea Freeze building area, the existing data (groundwater, soil, and soil gas) do not suggest a strong link between the Bldg 41 area and the PCE detected in the soil gas samples collected at the Sea Freeze building area:

    - Based on the 2010 soil gas data, PCE concentrations detected in the soil gas samples collected in the general Bldg 41 area do not exceed conservative soil gas screening levels.

    - Based on the 2007 soil gas data, only the maximum detected PCE soil gas concentration in the general Bldg 41 area exceeds soil gas screening levels.

Subslab sampling in the Sea Freeze Building is not practical because of the unique construction of the building. The building (at least the newer section) is underlain entirely by perforated piping used to keep the building cool. Therefore, the ventilation piping acts to capture venting soil gas. In addition, sampling without damage to the piping or the slab itself may be difficult and/or technically impractical. The most efficient way to collect a sample of air from beneath the Sea Freeze building is to sample the Crawl Space as the Navy has already accomplished.

Please see response to EPA Specific Comment No. 10.

The Navy already presented a similar estimate of the seepage velocity and travel time of a release at Building 41 to reach Narragansett Bay and Allen Harbor on Page 1-18 so it was not necessary for the EPA to present the calculation in the comment.

Additional EPA General Comment No. 5: In the new data presented to EPA in November, EPA notes the lack of sampling for the AFFF emerging contaminants. It has come to our attention that PFOA/PFOS may be toxic to the benthic community. In a review of papers on the aquatic toxicity of PFOS and/or PFOA to perhaps 10 species of aquatic animals, acute toxicity occurs at the range of about 10-300 mg/L. Chronic effects were observed at concentrations as low as 10 ug/l in fish larvae and about 90 ug/l in midge larvae. There was an unusual effect in that exposure of the parental generation of fish to PFOA or PFOS made the larvae much more susceptible, perhaps by depletion of parental thyroid hormones passed on through the egg combined with the anti-thyroid effect of post-hatch exposure. This phenomenon also occurs in rats in which effects occur in offspring at concentrations lower than those that

were nontoxic in the parents. Since toxicity might occur at FFTAs that abut surface water (i.e. with little or no groundwater dilution), EPA recommends that PFOS and PFOA be analyzed for in groundwater near the FFTA at NCBC. If these chemicals are detected in groundwater, then they should be analyzed for in downgradient groundwater and/or piezometers to demonstrate that they do not occur at concentrations that could be chronically toxic to benthic infauna. Although we did not search for terrestrial ecological effects, the search did come up with one study that reported that the highest no observed effect concentration in soil for earthworms was 160 mg/kg PFOS and 500 mg/kg PFOA. If the FFTA could serve as earthworm habitat, these chemicals should also be analyzed for in soil, because they are known to bioaccumulate in the aquatic and terrestrial food chains. I sent the list of references to you earlier so did not include them here. Therefore, prior to ROD signature, Navy must sample the groundwater at the FFTA to determine the concentration of PFOS and PFOA in the groundwater that may discharge to Allen Harbor.

Response to Additional EPA General Comment No. 5: The UFP-SAP did not specify sampling for PFOA or PFOS, therefore the EPA should not have expected this data to be provided.

Please see response to EPA Cover Letter Comment No. 7.

EPA SPECIFIC COMMENTS

EPA Specific Comment No. 6: p. 1-1: Identify the Operable Unit number for the area, it is OU9.

Response to EPA Specific Comment No. 6: Agree.

EPA Specific Comment No. 7: p. 1-4: In Sec. 1.2.1.2 identify the elevations of the 100-year and 500-year flood zones.

Response to EPA Specific Comment No. 7: Agree. According to the FEMA Flood Insurance Rate Map (FIRM) (Attachment E), the 100-year flood elevation is approximately 14 feet above sea level. No elevations are given for the 500-year flood zone. See attached FIRM figures.

EPA Specific Comment No. 8: p. 1-21: In the first paragraph, 3rd sentence – the contaminant levels should be compared to federal MCLs rather than RI GA standards, unless there is only a state standard for the contaminant.

Response to EPA Specific Comment No. 8: Agree. However, please note that the RI GA groundwater standards for BTEX (referenced in 3rd sentence) are the federal Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs). Based on a review of the RI GA groundwater standards, it appears that the State of Rhode Island adopted the SDWA MCLs available at the time the RIDEM standards were promulgated.

EPA Specific Comment No. 9: p.1-24: Navy says that no remedial action is needed for SB16-A3-12 because the forensics analysis showed that the PAHs are consistent with coal tar pitch and building materials rather than fuel. NFA would be allowed only if the material was unaltered fuel. Coal tar pitch is not exempt from Superfund. Please include an alternative to remedy this area.

Response to EPA Specific Comment No. 9: The Navy's rationale for not recommending remediation of the polycyclic aromatic hydrocarbons (PAH) at location SB16-A3-12 is that, in contrast to the PAH

contamination associated with the creosote dip tank area and the fire training area, the PAHs in soils to the south of Davisville Road appear to be most likely associated with the asphalt (which is everywhere in this portion of Site 16) and/or remnants of buildings (razed, for example, during based closure). Specifically, the PAHs do not appear to be related to releases from specific units or processes associated with past Navy operations. The PAHs detected south of Davisville Road are likely similar to those found in most developed areas across the United States and thus, because of their likely source, do not warrant remediation.

EPA Specific Comment No. 10: p. 1-26: In the table, what "Non-site related contamination appears to be contributing to the observed contamination" is the text referring to (its not mentioned regarding groundwater)? Please clarify keeping in mind that EPA believes PCE is a site related contaminant.

Response to EPA Specific Comment No. 10: PCE is definitely a site-related contaminant for Site 16 (e.g., the low-level PCE in the former Building 41 area is likely due to impurities of the TCE production process). However, as discussed in the response to Additional EPA Comment No. 4, the *pattern* of PCE contamination in the soils, groundwater (at and upgradient of the Sea Freeze building), soil gas, and the crawl-space air sample (from the crawl-space underlying the Sea Freeze building) suggests that a release in the immediate vicinity of the Sea Freeze building (not associated with the Site 16 CVOC plume) is likely responsible for the PCE detections noted in the environmental media in the immediate vicinity of the Sea Freeze building.

EPA Specific Comment No. 11: p. 1-26: Regarding the discussion in the third bullet about salinity measurements in the groundwater. The locations of wells exhibiting sufficient salinity to make them non-potable should be documented, since this affects the groundwater cleanup standard that may be required.

Response to EPA Specific Comment No. 11: Agree. The salinity measurements for all RI wells have been documented in Section 4 of the March 2009 Remedial Investigation report for Site 16 (please see Tables 4-31 through 4-40 of the RI report).

EPA Specific Comment No. 12: p. 1-26: Regarding the 4th bullet – the presence of lease restrictions should not influence the assessment of future risks (only current risks).

Response to EPA Specific Comment No. 12: Agree. The human health risk assessment included the hypothetical future residential land scenario for *all portions* of Site 16 (See the March 2009 Phase III RI report for NCBC Davisville Site 16). The fact that lease restrictions do exist is a point of perspective for the risk managers.

EPA Specific Comment No. 13: Figures 1-4 and 1-10; As per discussions included in the general comments, above, additional detail regarding the engineered drainage system in the areas surrounding the Sea Freeze building should be included on this figure. Appropriate details include locations and elevations for all surface drainage ditches and related features, locations and invert elevations for subsurface drainage pipes, catch basins, and manholes, etc.

Response to EPA Specific Comment No. 13: Please see response to Additional EPA General Comment Nos. 1 and 2.

The Navy feels that it is premature to assume that the engineered drainage system near the Sea Freeze

Building has significant impacts on the shallow groundwater flow system or that the system would impact the decision-making process for the Site 16 FS or Record of Decisions. Re-sampling performed on June 8 and 9, 2011 confirmed that low-level CVOCs only occur at TW16-24 and -25 as found in June 2010. Additionally, preliminary evaluations of synoptic water levels collected in June 2010 and 2011 do not indicate that the engineered drainage system has any hydraulic impacts on the shallow groundwater system in this area.

EPA Specific Comment No. 14: *Figure 1-17*: The 5 µg/l isoconcentration line surrounding MW16-78S should be extended to MW16-37S. The shallow release from the former TCE still likely migrates to the east-southeast, not to the north-northeast.

Response to EPA Specific Comment No. 14: Based on the extensive 3-D analyses performed using results from the Color-Tec® field screening and soil samples collected during the 2007 and 2010 field investigations, MW16-78S and MW16-37S each represent distinct release points. Additionally, based on the groundwater flow paths, migration is dominantly downward into the intermediate and deep overburden. Therefore, a release at MW16-78S will migrate east-southeast and vertically downward so that by time it reaches MW16-37, it is in the deep overburden zone.

The 5 ug/L isoconcentration will be adjusted to demonstrate an east-southeast migration, but it is not appropriate to connect these two wells in the shallow zone.

EPA Specific Comment No. 15: *Figure 1-18:* The 500 µg/l and 1,000 µg/l isoconcentration lines are over drawn (larger) than is justified based on the soil boring logs and Color-Tec® screening conducting in areas around MW16-78I. This provides a misleading larger extent of the TCE mass that is located near MW16-77I. Also, please note our comments on the data from MW16-91S and the Temporary Wells near the Sea Freeze and NORAD buildings.

Response to EPA Specific Comment No. 15: The Navy concurs that the 500 ug/L and 1,000 ug/L isoconcentration lines are drawn conservatively and encompass a large area. While the soil boring logs and Color-Tec® screening data shows that a much smaller, tighter area could be drawn for each, this conservative contouring accounts for potential migration of groundwater from these impacted soil areas and is a conservative estimate of potential volume requiring remediation

EPA Specific Comment No. 16: *Figure 1-19:* EPA believes that the figure is incorrect and needs to be re-drawn based on the observations noted below. There is a missing 500 µg/l isoconcentration line around MW16-59I. The 500 µg/l and 1,000 µg/l isoconcentration lines are over drawn (larger) than is justified based on the soil boring logs and Color-Tec® screening conducting in areas around MW16-78I and MW16-85"D". On the other hand, the 500 µg/l isoconcentration line should be extended to surround MW16-37I and MW16-38I. There is at least as much technical justification to show the release from the former TCE still area migrating toward MW16-37I and MW16-38I as there is to MW16-69I.

Response to EPA Specific Comment No. 16: A 500 ug/L isoconcentration line will be added around MW16-59I as well as extended to surround MW16-37I and -38I. The Navy believes that at these deeper depths, migration from the former TCE still area is toward both MW16-37 and -69. Due to the multiple source releases areas and subsurface complexities, some isoconcentration figures are simplified in order to be conservative and to ensure the success of the evaluated remedial option.

EPA Specific Comment No. 17: *Figure 1-20:* EPA believes the figure is incorrect and needs to be re-drawn based on the observations noted below. The 500 µg/l isoconcentration line around MW16-45I and MW16-05I should clearly be connected. There is no basis to treat these two areas as separate entities with a 5 µg/l isoconcentration line placed around MW16-05I. The 5 µg/l isoconcentration should not be drawn from the former Building 41 area to surround the BTEX Hot Spot and FFTA areas as shown. Inspection of the data within the 500 µg/l and 1,000 µg/l isoconcentration lines shows numerous errors. MW16-16L (49 µg/l), MW16-61D (220 µg/l), MW16-64D (380 µg/l), MW16-66D (18 µg/l) are all well below 500 µg/l and yet are shown within or on the 500 µg/l isoconcentration line.

Likewise, several wells with concentrations of TCE below 1,000 µg/l are shown within that isoconcentration line. These include INJ16-01D (620 µg/l), INJ16-02D (360µg/l), INJ16-04D (770 µg/l), MW16-69I (550 µg/l), MW16-68D (670 µg/l), MW16-70D (680 µg/l), MW16-71D (790 µg/l) in addition to several others. This is inappropriate in that it exaggerates the extent of TCE mass in the delineated area and impacts development and evaluation of remedial alternatives.

Response to EPA Specific Comment No. 17: Figure 1-20 will be re-drawn considering most of EPA's observations. The noted exceptions are as follows:

- The 500 ug/L isoconcentration contour will not be connected between MW16-45I and -05I.
    - MW16-05I is not downgradient of MW16-45I. MW16-58I2, which is upgradient of MW16-05I, does not have concentrations above 500 ug/L.
    - Non-detects in soil screening/soil borings are observed between MW16-05I and -45I (see Figure 8-6 of the Data Package for 2010 FS Support).
- There is no justification to remove the 5 ug/L isoconcentration between the former Building 41 and the FFTA as this contour approximates the edge of the coalesced CVOC plume
    - Based on the extensive 3-D analyses of the subsurface with soil screening/soil samples, the 5 ug/L isoconcentration should be maintained between the former Building 41 and BTEX hotspot area.

As in previous EPA comments concerning the Navy's interpretation of isoconcentration contours, the Navy maintains a conservative approach that may slightly over-estimate the actual extents but allows for the potential downgradient migration of contamination.

EPA Specific Comment No. 18: *Figure 1-21:* This figure also presents errors in delineating the extent of the TCE contamination and should be re-drawn. Wells with lower concentrations of TCE are arbitrarily included within isoconcentration lines representing higher concentrations. Detailed identification is not presented here, but can clearly be seen from inspection of the figure. Likewise, the extent of the 500 µg/l and 1,000µg/l isoconcentration lines is arbitrarily drawn without supporting data.

It should be noted, however, that there is justification for a 100 µg/l isoconcentration line to extend toward the Sea Freeze building. It is recognized that this figure arbitrarily present only a 5 µg/l and 500 µg/l isoconcentration line. However, this under-represents and minimizes a TCE plume of elevated concentrations that extends toward the Sea Freeze building that exceeds 100 µg/l. A plume with concentration in excess of 100 µg/l can be presented extending from the vicinity of MW16-25D (530 µg/l)

through MW16-19D (260 µg/l) through MW16-39I (140 µg/l) and MW16-57I (350 µg/l).

Response to EPA Specific Comment No. 18: As in previous EPA comments concerning the Navy's interpretation of isoconcentration contours, the Navy maintains a conservative approach that may slightly over-estimate the actual extents but allows for potential downgradient migration of contamination. Additionally, this conservative approach is not "arbitrarily drawn without supporting data." On the contrary, multiple lines of evidence are used when determining the extents of the coalesced CVOC plume on the 500 ug/L and 1,000 ug/L levels. The extents are based on both groundwater concentrations and 3-D soil screening/soil boring results coupled with multiple groundwater zone potentiometric maps developed over time and with consideration of the groundwater flowpaths at Site 16.

The Navy did not arbitrarily omit the 100 ug/L isoconcentration contour interval from this figure. Figures 1-17 through 1-25 include the same 5 ug/L, 500 ug/L and 1,000 ug/L isoconcentration intervals.

EPA Specific Comment No. 19: *Figure 1-25:* We believe there is no basis for not connecting/extending the 1,000 µg/l isoconcentration line between MW16-44R and MW16-05R. For that matter, the 1,000 µg/l isoconcentration line should encompass wells to the southwest including MW16-02R, MW16-59R, and MW16-60R. Using the data shown, there is no basis for including MW16-15R within the 1,000 µg/l isoconcentration line (although if using data from 2001 and 2002 it could be). The 500 µg/l isoconcentration line cannot encompass MW16-67R (425 µg/l average), or MW16-69R (240 µg/l), nor can it be extended arbitrarily as far to the northwest as depicted.

Response to EPA Specific Comment No. 19: As in previous EPA comments concerning the Navy's interpretation of isoconcentration contours, the Navy maintains a conservative approach that may slightly over-estimate the actual extents but allows for the potential downgradient migration of contamination. The extents are based on both groundwater concentrations and 3-D soil screening/soil boring results coupled with multiple groundwater zone potentiometric maps developed over time and with consideration of the groundwater flow paths at Site 16.

As outlined in Response to EPA Specific Comment Number 17, the lack of connection between MW16-44R and -05R is maintained. However, the Navy acknowledges that it is plausible that these two wells could be connected within the 1,000 ug/L isoconcentration contour.

EPA Specific Comment No. 20: p. 2-1: In the first sentence of the first paragraph insert "performance and/or cleanup goals" before "groundwater." [groundwater does not require cleanup within the compliance boundary of any waste management areas that may be established for contaminated soil] In the fourth sentence [and throughout the section whenever discussing groundwater] insert "and/or performance" after "cleanup."

Response to EPA Specific Comment No. 20: Agree.

EPA Specific Comment No. 21: p. 2-2: In the second bullet insert "EPA-" before "proposed" in both sentences.

Response to EPA Specific Comment No. 21: Agree.

EPA Specific Comment No. 22: p. 2-3: Regarding the second bullet note the TPH is not regulated under CERCLA.

Response to EPA Specific Comment No. 22: Agree.

EPA Specific Comment No. 23: p. 2-4: In the second paragraph, in the last sentence change "For purposes of completeness," to "In order address all risks present at the Site,".

Response to EPA Specific Comment No. 23: Agree.

EPA Specific Comment No. 24: p. 2-4: In the fourth paragraph remove the last sentence that starts: "Note that although Site 16..."

Response to EPA Specific Comment No. 24: Disagree. The reference sentence is a statement of fact.

EPA Specific Comment No. 25: p. 2-6: In section 2.3, second paragraph insert after "The development of cleanup goals" insert and "performance standards." In the third paragraph in the first sentence note that some areas are used for recreational purposes. Also in the last sentence change "For purposes of completeness," to "In order address all risks present at the Site,".

Response to EPA Specific Comment No. 25: Agree.

EPA Specific Comment No. 26: p. 2-7: Groundwater RAO no. 1 should include achievement of ARARs (i.e. MCLs & MCLGs), as well as achievement of risk-based concentrations.

Response to EPA Specific Comment No. 26: Partially agree. The RAO will be revised by adding "and meet the selected PRGs identified in Table 2-4."

EPA Specific Comment No. 27: p. 2-7: In the first, third, fourth and seventh paragraphs remove "and TPH" since TPH is not regulated by CERCLA and should not be factored into the CERCLA risk assessment or the development of CERCLA RAOs.

Response to EPA Specific Comment No. 27: TPH was not a component of the risk assessments prepared for Site 16. Per the comment-response exchange on the draft version of the FS, TPH is being addressed in this FS because of exceedances of State standards. The Navy will eliminate the reference to TPH in the actual Remedial Action Objective narratives and add a sentence(s) at the end of Section 2.3.1.1 regarding the evaluation of TPH in the revised draft version of the FS.

EPA Specific Comment No. 28: p.2-7: The absence of BTEX as COCs in Soil RAO no. 4 and 6 suggests that they are being exempted based on the fuel exemption (they would only be exempted if the source of the BTEX was unused fuel versus waste oil or other sources not exempted under CERCLA). Navy should clarify whether this is the case or whether BTEX in soil did not exceed risk criteria.

Response to EPA Specific Comment No. 28: We are unclear regarding this comment. BTEX (specifically benzene) is addressed in the second half of Section 2.3.1.1 (see BTEX Hot Spot Area). As indicated in the Phase III RI report for Site 16, benzene is not a direct contact risk COC in any area of Site 16. However, benzene is a groundwater COC and was detected in the groundwater underlying Allen Harbor. Additionally, two detections of benzene (only) in vadose zone soil samples in the BTEX Hot Spot Area exceed RIDEM leachability criteria. Conservatively, benzene is retained as a COC for soils because of the exceedances of the RIDEM leachability criteria and because it is co-located with other COCs

targeted for evaluation in the revised draft FS. Given the relatively low-level detections of benzene in the Site 16 groundwater (less than SDWA MCLs) and the isolated detections in the vadose zone soils, benzene would not have been selected as a soil COC otherwise. This information was presented in Table 2-3 of the revised draft FS report and will be repeated at the end of Section 2.3.1.1.

EPA Specific Comment No. 29: p. 2-7: The meaning of the seventh paragraph (which starts: "For most of the SENCA and Developed Area, there were no risks associated with soil....") is unclear since if there is no risk for unrestricted use of the Site there is no grounds for a CERCLA restriction on Site use.

Response to EPA Specific Comment No. 29: The reviewer is correct. The direct contact risk estimates for soils of the SENCA and Developed Area (south of Davisville Road) do not exceed risk management benchmarks established for NCBC Davisville Site 16. There are no grounds for a CERCLA restriction on Site use based on exposure to soil. This statement will be added to the referenced text.

EPA Specific Comment No. 30: p. 2-9: In the seventh bullet remove the citation to the CWA AWQCs since they only are chemical specific standard when used to develop sediment cleanup standards (in most cases they are action-specific standards for monitoring of surface waters)(as a separate note they also have been renamed in the CWA regulations so are no longer called AWQCs).

Response to EPA Specific Comment No. 30: Agree.

EPA Specific Comment No. 31: p. 2-10: In Section 2.4 and throughout this entire document it should discuss PRGs for soils and both PRGs and/or Performance Standards for groundwater. There is no cleanup required of groundwater within the compliance zone for any waste management area that may be established through the soil remedial alternatives. Therefore, within any compliance zone there are groundwater performance standards for preventing exposure to contaminated groundwater through ICs or engineering controls, as well as long-term monitoring. There are only groundwater PRGs for outside of the compliance zones where remediation of groundwater will be required.

Response to EPA Specific Comment No. 31: Agree. Text will be added to define the term "performance standards" and to note that the numerical values (PRGs) apply outside of the points of compliance, and exposure to groundwater beneath the waste management area would be controlled through LUCs and long-term monitoring.

EPA Specific Comment No. 32: p. 2-11: In the first paragraph – the Navy cannot take into account any background study of arsenic unless EPA agrees that the study meets EPA background guidance standards. p. 2-11: In the second paragraph – it is unclear why lead risk was only evaluated for industrial exposure, since residential exposure risk needs to be understood in order to identify the area that at least requires ICs to prevent unrestricted use.

Response to EPA Specific Comment No. 32: The Navy has not pursued a formal, *site-specific* background soil study for Site 16 because the primary contaminants of concern have been VOCs (in groundwater primarily) and PAHs in soils. Arsenic and lead are also listed as COCs for soils. However, PRGs for lead are typically risk-based numbers; therefore, the development of a background soil level for lead is not necessary. Additionally, the statistical evaluation of the arsenic data presented in Appendix D.2 of the revised draft FS indicates that the suggested background value (based on a limited amount of background soil data that does exist for NCBC Davisville [facility wide, not Site 16 specific]) is in general agreement with background values presented in current RIDEM regulations. Specifically, the RIDEM

regulations recommend upper bound and average (95% UCL on the arithmetic mean) background values of 15 mg/kg and 7 mg/kg, respectively (Please see Section 12 of the regulations). The upper prediction limit (UPL) calculated based on the limited amount of background soil data for NCBC Davisville is 13 mg/kg. This numerical comparison of RIDEM values to NCBC Davisville facility background concentrations and the statistical analysis presented in Appendix D.2 indicates that 13 mg/kg is a defensible background arsenic concentration for soils at Site 16.

The reviewer is correct regarding the need to present both industrial and residential PRGs. Note that *both types of PRGs have been presented in Table 2-3.* The referenced text will be modified accordingly.

EPA Specific Comment No. 33: p.2-11: In the fourth paragraph the Navy is proposing a typical naphthalene background from MADEPto derive a SSL of 500 ug/kg rather than 18 ug/kg for a site-specific SSL based on leachability. Only site-specific background numbers approved by EPA based on EPA background guidance can be used. This value for naphthalene would only be appropriate if the Navy uses a waste management unit north of Davisville Road. If Navy doesn't use a waste management unit north of Davisville Road, then the soil SSL must be protective of groundwater or 18ug/l.

Response to EPA Specific Comment No. 33: A comprehensive background study for naphthalene in soils is not warranted given the limited amount of naphthalene contamination detected in either soils or groundwater and the fact that most of the contamination is co-located with other COC contamination. Also, please note that the proposed PRG (500 ug/kg) is more conservative than the RIDEM GA leachability criterion of 800 ug/kg. Also, please refer to the response to Comment No. 2 of the May 5, 2011 EPA comments cover letter regarding the application of the waste management unit.

EPA Specific Comment No. 34: p. 2-12: In the first paragraph TPH standards (using whatever terminology is used under the applicable state standards rather than the CERCLA term "PRG.") can be discussed generally within the text of the FS, but not incorporated into any of the NCP analysis of the CERCLA alternatives.

Response to EPA Specific Comment No. 34: Agree. Consistent with RIDEM terminology, the term "Objective" will be used instead of "PRG" in reference to TPH.

EPA Specific Comment No. 35: p. 2-12: In the Groundwater section, as previously noted the term "Performance Standards" should be used when discussing standards from groundwater within any compliance zone for a waste management alternative for soil.

Response to EPA Specific Comment No. 35: Agree. Per the response to EPA Specific Comment No. 31, text discussing the use of "performance standards" will be added.

EPA Specific Comment No. 36: p. 2-12: In the second and fourth paragraphs of the Groundwater section screening contaminants for background can only be done based on EPA-approved background studies that meet EPA background guidance standards.

Response to EPA Specific Comment No. 36: Facility-specific background concentrations for inorganics in groundwater were established by the Navy during the Basewide Groundwater Inorganics Survey for NCBC Davisville (Stone and Webster Environmental Technology and Services, September 1996). While the referenced study was conducted prior to the most recent EPA guidance on background studies, the study was rigorous and comprehensive in nature and was reviewed by both USEPA and

RIDEM. The background concentrations reported therein and upgradient well concentrations collected more recently (e.g., during the Phase III RI field investigation) have been used to evaluate the inorganic concentrations detected in groundwater at Site 16.

EPA Specific Comment No. 37: p. 2-13: Regarding the second groundwater GRA bullet, natural attenuation should be a different bullet than limited action.

Response to EPA Specific Comment No. 37: Agree. Although natural attenuation has been included with Limited Action in past FSs, natural attenuation will be noted as a separate bullet.

EPA Specific Comment No. 38: p. 2-14: TPH should not be included in the Table. Only lead and other CERCLA contaminants exceeding risk standards should be included.

Response to EPA Specific Comment No. 38: Agree. TPH will be deleted from the table.

EPA Specific Comment No. 39: p. 2-14: In the first paragraph remove the 2nd and 3rd sentences (see previous comment).

Response to EPA Specific Comment No. 39: [This comment appears to refer to text on page 2-15.] Disagree. The text is a statement of fact to note the relatively high mass of lead compared to the other COCs.

EPA Specific Comment No. 40: Table 2-1, Page 2 – MCLs and RI Remediation Regs for groundwater are only chemical-specific ARARs for alternatives that address cleaning up groundwater outside of the compliance boundary of any waste management area established as part of a soil alternative for the Site, otherwise these are action-specific monitoring standards. Add the following to the "Action to be Taken" text: "Sets standards for establishing points of compliance for groundwater and soil and for instituting institutional controls."

Response to EPA Specific Comment No. 40: Agree. The proposed text will be added.

EPA Specific Comment No. 41: Add (only add the MCLGs and Groundwater Health Advisory for groundwater cleanup alternatives, otherwise the MCLGs Health Advisories are action-specific monitoring standards).

Responses to Comment No. 41 are interspersed below. Disagree. Although the CSGWPP is not approved by the EPA, the groundwater at the site is not likely to be used as a drinking water source. Therefore, MCLGs and Health Advisories are not relevant. These will not be included on Tables 2-1 or 2-5.

OSWER Draft Guidance for Evaluating the Vapor Pathway from Groundwater and Soils **Response: Agree.**	EPA530 -D-02-004	To Be Considered	Guidance for assessing and mitigating vapor intrusion risk.	Assessment and mitigation of potential vapor intrusion risks will be conducted in accordance with this guidance.
Draft Exposure and Human Health Reassessment of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds **Response: Agree.**		To Be Considered	The draft report includes significant new analyses on potential cancer and non-cancer human health effects that may result from exposures to dioxins and includes an oral reference dose for what is considered to be the most toxic of the dioxin-like compounds.	Soil alternatives that address dioxin-contaminated soil will achieve these draft standards for industrial and residential use.
Safe Drinking Water Act; National primary drinking water regulations - Maximum Contaminant Level Goals (MCLGs) **Response: Disagree. Although the CSGWPP in not approved by the EPA, the groundwater at the site is not likely to be used as a drinking water source. Therefore, MCLGs are not relevant.**	42 U.S.C. §300f *et seq.*); 40 CFR 141, Subpart	Relevant and Appropriate for non-zero MCLGs only; MCLGs set as zero are To Be Considered .	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	Groundwater adjacent to and downgradient from waste management area compliance boundary is considered a potential drinking water source. Remedial actions including groundwater treatment and discharge will be designed and implemented to meet this requirement. Other alternatives will achieve these standards over time.
Health Advisories (EPA Office of Drinking Water)		To be Considered	Health Advisories are estimates of risk due to consumption	Health advisories will be used to evaluate the non-carcinogenic risk resulting

Response: Disagree. Although the CSGWPP in not approved by the EPA, the groundwater at the site is not likely to be used as a drinking water source. Therefore, Health Advisories are not relevant.			of contaminated drinking water; they consider non-carcinogenic effects only. To be considered for contaminants in groundwater that may be used for drinking water where the standard is more conservative than either federal or state statutory or regulatory standards. The Health Advisory standard for manganese is 0.3 ppm.	from exposure to certain compounds (e.g., manganese). The remedy will be designed to ultimately reduce contaminant levels in groundwater used for drinking water to levels that do not exceed advisory levels. Groundwater use restrictions will be maintained until these standards are achieved.

EPA Specific Comment No. 42: Table 2-2: For Floodplain Management... Synopsis and Action to be Taken section replace the text with:

FEMA regulations that set forth the policy, procedure and responsibilities to implement and enforce Executive Order 11988, Floodplain Management, and Executive Order 11990, Protection of Wetlands.	Remedial alternatives conducted within the 500-year floodplain of Allen Harbor/Narragansett Bay or within federal jurisdictional wetlands will be implemented in compliance with these standards. The Navy will solicit public comment as part of the proposed plan on the measures taken through the remedial action to protect floodplain and wetland resources.

Response to EPA Specific Comment No. 42: Partly agree. The proposed text will be incorporated, however, the last column will be revised from "500-year" to "100-year".

EPA Specific Comment No. 43: Table 2-2: Add the Federal Endangered Species Act since the two sea turtles listed under the State endangered species act are also listed on the federal list.

Endangered Species Act;	16 U.S.C. Part 1531 *et seq.*	Applicable	Requires consultation with appropriate agencies if a threatened or listed species or their habitat may be affected by a federal action.	The will coordinate with appropriate agencies to consider mitigation measures if either any remedial actions adjacent to Allen Harbor may affect the habitat of the federally-listed loggerhead turtle (*Carette caretta*) and Kemp's ridley turtle (*Lepidochelys kempii*)

Response to EPA Specific Comment No. 43: Agree. This requirement will be added.

EPA Specific Comment No. 44: Also add the Federal Fish and Wildlife Coordination Act since remedial alternatives may affect Allen Harbor.

Fish and Wildlife Coordination Act	16 USC 661 *et seq.*	Applicable	Requires Federal agencies involved in actions that will result in the control of structural modification of any stream or body of water for any purpose, to take action to protect the fish and wildlife resources that may be affected by the action. USEPA must consult with appropriate Federal and State resource agencies to ascertain the means and measures necessary to mitigate, prevent, and compensate for project-related losses of fish and wildlife resources and to enhance the resources.	Measures to mitigate or compensate adverse project-related impacts to fish and wildlife resources will be taken, if determined necessary. The appropriate Federal and State resource agencies will be consulted.

Response to EPA Specific Comment No. 44: Disagree. None of the alternatives affect waterways or wetlands and no modifications to Allen Harbor are proposed, so this requirement is not necessary.

EPA Specific Comment No. 45: Table 2-3 – See previous comments that for groundwater there are Performance Standards rather than PRGs for alternatives that don't include cleaning up groundwater within compliance zones for waste management areas. Also note previous comments concerning allowing only EPA approved background levels to be cited that meet EPA background guidance standards.

Response to EPA Specific Comment No. 45: Please see preceding responses to the previous comments on performance standards versus PRGs and the EPA background guidance standards.

EPA Specific Comment No. 46: Table 2-4: The Table should be labeled "PERFORMANCE STANDARDS/PRELIMINARY REMEDIATION GOALS..." In addition, 1) The selected Performance Standards/PRGs in groundwater are all MCLs except for using the tapwater RSL for 1E-06 risk for naphthalene. The risk-based Performance Standard/PRG for 1E-05 is lower than the MCL for PCE and vinyl chloride, therefore achievement of MCLs for these chemicals may not be protective, based on possible cumulative risk to residential users of groundwater. The Groundwater RAO No. 1 (page 2-7) includes preventing exposure to groundwater containing COCs that cause unacceptable risk, so that should cover cumulative risk. However, EPA will insist that there is language in the ROD that the site may not be closed out if cumulative risk of all COCs exceeds risk criteria and that a cumulative risk assessment will be conducted prior to site closure.

Response to EPA Specific Comment No. 46: The table label will be revised as requested. The addition of the risks associated with the MCL of each COC overestimates the final cumulative risk. As remediation progresses, the concentration of each COC will decrease even after reaching its MCL. Therefore, the risk must be evaluated at each well after concentrations of all COCs have decreased below their MCLs. This risk can then be compared to the risk level in the RAO.

EPA Specific Comment No. 47: Table 2-4: 2) Please calculate the 1E-05 cancer risk-based Performance Standard/PRG for naphthalene and enter it in the 3rd column from the left. The non-cancer PRG is provided (230 ug/L) but the cancer Performance Standard/PRG is not listed.

Response to EPA Specific Comment No. 47: Agree. The requested PRG will be added.

EPA Specific Comment No. 48: Table 2-4: 3) The non-cancer risk of the selected Performance Standard/PRG for cis-1,2,-DCE (70 ug/L, the MCL) is not protective for the resident because the calculated Performance Standard/PRG (30 ug/L) for the resident is lower than the MCL. The non-cancer risk of the selected Performance Standard/PRG would be HI=2 (i.e. 70/30 = 2.3). The Performance Standard/PRG must achieve risk limits (i.e. 30 ug/L).

Response to EPA Specific Comment No. 48: Disagree. MCLs are considered to be protective. No change in the selected PRG for cis-1,2-DCE is proposed. Also, refer to the response to EPA Specific Comment No. 46.

EPA Specific Comment No. 49: Table 2-5 for the MCLs and MCLGs change the text of the Action to be Taken to:

Within the compliance boundary for any waste management unit these standards are used as monitoring standards.

Response to EPA Specific Comment No. 49: Partially agree. The proposed text for MCLs will be added. MCLGs were inadvertently included on this table, and per the response to EPA Specific Comment No. 41, MCLGs will be deleted from this table.

EPA Specific Comment No. 50: Table 2-5: As previously noted for alternatives that include waste management areas add the RI groundwater remediation regulations and the EPA Health Advisory as action-specific monitoring standards. On page 3 remove the Vapor Intrusion Guidance since that should

be cited as a chemical-specific standards (see previous comments).

Response to EPA Specific Comment No. 50: Partially agree. The RI Groundwater values will be added as a "performance standard". Health Advisories will not be added per the response to EPA Specific Comment 41. The Vapor Intrusion Guidance will be deleted as requested.

EPA Specific Comment No. 51: Table 2-5: Add the following for monitoring surface waters/sediments.

Clean Water Act, National Recommended Water Quality Criteria (NRWQC)	33 USC 1251 *et seq.*; 40 CFR § 122.44	Relevant and Appropriate	Used to establish water quality standards for the protection of aquatic life.	Water quality monitoring will be conducted to ensure that these criteria are not exceeded during excavation and other remedial activities or during long-term water quality/sediment monitoring of any waste that left to be managed on site in a waste management area.

Response to EPA Specific Comment No. 51: Partially agree. This requirement will be added only for surface water monitoring during remedial activities. Sediments were not identified as a site-specific medium of concern for evaluation in the FS. Therefore, the sampling of sediments should not be a component of any long-term monitoring plan. However, the inclusion of this ARAR will be added to any alternative that includes some type of discharge to either Allen Harbor or Narragansett Bay.

EPA Specific Comment No. 52: Table 2-5: Add the following State standard:

Storm Drainage System Maintenance,	RIGL 45-61.1	Relevant and Appropriate	Storm drainage systems prone to flooding or contributing significantly to storm water management problems shall be inspected at least once per year and maintained and cleaned as necessary in order to reduce the risks of flooding and ensure proper functioning of storm drain systems.	Storm drain systems created as part of the remedial alternatives will be maintained in compliance with these standards.

Response to EPA Specific Comment No. 52: Disagree. No storm water drainage systems are included as part of any of the remedial alternatives.

EPA Specific Comment No. 53: p. 3-1: In the second bullet add "Performance Standard/" before "PRGs."

Response to EPA Specific Comment No. 53: Agree.

EPA Specific Comment No. 54: p. 3.2: Section 3.2 – Throughout all of the text remove any discussion of TPH since there is no CERCLA jurisdiction over petroleum. The NCP analysis should not factor in any remedial efforts to address TPH (other than to mention that it will be addressed under State authority).

Response to EPA Specific Comment No. 54: Disagree. TPH is co-located with other COCs and is being addressed coincidentally. Additionally, the TPH-only area is comparatively small. Please note that Section 2.2.1 has already clearly indicated that TPH is a non-CERCLA issue that is been evaluated to address State of Rhode concerns and regulations. Also, please note that this issue was discussed and resolved during the October 28, 2009 BCT meeting during which responses to comments on the Draft FS for Site 16 were discussed.

EPA Specific Comment No. 55: p. 3-2: In the second dashed text of the first bullet add Performance Standard/" before "PRGs."

Response to EPA Specific Comment No. 55: Agree.

EPA Specific Comment No. 56: pp. 3-2 and 3-3: In the Table move "Size Reduction" and "Screening" to the "Removal" GRA since these activities are not Treatment under the NCP.

Response to EPA Specific Comment No. 56: Agree.

EPA Specific Comment No. 57: p. 3-3: In section 3.2 note that No Action does include statutorily required 5-year reviews.

Response to EPA Specific Comment No. 57: Agree. Text will be added to note that 5-year reviews are included. (Costs for 5-Year Reviews were included in the cost estimate.)

EPA Specific Comment No. 58: p. 3-4: In section 3.2.2.1, first paragraph – The use of existing pavement or other barrier as a cover is "containment" and should be discussed in section 3.2.3. Also, although specific administrative land use controls are developed at the Remedial Design Stage, any engineering controls need to be incorporated into the ROD.

Response to EPA Specific Comment No. 58: Disagree. Engineering controls (such as existing pavement) are typically included as part of the land use controls. This discussion does not need to be moved.

Agree that any engineering controls would be incorporated into the ROD.

EPA Specific Comment No. 59: Section 3.2.2.1, page 3-4: in the first bullet, it is stated that "MARAD has determined that the use of port property for residential use will not likely qualify as an acceptable use of PBC property; accordingly, any request for residential use would require MARAD review and approval." Navy and EPA need to tighten up this language to prevent residential use unless approved by EPA, Navy and RIDEM. Please include in the ROD restrictions on residential use, if the soil is not cleaned up to

unrestricted/unlimited exposure levels.

Response to EPA Specific Comment No. 59: Agree. The referenced text was only included to provide reader with information on the current, existing restrictions.

EPA Specific Comment No. 60: p. 3-5: In the third paragraph insert "the meets State recording standards" after "Environmental LUCs."

Response to EPA Specific Comment No. 60: Agree. The proposed text will be added.

EPA Specific Comment No. 61: p. 3-6: In the third paragraph change the second sentence to "Monitoring well installation and operation and maintenance would need to comply with applicable federal and state ARARs."

Response to EPA Specific Comment No. 61: Agree.

EPA Specific Comment No. 62: p. 3-6: Section 3,2,3 – Containment also include the use of existing cover (such as pavement) – termed "Engineering Controls" in Section 3.2.2.1 (see previous comment).

Response to EPA Specific Comment No. 62: Disagree. Please see response to EPA Specific Comment No. 58.

EPA Specific Comment No. 63: p. 3-9: Sections 3.2.5.1 and 3.2.5.2 should be moved to the GRA Removal category since size reduction and screening are not considered treatment under the NCP.

Response to EPA Specific Comment No. 63: Agree.

EPA Specific Comment No. 64: p. 3-11: In the second and third paragraphs the discussion of pre-treatment prior to off-site disposal should clarify whether pre-treatment would occur potentially on-site or at the off-site disposal facility. If the Navy wants to maintain the option of on-site pre-treatment, pre-treatment technologies need to be evaluated in this FS.

Response to EPA Specific Comment No. 64: No on-site treatment of waste is anticipated at this time. The subject sentences were intended to refer to off-site treatment. If it was determined at a later time (e.g., during the remedial design) that it would be cost effective to treat soil on-site before disposal, then appropriate post-ROD changes would be made.

EPA Specific Comment No. 65: p. 3-12: Remove the second bullet and move "Size Reduction and Screening" to the first bullet.

Response to EPA Specific Comment No. 65: Agree.

EPA Specific Comment No. 66: p. 3-13: In section 3.5.1 note that No Action does include statutorily required 5-year reviews.

Response to EPA Specific Comment No. 66: Agree. Text will be added to note that 5-year reviews are included. (Costs for 5-Year Reviews were included in the cost estimate.)

EPA Specific Comment No. 67: p. 3-13: Section 3.5.2 - apply all previous comments made in Section 3.2.2 (Soil Limited Action).

Response to EPA Specific Comment No. 67: Agree. However, only EPA Specific Comment Nos. 57, 59, 60, and 61 are relevant to the groundwater discussion.

EPA Specific Comment No. 68: p. 3-17: In the fourth paragraph the Conclusion should state that MNA is not retained since in the Effectiveness section it states that MNA is not occurring to a significant degree. MNA should only be retained if modeling, based on EPA's MNA Guidance shows that MNA will achieve groundwater standards within a reasonable period of time.

Response to EPA Specific Comment No. 68: Disagree. Although natural attenuation is not progressing at a high rate, the process is occurring. As noted in the text, MNA can also be used as a component in combination with other process for a complete alternative. EPA guidance should not be confused with promulgated law or EPA policy. EPA MNA guidance does not define a reasonable period of time.

EPA Specific Comment No. 69: p. 3-18: Remove the fifth paragraph since any internal Navy review process for pump and treat systems is not part of the NCP review process. Also remove this paragraph from all of the treatment subsections in 3.5.5.

Response to EPA Specific Comment No. 69: Agree. This subject text will be deleted.

EPA Specific Comment No. 70: p. 3-30: In the first and second paragraphs replace "an NPDES permit" with "applicable federal and state water discharge ARARs."

Response to EPA Specific Comment No. 70: Agree.

EPA Specific Comment No. 71: p. 3-30: In the second paragraph, second sentence the Navy would not be permitted to discharge into the storm sewers unless the discharge met pre-treatment standards for the sewer system under federal and state ARARs. Since Section 3.5.6.2 notes that groundwater isn't permitted to be discharged to the sewer system this appears not to be an option. Therefore the Navy would need to build a direct discharge into the Bay or meet treatment standards for discharging to Allen Harbor.

Response to EPA Specific Comment No. 71: The comment does not correspond with the text. Section 3.5.6.1 discusses Direct Surface Discharges (for example, via storm sewers) and Section 3.5.6.2 discusses Indirect Surface Discharges (discharges to sanitary sewers). No changes are necessary.

EPA Specific Comment No. 72: p. 3-31: In the second bullet, remove MNA (see previous comments).

Response to EPA Specific Comment No. 72: Disagree. Please see response to EPA Specific Comment No. 68.

EPA Specific Comment No. 73: Table 3-1, p. 5: Move "Solids Processing" to the Removal GRA. Unclear why On-Site Consolidation was not retained since the reason given "Leaving contaminated soil on site would limit site reuse." would occur for the "Cover/Barrier" technology which was retained. Please clarify.

Response to EPA Specific Comment No. 73: The referenced text will be modified to also note that on-site consolidation would likely trigger landfill and on-site disposal facility regulations. These requirements would limit site re-use.

EPA Specific Comment No. 74: Table 3-2, Page 1: Change the Screening Comment for "Passive Controls" to This technology will limit all future uses of groundwater and prevent disturbance of groundwater monitoring wells and other remedial infrastructure and thus limit human exposure to groundwater and disturbance of the remedy.

Response to EPA Specific Comment No. 74: Agree.

EPA Specific Comment No. 75: Table 3-2, Page 1: Eliminate Natural Attenuation unless the FS includes modeling that meets EPA guidance standards that MNA will achieve groundwater standards within a reasonable time period.

Response to EPA Specific Comment No. 75: Disagree. Please see response to EPA Specific Comment No. 68.

EPA Specific Comment No. 76: Table 3-2, Page 3: Extraction Well Screening Comment, remove the third sentence (see previous comment regarding this matter). The same comment applies when PMO approval is mentioned for any other retained technologies in the Table.

Response to EPA Specific Comment No. 76: Agree.

EPA Specific Comment No. 77: Table 3-2, Page 6: Indirect Discharge was eliminated in the text because the local POTW does not accept treated groundwater but it noted as retained in this Table.

Response to EPA Specific Comment No. 77: Agree. The table will be revised.

EPA Specific Comment No. 78: Table 3-2, Page 7: Remove "BRAC PMO" citation.

Response to EPA Specific Comment No. 78: Agree.

EPA Specific Comment No. 79: p. 4-1: In the second sentence in section 4.1.1.2 insert "pollutants, and contaminants" after "hazardous substances."

Response to EPA Specific Comment No. 79: Agree.

EPA Specific Comment No. 80: p. 4-4: Section 4.1.1.8 – State acceptance is not addressed until the ROD (the State does not concur until after it has evaluated comments received on the PRAP and the draft ROD).

Response to EPA Specific Comment No. 80: Agree.

EPA Specific Comment No. 81: p. 4-4, Section 4.1.1.9 – Change the second sentence to "The assessment of this criterion is conducted after receiving public comments on the Proposed Plan. Based on public comments the Navy may choose to reissue the Proposed Plan or to issue a ROD that includes

a Responsiveness Summary that addresses all public comments received.

Response to EPA Specific Comment No. 81: Agree.

EPA Specific Comment No. 82: p. 4-5, Section 4.1.2: In the last paragraph replace the second sentence with "These last two criteria are evaluated after receiving comments on the Proposed Plan and are addressed in the ROD.

Response to EPA Specific Comment No. 82: Agree.

EPA Specific Comment No. 83: p. 4-5, Section 4.1.3: Change the third bullet to "Address the five balancing criteria."

Response to EPA Specific Comment No. 83: Agree.

EPA Specific Comment No. 84: p. 4-6: In the first paragraph insert "after obtaining the approval by EPA and" before "in consultation with the State of Rhode Island."

Response to EPA Specific Comment No. 84: Agree.

EPA Specific Comment No. 85: p. 4-6: Section 4-2 it would appear that Alternative S-3 also would require a backfilled cover to replace the material to be excavated and prevent exposure to deeper contaminants. Remove the last paragraph of the Section (not relevant to describing the alternatives).

Response to EPA Specific Comment No. 85: Agree with the first sentence, and the text will be modified to note that excavations will be backfilled with clean fill. Disagree with the second sentence. The referenced text is a statement of fact and provides information/perspective to the reader reviewing the alternatives.

EPA Specific Comment No. 86: Section 4.2.1 – The existing land use controls would not be incorporated into the remedy under this alternative, so should not be evaluated in the text (for instance they can't be factored in evaluating the future protectiveness of the alternative). The alternative does include the statutorily-required five-year review, so this needs to be discussed under all of the criteria.

Response to EPA Specific Comment No. 86: Disagree. The existing land use controls would not be eliminated under the "No Action" alternative. The fact that they exist provides a certain perspective to the discussion presented. However, the text already states that such land use controls are not *environmental* land use restrictions and are not enforceable under the relevant environmental regulations. Also, the Five-Year Review is noted in the Cost section. However, the Five-Year Review is not considered to be a component of a remedy and does not get discussed in the Detailed Analysis.

EPA Specific Comment No. 87: In the third paragraph insert "Location-specific and" before "Action-specific" in the second sentence.

Response to EPA Specific Comment No. 87: Agree.

EPA Specific Comment No. 88: p. 4-7: In the fourth paragraph remove the last sentence.

Response to EPA Specific Comment No. 88: Disagree. Please see response to EPA Specific Comment No. 68.

EPA Specific Comment No. 89: p. 4-7: In the last paragraph remove the last sentence.

Response to EPA Specific Comment No. 89: Disagree. It is plainly stated that no treatment occurs. However, the reduction can still be noted.

EPA Specific Comment No. 90: p. 4-8: In the first paragraph remove the last sentence.

Response to EPA Specific Comment No. 90: Disagree. Please see response to EPA Specific Comment No. 68.

EPA Specific Comment No. 91: p. 4-10: Component 4 – Change the second paragraph text to "Monitoring will be required around a groundwater compliance zone established around the areas where waste will be managed in place. The number of wells that may be required and monitoring frequency will be determined as part of Remedial Design. Monitoring will be coordinated with any additional monitoring required to address site groundwater contamination beyond the compliance zone.

Response to EPA Specific Comment No. 91: Partially agree. The suggested text will be added. However, the existing subject paragraph will be retained to identify the assumptions in the cost estimate.

EPA Specific Comment No. 92: p. 4-10: Component 5 – incorporate the comments made to section 3.2.2.1 (above). Also the area requiring LUC to prevent residential use may be larger than the area covered/capped to meet industrial exposure standards (the areas should be defined in a figure.

Response to EPA Specific Comment No. 92: Agree. Please see responses to EPA Specific Comments Nos. 59 and 60 (from Section 3.2.2.1) which will be incorporated into the text. Also, regarding the second sentence of the comment, please see existing Figure 4-7.

EPA Specific Comment No. 93: P. 4-12: In the fourth paragraph the proposed cover and cap designs need to meet ARAR standards (either under the RI Remediation Regulations or the State Solid Waste Regulations). If waste exceeding hazardous waste thresholds is left on site the area would need to be capped based on RI Hazardous Waste standards.

Response to EPA Specific Comment No. 93: The 2 feet of soil cover is to prevent exposure to soil contaminants in an industrial scenario. This will meet the RIDEM Remediation Regulations. This information will be noted in the component description and included as an ARAR. Where COCs are present at concentrations greater than leachability criteria, a low permeability layer is proposed. There are no specific ARARs in the RIDEM Remediation Regulations and landfill rules are not applicable or relevant. There are no hazardous wastes disposed of at the site.

EPA Specific Comment No. 94: p. 4-13: In the second paragraph remove the second sentence.

Response to EPA Specific Comment No. 94: Disagree. No basis is provided in the comment for removal of the subject text. The referenced text notes the residuals generated by the alternative.

EPA Specific Comment No. 95: p. 4-13: In the fifth paragraph it is unclear what the rating system used is based on. For instance Energy Demand is rated "Moderate to High" but it is not clear why this is so. There needs to be citations as to what these evaluations are based on that need to be incorporated into the Administrative Record. The process for developing this analysis cannot be inconsistent with any EPA guidance on evaluating sustainability for CERCLA remedies.

Response to EPA Specific Comment No. 95: This analysis is not inconsistent with EPA guidance. The sustainability analysis uses SiteWise™. This program was developed by Battelle, and was further developed jointly with the Navy and USACE. The Sustainability Evaluation is included in Appendix H. The ratings are qualitative and are relative to the other alternatives in the analysis. As noted in Section 4.1.1.5, the sustainability analyses are in Appendix H. A citation for the program will be added to the References section.

EPA Specific Comment No. 96: p. 4-14: Section 4.2.3 – as previously noted this alternative also includes a cover component (the backfill to maintain at least 2 feet of clean material to prevent contact exposure). Also the alternative has monitoring requirements because contamination exceeding residential risk levels will be left in place (establishment of a compliance zone around the waste management area that also will be incorporated into any groundwater remedy) and yearly compliance monitoring of the LUCs will be required.

Response to EPA Specific Comment No. 96: The backfill can be regarded as cover in some cases and the text will be revised to note this. Monitoring of groundwater is included in the groundwater alternatives. The waste management unit concept will be incorporated into the description of the alternative.

EPA Specific Comment No. 97: p. 4-15: Second paragraph – regarding the last sentence, if the lead exceeds residential standards it is posing an unacceptable risk

Response to EPA Specific Comment No. 97: The focus of the referenced text is "pounds" of COCs removed, not risk. The text is providing an explanation as to "why" the amount of lead removed is larger than one might expect given the number of sampled locations actually greater than the PRGs (i.e., the areal extent of the lead contamination). The reason is that lead, a naturally occurring metal, is a component *of all* of the soils removed.

EPA Specific Comment No. 98: p. 4-15: Component 3 – See comments on Component 5 for S-2. Regarding the last sentence of the first paragraph – there will need to be LUCs to protect the cover being created under this alternative.

Response to EPA Specific Comment No. 98: Agree. Where backfill covers soil with COC concentrations greater than PRGs, the backfill will be managed as a cover. The text will be revised.

EPA Specific Comment No. 99: p. 4-16: In the second paragraph, second sentence insert "and backfilled with 2 feet of clean cover" after "surface of the site."

Response to EPA Specific Comment No. 99: Agree.

EPA Specific Comment No. 100: p. 4-16: In the fourth paragraph the proposed cover design need to meet ARAR standards (either under the RI Remediation Regulations or the State Solid Waste Regulations).

Response to EPA Specific Comment No. 100: See response to EPA Specific Comment No. 93.

EPA Specific Comment No. 101: p. 4-17: In the sixth paragraph it is unclear what the rating system used is based on. For instance Energy Demand is rated "Moderate to High" but it is not clear why this is so. There needs to be citations as to what these evaluations are based on that need to be incorporated into the Administrative Record. The process for developing this analysis cannot be inconsistent with any EPA guidance on evaluating sustainability for CERCLA remedies.

Response to EPA Specific Comment No. 101: See Response to EPA Specific Comment No. 95.

EPA Specific Comment No. 102: p. 4-18: In the second paragraph it will also be necessary to establish LUCs on property no longer owned by the Navy.

Response to EPA Specific Comment No. 102: Agree. The text will be revised to note that LUCs will be required on property no longer owned by the Navy.

EPA Specific Comment No. 103: p. 4-18: In the Cost section – only the cost of excavating and disposing of CERCLA contaminated soil should be included in the cost estimate (any costs for removing TPH-only contaminated soil can be noted, but not included in the analysis).

Response to EPA Specific Comment No. 103: See responses to EPA Specific Comment Nos. 27 and 54.

EPA Specific Comment No. 104: p. 4-18: In Section 4.2.4 – as previously noted this alternative also includes a cover component (the backfill to maintain at least 2 feet of clean material to prevent contact exposure). Also the alternative has monitoring requirements because contamination will be left in place (establishment of a compliance zone around the waste management area that also will be incorporated into any groundwater remedy) and yearly compliance monitoring of the LUCs will be required.

Response to EPA Specific Comment No. 104: See response to EPA Specific Comment No. 96.

EPA Specific Comment No. 105: p. 4-19: Second paragraph – regarding the last sentence, if the lead exceeds residential standards it is posing an unacceptable risk.

Response to EPA Specific Comment No. 105: See response to EPA Specific Comment No. 97.

EPA Specific Comment No. 106: p. 4-20: See comments on Component 5 for S-2.

Response to EPA Specific Comment No. 106: See response to EPA Specific Comment No. 92.

EPA Specific Comment No. 107: p. 4-21: In the second paragraph the proposed cover design need to meet ARAR standards (either under the RI Remediation Regulations or the State Solid Waste Regulations).

Response to EPA Specific Comment No. 107: See response to EPA Specific Comment No. 93.

EPA Specific Comment No. 108: p. 4-22: In the third paragraph it is unclear what the rating system used is based on. For instance Energy Demand is rated "Moderate to High" but it is not clear why this is so. There needs to be citations as to what these evaluations are based on that need to be incorporated into the Administrative Record. The process for developing this analysis cannot be inconsistent with any EPA guidance on evaluating sustainability for CERCLA remedies.

Response to EPA Specific Comment No. 108: See response to EPA Specific Comment No. 95.

EPA Specific Comment No. 109: p. 4-22: In the fifth paragraph it will also be necessary to establish LUCs on property no longer owned by the Navy.

Response to EPA Specific Comment No. 109: Agree. The text will be revised to note that LUCs will be required on property no longer owned by the Navy.

EPA Specific Comment No. 110: p. 4-22: In the Cost section – only the cost of excavating and disposing of CERCLA contaminated soil should be included in the cost estimate (any costs for removing TPH-only contaminated soil can be noted, but not included in the analysis).

Response to EPA Specific Comment No. 110: See responses to EPA Specific Comment Nos. 27 and 54.

EPA Specific Comment No. 111: p. 4-23: In Section 4.2.5 excavating only down to the water table will meet EPA residential risk standards for unrestricted use only if the contamination is not causing a risk to groundwater.

Response to EPA Specific Comment No. 111: Acknowledged. "Unrestricted use" refers to the soil portion of the site. Groundwater contamination is addressed in the Groundwater Alternatives.

EPA Specific Comment No. 112: p. 4-25: In the sixth paragraph it is unclear what the rating system used is based on. For instance Energy Demand is rated "Moderate to High" but it is not clear why this is so. There needs to be citations as to what these evaluations are based on that need to be incorporated into the Administrative Record. The process for developing this analysis cannot be inconsistent with any EPA guidance on evaluating sustainability for CERCLA remedies.

Response to EPA Specific Comment No. 112: See response to EPA Specific Comment No. 95.

EPA Specific Comment No. 113: p. 4-26: In the Cost section – only the cost of excavating and disposing of CERCLA contaminated soil should be included in the cost estimate (any costs for removing TPH-only contaminated soil can be noted, but not included in the analysis).

Response to EPA Specific Comment No. 113: See responses to EPA Specific Comment Nos. 27 and 54.

EPA Specific Comment No. 114: p. 4-26: Section 4.3 – Remove alternative G-2, since there is no basis for supporting MNA at this Site. Need to add a LUC and monitoring alternative that will apply to the area inside of the compliance zone for areas where soil contamination will be managed in place (under soil alternatives S-2 – S-4). This alternative will have Performance Standards rather than PRGs since no groundwater treatment within the compliance zone is required under CERCLA. Alternatives G-3 through

G-6 are only needed to the extent that contaminated groundwater is migrating beyond the compliance boundary for managed contaminated soils under alternatives S-2 – S-4 or if soil alternative S-5 is selected. Alternatives G-3 through G-6 are only protective if the MNA period that occurs after treatment will reach PRGs within a reasonable period (based on EPA MNA guidance standards). PRGs need to be based on federal drinking water standards and more stringent State drinking water standards, except in areas that are saline, in which case non-potable PRGs would apply.

Response to EPA Specific Comment No. 114: Natural attenuation is occurring at the site, but not at a high rate. Considering that there are no groundwater users at the site and no groundwater users downgradient of the site, a long period for remediation is reasonable for this site. The alternative already includes LUC and monitoring components. Performance standards will be added to the alternative to account for the waste management unit. The development of PRGs is described in Section 2.

EPA Specific Comment No. 115: p. 4-27; Section 4.3.1 – see comments for the No Action alternative for soil.

Response to EPA Specific Comment No. 115: Refer to responses to EPA Specific Comments 86, 87, 88, 89, and 90.

EPA Specific Comment No. 116: p. 4-29: Section 4.3.2 – change this alternative to a LUC and monitoring for areas inside the compliance zone for the waste management area established under soil alternatives S-2 through S-4. This alternative will have Performance Standards for preventing contact with contaminated groundwater and monitoring to ensure contaminated groundwater does not migrate beyond the compliance zone for the waste management area (there are no PRGs since no groundwater treatment is required within the compliance zone).

Response to EPA Specific Comment No. 116: Refer to response to EPA Specific Comment No. 114.

EPA Specific Comment No. 117: pp. 4-34 through 4-53: A detailed review of alternatives G-3 through G-6 is not provided at this time since the Navy needs to evaluate what treatment would be required outside of the compliance zone that would be established under soil alternatives S-2 through S-4. To evaluate any of the groundwater treatment alternatives presented the Navy needs to conduct a MNA analysis based on modeling that meets EPA MNA guidance standards. As presented only G-6 achieves groundwater PRGs within a reasonable time period (50 years), but is significantly more expensive than the other treatment alternative that are estimated to take 100 to 150 years to achieve cleanup standards (again these alternatives, as presented, only apply if the Navy chooses soil alternative S.5).

Response to EPA Specific Comment No. 117: Alternatives G-3 through G-6 treat a significant portion of the plume and rely on natural attenuation for the balance of the plume. The extent of treatment in the groundwater alternatives will be revised to account for portions of the plume beneath the waste management unit.

Natural attenuation is occurring at the site, but not at a high rate. Considering that there are no groundwater users at the site and no groundwater users downgradient of the site, a long period for remediation is reasonable for this site. The alternative already includes LUC and monitoring components. Performance standards will be added to the alternative to account for the waste management unit.

EPA Specific Comment No. 118: Alternative-specific ARARs Tables – include the name of the alternative in each title rather than just the number. Make all of the text changes identified for the Chapter 2 general ARARs tables (but in the Action to be Taken the text should be specific as to how each alternative will satisfy the requirements of each standard.) For the soil alternatives that leave contamination in place the key ARAR issue is what ARAR establishes the standards for the cover/cap (either RI Remediation Regulation risk-based standards, RI Solid Waste Regulations, or RI Hazardous Waste Regulations).

Response to EPA Specific Comment No. 118: The name of the alternatives will be added to the titles of the tables. Revisions to the ARAR tables in Section 4 will be made per the Comments and Responses on the Section 2 tables. As noted, the soil cover in the soil alternatives addresses the requirements in the RIDEM Remediation Regulations.

EPA Specific Comment No. 119: Table 4-1: For each ARAR and TBC the Action to be Taken text needs to explain that the No Action alternative will not satisfy the standards since no action will be taken to address the risks or cleanup standards identified. Also add the TSCA citation (listed in the Action-specific table in the Chapter 2 ARARs tables) as a chemical-specific ARAR for establishing a risk-based cleanup number for PCBs and also the EPA dioxin guidance for establishing a risk-based standard for dioxin.

Response to EPA Specific Comment No. 119: Partially agree as follows. The Federal TBCs listed are methods for calculating risk, not criteria. Therefore, text will be added that the No Action alternative will not address the risks posed by the contaminants at the site. The text for the state Criteria will be revised to state that the numerical cleanup standards will not be met. TSCA will not be added because PCBs are not COCs. The Dioxin Guidance will be added per EPA Specific Comment 41.

EPA Specific Comment No. 120: Table 4-14: The Action to be Taken text needs to explain why the No Action alternative does not meet any of the standards listed in the Table. Navy used MCLs as ARARs/cleanup levels but didn't include MCLGs in the ARAR table as was requested in our comment #1 on the draft FS. Why not?

Response to EPA Specific Comment No. 120: Partially agree as follows. The Federal TBCs listed are methods for calculating risk, not criteria. Therefore, text will be added that the No Action alternative will not address the risks posed by the contaminants at the site. The text for the state Criteria will be revised to state that the numerical cleanup standards will not be met. MCLGs are being excluded per the response to EPA Specific Comment No. 41.

EPA Specific Comment No. 121: Tables 4-15 through 4-17: These Tables need to be changed from standards for MNA and LUCs to LUCs and Monitoring. The Standards apply to groundwater within the Compliance Zone for the waste management units established under soil alternatives S.2 through S.4. There are no PRGs, instead these are Performance Standards which are the basis for establishing LUCs and for monitoring to ensure that contaminated groundwater does not migrate beyond the compliance boundary of the waste management areas (if it has already has migrated beyond the compliance boundary then that plume area will need to be addressed by one of the treatment alternatives). For this alternative federal drinking water standards are action-specific ARARs for establishing monitoring standards (rather than chemical-specific ARARs for establishing PRGs for the treatment alternatives).

Response to EPA Specific Comment No. 121: Partially Agree. The MNA component will be retained for reasons discussed in the previous responses. MCLs (and similar PRGs) will be added to the Action-Specific ARAR tables to address the Performance Standards for monitoring beneath the waste management unit.

EPA Specific Comment No. 122: Tables 4-18 through 4-26: It is unclear whether alternatives G-3 through G-5 meet chemical-specific standards for addressing groundwater risks due to the uncertainty as to whether groundwater PRGs can ever be obtained by MNA after treatment. These alternatives would appear not to meet MNA action-specific guidance standards.

Response to EPA Specific Comment No. 122: Although the process is slow, it is expected that the groundwater will meet PRGs through MNA.

EPA Specific Comment No. 123: p. 5-1: Chapter 5.0 – incorporate all of the comments made under the previous chapters. As noted above, it is not possible to compare the groundwater alternatives as presented because the extent of contaminated groundwater outside of potential soil waste management areas is not defined and the viability of MNA as a component of the treatment alternatives needs to be further assessed.

Response to EPA Specific Comment No. 123: Section 5 will be revised as needed to account for changes based on the comments. However, the extent of contaminated groundwater outside of a potential waste management area is defined.

EPA Specific Comment No. 124: Tables 5-1 and 5-2: These tables need to be revised based on the comments above.

Response to EPA Specific Comment No. 124: Acknowledged. Tables 5-1 and 5-2 will be revised as needed to account for changes based on the comments.

EPA Specific Comment No. 125: *Appendix B - MNA Evaluation*: EPA believes that the use of only MNA is not a viable option for the sole type of remediation at Site 16/OU9. For the "Central Plume", of the 16 wells tested 63% showed "inadequate" or "limited" evidence of biological natural attenuation potential., For the "BTEX Plume" of the 9 wells tested 55% resulted in "inadequate" or "limited" evidence, while for the "Eastern Arm Plume" 100% of the 7 wells tested showed "limited" or "inadequate" evidence. Only one well of the 32 total tested showed "strong" evidence (3%), while of those scoring "adequate" over half were just above the cutoff score of 16. This result is not surprising given the very limited concentrations of cis-1, 2 DCE and vinyl chloride in Site 16 groundwater compared to the concentrations of TCE. Also of note, inspection of the "Sensitivity Analysis" in the BIOCHLOR model shows that for the masses of TCE assumed to have been released much greater concentrations of cis-1, 2 DCE would be expected than provided by the field data. For MNA to be viable (if not considering simple dilution and/or volatilization) most of the wells should score as "strong" or with the "adequate" scores being on the upper end of the "adequate" evidence range. In addition, the MNA guidance suggests that the use of MNA is for the distal parts of the plume after source are control has reduced the source. This has not been evaluated here in the FS. A combination of technologies should be employed at this site. The source area should be cleaned up in a timely manner prior to the evaluation of the use of MNA in distal portions of the plume.

Response to EPA Specific Comment No. 125: As noted in the MNA evaluation in the FS, there is evidence that MNA is occurring, but not at a high rate. Because the site is not a source of drinking water and there are no groundwater users downgradient, a short remediation time is not necessary.

Also note that Alternatives G-3 through G-6 all included MNA in the distal portions of the plume as a component.

EPA Specific Comment No. 126: *Appendix C: Contaminant Mass Calculations:* EPA believes the calculation of groundwater contaminant mass is overestimated. In addition to the incorrect/improper delineation of the areas of contaminant impacted groundwater the method used to calculate the mass within those unjustified areas significant exaggerates the mass of CVOC within those areas. The calculations inappropriately take the highest concentration of CVOC within a delineated area and the higher isoconcentration line value surrounding that area to determine a geometric mean of the CVOC concentration within that area. Also, the calculations selectively use the highest temporal value even if more recent data shows lower concentrations. Finally, an inappropriate estimate of the mass of cis-1, 2 DCE and vinyl chloride is made by assuming without justification that those compounds are present at 10% and 1% of the mass of the (overestimated) mass of TCE. This over estimation of the contamination may lead to unrealistically high costs for remediation at this site.

Response to EPA Specific Comment No. 126: Because of the limited number of data points for each contour, an estimate of the concentration using the geometric mean, the maximum concentration, and the contour concentration is reasonable. Using just the maximum concentration would significantly overestimate the concentration and there are too few points to calculate an average.

The percentages of 1,2-DCE and vinyl chloride were assumed based on inspection of the data. No rigorous evaluation of the data was performed. This method was used to provide a reasonable estimate of the mass of contaminants. However, the well data will be evaluated to determine an average ratio of 1,2-DCE to TCE and vinyl chloride to TCE.

However, this conservative estimate of contaminants does not lead to an appreciable overestimation of the costs of remediation of the groundwater. Chemical use from non-COC demands are significantly higher than the demand from COCs, and these non-COC components largely determine the chemical dosages.

Further, the high costs predicted for the remediation of the site are also a consequence of the large areas which must be treated. Subsurface application of the chemicals requires a large number of injection points which are a significant cost compared to the cost of the chemicals being injected.

The mass of COCs will affect the operating costs of a pump and treat system associated with GAC use. However, the highest costs are only noted during the early operations of a pump and treat system. As the concentrations are reduced, the operating costs associated with the treatment of the COCs will decrease. The extraction rate will be fixed regardless of the COC concentrations until portions of the plume meet remedial goals.

EPA Specific Comment No. 127: *Appendix C, Page 1 of 1, 2nd Paragraph:* The delineation of the areas and depth intervals of groundwater contamination (i.e. the 5 µg/l, 500 µg/l, and the 1,000 µg/l, are overestimated. Inspection of the data clearly shows that within specific areas designated as 1,000 µg/l, and 500 µg/l, in particular are numerous data points (wells) with lower concentrations than is supported

by the isoconcentration line (contour). This overestimate is aggravated by taking the geometric mean of the highest concentration within that contour and the isoconcentration contour value. Further, the estimates also selectively use the highest concentration provided in the data from 2004 to 2010 even when the most recent data is significantly lower than the older date data used.

A more appropriate method of calculating the contaminant mass would have been to take the geometric mean of all of the individual values in the particular interval being evaluated. This would be similar to the approach taken for evaluating the hydraulic conductivity of a particular interval in the aquifer. Several examples are provided below for illustrative purposes.

Figure 1-19: Within the 500 µg/l isoconcentration contour, drawn around MW16-37I and MW16-38I, the geometric mean of the concentration of TCE using the two data points for 2010 is approximately 176 µg/l. Using the method stated in this paragraph, the geometric mean of the highest concentration within the 500 µg/l isoconcentration line, MW16-38I (815 µg/l average of the two values for 2010) the result is 638 µg/l, which is 362% greater than what is actually within that area and depth interval.

Figure 1-20: Within the (incorrectly drawn) 1,000 µg/l isoconcentration contour, the geometric mean of the concentration of TCE is approximately 857 µg/l. Using the method stated in this paragraph, the geometric mean of the highest concentration within the 1,000 µg/l isoconcentration line, INJ16-12D (1,700 µg/l, from 2004) the value is 1,303 µg/, which is 50% greater than what is actually within that area and depth interval.

Figure 1-21: Within the (incorrectly drawn) 1,000 µg/l isoconcentration contour, the geometric mean of the concentration of TCE is approximately 825 µg/l. Using the method stated in this paragraph, the geometric mean of the highest concentration within the 1,000 µg/l isoconcentration line, MW16-60D (2,000 µg/l, from 2007) the value is 1,414 µg/, which is 58% greater than what is actually within that area and depth interval.

Response to EPA Specific Comment No. 127: As indicated in the responses to EPA Specific Comment Nos. 14 though 19, the TCE isoconcentration contours have been drawn conservatively. A conservative approach is appropriate so that adequate budgets can be developed and programmed. Underestimating the remedial footprint would lead to underfunding of the remediation, and delay the completion of a remedy.

The method for estimating the average plume concentration was discussed in the response to EPA Specific Comment No. 126. As noted, a reduction in the mass of contaminants will not have a significant effect on the overall cost estimate because non-COC demands and the physical extents of the plumes have the greatest impacts on the overall project costs.

EPA Specific Comment No. 128: *Appendix C, Page 1 of 1, 3rd Paragraph:* The method of calculating the mass of cis-1, 2 DCE and vinyl chloride is unsupported. As stated in this paragraph, the concentrations of cis-1, 2 DCE and vinyl chloride detected are much lower than that of TCE. Therefore, the use of the values of 10% of the TCE mass to estimate the mass of cis-1, 2 DCE is not justified. Likewise the use of 1% of the TCE mass to estimate the mass of vinyl chloride is not justified. While the text notes that the intent is to be conservative, this rolling up of the concentrations is added to the overestimates made in certain layers and areas of the site groundwater as noted above. This has an adverse impact on development of realistic remedial cost estimates. In particular, it artificially drives up

the costs of chemical oxidation, enhanced bioremediation, and groundwater pump ant treat.

Response to EPA Specific Comment No. 128: Please see response to EPA Specific Comment No. 126 regarding the estimation of the mass of cis-1,2-DCE and vinyl chloride. Also, please refer to the responses to EPA Specific Comment Nos. 126 and 127 regarding the effects of the mass of COCs on the cost estimates.

EPA Specific Comment No. 129: *Appendix C, Tables:* Inspection of the tables provides an additional factor leading to additional overestimates of the contaminant mass. As an example, on the *first sheet, on the 8th line,* values are entered for the 500 µg/l isoconcentration line drawn around MW16-37I and MW16-38I (discussed in comment on Figure 1-19 above). On this line, the highest value is not only taken, the highest value from the three data points presented is used even though that data is not the most recent value.

> The maximum concentration used is given as 1,700 µg/l, which is the value for 2004, rather than the most recent data collected in 2010 which was 38 µg/l. If the most recent data were used, the value would have been taken from MW16-38I (815 µg/l). (This value was used in the example provided in the discussion of Figure 1-19 above which still resulted in an overestimate of 362%). Using the 1,700 µg/l concentration and the 1,000 µg/l isoconcentration line, the geometric mean of TCE within this designated area is 922 µg/l, which is 523% higher than the geometric mean of the latest data from MW16-37I and MW16-38I. Please explain the basis for the selective use of the highest value when there is an apparent decreasing trend in the data set presented.
>
> Overall, EPA believes there is an inappropriate approach taken to calculate the mass of contamination in Site 16 groundwater. In addition to overestimated (delineated) areas for zones in excess of 500 µg/l, and 1,000 µg/l, the method used to calculate the concentration within each of those delineated areas is overestimated. As such, the masses and volumes used in this feasibility study are meaningless for cost-estimation purposes and assessment of remedial alternatives.

Response to EPA Specific Comment No. 129: As discussed in the responses to previous comments, the methods used for estimating the contaminant mass and plume volumes are conservative and reasonable. The focus of active treatment is on the portions of the plumes with the highest contamination, as defined by the 1,000 ug/L TCE concentration. The Site 16 plume covers an extremely large area and although there are numerous wells that define the general extent of the plume, both horizontally and vertically, the density of the wells is not always sufficient to define the concentration gradients. Thus, professional judgment was used to conservatively estimate the locations of the contours. Occasionally, wells with concentrations less than the contour concentration are included within the contour, and this was done largely to avoid a patchwork of contours or meandering contours. However, this practice does not exaggerate the extent of the plume.

The effect of the mass of COCs on the project cost has been discussed in previous comments.

EPA Specific Comment No. 130: *Appendix E – BIOCHLOR Calculations and Model:* The BIOCHLOR model is of little value in assessing time to achieve remedial goals. Several of the assumptions employed in the model are not supported.

> First, the model cannot account for three-dimensional complexity in the aquifer characteristic or

the distribution of contaminants. The Site 16 hydrogeology does not lend itself to a simple uniform hydraulic conductivity, for instance, along the inferred Centerline of groundwater flow and contaminant migration. The BIOCHLOR model is intended for relatively simple hydro-geological settings where the materials are similar, i.e. sands. It cannot be used where there is a mix of sand, silt, and weathered bedrock.

Second, the model does not evaluate releases in the North Central Area. For BIOCHLOR to be useful there cannot be additional inputs along the "centerline" of the relatively simple two-dimensional model. If there are additional inputs of CVOC along the Centerline of the plume, any attempts at calibration will be fruitless.

Third, Based upon recent information for the Site 16 Supplemental Feasibility Study Data Package (in addition to previous remedial investigation data), the releases in the former Building 41 area are primarily confined to the intermediate overburden and likely flow toward the Sea Freeze building.

Inspection of the 2004 and 2007 calibration run output supports the lack of applicability of the model in that the correlation between predicted and field data is actually very poor. Also, the data is very scattered and does not follow an expected pattern. This indicates multiple source area inputs. Also, a key output that apparently was ignored is the BIOCHLOR model prediction of cis-1, 2 DCE that should be observed down gradient. In the section titled "Sensitivity Analysis – Assumed Source Concentrations" output is provided for both TCE and DCE. In addition to the poor correlation of predicted TCE concentrations down gradient the model predicts that significant concentrations of cis-1, 2 DCE should be observed.

For the mass of TCE assumed to have been released in the TCE still area of 200 milligrams per liter (mg/l) the model predicts that in 53 to 56 years approximately 2,000 µg/l of TCE should be observed down gradient if biotransformation were occurring. Although the predicted data poorly correlates with the field data points, an approximate concentration of TCE that the model predicts is observed. However, the model also notes that DCE should be observed at a concentration of approximately 9,000 µg/l. The maximum field data shows that cis-1, 2 DCE is present at only 26 µg/l.

For the model run with a source area concentration of 500 mg/l the model predicted concentration of DCE down gradient is even higher if biotransformation is occurring. The BICHLOR model predicts that over 20,000 µg/l of DCE should be observed at the down gradient locations if biotransformation is occurring. The production of cis-1, 2 DCE is clearly not occurring and therefore, there is extremely little biological attenuation of TCE occurring at Site 16. Therefore, if the BIOCHLOR model output is taken at face value, it actually supports the lack of viability of MNA. That is, even after 50 years of release of some mass of contamination "at the TCE still" significantly elevated concentrations of CVOC exist in site groundwater down gradient of "the release."

Response to EPA Specific Comment No. 130: The outright dismissal of the BIOCHLOR modeling is unfounded as it was used as a screening level tool to assist in establishing time-frames for clean-up to end-point standards under various assumed scenarios. The Navy acknowledged and discussed its limited usefulness due to the over-simplifications assumed in the model compared to actual site conditions. Additionally, the modeling was only performed in a limited area of the coalesced CVOC

plume (former Building 41 area only) to minimize the effects of multiple point source contributions, varying flow paths, etc.

The Navy does not agree with the EPA conclusion that "the releases in the former Building 41 area are primarily confined to the intermediate overburden and likely flow toward the Sea Freeze building." There are multiple lines of complimenting data presented in Section 3 of the Phase III RI (March 2009) that refute this assumption. A release in the former Building 41 area – which includes the former Still area, central building and loading dock area – migrates downward from the shallow to deep overburden zones. The individual pathways are complex and residual areas of soil contamination remain (such as near MW16-85D – screened in the upper portions of the deep overburden), but there is strong hydraulic connection between all of the overburden zones as well as the bedrock system. The Navy is concerned that EPA cannot adequately evaluate remedial scenarios in the former Building 41 area if contamination released there is assumed to be confined to the intermediate overburden.

EPA Specific Comment No. 131: *Appendix G: Alternative G-5 (Groundwater Extraction and Treatment):* EPA believes that the limited "constant rate testing" performed in the Phase III remedial investigation referred to at the end of the section is inadequate to draw broad assumptions regarding aquifer hydraulic performance characteristics and a groundwater extraction network. Review of that work shows that it only tested two overburden wells (MW16-14D and MW16-85"D"). MW16-85"D" is an intermediate well situated in silt. All the rest of the "constant rate tests" were in bedrock wells (MW16-14R, MW16-60R, MW16-67R, MW16-68R, MW16-70R, MW16-71R,

> Further, comments made at the end of the section disparaging the use of analytical or finite difference models is out of place and also not supported. In fact, some form of groundwater analytical or finite difference model *is required for the entire site* in order to be able to support the use of 45 groundwater extraction wells. Also, as noted below, groundwater capture can (and usually is) be achieved by the installation of many fewer wells across the groundwater flow path.
>
> A detailed analysis of site groundwater hydraulics relative to application is not provided herein. However, a simple example of groundwater capture by an extraction well is provided to support the above comments. By definition, the groundwater capture zone width is the cross sectional width perpendicular from the up gradient direction toward the pumping well along the centerline of groundwater flow to that well. All groundwater and contamination within this "capture zone" will be recovered by the groundwater extraction well.
>
> This example is provided using data from the FS. For purposes of this illustrative example data provided on Table 1-1, and Figures 1-6 and 4-6 are used along with the FS stated groundwater extraction rate of approximately 0.5 gallons per minute (GPM) per each of the 45 groundwater extraction wells, is used to calculate the width of the "capture zone" for a single groundwater extraction well.
>
> From the FS data, for the Deep Overburden groundwater just down gradient the former Building 41 area the "plume" width is approximately 150 feet wide as shown by the green oval on Figure 4-6. From Table 1-1, for the area down gradient of Building 39 to Davisville Road, the hydraulic gradient in the Deep Overburden is approximately 0.005 feet/foot, while the hydraulic conductivity value is provided as 4.77 feet/day. From Figure 1-6 (Cross Section A-A') the thickness of the Deep Overburden is approximately 20 feet in the vicinity of MW16-60D.

The Capture Zone width on either side of the centerline of the flow axis toward the pumping well can be estimated by the following equation. Therefore, the full Capture Zone width is twice the value calculated from this formula.

$$Y = \frac{Q}{2\,(K)\,(b)\,(i)}$$

Q = pumping rate in cubic feet/day (96 Ft^3/day) for 0.50 GPM.
K = hydraulic conductivity in feet/day (4.77 Feet/day).
B = thickness of the saturated zone evaluated (20 feet).
I = hydraulic gradient in feet per foot (0.005).

Inserting these values into the above equation will generate a value for "Y" of 100.6 feet. Therefore, the width of the Capture Zone in the Deep Overburden just down gradient of the former Building 41 area will entirely capture the "plume" which has a width of approximately 150 feet. Even at a lower groundwater extraction rate the entire width of the "plume" in the Deep Overburden will be captured. A Capture Zone that would encompass the approximately 150 wide Deep Overburden "plume" would be achieved with pumping approximately 0.40 GPM.

It can be seen from this analysis that while there will be variations throughout the Site 16 area complete groundwater "plume" capture and recovery can be achieved with significantly lower numbers of groundwater extraction wells than the 45 used in this feasibility study analysis. As such, the approach taken in this alternative clearly and unrealistically biases the outcome of the use of groundwater extraction and treatment both in terms of efficacy and cost. As noted in comments on the draft FS, groundwater extraction and treatment is normally employed synergistically with other technologies to achieve faster remediation of groundwater at lower cost.

Response to EPA Specific Comment No. 131: The Navy does not concur with EPA that the constant rate testing performed in the Phase III remedial investigation is inadequate to draw broad assumptions regarding aquifer hydraulic performance characteristics and a groundwater extraction network. While it is correct that only 2 overburden wells were evaluated, both are directly in the proposed treatment area and within the proposed target intervals making their results valid for consideration.

However, field verification is proposed prior to any full scale implementation of a remedy. This field verification would include but not be limited to multi-well constant-rate step-drawdown and pumping tests to gather additional information on design pumping rates, transmissivity, storativity, vertical K, etc. While the Navy acknowledges that 45 wells is a conservative estimate, the actual number would be determined based on site-specific studies if the alternative is selected.

Based on EPA's response to the previous comment, discussions regarding the numbers and the influence of pumping wells in the former Building 41 area are somewhat moot given EPA's assumption that contamination from the former Still area is confined to the intermediate zone. There is no evidence of that groundwater is confined in this fashion. However, the Navy has three concerns from EPA's response.

The first concern is that the number of wells and orientation proposed are not consistent within the

context of the alternative presented. Specifically, EPA presents a two well approach to capture the width of the groundwater plume while the alternative presented aggressively pumped groundwater from each zone over the entire area contained within a specified concentration.

The second concern is that the "simple example of groundwater capture by an extraction well" equation presented is mis-applied. As presented, the equation and result are for the capture zone width for one well at a location far upgradient of the line of wells, not at the well. Additionally, the use of this simple equation is not consistent with EPA's previous comment of using simplified equations to represent a complex subsurface (one of the basis for rejecting the BIOCHLOR screening results).

Lastly, the Navy believes that the EPA did not use the equation correctly. The Navy assumes the equation is sourced from EPA publication 600/R-08/003, page 19, Figure 13. In this equation, Y (w in the reference) is calculated to be the *entire* capture zone width, not *one-half* of the capture zone width as stated by the commenter.

Further the EPA cited that the thickness of the deep overburden was 20 feet in the area of MW16-60D. This is correct; however, the entire saturated thickness at this location is about 49 feet. Using the correct values in the equation yields a total capture zone width of about 41.1 feet. The EPA's calculation (incorrectly) results in a total capture zone width of 201.2 feet. Therefore, with correct use of the equation, one well pumping at 0.45 gallons per minute would *not* capture the 150 foot wide plume in the area cited by the EPA.

ATTACHMENT A

LETTER DATED MAY 6, 2010 TO JEFF DALE
DEPARTMENT OF THE NAVY FROM
USEPA NEW ENGLAND – REGION I
REGARDING "DRAFT FINAL SAMPLING AND ANALYSIS PLAN TO SUPPORT THE FS FOR IRP SITE 16, DATED APRIL 2010 AT THE FORMER DAVISVILLE NAVAL CONSTRUCTION BATTALION CENTER RHODE ISLAND

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
5 POST OFFICE SQUARE, SUITE 100
MAIL CODE: OSRR07-03
BOSTON, MASSACHUSETTS 02109-3912

May 6, 2010
Jeff Dale
Dept of the Navy, BRAC PMO Northeast
Code 5090 BPMO NE/JD, 4911 South Broad St
Philadelphia, PA 19112-1303

Re: *"Draft Final Sampling and Analysis Plan to Support the FS for IRP site 16,* dated April 2010 at the Former Davisville Naval Construction Battalion Center (NCBC), Rhode Island

Dear Mr. Dale:

Pursuant to § 7.6 of the Davisville Naval Construction Battalion Center Federal Facility Agreement dated March 23, 1992, as amended (FFA), the Environmental Protection Agency has reviewed the subject document.

This work plan has improved since the draft and has satisfactorily addressed many of EPA's original comments. The additional data collection is appreciated. EPA will review the data in light of the problem statements and may make additional recommendations to completely address the problem statements once the entire effort is complete. It is anticipated that these additional efforts may be undertaken during the remedial design for this site.

EPA notes Navy has promised to coordinate with EPA in a number of data submittals during the field effort. EPA requests Navy provide timely submittal of data so that EPA has enough time to review and make recommendations.

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

Sincerely,

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

cc: Richard Gottlieb, RIDEM
Johnathan Reiner, ToNK
Steven King, RIEDC
Dave Barney, BRAC PMO (via e-mail only)
Bill Brandon, EPA (via e-mail only)
Steve DiMattei, EPA (via e-mail only)
Rick Sugatt, EPA (via e-mail only)
Kathleen Campbell, CDW (via e-mail only)
Conrad Leszkiewicz, CDW (via e-mail only)
Lee Ann Sinagoga, Tetra Tech NUS, Inc (via e-mail only)
Stephen Vetere, Tetra Tech NUS, Inc (via e-mail only)

ATTACHMENT B

MEMO DATED AUGUST 12, 2011 TO LEE ANN SINAGOGA FROM JENNIFER CARDINAL REGARDING TIER III ORGANIC DATA VALIDATION, SDG WE51-25, KATAHDIN ANALYTICAL – CTO WE51, FEASIBILITY STUDY SUPPORT, SITE 16 FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE NORTH KINGSTOWN, RHODE ISLAND

TETRA TECH NUS, INC **INTERNAL CORRESPONDENCE**

Date: August 12, 2011

To: Lee Ann Sinagoga

From: Jennifer Cardinal

Subject: Tier III Organic Data Validation, SDG WE51-25
Katahdin Analytical
CTO WE51, Feasibility Study Support, Site 16, Former Naval Construction Battalion Center Davisville, North Kingstown, Rhode Island

Volatiles:

5/Temporary Wells (Piezometers)/	TW16-24-060811	TW16-25-060811
	TW16-26-060911	TW16-27-060811
	FD060811-01	

(Field Duplicate Pair: TW16-24-060811/FD060811-01)

1/Monitoring Well/	MW16-93S-060911
1/Trip Blank/	TB16-GW-060811

Tetra Tech NUS, Inc. (TtNUS) performed a Tier III data validation on the volatile organic compound (VOC) analytical data for the aqueous samples in this SDG. The samples were collected at Site 16 of the Former Naval Construction Battalion Center Davisville, North Kingstown, Rhode Island from June 8-9, 2011. Sample collection and analysis was performed according to the requirements of the Draft Final Sampling and Analysis Plan (SAP) to Support the Feasibility Study for Site 16, Former Naval Construction Battalion Center Davisville, North Kingstown, Rhode Island, dated April 2010.

The VOC analysis was performed according to USEPA SW-846 Method 8260B. The project specific criteria listed in the project SAP were applied for validation. The project-specific project action limits (PALs) provided in the SAP were applied in this validation. The data user should consider the most recent revisions to the applicable regulatory limits. The VOC data validation was performed in accordance with the Region I EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, December 1996.

The sample results, validation qualifiers (VQL), and qualifier codes (QLCD) are presented in the enclosed data summary tables. A list of the qualifier codes, which provide the reasons for the validation qualifiers, is enclosed.

The data were evaluated based on the following parameters:

- Laboratory Data Completeness
- * Preservation and Technical Holding Times
- * GC/MS Instrument Performance Check (Tuning)
- Initial and Continuing Calibrations
- * Laboratory and Field Blank Contamination

* • Surrogate Recoveries
* • Internal Standard Recoveries
* • Matrix Spike/Matrix Spike Duplicate Recoveries
• Laboratory Control Sample Recoveries
* • Field Duplicates
* • Sample Quantitation
• Limits of Detection

* All criteria were met for this parameter.

Laboratory Data Completeness

On July 19, 2011 the laboratory resubmitted select pages from the data package to correct select samples IDs since sample MW16-93S-060911 was logged in as MW16-93S-**0**060911 and sample TW16-26-060911 was logged in as TW16-26-**060811**. Also, the laboratory corrected the Form I for sample FD060811-01 since the sample was logged in with the sample date 6/9/11 while the correct sample date is 6/8/11.

On July 19, 2011 the laboratory clarified that 10 µg/L of surrogate is added for a 25 mL purge for the volatiles samples.

Initial and Continuing Calibrations

The following table summarizes the volatile compound that failed to meet the initial calibration verification (ICV) criterion of 80 < %R < 120:

Compound	%R	Action		Affected Samples
		(+)	NDs	
Acetone	160.76	J		TW16-24-060811, TW16-25-060811, TW16-27-060811, FD060811-01, MW16-93S-060911

The positive acetone results in the affected samples are estimated (J) due to a high initial calibration verification recovery. The affected results may be biased high.

The following table summarizes the volatile compounds that failed to meet the continuing calibration criterion of %D< 20:

Compound	%D	Action		Affected Sample
		(+)	NDs	
Chloromethane	20.9		UJ	MW16-93S-060911
Bromomethane	23.0		UJ	MW16-93S-060911
Chloroethane	23.5		UJ	MW16-93S-060911
Acetone	31.2	J		MW16-93S-060911

The positive acetone result in the affected sample is estimated (J) due to instrument calibration variability. Nondetected results for chloromethane, bromomethane, and chloroethane were qualified as estiamated (UJ).

Laboratory Control Sample/Laboratory Control Sample Duplicates

The following table summarizes the volatile compound that failed to meet the laboratory control sample (LCS) recovery limits:

Compound	LCS % Rec.	QC Limits	Action		Affected Samples
			(+)	NDs	
Acetone	161, 179	40-140	J		TW16-24-060811, TW16-25-060811, TW16-27-060811, FD060811-01, MW16-93S-060911

The positive acetone results in the affected samples are estimated (J) due to high LCS recoveries. The affected results may be biased high.

Limits of Detection

Non-detected results were reported at the limit of detection (LOD). Positive results below the limit of quantitation (LOQ) and above the method detection limit (MDL) were qualified as estimated (J) due to uncertainty below the LOQ. Project action limits (PALs) are evaluated for non-detected results only (reported at the LOD).

There are no PALs established for the trip blank sample.

All PALs were met by the LODs for the temporary well (piezometer) samples except for cis-1,3-dichloropropene and trans-1,3-dichloropropene. All PALs were met by the LODs for the monitoring well samples except for bromomethane, vinyl chloride, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, 1,2-dibromo-3-chloropropane, 1,2-dibromomethane, 1,2-dichloroethane, 1,2-dichloropropane, 1,4-dichlorobenzene, benzene, bromodichloromethane, carbon tetrachloride, chloroform, cis-1,3-dichloropropene, dibromochloromethane, and tetrachloroethene.

Appendix A — Data Validation Qualifiers and Codes
Data Summary Tables

Appendix B — Results Reported by the Laboratory

Appendix C — Support Documentation and Worksheets

APPENDIX A

QUALIFIED ANALYTICAL RESULTS

Data Validation Qualifiers and Codes

Data Validation Qualifiers:

= No qualifier attached to value (positive hit)
J = Value is estimated
U = Value is not detected
UJ = Value is not detected and estimated
R = Value (positive hit) is not usable
UR = Value was reported as ND but is not usable

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O = Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty below quantitation limit (< QL but ≥ MDL)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient $r < 0.995$
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 02584	NSAMPLE	FD060811-01			MW16-93S-060911			TB16-GW-060811			TW16-24-060811		
SDG: WE51-25	LAB_ID	SE3328-6			SE3328-5			SE3328-7			SE3328-1		
FRACTION: OV	SAMP_DATE	6/8/2011			6/9/2011			6/8/2011			6/8/2011		
MEDIA: WATER	QC_TYPE	FD			NM			TB			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	TW16-24-060811											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,1,2,2-TETRACHLOROETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,1,2-TRICHLOROETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,1-DICHLOROETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,1-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2,4-TRICHLOROBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2-DIBROMO-3-CHLOROPROPANE		1	U		1	U		1	U		1	U	
1,2-DIBROMOETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROPROPANE		0.5	U		0.5	U		0.5	U		0.5	U	
1,3-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	
1,4-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	
2-BUTANONE		2.5	U		2.5	U		2.5	U		2.5	U	
2-HEXANONE		2.5	U		2.5	U		2.5	U		2.5	U	
4-METHYL-2-PENTANONE		2.5	U		2.5	U		2.5	U		2.5	U	
ACETONE		3.4	J	CEP	2.6	J	CEP	2.5	U		2.8	J	CEP
BENZENE		0.5	U		0.5	U		0.5	U		0.5	U	
BROMODICHLOROMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
BROMOFORM		0.5	U		0.5	U		0.5	U		0.5	U	
BROMOMETHANE		1	U		1	UJ	C	1	U		1	U	
CARBON DISULFIDE		0.5	U		0.5	U		0.5	U		0.5	U	
CARBON TETRACHLORIDE		0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	
CHLORODIBROMOMETHANE		0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROETHANE		1	U		1	UJ	C	1	U		1	U	
CHLOROFORM		0.5	U		0.5	U		0.5	U		0.5	U	
CHLOROMETHANE		1	U		1	UJ	C	1	U		1	U	
CIS-1,2-DICHLOROETHENE		0.66	J	P	0.5	U		0.5	U		0.62	J	P
CIS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		0.5	U	
CYCLOHEXANE		0.5	U		0.5	U		0.5	U		0.5	U	
DICHLORODIFLUOROMETHANE		1	U		1	U		1	U		1	U	
ETHYLBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	
ISOPROPYLBENZENE		0.5	U		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02584	NSAMPLE	TW16-25-060811			TW16-26-060911			TW16-27-060811		
SDG: WE51-25	LAB_ID	SE3328-2			SE3328-4			SE3328-3		
FRACTION: OV	SAMP_DATE	6/8/2011			6/9/2011			6/8/2011		
MEDIA: WATER	QC_TYPE	NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS									
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,1-TRICHLOROETHANE		0.5	U		0.5	U		0.5	U	
1,1,2,2-TETRACHLOROETHANE		0.5	U		0.5	U		0.5	U	
1,1,2-TRICHLOROETHANE		0.5	U		0.5	U		0.5	U	
1,1,2-TRICHLOROTRIFLUOROETHANE		0.5	U		0.5	U		0.5	U	
1,1-DICHLOROETHANE		0.5	U		0.5	U		0.5	U	
1,1-DICHLOROETHENE		0.5	U		0.5	U		0.5	U	
1,2,4-TRICHLOROBENZENE		0.5	U		0.5	U		0.5	U	
1,2-DIBROMO-3-CHLOROPROPANE		1	U		1	U		1	U	
1,2-DIBROMOETHANE		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROETHANE		0.5	U		0.5	U		0.5	U	
1,2-DICHLOROPROPANE		0.5	U		0.5	U		0.5	U	
1,3-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U	
1,4-DICHLOROBENZENE		0.5	U		0.5	U		0.5	U	
2-BUTANONE		2.5	U		2.5	U		2.5	U	
2-HEXANONE		2.5	U		2.5	U		2.5	U	
4-METHYL-2-PENTANONE		2.5	U		2.5	U		2.5	U	
ACETONE		2.8	J	CEP	2.5	U		2.8	J	CEP
BENZENE		0.5	U		0.5	U		0.5	U	
BROMODICHLOROMETHANE		0.5	U		0.5	U		0.5	U	
BROMOFORM		0.5	U		0.5	U		0.5	U	
BROMOMETHANE		1	U		1	U		1	U	
CARBON DISULFIDE		0.5	U		0.5	U		0.5	U	
CARBON TETRACHLORIDE		0.5	U		0.5	U		0.5	U	
CHLOROBENZENE		0.5	U		0.5	U		0.5	U	
CHLORODIBROMOMETHANE		0.5	U		0.5	U		0.5	U	
CHLOROETHANE		1	U		1	U		1	U	
CHLOROFORM		0.5	U		0.5	U		0.5	U	
CHLOROMETHANE		1	U		1	U		1	U	
CIS-1,2-DICHLOROETHENE		0.28	J	P	0.5	U		0.5	U	
CIS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U	
CYCLOHEXANE		0.5	U		0.5	U		0.5	U	
DICHLORODIFLUOROMETHANE		1	U		1	U		1	U	
ETHYLBENZENE		0.5	U		0.5	U		0.5	U	
ISOPROPYLBENZENE		0.5	U		0.5	U		0.5	U	

PROJ_NO: 02584	NSAMPLE	FD060811-01			MW16-93S-060911			TB16-GW-060811			TW16-24-060811		
SDG: WE51-25	LAB_ID	SE3328-6			SE3328-5			SE3328-7			SE3328-1		
FRACTION: OV	SAMP_DATE	6/8/2011			6/9/2011			6/8/2011			6/8/2011		
MEDIA: WATER	QC_TYPE	FD			NM			TB			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS												
	DUP_OF	TW16-24-060811											
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
METHYL ACETATE		0.75	U		0.75	U		0.75	U		0.75	U	
METHYL CYCLOHEXANE		0.5	U		0.5	U		0.5	U		0.5	U	
METHYL TERT-BUTYL ETHER		0.5	U		0.5	U		0.5	U		0.5	U	
METHYLENE CHLORIDE		2.5	U		2.5	U		2.5	U		2.5	U	
STYRENE		0.5	U		0.5	U		0.5	U		0.5	U	
TETRACHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TOLUENE		0.5	U		0.5	U		0.5	U		0.5	U	
TOTAL XYLENES		1.5	U		1.5	U		1.5	U		1.5	U	
TRANS-1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRICHLOROETHENE		0.5	U		0.5	U		0.5	U		0.5	U	
TRICHLOROFLUOROMETHANE		1	U		1	U		1	U		1	U	
VINYL CHLORIDE		1	U		1	U		1	U		1	U	

PROJ_NO: 02584	NSAMPLE	TW16-25-060811			TW16-26-060911			TW16-27-060811		
SDG: WE51-25	LAB_ID	SE3328-2			SE3328-4			SE3328-3		
FRACTION: OV	SAMP_DATE	6/8/2011			6/9/2011			6/8/2011		
MEDIA: WATER	QC_TYPE	NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS									
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
METHYL ACETATE		0.75	U		0.75	U		0.75	U	
METHYL CYCLOHEXANE		0.5	U		0.5	U		0.5	U	
METHYL TERT-BUTYL ETHER		0.5	U		0.5	U		0.5	U	
METHYLENE CHLORIDE		2.5	U		2.5	U		2.5	U	
STYRENE		0.5	U		0.5	U		0.5	U	
TETRACHLOROETHENE		0.5	U		0.5	U		0.5	U	
TOLUENE		0.5	U		0.5	U		0.5	U	
TOTAL XYLENES		1.5	U		1.5	U		1.5	U	
TRANS-1,2-DICHLOROETHENE		0.5	U		0.5	U		0.5	U	
TRANS-1,3-DICHLOROPROPENE		0.5	U		0.5	U		0.5	U	
TRICHLOROETHENE		0.5	U		0.5	U		0.5	U	
TRICHLOROFLUOROMETHANE		1	U		1	U		1	U	
VINYL CHLORIDE		1	U		1	U		1	U	

APPENDIX B

RESULTS AS REPORTED BY THE LABORATORY

Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-6
Client ID: FD060811-01
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 08-JUN-11
Received Date: 10-JUN-11
Extract Date: 20-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93091

Analysis Date: 20-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 19-JUL-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Dichlorodifluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
Chloromethane	U	1.0	ug/L	1	2	2.0	0.36	1.0
Vinyl Chloride	U	1.0	ug/L	1	2	2.0	0.25	1.0
Bromomethane	U	1.0	ug/L	1	2	2.0	0.49	1.0
Chloroethane	U	1.0	ug/L	1	2	2.0	0.55	1.0
Trichlorofluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
1,1-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.35	0.50
Carbon Disulfide	U	0.50	ug/L	1	1	1.0	0.25	0.50
Freon-113	U	0.50	ug/L	1	1	1.0	0.31	0.50
Methylene Chloride	U	2.5	ug/L	1	5	5.0	1.1	2.5
Acetone	J	3.4	ug/L	1	5	5.0	2.2	2.5
trans-1,2-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.25	0.50
Methyl tert-butyl Ether	U	0.50	ug/L	1	1	1.0	0.36	0.50
1,1-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.21	0.50
cis-1,2-Dichloroethene	J	0.66	ug/L	1	1	1.0	0.21	0.50
Chloroform	U	0.50	ug/L	1	1	1.0	0.32	0.50
1,1,1-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
2-Butanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
Cyclohexane	U	0.50	ug/L	1	1	1.0	0.31	0.50
Carbon Tetrachloride	U	0.50	ug/L	1	1	1.0	0.22	0.50
Benzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,2-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
Trichloroethene	U	0.50	ug/L	1	1	1.0	0.28	0.50
1,2-Dichloropropane	U	0.50	ug/L	1	1	1.0	0.25	0.50
Bromodichloromethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
cis-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.19	0.50
Toluene	U	0.50	ug/L	1	1	1.0	0.27	0.50
4-Methyl-2-Pentanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
trans-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.20	0.50
1,1,2-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
Tetrachloroethene	U	0.50	ug/L	1	1	1.0	0.40	0.50
Dibromochloromethane	U	0.50	ug/L	1	1	1.0	0.30	0.50
1,2-Dibromoethane	U	0.50	ug/L	1	1	1.0	0.22	0.50
2-Hexanone	U	2.5	ug/L	1	5	5.0	1.7	2.5
Chlorobenzene	U	0.50	ug/L	1	1	1.0	0.22	0.50

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-6
Client ID: FD060811-01
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 08-JUN-11
Received Date: 10-JUN-11
Extract Date: 20-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93091

Analysis Date: 20-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 19-JUL-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Ethylbenzene	U	0.50	ug/L	1	1	1.0	0.21	0.50
Total Xylene	U	1.5	ug/L	1	3	3.0	0.25	1.5
Styrene	U	0.50	ug/L	1	1	1.0	0.23	0.50
Bromoform	U	0.50	ug/L	1	1	1.0	0.23	0.50
Isopropylbenzene	U	0.50	ug/L	1	1	1.0	0.23	0.50
1,1,2,2-Tetrachloroethane	U	0.50	ug/L	1	1	1.0	0.38	0.50
1,3-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,4-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.24	0.50
1,2-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.15	0.50
1,2-Dibromo-3-Chloropropane	U	1.0	ug/L	1	2	2.0	0.50	1.0
1,2,4-Trichlorobenzene	U	0.50	ug/L	1	1	1.0	0.37	0.50
Methyl Acetate	U	0.75	ug/L	1	1	1.0	0.53	0.75
Methylcyclohexane	U	0.50	ug/L	1	1	1.0	0.30	0.50
P-Bromofluorobenzene		90.9	%					
Toluene-d8	*	81.0	%					
1,2-Dichloroethane-d4	*	124.	%					
Dibromofluoromethane		103.	%					

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Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-5
Client ID: MW16-93S-060911
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 09-JUN-11
Received Date: 10-JUN-11
Extract Date: 21-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93118

Analysis Date: 21-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 19-JUL-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Dichlorodifluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
Chloromethane	U	1.0	ug/L	1	2	2.0	0.36	1.0
Vinyl Chloride	U	1.0	ug/L	1	2	2.0	0.25	1.0
Bromomethane	U	1.0	ug/L	1	2	2.0	0.49	1.0
Chloroethane	U	1.0	ug/L	1	2	2.0	0.55	1.0
Trichlorofluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
1,1-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.35	0.50
Carbon Disulfide	U	0.50	ug/L	1	1	1.0	0.25	0.50
Freon-113	U	0.50	ug/L	1	1	1.0	0.31	0.50
Methylene Chloride	U	2.5	ug/L	1	5	5.0	1.1	2.5
Acetone	J	2.6	ug/L	1	5	5.0	2.2	2.5
trans-1,2-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.25	0.50
Methyl tert-butyl Ether	U	0.50	ug/L	1	1	1.0	0.36	0.50
1,1-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.21	0.50
cis-1,2-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.21	0.50
Chloroform	U	0.50	ug/L	1	1	1.0	0.32	0.50
1,1,1-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
2-Butanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
Cyclohexane	U	0.50	ug/L	1	1	1.0	0.31	0.50
Carbon Tetrachloride	U	0.50	ug/L	1	1	1.0	0.22	0.50
Benzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,2-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
Trichloroethene	U	0.50	ug/L	1	1	1.0	0.28	0.50
1,2-Dichloropropane	U	0.50	ug/L	1	1	1.0	0.25	0.50
Bromodichloromethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
cis-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.19	0.50
Toluene	U	0.50	ug/L	1	1	1.0	0.27	0.50
4-Methyl-2-Pentanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
trans-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.20	0.50
1,1,2-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
Tetrachloroethene	U	0.50	ug/L	1	1	1.0	0.40	0.50
Dibromochloromethane	U	0.50	ug/L	1	1	1.0	0.30	0.50
1,2-Dibromoethane	U	0.50	ug/L	1	1	1.0	0.22	0.50
2-Hexanone	U	2.5	ug/L	1	5	5.0	1.7	2.5
Chlorobenzene	U	0.50	ug/L	1	1	1.0	0.22	0.50

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ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-5
Client ID: MW16-93S-060911
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 09-JUN-11
Received Date: 10-JUN-11
Extract Date: 21-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93118

Analysis Date: 21-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 19-JUL-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Ethylbenzene	U	0.50	ug/L	1	1	1.0	0.21	0.50
Total Xylene	U	1.5	ug/L	1	3	3.0	0.25	1.5
Styrene	U	0.50	ug/L	1	1	1.0	0.23	0.50
Bromoform	U	0.50	ug/L	1	1	1.0	0.23	0.50
Isopropylbenzene	U	0.50	ug/L	1	1	1.0	0.23	0.50
1,1,2,2-Tetrachloroethane	U	0.50	ug/L	1	1	1.0	0.38	0.50
1,3-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,4-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.24	0.50
1,2-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.15	0.50
1,2-Dibromo-3-Chloropropane	U	1.0	ug/L	1	2	2.0	0.50	1.0
1,2,4-Trichlorobenzene	U	0.50	ug/L	1	1	1.0	0.37	0.50
Methyl Acetate	U	0.75	ug/L	1	1	1.0	0.53	0.75
Methylcyclohexane	U	0.50	ug/L	1	1	1.0	0.30	0.50
P-Bromofluorobenzene		77.9	%					
Toluene-d8		84.9	%					
1,2-Dichloroethane-d4		107.	%					
Dibromofluoromethane		89.7	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-7
Client ID: TB16-GW-060811
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 08-JUN-11
Received Date: 10-JUN-11
Extract Date: 20-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93091

Analysis Date: 20-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 01-JUL-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Dichlorodifluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
Chloromethane	U	1.0	ug/L	1	2	2.0	0.36	1.0
Vinyl Chloride	U	1.0	ug/L	1	2	2.0	0.25	1.0
Bromomethane	U	1.0	ug/L	1	2	2.0	0.49	1.0
Chloroethane	U	1.0	ug/L	1	2	2.0	0.55	1.0
Trichlorofluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
1,1-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.35	0.50
Carbon Disulfide	U	0.50	ug/L	1	1	1.0	0.25	0.50
Freon-113	U	0.50	ug/L	1	1	1.0	0.31	0.50
Methylene Chloride	U	2.5	ug/L	1	5	5.0	1.1	2.5
Acetone	U	2.5	ug/L	1	5	5.0	2.2	2.5
trans-1,2-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.25	0.50
Methyl tert-butyl Ether	U	0.50	ug/L	1	1	1.0	0.36	0.50
' 1-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.21	0.50
-1,2-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.21	0.50
Chloroform	U	0.50	ug/L	1	1	1.0	0.32	0.50
1,1,1-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
2-Butanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
Cyclohexane	U	0.50	ug/L	1	1	1.0	0.31	0.50
Carbon Tetrachloride	U	0.50	ug/L	1	1	1.0	0.22	0.50
Benzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,2-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
Trichloroethene	U	0.50	ug/L	1	1	1.0	0.28	0.50
1,2-Dichloropropane	U	0.50	ug/L	1	1	1.0	0.25	0.50
Bromodichloromethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
cis-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.19	0.50
Toluene	U	0.50	ug/L	1	1	1.0	0.27	0.50
4-Methyl-2-Pentanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
trans-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.20	0.50
1,1,2-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
Tetrachloroethene	U	0.50	ug/L	1	1	1.0	0.40	0.50
Dibromochloromethane	U	0.50	ug/L	1	1	1.0	0.30	0.50
1,2-Dibromoethane	U	0.50	ug/L	1	1	1.0	0.22	0.50
2-Hexanone	U	2.5	ug/L	1	5	5.0	1.7	2.5
Chlorobenzene	U	0.50	ug/L	1	1	1.0	0.22	0.50

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ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-7
Client ID: TB16-GW-060811
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 08-JUN-11
Received Date: 10-JUN-11
Extract Date: 20-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93091

Analysis Date: 20-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 01-JUL-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Ethylbenzene	U	0.50	ug/L	1	1	1.0	0.21	0.50
Total Xylene	U	1.5	ug/L	1	3	3.0	0.25	1.5
Styrene	U	0.50	ug/L	1	1	1.0	0.23	0.50
Bromoform	U	0.50	ug/L	1	1	1.0	0.23	0.50
Isopropylbenzene	U	0.50	ug/L	1	1	1.0	0.23	0.50
1,1,2,2-Tetrachloroethane	U	0.50	ug/L	1	1	1.0	0.38	0.50
1,3-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,4-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.24	0.50
1,2-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.15	0.50
1,2-Dibromo-3-Chloropropane	U	1.0	ug/L	1	2	2.0	0.50	1.0
1,2,4-Trichlorobenzene	U	0.50	ug/L	1	1	1.0	0.37	0.50
Methyl Acetate	U	0.75	ug/L	1	1	1.0	0.53	0.75
Methylcyclohexane	U	0.50	ug/L	1	1	1.0	0.30	0.50
ᵀ Bromofluorobenzene		81.3	%					
ɔluene-d8	*	79.7	%					
1,2-Dichloroethane-d4		98.8	%					
Dibromofluoromethane		91.6	%					

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Katahdin
ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-1
Client ID: TW16-24-060811
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 08-JUN-11
Received Date: 10-JUN-11
Extract Date: 20-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93091

Analysis Date: 20-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 30-JUN-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Dichlorodifluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
Chloromethane	U	1.0	ug/L	1	2	2.0	0.36	1.0
Vinyl Chloride	U	1.0	ug/L	1	2	2.0	0.25	1.0
Bromomethane	U	1.0	ug/L	1	2	2.0	0.49	1.0
Chloroethane	U	1.0	ug/L	1	2	2.0	0.55	1.0
Trichlorofluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
1,1-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.35	0.50
Carbon Disulfide	U	0.50	ug/L	1	1	1.0	0.25	0.50
Freon-113	U	0.50	ug/L	1	1	1.0	0.31	0.50
Methylene Chloride	U	2.5	ug/L	1	5	5.0	1.1	2.5
Acetone	J	2.8	ug/L	1	5	5.0	2.2	2.5
trans-1,2-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.25	0.50
Methyl tert-butyl Ether	U	0.50	ug/L	1	1	1.0	0.36	0.50
1,1-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.21	0.50
s-1,2-Dichloroethene	J	0.62	ug/L	1	1	1.0	0.21	0.50
Chloroform	U	0.50	ug/L	1	1	1.0	0.32	0.50
1,1,1-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
2-Butanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
Cyclohexane	U	0.50	ug/L	1	1	1.0	0.31	0.50
Carbon Tetrachloride	U	0.50	ug/L	1	1	1.0	0.22	0.50
Benzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,2-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
Trichloroethene	U	0.50	ug/L	1	1	1.0	0.28	0.50
1,2-Dichloropropane	U	0.50	ug/L	1	1	1.0	0.25	0.50
Bromodichloromethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
cis-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.19	0.50
Toluene	U	0.50	ug/L	1	1	1.0	0.27	0.50
4-Methyl-2-Pentanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
trans-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.20	0.50
1,1,2-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
Tetrachloroethene	U	0.50	ug/L	1	1	1.0	0.40	0.50
Dibromochloromethane	U	0.50	ug/L	1	1	1.0	0.30	0.50
1,2-Dibromoethane	U	0.50	ug/L	1	1	1.0	0.22	0.50
2-Hexanone	U	2.5	ug/L	1	5	5.0	1.7	2.5
Chlorobenzene	U	0.50	ug/L	1	1	1.0	0.22	0.50

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ANALYTICAL SERVICES

Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-1
Client ID: TW16-24-060811
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 08-JUN-11
Received Date: 10-JUN-11
Extract Date: 20-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93091

Analysis Date: 20-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 30-JUN-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Ethylbenzene	U	0.50	ug/L	1	1	1.0	0.21	0.50
Total Xylene	U	1.5	ug/L	1	3	3.0	0.25	1.5
Styrene	U	0.50	ug/L	1	1	1.0	0.23	0.50
Bromoform	U	0.50	ug/L	1	1	1.0	0.23	0.50
Isopropylbenzene	U	0.50	ug/L	1	1	1.0	0.23	0.50
1,1,2,2-Tetrachloroethane	U	0.50	ug/L	1	1	1.0	0.38	0.50
1,3-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,4-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.24	0.50
1,2-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.15	0.50
1,2-Dibromo-3-Chloropropane	U	1.0	ug/L	1	2	2.0	0.50	1.0
1,2,4-Trichlorobenzene	U	0.50	ug/L	1	1	1.0	0.37	0.50
Methyl Acetate	U	0.75	ug/L	1	1	1.0	0.53	0.75
Methylcyclohexane	U	0.50	ug/L	1	1	1.0	0.30	0.50
P-Bromofluorobenzene		91.2	%					
luene-d8		84.6	%					
1,2-Dichloroethane-d4		117.	%					
Dibromofluoromethane		97.6	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-2
Client ID: TW16-25-060811
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 08-JUN-11
Received Date: 10-JUN-11
Extract Date: 20-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93091

Analysis Date: 20-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 30-JUN-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Dichlorodifluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
Chloromethane	U	1.0	ug/L	1	2	2.0	0.36	1.0
Vinyl Chloride	U	1.0	ug/L	1	2	2.0	0.25	1.0
Bromomethane	U	1.0	ug/L	1	2	2.0	0.49	1.0
Chloroethane	U	1.0	ug/L	1	2	2.0	0.55	1.0
Trichlorofluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
1,1-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.35	0.50
Carbon Disulfide	U	0.50	ug/L	1	1	1.0	0.25	0.50
Freon-113	U	0.50	ug/L	1	1	1.0	0.31	0.50
Methylene Chloride	U	2.5	ug/L	1	5	5.0	1.1	2.5
Acetone	J	2.8	ug/L	1	5	5.0	2.2	2.5
trans-1,2-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.25	0.50
Methyl tert-butyl Ether	U	0.50	ug/L	1	1	1.0	0.36	0.50
1,1-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.21	0.50
-1,2-Dichloroethene	J	0.28	ug/L	1	1	1.0	0.21	0.50
Chloroform	U	0.50	ug/L	1	1	1.0	0.32	0.50
1,1,1-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
2-Butanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
Cyclohexane	U	0.50	ug/L	1	1	1.0	0.31	0.50
Carbon Tetrachloride	U	0.50	ug/L	1	1	1.0	0.22	0.50
Benzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,2-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
Trichloroethene	U	0.50	ug/L	1	1	1.0	0.28	0.50
1,2-Dichloropropane	U	0.50	ug/L	1	1	1.0	0.25	0.50
Bromodichloromethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
cis-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.19	0.50
Toluene	U	0.50	ug/L	1	1	1.0	0.27	0.50
4-Methyl-2-Pentanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
trans-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.20	0.50
1,1,2-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
Tetrachloroethene	U	0.50	ug/L	1	1	1.0	0.40	0.50
Dibromochloromethane	U	0.50	ug/L	1	1	1.0	0.30	0.50
1,2-Dibromoethane	U	0.50	ug/L	1	1	1.0	0.22	0.50
2-Hexanone	U	2.5	ug/L	1	5	5.0	1.7	2.5
Chlorobenzene	U	0.50	ug/L	1	1	1.0	0.22	0.50

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Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-2
Client ID: TW16-25-060811
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 08-JUN-11
Received Date: 10-JUN-11
Extract Date: 20-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93091

Analysis Date: 20-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 30-JUN-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Ethylbenzene	U	0.50	ug/L	1	1	1.0	0.21	0.50
Total Xylene	U	1.5	ug/L	1	3	3.0	0.25	1.5
Styrene	U	0.50	ug/L	1	1	1.0	0.23	0.50
Bromoform	U	0.50	ug/L	1	1	1.0	0.23	0.50
Isopropylbenzene	U	0.50	ug/L	1	1	1.0	0.23	0.50
1,1,2,2-Tetrachloroethane	U	0.50	ug/L	1	1	1.0	0.38	0.50
1,3-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,4-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.24	0.50
1,2-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.15	0.50
1,2-Dibromo-3-Chloropropane	U	1.0	ug/L	1	2	2.0	0.50	1.0
1,2,4-Trichlorobenzene	U	0.50	ug/L	1	1	1.0	0.37	0.50
Methyl Acetate	U	0.75	ug/L	1	1	1.0	0.53	0.75
Methylcyclohexane	U	0.50	ug/L	1	1	1.0	0.30	0.50
P-Bromofluorobenzene		91.4	%					
luene-d8	*	83.6	%					
1,2-Dichloroethane-d4		117.	%					
Dibromofluoromethane		99.0	%					

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Cert No E87604

Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-4
Client ID: TW16-26-060911
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 09-JUN-11
Received Date: 10-JUN-11
Extract Date: 20-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93091

Analysis Date: 20-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 19-JUL-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Dichlorodifluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
Chloromethane	U	1.0	ug/L	1	2	2.0	0.36	1.0
Vinyl Chloride	U	1.0	ug/L	1	2	2.0	0.25	1.0
Bromomethane	U	1.0	ug/L	1	2	2.0	0.49	1.0
Chloroethane	U	1.0	ug/L	1	2	2.0	0.55	1.0
Trichlorofluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
1,1-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.35	0.50
Carbon Disulfide	U	0.50	ug/L	1	1	1.0	0.25	0.50
Freon-113	U	0.50	ug/L	1	1	1.0	0.31	0.50
Methylene Chloride	U	2.5	ug/L	1	5	5.0	1.1	2.5
Acetone	U	2.5	ug/L	1	5	5.0	2.2	2.5
trans-1,2-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.25	0.50
Methyl tert-butyl Ether	U	0.50	ug/L	1	1	1.0	0.36	0.50
1,1-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.21	0.50
cis-1,2-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.21	0.50
Chloroform	U	0.50	ug/L	1	1	1.0	0.32	0.50
1,1,1-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
2-Butanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
Cyclohexane	U	0.50	ug/L	1	1	1.0	0.31	0.50
Carbon Tetrachloride	U	0.50	ug/L	1	1	1.0	0.22	0.50
Benzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,2-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
Trichloroethene	U	0.50	ug/L	1	1	1.0	0.28	0.50
1,2-Dichloropropane	U	0.50	ug/L	1	1	1.0	0.25	0.50
Bromodichloromethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
cis-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.19	0.50
Toluene	U	0.50	ug/L	1	1	1.0	0.27	0.50
4-Methyl-2-Pentanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
trans-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.20	0.50
1,1,2-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
Tetrachloroethene	U	0.50	ug/L	1	1	1.0	0.40	0.50
Dibromochloromethane	U	0.50	ug/L	1	1	1.0	0.30	0.50
1,2-Dibromoethane	U	0.50	ug/L	1	1	1.0	0.22	0.50
2-Hexanone	U	2.5	ug/L	1	5	5.0	1.7	2.5
Chlorobenzene	U	0.50	ug/L	1	1	1.0	0.22	0.50

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ANALYTICAL SERVICES

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-4
Client ID: TW16-26-060911
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 09-JUN-11
Received Date: 10-JUN-11
Extract Date: 20-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93091

Analysis Date: 20-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 19-JUL-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Ethylbenzene	U	0.50	ug/L	1	1	1.0	0.21	0.50
Total Xylene	U	1.5	ug/L	1	3	3.0	0.25	1.5
Styrene	U	0.50	ug/L	1	1	1.0	0.23	0.50
Bromoform	U	0.50	ug/L	1	1	1.0	0.23	0.50
Isopropylbenzene	U	0.50	ug/L	1	1	1.0	0.23	0.50
1,1,2,2-Tetrachloroethane	U	0.50	ug/L	1	1	1.0	0.38	0.50
1,3-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,4-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.24	0.50
1,2-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.15	0.50
1,2-Dibromo-3-Chloropropane	U	1.0	ug/L	1	2	2.0	0.50	1.0
1,2,4-Trichlorobenzene	U	0.50	ug/L	1	1	1.0	0.37	0.50
Methyl Acetate	U	0.75	ug/L	1	1	1.0	0.53	0.75
Methylcyclohexane	U	0.50	ug/L	1	1	1.0	0.30	0.50
P-Bromofluorobenzene		93.6	%					
Toluene-d8		85.5	%					
1,2-Dichloroethane-d4	*	126.	%					
Dibromofluoromethane		106.	%					

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-3
Client ID: TW16-27-060811
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 08-JUN-11
Received Date: 10-JUN-11
Extract Date: 20-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93091

Analysis Date: 20-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 30-JUN-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Dichlorodifluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
Chloromethane	U	1.0	ug/L	1	2	2.0	0.36	1.0
Vinyl Chloride	U	1.0	ug/L	1	2	2.0	0.25	1.0
Bromomethane	U	1.0	ug/L	1	2	2.0	0.49	1.0
Chloroethane	U	1.0	ug/L	1	2	2.0	0.55	1.0
Trichlorofluoromethane	U	1.0	ug/L	1	2	2.0	0.24	1.0
1,1-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.35	0.50
Carbon Disulfide	U	0.50	ug/L	1	1	1.0	0.25	0.50
Freon-113	U	0.50	ug/L	1	1	1.0	0.31	0.50
Methylene Chloride	U	2.5	ug/L	1	5	5.0	1.1	2.5
Acetone	J	2.8	ug/L	1	5	5.0	2.2	2.5
trans-1,2-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.25	0.50
Methyl tert-butyl Ether	U	0.50	ug/L	1	1	1.0	0.36	0.50
1,1-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.21	0.50
-1,2-Dichloroethene	U	0.50	ug/L	1	1	1.0	0.21	0.50
Chloroform	U	0.50	ug/L	1	1	1.0	0.32	0.50
1,1,1-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
2-Butanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
Cyclohexane	U	0.50	ug/L	1	1	1.0	0.31	0.50
Carbon Tetrachloride	U	0.50	ug/L	1	1	1.0	0.22	0.50
Benzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,2-Dichloroethane	U	0.50	ug/L	1	1	1.0	0.20	0.50
Trichloroethene	U	0.50	ug/L	1	1	1.0	0.28	0.50
1,2-Dichloropropane	U	0.50	ug/L	1	1	1.0	0.25	0.50
Bromodichloromethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
cis-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.19	0.50
Toluene	U	0.50	ug/L	1	1	1.0	0.27	0.50
4-Methyl-2-Pentanone	U	2.5	ug/L	1	5	5.0	1.3	2.5
trans-1,3-Dichloropropene	U	0.50	ug/L	1	1	1.0	0.20	0.50
1,1,2-Trichloroethane	U	0.50	ug/L	1	1	1.0	0.33	0.50
Tetrachloroethene	U	0.50	ug/L	1	1	1.0	0.40	0.50
Dibromochloromethane	U	0.50	ug/L	1	1	1.0	0.30	0.50
1,2-Dibromoethane	U	0.50	ug/L	1	1	1.0	0.22	0.50
2-Hexanone	U	2.5	ug/L	1	5	5.0	1.7	2.5
Chlorobenzene	U	0.50	ug/L	1	1	1.0	0.22	0.50

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ANALYTICAL SERVICES

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Report of Analytical Results

Client: Tetra Tech NUS, Inc.
Lab ID: SE3328-3
Client ID: TW16-27-060811
Project: NCBC Davisville CTO WE51
SDG: WE51-25

Sample Date: 08-JUN-11
Received Date: 10-JUN-11
Extract Date: 20-JUN-11
Extracted By: DJP
Extraction Method: SW846 8260B
Lab Prep Batch: WG93091

Analysis Date: 20-JUN-11
Analyst: DJP
Analysis Method: SW846 8260B
Matrix: AQ
% Solids: NA
Report Date: 30-JUN-11

Compound	Qualifier	Result	Units	Dilution	LOQ	ADJ LOQ	ADJ MDL	ADJ LOD
Ethylbenzene	U	0.50	ug/L	1	1	1.0	0.21	0.50
Total Xylene	U	1.5	ug/L	1	3	3.0	0.25	1.5
Styrene	U	0.50	ug/L	1	1	1.0	0.23	0.50
Bromoform	U	0.50	ug/L	1	1	1.0	0.23	0.50
Isopropylbenzene	U	0.50	ug/L	1	1	1.0	0.23	0.50
1,1,2,2-Tetrachloroethane	U	0.50	ug/L	1	1	1.0	0.38	0.50
1,3-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.26	0.50
1,4-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.24	0.50
1,2-Dichlorobenzene	U	0.50	ug/L	1	1	1.0	0.15	0.50
1,2-Dibromo-3-Chloropropane	U	1.0	ug/L	1	2	2.0	0.50	1.0
1,2,4-Trichlorobenzene	U	0.50	ug/L	1	1	1.0	0.37	0.50
Methyl Acetate	U	0.75	ug/L	1	1	1.0	0.53	0.75
Methylcyclohexane	U	0.50	ug/L	1	1	1.0	0.30	0.50
P-Bromofluorobenzene		88.4	%					
luene-d8	*	83.6	%					
1,2-Dichloroethane-d4	*	121.	%					
Dibromofluoromethane		96.4	%					

600 Technology Way
P.O. Box 540, Scarborough, ME 04070
Tel:(207) 874-2400 Fax:(207) 775-4029

http://www.katahdinlab.com

APPENDIX C

SUPPORT DOCUMENTATION

EPA-NE
Data Validation Worksheet Cover Page - Page 1

Site Name FS Support, Site 16, Davisville
Reference No. CTO WES1

REGION I ORGANIC DATA VALIDATION

The following data package has been validated:

Lab Name Katahdin
Case/Project No. GD2584
SDG No. WES1-25
No. of Samples/Matrix AQ

SOW/Method No. WC 8260B
Sampling Date(s) 6/8/11 - 6/9/11
Shipping Date(s)
Date Rec'd by lab 6/10/11

Traffic Report Sample Nos. See following pages

Trip Blank No.
Equipment Blank No.
Bottle Blank No
Field Duplicate Nos. TW16-24-060811/FD060811-01
PES Nos.

The Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, revision Dec 96 was used to evaluate the data and/or approved modifications to the EPA-NE Functional Guidelines were used to evaluate the data and are attached to this cover page: (attach modified criteria from EPA approved QAPjP or amendment to QAPjP).

A Tier II or Tier III evaluation was used to validate the data (circle one). If a Tier II validation with a partial Tier III was used, then identify samples, parameters, etc. that received partial Tier III validation Draft Final Sampling and Analysis Plan to Support the Feasibility Study for Site 16, Former Naval Construction Battalion Center Davisville, North Kingstown RI April 2010

The data were evaluated based upon the following parameters:

- Overall Evaluation of Data
- Data Completeness (CSF Audit - Tier I)
- Preservation & Technical Holding Times
- GC/MS & GC/ECD Instrument Performance Check
- Initial & Continuing Calibrations
- Blanks
- Surrogate Compounds
- Internal Standards
- Matrix Spike/Matrix Spike Duplicate
- Field Duplicates
- Sensitivity Check
- PE Samples/Accuracy Check
- Target Compound Identification
- Compound Quantitation and Reported Quantitation Limits
- TICs
- Semivolatile and Pesticide/PCB Cleanup
- System Performance

Region I Definitions and Qualifiers:

A - Acceptable Data
J - Numerical value associated with compound is an estimated quantity.
R - The data are rejected as unusable. The R replaces the numerical value or sample quantitation limit.
U - Compound not detected at that numerical sample quantitation limit.
UJ - The sample quantitation limit is an estimated quantity.
TB, BB, EB - Compound detected in aqueous trip blank, bottle blank, or equipment blank associated with soil/sediment samples.

Validator's Name J. Cardinal Company Name TtNUS Phone Number

Date Validation Started Date Validation Completed

Katahdin ANALYTICAL SERVICES
600 Technology Way
Scarborough, ME 04074
Tel: (207) 874-2400
Fax: (207) 775-4029

CHAIN of CUSTODY

PLEASE BEAR DOWN AND PRINT LEGIBLY IN PEN

Client: Tetra Tech NUS | Contact: Lee Ann Sinagoga | Phone #: (412) 921-8887 | Fax #: (412) 921-4040

Address: 661 Andersen Drive Foster Plaza Bldg 7 | City: Pittsburgh | State: PA | Zip Code: 15220

Purchase Order #: | Proj. Name / No.: Davisville / 112G02584 | Katahdin Quote #:

Bill (if different than above): — | Address: —

Sampler (Print / Sign): Scott R. Anderson Scott R. Anderson | Copies To: Kelly Perkins

LAB USE ONLY | WORK ORDER #: | KATAHDIN PROJECT NUMBER: SE3328

REMARKS:

SHIPPING INFO: ☐ FED EX ☐ UPS ☐ CLIENT

AIRBILL NO:

TEMP°C ____ ☐ TEMP BLANK ☐ INTACT ☐ NOT INTACT

ANALYSIS AND CONTAINER TYPE PRESERVATIVES

*	Sample Description	Date / Time coll'd	Matrix	No. of Cntrs.	VOCs by 8260B (see Project Req.) Filt. ☐Y ☒N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N	Filt. ☐Y ☐N
	TW16-24-060811	6/8/11/1430	Water	3	X									
	TW16-25-060811	6/8/11/1550	↓	3	X									
	TW16-27-060811	6/8/11/1710	↓	3	X									
	TW16-26-060911	6/9/11/1355	↓	3	X									
*	MW16-93S-060911	6/9/11/1510	↓	9	X									
	FD060811-01	— / —	↓	3	X									
	TB16-GW-060811	6/8/11/1200	DI Water	3	X									
		/												
		/												
		/												
		/												
		/												
		/												
		/												
		/												
		/												

COMMENTS
* Run MS/MSD on MW16-93S-060911 / TB Date of 6/1/11 @ 15:55 (Time above in chain when added)

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
Scott Anderson	06/10/11 11:11	Mike [illegible]			
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Relinquished By: (Signature)	Date / Time	Received By: (Signature)
					0000007

THE TERMS AND CONDITIONS ON THE REVERSE SIDE HEREOF SHALL GOVERN SERVICES, EXCEPT WHEN A SIGNED CONTRACTUAL AGREEMENT EXISTS.

ORIGINAL

Cardinal, Jennifer

From: Anderson, Scott
Sent: Monday, July 18, 2011 1:23 PM
To: Cardinal, Jennifer; Samchuck, Joseph
Subject: RE: DAVISVILLE FIELD DUPLICATES

Hi Jennifer and Joe,

FD060811-01 = TW16-24-060811

It was sampled on 6/8/11 (as was TW16-24).

Thanks,

Scott

From: Cardinal, Jennifer
Sent: Monday, July 18, 2011 12:40 PM
To: Samchuck, Joseph; Anderson, Scott
Subject: RE: DAVISVILLE FIELD DUPLICATES

Scott,
Also, please confirm that this field dups was collected 6/8/11 (the laboratory logged it in with the sample date 6/9/11).
Thanks
Jen

Jennifer R. Cardinal | Chemist
Direct: 518.695 3092 x313 | Fax: 518.695.3096
jennifer.cardinal@tetratech.com

Tetra Tech | 12 Spring Street, Suite 102 | Schuylerville, NY 12871 | www.tetratech.com

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From: Samchuck, Joseph
Sent: Monday, July 18, 2011 9:27 AM
To: Anderson, Scott
Cc: Cardinal, Jennifer
Subject: DAVISVILLE FIELD DUPLICATES

Hi Scott,

Please identify the field duplicate of the sample below.

FD060811-01

Thanks.

Joe

Joseph Samchuck | **Senior Chemist/Environmental Scientist**
Direct: 412.921.8510 | Personal Fax: 412.921.4040
joseph.samchuck@tetratech.com

Tetra Tech
661 Andersen Drive Foster Plaza 7 | Pittsburgh, PA 15220 | www.tetratech.com

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EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB

COMPLETE SDG FILE (CSF) AUDIT

Organic Fractions:_____

Missing Information	Date Lab Contacted	Date Received
"TW" = temporary well/piezometer (per SAP)		
See following pages →		

Validator: _____ Date: _____

Cardinal, Jennifer

From: Cardinal, Jennifer
Sent: Monday, July 18, 2011 12:42 PM
To: 'Kelly Perkins'
Cc: 'Deb Nadeau'
Subject: WE51-25

Kelly,
In SDG WE51-25 sample MW16-93S-060911 was logged in as MW16-93S-0060911. Also, sample TW16-26-060911 was logged in as TW16-26-**060811**. Please correct all affected forms to show the correct sample IDs.

Also, could you please clarify how much surrogate was added to the VOC samples?

Thanks
Jennifer

Jennifer R. Cardinal | Chemist
Direct: 518.695.3092 x313 | Fax: 518.695.3096
jennifer.cardinal@tetratech.com

Tetra Tech | 12 Spring Street, Suite 102 | Schuylerville, NY 12871 | www.tetratech.com

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Cardinal, Jennifer

From: Cardinal, Jennifer
Sent: Monday, July 18, 2011 1:35 PM
To: 'Kelly Perkins'
Cc: 'Deb Nadeau'
Subject: WE51-25 #2

Kelly,
Also in WE51-25, sample FD060811-01 was logged in with the sample date 6/9/11 while the correct sample date is 6/8/11. Please correct all affected forms.
Thanks
Jen

Jennifer R. Cardinal | Chemist
Direct: 518.695.3092 x313 | Fax: 518.695.3096
jennifer.cardinal@tetratech.com

Tetra Tech | 12 Spring Street, Suite 102 | Schuylerville, NY 12871 | www.tetratech.com

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Cardinal, Jennifer

From: Peter Lemay [plemay@katahdinlab.com]
Sent: Tuesday, July 19, 2011 1:51 PM
To: 'Deb Nadeau'; Cardinal, Jennifer
Cc: jobrin@katahdinlab.com; 'Kelly Perkins'
Subject: RE: WE51-25
Attachments: Reissue WE51-25.pdf

Resubmittal received
TEMS
7/19/11

Jennifer,

Attached are the forms for the samples that were corrected (SE3328-4, 5, and 6).

Also, concerning the surrogate amount, 10ug/L is added for a 25mL purge. ✓

Let us know if you need more information.

Peter Lemay
Organics Department Manager
Katahdin Analytical Services
600 Technology Way
Scarborough, ME 04074
Phone (207) 874-2400
Fax (207) 775-4029
plemay@katahdinlab.com

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From: Deb Nadeau [mailto:dnadeau@katahdinlab.com]
Sent: Monday, July 18, 2011 2:28 PM
To: 'Peter Lemay'; jsampson@katahdinlab.com; dpaul@katahdinlab.com; tcote@katahdinlab.com
Cc: jobrin@katahdinlab.com
Subject: FW: WE51-25

Samples SE3328-4 and -5 were logged in with incorrect client IDs. I have made the corrections in KIMs. Please reprint all affected forms. Could somebody also let me know the answer to the surrogate question below.

Thanks,
Deb

Deborah Nadeau
Laboratory Operations Manager
Katahdin Analytical Services
A Woman-Owned Small Business Enterprise
600 Technology Way
Scarborough, Maine 04074
Direct - 207.874.2400 x19
Fax - 207.775.4029
www.katahdinlab.com

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From: Cardinal, Jennifer [mailto:Jennifer.Cardinal@tetratech.com]
Sent: Monday, July 18, 2011 12:42 PM
To: Kelly Perkins
Cc: 'Deb Nadeau'
Subject: WE51-25

Kelly,
In SDG WE51-25 sample MW16-93S-060911 was logged in as MW16-93S-**0**060911. Also, sample TW16-26-060911 was logged in as TW16-26-**060811**. Please correct all affected forms to show the correct sample IDs.

Also in WE51-25, sample FD060811-01 was logged in with the sample date 6/9/11 while the correct sample date is 6/8/11. Please correct all affected forms.

Also, could you please clarify how much surrogate was added to the VOC samples?
Thanks
Jennifer

Jennifer R. Cardinal | Chemist
Direct: 518.695.3092 x313 | Fax: 518.695.3098
jennifer.cardinal@tetratech.com

Tetra Tech | 12 Spring Street, Suite 102 | Schuylerville, NY 12871 | www.tetratech.com

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No virus found in this incoming message.
Checked by AVG - www.avg.com
Version: 9.0.901 / Virus Database: 271.1.1/3771 - Release Date: 07/18/11 02:34:00

No virus found in this message.
Checked by AVG - www.avg.com
Version: 10.0.1390 / Virus Database: 1518/3774 - Release Date: 07/19/11

SAP Worksheet #28c - Laboratory QC Samples Table - Katahdin

(UFP-QAPP Manual Section 3.4)

Matrix	Water/Soil
Analytical Group	Volatiles
Analytical Method/ SOP Reference	SW-846 8260B/Katahdin SOP CA-202

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	One per batch of 20 or less.	No target compounds should be greater than ½ the QL except common lab contaminants, which should be < the QL.	Investigate source of contamination. Rerun method blank prior to analysis of samples if possible. Evaluate the samples and associated QC: if blank results are above QL, report sample results which are < QL or > 10X the blank concentration. Reanalyze blank and samples >QL and < 10X the blank.	Analyst, Laboratory Supervisor, and Data Validator	Bias/Contamination	No target compounds should be greater than ½ the QL except common lab contaminants, which should be < the QL.
Surrogate	Four per sample	Percent recoveries: Water: Dibromofluoromethane 78-116% 1,2-dichloroethane-d4 70-124% Toluene-d8 70-123% Bromofluorobenzene 69-119% Soil: Dibromofluoromethane 67-118% 1,2-dichloroethane-d4 55-148% Toluene-d8 71-102% Bromofluorobenzene 53-122%	If sample volume available and within hold time, reanalyze.	Analyst, Laboratory Supervisor and Data Validator	Accuracy/Bias	Percent recoveries: Water: Dibromofluoromethane 78-116% 1,2-dichloroethane-d4 70-124% Toluene-d8 70-123% Bromofluorobenzene 69-119% Soil: Dibromofluoromethane 67-118% 1,2-dichloroethane-d4 55-148% Toluene-d8 71-102% Bromofluorobenzene 53-122%

Matrix	Water/Soil
Analytical Group	Volatiles
Analytical Method/ SOP Reference	SW-846 8260B/Katahdin SOP CA-202

lab uses QSM recovery limits (ok)

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per batch of 20 or less.	Recovery must be within Katahdin Analytical Services statistically derived limits which are provided in Appendix C.	Evaluate and reanalyze if possible. If an MS/MSD was performed in the same 12 hour clock and acceptable, narrate. If the LCS recoveries are high but the sample results are <QL, then narrate; otherwise, re-prepare and reanalyze.	Analyst, Laboratory Supervisor, and Data Validator	Precision/Accuracy/ Bias	Recovery must be within Katahdin Analytical Services statistically derived limits.
IS	Four per sample- Pentafluorobenzene, Chlorobenzene-d5, 1,4-dichlorobezene-d4, and 1,4-Difluorobenzene	Retention times for internal standards must be ± 30 seconds and the responses within -50% to +100% of last calibration verification (12 hours) for each internal standard.	Inspect mass spectrometer or gas chromatograph for malfunctions; mandatory reanalysis of samples analyzed while system was malfunctioning.	Analyst, Laboratory Supervisor, and Data Validator	Precision/Accuracy/ Bias	Retention times for internal standards must be ± 30 seconds and the responses within -50% to +100% of last calibration verification (12 hours) for each internal standard.
MS/MSD	One per sample delivery group (SDG) or every 20 samples.	Recovery should be within Katahdin Analytical Services statistically derived limits which are provided in Appendix C. Water Precision RPD ≤ 20% Soil Precision RPD ≤ 30%	Corrective actions will not be taken for samples when recoveries are outside limits and surrogate and LCS criteria are met. If both the LCS and MS/MSD are unacceptable, re-prepare the samples and QC.	Analyst, Laboratory Supervisor, and Data Validator	Precision/Accuracy/ Bias	Recovery should be within Katahdin Analytical Services statistically derived limits. Water Precision RPD ≤ 20% Soil Precision RPD ≤ 30%

TETRA TECH NUS, INC. **RECORD OF REVIEW**

1. TITLE AS IT APPEARS ON THE DOCUMENT – (See instruction #1 on reverse for definition of Documents):

DV Memo to Lee Ann Sinagoga, CTO WE51, Feasibility Study Support, Site 16, Former Naval Construction Battalion Center Davisville, North Kingstown, Rhode Island

Tier III Organic Data Validation, SDG WE51-25

2. DATE OF DOCUMENT: DOCUMENT CONTROL No.:

AUTHORS: **J. Cardinal** TtNUS JOB CHARGE No.: **112G02584-SA.DV**

TYPE (DRAFT, DRAFT FINAL, FINAL): **Final** SUBMITTAL DATE:

3. REVIEWER AND STATUS REVIEWERS ASSIGNED BY: Date

Assigned Reviewer (See Instruction #3)	Disapproval		Approved with Suggestions		Reviewer Requires Final Verification		Approved By	
	Initials	(Date)	Initials	(Date)	Initials	(Date)	Initials	(Date)
a)								
b)								
c)								
d)								

4. COMMENTS (Explain conditions and comments, or state where comments and edits are provided. Attach additional pages as needed):

5. AUTHOR COMMENTS/RESOLUTION:

6. APPROVAL FOR TRANSMITTAL:

_____ DATE: _____

See #7 on Reverse for Authority to Approve Transmittals

FORM 2
WATER VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: NCBC DAVISVILLE CTO WE51 SDG No.: WE51-25

	CLIENT SAMPLE ID	LAB SAMPLE ID	SMC1 DBF#	SMC2 DCA#	SMC3 TOL#	SMC4 BFB#	TOT OUT
01	WG93091-LCS	WG93091-1	101	103	94	93	0
02	WG93091-BLANK	WG93091-2	88	93	82*	84	1
03	TB16-GW-060811	SE3328-7	92	99	80*	81	1
04	TW16-24-060811	SE3328-1	98	117	85	91	0
05	TW16-25-060811	SE3328-2	99	117	84*	91	1
06	TW16-27-060811	SE3328-3	96	121*	84*	88	2
07	TW16-26-060911	SE3328-4	106	126*	85	94	1
08	FD060811-01	SE3328-6	103	124*	81*	91	2
09	WG93118-LCS	WG93118-1	101	109	95	95	0
10	WG93118-BLANK	WG93118-2	97	108	86	89	0
11	MW16-93S-060911	SE3328-5	90	107	85	78	0
12	MW16-93S-0060911MS	WG93118-3	93	111	84*	86	1
13	MW16-93S-0060911MSD	WG93118-4	93	102	89	86	0
14							
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28							

		QC LIMITS
SMC1 (DBF)	= Dibromofluoromethane	(85-115)
SMC2 (DCA)	= 1,2-Dichloroethane-D4	(70-120)
SMC3 (TOL)	= Toluene-D8	(85-115)
SMC4 (BFB)	= P-Bromofluorobenzene	(75-120)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D System Monitoring Compound diluted out

FORM 4
VOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG93091-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: NCBC DAVISVILLE CTO WE51 SDG No.: WE51-25

Lab File ID: S4448 Lab Sample ID: WG93091-2

Date Analyzed: 06/20/11 Time Analyzed: 1729

GC Column: RTX-VMS ID: 0.18 (mm) Heated Purge: (Y/N) N

Instrument ID: GCMS-S

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG93091-LCS	WG93091-1	S4446	06/20/11	1607
02	TB16-GW-060811	SE3328-7	S4449	06/20/11	1807
03	TW16-24-060811	SE3328-1	S4452	06/20/11	1957
04	TW16-25-060811	SE3328-2	S4453	06/20/11	2033
05	TW16-27-060811	SE3328-3	S4454	06/20/11	2110
06	TW16-26-060911	SE3328-4	S4455	06/20/11	2146
07	FD060811-01	SE3328-6	S4456	06/20/11	2223
08					
09					
10					
11					
12					
13					
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29					
30					

COMMENTS:

FORM IVVOA

FORM 4
VOLATILE METHOD BLANK SUMMARY

CLIENT SAMPLE ID

WG93118-BLANK

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: NCBC DAVISVILLE CTO WE51 SDG No.: WE51-25

Lab File ID: S4463 Lab Sample ID: WG93118-2

Date Analyzed: 06/21/11 Time Analyzed: 1156

GC Column: RTX-VMS ID: 0.18 (mm) Heated Purge: (Y/N) N

Instrument ID: GCMS-S

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS and MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	WG93118-LCS	WG93118-1	S4461	06/21/11	1024
02	MW16-93S-060911	~~SE3328-5~~	~~S4467~~	06/21/11	1531
03	MW16-93S-060911MS	WG93118-3	S4468	06/21/11	1607
04	MW16-93S-060911MSD	WG93118-4	S4469	06/21/11	1644
05					
06					
07					
08					
09					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
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29					
30					

COMMENTS:

FORM IVVOA

FORM 5
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: NCBC DAVISVILLE CTO WE51 SDG No.: WE51-25

Lab File ID: SB084 BFB Injection Date: 06/20/11

Instrument ID: GCMS-S BFB Injection Time: 1141

GC Column: RTX-VMS ID: 0.18 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	17.9
75	30.0 - 60.0% of mass 95	39.4
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	6.6
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	Greater than 50.0% of mass 95	80.4
175	5.0 - 9.0% of mass 174	5.0 (6.2)1
176	95.0 - 101.0% of mass 174	78.9 (98.2)1
177	5.0 - 9.0% of mass 176	5.2 (6.6)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01		VSTD040S20A	S4440	06/20/11	1208
02		VSTD020S20A	S4441	06/20/11	1245
03		VSTD010S20A	S4442	06/20/11	1322
04		VSTD005S20A	S4443	06/20/11	1400
05		VSTD002S20A	S4444	06/20/11	1438
06		VSTD001S20A	S4445	06/20/11	1514
07	WG93091-LCS	WG93091-1	S4446	06/20/11	1607
08		IND CHECK	S4446A	06/20/11	1607
09	WG93091-BLANK	WG93091-2	S4448	06/20/11	1729
10	TB16-GW-060811	SE3328-7	S4449	06/20/11	1807
11	TW16-24-060811	SE3328-1	S4452	06/20/11	1957
12	TW16-25-060811	SE3328-2	S4453	06/20/11	2033
13	TW16-27-060811	SE3328-3	S4454	06/20/11	2110
14	TW16-26-060911	SE3328-4	S4455	06/20/11	2146
15	FD060811-01	SE3328-6	S4456	06/20/11	2223
16					
17					
18					
19					
20					
21					
22					

FORM V VOA

SAP Worksheet #24c - Analytical Instrument Calibration Table - Katahdin

(UFP-QAPP Manual Section 3.2.2)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC/MS - VOCs	Initial Calibration - Six-point initial calibration for all analytes.	Instrument receipt, instrument change (new column, source cleaning, etc.), when CCV is out of criteria.	System Performance Check Compound (SPCCs) average Response Factors (RFs) ≥0.30, except chloromethane, 1,1-Dichloroethane and bromoform ≥0.10; Percent Relative Standard Deviation (%RSD) for RFs ≤ 30% for Calibration Check Compound (CCCs) and: RSD < 15% for all compounds. If not met: Option 1) Linear least squares regression: r ≥ 0.995 Option 2) Non-linear regression: coefficient of determination (COD) r^2 ≥ 0.99 (6 points for second order)	Repeat calibration if criterion is not met.	Analyst, Supervisor	CA-202
	ICV	After each initial calibration.	Recovery within 80-120%.	Correct problem and verify second source standard. Reanalyze initial calibration.	Analyst, Supervisor	
	CCV	At the beginning of each 12 hour shift immediately after BFB tune.	CCCs ≤ 20%D (D = Difference or Drift); SPCCs RF ≥0.10 & 0.30 RRF >0.01.	Repeat initial calibration and reanalyze all samples analyzed since the last successful calibration verification.	Analyst, Supervisor	
	BFB Tune	Every 12 hours.	Criteria listed in section 7.3 current revision of SOP CA-202.	Retune and/or clean source.	Analyst, Supervisor	

FORM 5
VOLATILE ORGANIC INSTRUMENT PERFORMANCE CHECK
BROMOFLUOROBENZENE (BFB)

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: NCBC DAVISVILLE CTO WE51 SDG No.: WE51-25

Lab File ID: SB085 BFB Injection Date: 06/21/11

Instrument ID: GCMS-S BFB Injection Time: 0817

GC Column: RTX-VMS ID: 0.18 (mm) Heated Purge: (Y/N) N

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	24.5
75	30.0 - 60.0% of mass 95	48.8
95	Base Peak, 100% relative abundance	100.0
96	5.0 - 9.0% of mass 95	6.9
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	Greater than 50.0% of mass 95	77.1
175	5.0 - 9.0% of mass 174	4.3 (5.6)1
176	95.0 - 101.0% of mass 174	75.4 (97.7)1
177	5.0 - 9.0% of mass 176	4.1 (5.4)2

1-Value is % mass 174 2-Value is % mass 176

THIS CHECK APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	CLIENT SAMPLE ID	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01		VSTD010S21B	S4460	06/21/11	0936
02	WG93118-LCS	WG93118-1	S4461	06/21/11	1024
03	WG93118-BLANK	WG93118-2	S4463	06/21/11	1156
04	MW16-93S-060911	SE3328-5	S4467	06/21/11	1531
05	MW16-93S-060911MS	WG93118-3	S4468	06/21/11	1607
06	MW16-93S-060911MSD	WG93118-4	S4469	06/21/11	1644
07					
08					
09					
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14					
15					
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17					
18					
19					
20					
21					
22					

FORM V VOA

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: NCBC DAVISVILLE CTO WE51 SDG No.: WE51-25

Instrument ID: GCMS-S Calibration Date: 06/21/11 Time: 0936

Lab File ID: S4460 Init. Calib. Date(s): 06/20/11 06/20/11

Init. Calib. Times: 1208 1514

GC Column: RTX-VMS ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF10.000 or AMOUNT	CCAL RRF10.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE
Dichlorodifluoromethane	0.6640000	0.7636700	0.7636700	0.01	15.01		AVRG
Chloromethane	12.092000	10.000000	1.2194000	0.1	20.92		2RDR
Vinyl chloride	0.8440000	1.0043000	1.0043000	0.01	18.99	20.00	AVRG
Bromomethane	0.2920000	0.3591200	0.3591200	0.01	22.99		AVRG
Chloroethane	0.3080000	0.3804800	0.3804800	0.01	23.53		AVRG
Trichlorofluoromethane	0.7360000	0.8435000	0.8435000	0.01	14.61		AVRG
1,1-Dichloroethene	0.6380000	0.6803200	0.6803200	0.1	6.63	20.00	AVRG
Carbon Disulfide	2.2200000	2.4666000	2.4666000	0.01	11.11		AVRG
Freon-113	0.3880000	0.3470900	0.3470900	0.01	-10.54		AVRG
Methylene Chloride	0.6060000	0.6033500	0.6033500	0.01	-0.44		AVRG
Acetone	4.2e-002	5.51e-002	5.51e-002	0.01	31.19		AVRG
trans-1,2-Dichloroethene	0.7780000	0.8045800	0.8045800	0.01	3.42		AVRG
Methyl tert-butyl ether	0.6460000	0.6877000	0.6877000	0.01	6.46		AVRG
1,1-Dichloroethane	1.2160000	1.3678000	1.3678000	0.1	12.48		AVRG
cis-1,2-Dichloroethene	0.7030000	0.7057200	0.7057200	0.01	0.39		AVRG
Chloroform	0.9780000	1.1042000	1.1042000	0.01	12.90	20.00	AVRG
1,1,1-Trichloroethane	0.8570000	0.9921600	0.9921600	0.01	15.77		AVRG
2-Butanone	7.1e-002	8.26e-002	8.26e-002	0.01	16.34		AVRG
Cyclohexane	1.0670000	1.2683000	1.2683000	0.01	18.87		AVRG
Carbon Tetrachloride	0.3920000	0.4478600	0.4478600	0.01	14.25		AVRG
Benzene	1.5450000	1.5529000	1.5529000	0.01	0.51		AVRG
1,2-Dichloroethane	0.2440000	0.2779000	0.2779000	0.01	13.89		AVRG
Trichloroethene	0.4110000	0.4149900	0.4149900	0.01	0.97		AVRG
1,2-Dichloropropane	0.3360000	0.3447300	0.3447300	0.01	2.60	20.00	AVRG
Bromodichloromethane	0.3500000	0.3608900	0.3608900	0.01	3.11		AVRG
cis-1,3-dichloropropene	0.4120000	0.4140800	0.4140800	0.01	0.50		AVRG
Toluene	0.8500000	0.8674700	0.8674700	0.01	2.06	20.00	AVRG
4-methyl-2-pentanone	9.4e-002	0.1064300	0.1064300	0.01	13.22		AVRG
trans-1,3-Dichloropropene	0.2420000	0.2601700	0.2601700	0.01	7.51		AVRG

FORM VII PEST

FORM 7B
VOLATILE CALIBRATION VERIFICATION SUMMARY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: NCBC DAVISVILLE CTO WE51 SDG No.: WE51-25

Instrument ID: GCMS-S Calibration Date: 06/21/11 Time: 0936

Lab File ID: S4460 Init. Calib. Date(s): 06/20/11 06/20/11

Init. Calib. Times: 1208 1514

GC Column: RTX-VMS ID: 0.18 (mm)

COMPOUND	RRF or AMOUNT	RRF10.000 or AMOUNT	CCAL RRF10.000	MIN RRF	%D or %DRIFT	MAX %D or %DRIFT	CURV TYPE	
1,1,2-Trichloroethane	0.1230000	0.1280400	0.1280400	0.01	4.10		AVRG	
Tetrachloroethene	0.4280000	0.4053100	0.4053100	0.01	-5.30		AVRG	
Dibromochloromethane	0.2700000	0.2592200	0.2592200	0.01	-3.99		AVRG	
1,2-Dibromoethane	0.1490000	0.1434400	0.1434400	0.01	-3.73		AVRG	
2-Hexanone	9.3e-002	0.1045300	0.1045300	0.01	12.40		AVRG	
Chlorobenzene	1.1170000	1.0869000	1.0869000	0.3	-2.69		AVRG	
Ethylbenzene	0.6400000	0.6499400	0.6499400	0.01	1.55	20.00	AVRG	
Xylenes (total)	0.0000000	0.7398500	0.7398500	0.01	0.00		AVRG	<-
Styrene	1.0850000	1.0848000	1.0848000	0.01	-0.02		AVRG	
Bromoform	0.1220000	0.1186800	0.1186800	0.1	-2.72		AVRG	
Isopropylbenzene	4.2230000	4.3584000	4.3584000	0.01	3.21		AVRG	
1,1,2,2-Tetrachloroethane	0.4350000	0.4582400	0.4582400	0.3	5.34		AVRG	
1,3-Dichlorobenzene	1.7820000	1.7006000	1.7006000	0.01	-4.57		AVRG	
1,4-Dichlorobenzene	1.6540000	1.6149000	1.6149000	0.01	-2.36		AVRG	
1,2-Dichlorobenzene	1.3720000	1.3398000	1.3398000	0.01	-2.35		AVRG	
1,2-Dibromo-3-Chloropropane	5.5e-002	6.02e-002	6.02e-002	0.01	9.45		AVRG	
1,2,4-Trichlorobenzene	0.6890000	0.6802800	0.6802800	0.01	-1.26		AVRG	
Methyl Acetate	0.1270000	0.1219000	0.1219000	0.01	-4.02		AVRG	
Methylcyclohexane	0.8800000	0.9014900	0.9014900	0.01	2.44		AVRG	
Dibromofluoromethane	0.5700000	0.5619800	0.5619800	0.01	-1.41		AVRG	
1,2-Dichloroethane-D4	0.3300000	0.3646400	0.3646400	0.01	10.50		AVRG	
Toluene-D8	1.2630000	1.1704000	1.1704000	0.01	-7.33		AVRG	
P-Bromofluorobenzene	0.3830000	0.3581700	0.3581700	0.01	-6.48		AVRG	

FORM VII PEST

FORM 8
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: NCBC DAVISVILLE CTO WE51 SDG No.: WE51-25

Lab File ID (Standard): S4442 Date Analyzed: 06/20/11

Instrument ID: GCMS-S Time Analyzed: 1322

GC Column: RTX-VMS ID: 0.18 (mm) Heated Purge: (Y/N) N

		IS1(PFB) AREA #	RT #	IS2(DFB) AREA #	RT #	IS3(CBZ) AREA #	RT #
12 HOUR STD		517946	10.11	813884	10.75	582359	14.29
UPPER LIMIT		1035892	10.61	1627768	11.25	1164718	14.79
LOWER LIMIT		258973	9.61	406942	10.25	291180	13.79
CLIENT SAMPLE ID	LAB SAMPLE ID						
01 WG93091-LCS	WG93091-1	487107	10.10	779702	10.74	546687	14.29
02 WG93091-BLANK	WG93091-2	488969	10.10	792948	10.74	537663	14.29
03 TB16-GW-060811	SE3328-7	453107	10.11	755822	10.75	512423	14.29
04 TW16-24-060811	SE3328-1	389257	10.10	641027	10.74	460173	14.29
05 TW16-25-060811	SE3328-2	376783	10.10	628379	10.74	447937	14.29
06 TW16-27-060811	SE3328-3	375492	10.11	613352	10.75	435132	14.29
07 TW16-26-060911	SE3328-4	356390	10.11	596434	10.75	428253	14.29
08 FD060811-01	SE3328-6	345927	10.10	589515	10.74	422579	14.29
09	VSTD010S21B	421728	10.10	700671	10.74	500815	14.29
10 WG93118-LCS	WG93118-1	450745	10.10	730061	10.74	514254	14.29
11 WG93118-BLANK	WG93118-2	444289	10.11	738147	10.75	517453	14.28
12 MW16-93S-060911	SE3328-5	418740	10.10	711774	10.74	487233	14.29
13 MW16-93S-060911MS	WG93118-3	384952	10.11	666258	10.75	469358	14.29
14 MW16-93S-060911MSD	WG93118-4	416379	10.11	694795	10.75	493052	14.29
15							
16							
17							
18							
19							
20							

IS1 (PFB) = Pentafluorobenzene
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-D5

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

FORM VIII VOA

FORM 8
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: KATAHDIN ANALYTICAL SERVICES Lab Code: KAS

Project: NCBC DAVISVILLE CTO WE51 SDG No.: WE51-25

Lab File ID (Standard): S4442 Date Analyzed: 06/20/11

Instrument ID: GCMS-S Time Analyzed: 1322

GC Column: RTX-VMS ID: 0.18 (mm) Heated Purge: (Y/N) N

		IS4(DCB) AREA #	RT #	AREA #	RT #	AREA #	RT #
12 HOUR STD		244547	17.46				
UPPER LIMIT		489094	17.96				
LOWER LIMIT		122274	16.96				
CLIENT SAMPLE ID	LAB SAMPLE ID						
01 WG93091-LCS	WG93091-1	223644	17.46				
02 WG93091-BLANK	WG93091-2	234684	17.46				
03 TB16-GW-060811	SE3328-7	228147	17.46				
04 TW16-24-060811	SE3328-1	206877	17.46				
05 TW16-25-060811	SE3328-2	196805	17.46				
06 TW16-27-060811	SE3328-3	190045	17.46				
07 TW16-26-060911	SE3328-4	188896	17.46				
08 FD060811-01	SE3328-6	189724	17.46				
09	VSTD010S21B	206932	17.46				
10 WG93118-LCS	WG93118-1	213652	17.46				
11 WG93118-BLANK	WG93118-2	218882	17.46				
12 MW16-93S-060911	SE3328-5	199586	17.46				
13 MW16-93S-060911MS	WG93118-3	205569	17.46				
14 MW16-93S-060911MSD	WG93118-4	210331	17.46				
15							
16							
17							
18							
19							
20							

IS4 (DCB) = 1,4-Dichlorobenzene-D4

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

FORM VIII VOA

EPA-NE - Data Validation 12/96
VOA/SV - Pest/PCB-I

AQ samples - WC - 14 days to analysis
pH < 2
4°C ± 2°C

Sampler:_____ Company:_____ Contacted: Yes No Date:_____

I. **PRESERVATION AND HOLDING TIMES** - Circle sample numbers with exceeded technical holding times or omitted preservation.
List all required preservation codes and circle omitted preservation codes.
Circle all exceeded technical holding times.
Identify extraction technique after "# of Days"/(*Extraction Code).

Sample No (TR No.)	Matrix	Pres. Code	Date Sampled	VOA			BNA					PEST/PCB				
				Date Analyzed	# of Days from Samp. to Anal.	Action	Date Extracted	# of Days from Samp. to Extr./(*)	Date Analyzed	# of Days from Extr. to Anal.	Action	Date Extracted	# of Days from Samp. to Extr./(*)	Date Analyzed	# of Days from Extr. to Anal.	Action
TW16-24-060811	AQ	1,2,3	6/8/11	6/20/11	12	none										
TW16-25-060811					12											
TW16-27-060811					12											
TW16-26-060911			6/9/11		11											
MW16-93S-060911			6/9/11	6/21/11	12											
FD060811-01			6/8/11	6/20/11	12											
TB16-GW-060811	TB		6/8/11		12											

Preservation Code:
1. Cool @ 4°C (± 2°) ✓
2. Preserve with HCl to at least pH 2 ____
3. Protect from light
4. Freeze
5. Room Temperature (Avoid excessive heat)
6. Methanol

(*Extraction Code:)
L/L - Liquid/Liquid
SON - Sonication
SEP - Separatory Funnel
SOX - Soxhlet
SPE - Solid Phase Extraction

Action Code:
J - Estimate (J) Detected Values
UJ - Estimate (UJ) Non-Detected Values
R - Reject (R) Non-Detected Values

Cooler temperatures: 2.8°C

SAP Worksheet #24c - Analytical Instrument Calibration Table - Katahdin

(UFP-QAPP Manual Section 3.2.2)

Professional judgment to apply RRF > 0.01 for all other compounds

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC/MS - VOCs	Initial Calibration - Six-point initial calibration for all analytes.	Instrument receipt, instrument change (new column, source cleaning, etc.), when CCV is out of criteria.	System Performance Check Compound (SPCCs) average Response Factors (RFs) ≥0.30, except chloromethane, 1,1-Dichloroethane and bromoform ≥0.10; Percent Relative Standard Deviation (%RSD) for RFs ≤ 30% for Calibration Check Compound (CCCs) and: RSD < 15% for all compounds. If not met: Option 1) Linear least squares regression: r ≥ 0.995 Option 2) Non-linear regression: coefficient of determination (COD) r^2 ≥ 0.99 (6 points for second order)	Repeat calibration if criterion is not met.	Analyst, Supervisor	CA-202
	ICV	After each initial calibration.	Recovery within 80-120%.	Correct problem and verify second source standard. Reanalyze initial calibration.	Analyst, Supervisor	
	CCV	At the beginning of each 12 hour shift immediately after BFB tune.	CCCs ≤ 20%D (D = Difference or Drift); SPCCs RF ≥0.10 & 0.30 * RRF >0.01.	Repeat initial calibration and reanalyze all samples analyzed since the last successful calibration verification.	Analyst, Supervisor	
	BFB Tune	Every 12 hours.	Criteria listed in section 7.3 current revision of SOP CA-202.	Retune and/or clean source.	Analyst, Supervisor	

SPCC
chloromethane
1,1 DCA
bromoform
chlorobenzene
1,1,2,2 tetrachloroethane

CCC
1,1 DCE
chloroform
1,2 dichloropropane
toluene
ethylbenzene
vinyl chloride

* Professional Judgment to apply %D < 25 for all other compounds per Region 1 DV guidelines

met criteria

II. GC/MS INSTRUMENT PERFORMANCE CHECK (TUNING)

List all Instrument Performance Checks that are outside method QC tuning acceptance criteria.

Volatile Instrument Performance Check (Compound Name)	Analysis Date and Time	Instrument	Ion(s) Affected	Percent Relative Abundance	QC Limits	Samples Affected	Action

Comments:

Semivolatile Instrument Performance Check (Compound Name)	Analysis Date and Time	Instrument	Ion(s) Affected	Percent Relative Abundance	QC Limits	Samples Affected	Action

Comments: 8270C > 4,4DDT degradation < 20%. pentachlorophenol and benzidine tailing not visible

8270D QSM > 4,4DDT degradation < 20%. pentachlorophenol and benzidine tailing < 2%.

If tuning compounds and criteria are different from those specified in CLP SOW OLM03.1, then the validator should include a copy of the method-specific tuning criteria with this worksheet.

Validator: _____

EPA-NE - Data Validation Worksheet
VOA/SV-III

III. INITIAL CALIBRATION - List all analytes that are outside calibration criteria.

Date of ICAL	Instrument	Parameter	Matrix	Compound	% RSD	RRF	Samples Affected	Action
6/20/11	S	VOC		mtpxylenes	15.462	- round to 15 - no action		
				acetone		0.04256	all > 0.01. - no action	
				2butanone		0.07137		
				4methyl2pentanone		0.09463		
				2hexanone		0.09276		
				12dibromo3chloropropane		0.05518		

Comments:

TIC III: Checked mtpxylenes RSD in excel ✓ (slightly off due to rounding)

mtpxylenes RFI = File S4445 0.767 IS = Chlorobenzene d5

$$RRF = \frac{A_x}{A_{IS}} \times \frac{C_{IS}}{C_x} = \frac{88504}{577148} \times \frac{10\ \mu g/L}{2.0\ \mu g/L} = 0.767 \checkmark$$

Validator: _____ Date: _____

INITIAL CALIBRATION VERIFICATION

QC LIMIT = ~~25 %D or 75-125% REC~~
80-120% REC per SAP

Parameter	IC Date	Compound	~~Rec~~	~~%D~~	Affected Samples	Action
VOC	6/20/11	bromomethane	120.54			→ all ND - no action
		acetone	160.76			→ J - FD060811-01, MW16-93S, TW16-24, TW16-25, TW16-27
		2butanone	122.35		all	
		isopropylbenzene	120.77			→ all ND - no action

Tier III calc: acetone 160.76% rec

$\frac{16.1 \text{ µg/L}}{10 \text{ µg/L}} \times 100 = 161$ ✓

EPA-NE - Data Validation Worksheet
VOA/SV-IV

IV. CONTINUING CALIBRATION - List all analytes that are outside calibration criteria.

Date of ICAL	Date of CCAL	Instrument	Parameter	Matrix	Compound	%D	RRF	Samples Affected	Action
6/20/11	6/21/11	S	VOC		acetone	31.A		MW 16-935	J

Comments:

Tier III: $\frac{\text{acetone } 0.0551 - 0.042}{0.042} \times 100 = 31.19\%$ ✓

Validator: _____

Date:

Blank Analysis and Blank Action

Type of Blank	Laboratory Blanks						Field Blanks						Max. Conc.	Action Level
Compound	VOC: WG93091-2	WG93118-2					VOC: TB16-GW-060911							
no contamination	✓	✓					✓							

Professional judgment not to apply rinsate blanks or field blanks to determine blank action levels.
For information purposes only.

EPA-NE - Data Validation Worksheet
VOA-VI

VI. VOA SURROGATE SPIKE RECOVERIES - List all surrogate compound recoveries that are outside method QC acceptance criteria.

Method	Volatile Method QC Acceptance Criteria				
	Toluene-d_8	~~BFB~~ (1,2-dichloroethane-d_4: DCA)	~~DCE-d_4~~ (toluene-d_8: TOL)	Other:	
OLM03.2	Water 88-110 / Soil 84-138	Water 86-115 / Soil 59-113	Water 76-114 / Soil 70-121		
OLC02.1	NA	~~80-120~~	NA		
Other:		70-120	85-115		
Sample Number/Matrix	% Recovery	% Recovery	% Recovery	% Recovery	Action
VOC: blank			82 met		no action on blank sample
TB16-GW-060811			80 met		none, met SAP criteria
TW16-25			84 met		none, met SAP criteria
TW16-27		121 met	84 met		none, met SAP criteria
TW16-26		126			none, all ND
FD060811-01		124 met	81 met		none, met SAP criteria
MS			84 met		no action on MS sample
	SAP criteria:	70-124	70-123		

TIC 111 TW16-26 DCA 126%

$\frac{12.5645\ \mu g/L \text{ on column}}{10\ \mu g/L \text{ surrogate}} \times 100 = 126\%$ ✓

Validator: _____ Date: _____

EPA-NE - Data Validation Worksheet
VOA/SV-VII

criteria met

VII. INTERNAL STANDARD PERFORMANCE

List the internal standards that are outside the area count and retention time method QC acceptance criteria.
IS Area Count method QC acceptance criteria: _____
IS Retention Time method QC acceptance criteria: _____

Sample Number (TR#)	Date and Time Analyzed	Instrument	Parameter	IS Outside Area Count and/or RT Criteria	IS Area	RT Shift	Acceptable Range (IS area or RT shift)	Action

QSM 8260/8270: Compare to midpoint standard in ICAL

Validator: _____ Date: _____

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-VIII

VIII. MATRIX SPIKE/MATRIX SPIKE DUPLICATE - List all MS/MSD analytes that are outside method QC acceptance criteria. Use a separate worksheet for each MS/MSD pair.

Sample # MW116-935-060911 Matrix AQ Concentration Level _____

Parameter	Compound	MS %Rec	MSD %Rec	RPD	Method QC Limits		Concentration			% RSD	Action
					% Rec	RPD	Unspiked Sample	MS	MSD		
VOC	chloromethane	129	—		40-125					ND	no action
	chloroethane	151	138		60-135						
	MTBE	126	—		65-125						
	isopropylbenzene	—	127		75-125						
	RPD criteria met										

TICs III: isopropylbenzene MSD Rec 127%

$\frac{12.7 - 0}{10} \times 100 = 127\%$

RPD = 2%

$\frac{127 - 124}{\left(\frac{127+124}{2}\right)} \times 100 = 2\%$ ✓

Validator: _____ Date:

Laboratory Control Sample								
Parameter	LCS ID	Matrix	Compound	% Rec.	RPD	QC Limits	Associated Samples	Action
VOC	WG93091-1	AQ	acetone	161		40-140	all except below	J-FD0608 11-07
								TW16-24
								-25
								-27
	WG93118-1	AQ	acetone	179		40-140		J
			2butanone	164		30-150	MW16-93S	none, ND
			2hexanone	158		55-130		none, ND
			Tier (1):					
			acetone Rec = 179%					
			$\frac{17.9\ \mu g/L}{10.0\ \mu g/L} \times 100\ \mu g/L = 179$ ✓					

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-IX

IX. **FIELD DUPLICATE PRECISION** - List all field duplicate analytes that are outside criteria.

Use a separate worksheet for each field duplicate pair.

Sample Number TW16-24-060811 Duplicate Sample Number FD060811-01 Matrix AQ

4QL RPD<30%

Parameter	Compound	Sample Conc.	Sample QL		Duplicate Conc.	Duplicate QL		RPD	QC Acceptance Criteria RPD or NA*	Action
			SQL	2xSQL		SQL	2xSQL			
NC	acetone	2.8 J			3.4 J			NC	both<LOQ	none
	cis 12 DCE	0.62 J			0.66 J			NC	both<LOQ	none

* For instances where one duplicate result is ND (or reported less than the sample QL).

Does the MS/MSD data indicate acceptable laboratory precision? Y N

Comments:

NC = not calculated

Calculate RPD for all results >QL

If RPD > QC limit:
- If both >2QL, qualify
- If one <2QL and one >2QL, prof judg to qualify
- If both <2QL, prof judg not to qualify

Sampler Name: _____ Contractor Name: _____ Date Contacted:

Reason for Contact and resolution obtained:

Validator: _____ Date:

Do not evaluate RPD when:
- one ND or pos. <QL and one >2QL, estimate (J, UJ)

EPA-NE - Data Validation Worksheet
VOA/SV - Pest/PCB-XIII

XIII. SAMPLE QUANTITATION

Recalculate, from the raw data, the concentrations for one positive detect and one reported sample quantitation limit for a non-detect in a diluted sample c soil sample per fraction. (Note: Although Section XIII, C.1.a, requires that one calculation for each fraction in each sample be performed, the validator i only required to reproduce an example, for each fraction, of one positive detect and one sample quantitation limit calculation on this worksheet.)

Do all soil/sediment samples have % solids greater than 30%? NA - Waters Y N
If no, list sample numbers_____

Fraction		Calculation
VOA		FD060811-01 acetone 3.4J ug/L $Conc = \frac{A_x * IS * DF}{A_{IS} * RRF * V_o}$ IS = pentafluorobenzene $Conc = \frac{4993 * 10 * 1}{345927 * 0.04236 * 1}$ = 3.39 ≃ 3.4 ug/L LOQ=5 ∴ 3.4J ug/L ✓
Sample No.:		
Reported Compound:		
Reported Value:		
Not Detected Compound:		
Reported Quantitation Limit:		
BNA		JAJ
Sample No.:		
Reported Compound:		
Reported Value:		
Not Detected Compound:		
Reported Quantitation Limit:		
Pesticide/PCB		
Sample No.:		
Reported Compound:		
Reported Value:		
Not Detected Compound:		
Reported Quantitation Limit:		

Validator:_____ Date:_____

REPORTING LIMITS

— Positive results <LOQ and >MDL are estimated (J) due to uncertainty below LOQ

— nondetected results are reported down to the LOD

Project action limits (PALS) are evaluated for nondetected values only (reported at LOD.)

TW samples: all PALS met by LODs for ND results
except cis 13 dichloropropene
trans 13 dichloropropene

MW samples: all PALS met by LODs for ND results
except bromomethane
vinyl chloride
1122 tetrachloroethane
112 trichloroethane
12 dibromo 3 chloropropane
12 dibromomethane
12 dichloroethane
12 dichloropropane
14 dichlorobenzene
benzene
bromodichloromethane
carbon tetrachloride
chloroform
cis 13 dichloropropene
dibromochloromethane
tetrachloroethene

no PALS established for the trip blank sample

Matrix: Groundwater (Piezometers) (IW)
Analytical Group: Volatiles

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Katahdin	
					QL (µg/L)	MDL (µg/L)
1,1,1-Trichloroethane	71-55-6	312	USEPA III Marine	100	1	0.2
1,1,2,2-Tetrachloroethane	79-34-5	90.2	USEPA III Marine	30	1	0.17
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	6,500,000	N RBC	2200000	1	0.18
1,1,2-Trichloroethane	79-00-5	430	C RBC	140	1	0.29
1,1-Dichloroethane	75-34-3	47	USEPA III Freshwater	16	1	0.16
1,1-Dichloroethene	75-35-4	2240	USEPA III Marine	750	1	0.19
1,2,4-Trichlorobenzene	120-82-1	5.4	USEPA III Marine	2	1	0.16
1,2-Dibromo-3-chloropropane	96-12-8	16	C RBC	5	1	0.37
1,2-Dibromoethane	106-93-4	11	C RBC	4	1	0.22
1,2-Dichlorobenzene	95-50-1	42	USEPA III Marine	14	1	0.15
1,2-Dichloroethane	107-06-2	470	C RBC	160	1	0.2
1,2-Dichloropropane	78-87-5	610	C RBC	200	1	0.18
1,3-Dichlorobenzene	541-73-1	28.5	USEPA III Marine	10	1	0.18
1,4-Dichlorobenzene	106-46-7	19.9	USEPA III Marine	7	1	0.16
2-Butanone	78-93-3	14000	USEPA III Freshwater	4700	5	1.25
2-Hexanone	591-78-6	99	USEPA III Freshwater	33	5	1.07
4-Methyl-2-pentanone	108-10-1	123000	USEPA III Marine	41000	5	1.32
Acetone	67-64-1	564000	USEPA III Marine	190000	5	2.11
Benzene	71-43-2	110	USEPA III Marine	37	1	0.17
Bromodichloromethane	75-27-4	470	C RBC	160	1	0.23
Bromoform	75-25-2	640	USEPA III Marine	210	1	0.18
Bromomethane	74-83-9	120	USEPA III Marine	40	2	0.11

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Katahdin	
					QL (µg/L)	MDL (µg/L)
Carbon Disulfide	**75-15-0**	**0.92**	**USEPA III Freshwater**	**0.3**	**1**	**0.19**
Carbon Tetrachloride	56-23-5	66	C RBC	22	1	0.22
Chlorobenzene	108-90-7	25	USEPA III Marine	8	1	0.17
Chloroethane	75-00-3	NA	NA	NA	2	0.23
Chloroform	67-66-3	790	C RBC	260	1	0.2
Chloromethane	74-87-3	2700	USEPA III Marine	900	2	0.17
cis-1,2-Dichloroethene	156-59-2	680	USEPA III Marine	230	1	0.16
cis-1,3-Dichloropropene(2)	**10061-01-5**	**0.055**	**SCV**	**0.02**	**1**	**0.18**
Cyclohexane	110-82-7	NA	NA	NA	1	0.17
Dibromochloromethane	124-48-1	500	C RBC	170	1	0.21
Dichlorodifluoromethane	75-71-8	640	NOAA Marine(1)	210	2	0.19
Ethylbenzene	100-41-4	25	USEPA III Marine	8	1	0.18
Isopropylbenzene	98-82-8	2.6	USEPA III Freshwater	0.9	1	0.19
Methyl Acetate	79-20-9	7,800,000	N RBC	2600000	1	0.37
Methyl tert-Butyl Ether	1634-04-4	5000	NOAA Marine	1700	1	0.27
Methylcyclohexane	108-87-2	NA	NA	NA	1	0.11
Methylene Chloride	75-09-2	2560	USEPA III Marine	850	5	0.21
Styrene	100-42-5	910	USEPA III Marine	300	1	0.19
Tetrachloroethene	127-18-4	7	C RBC	2	1	0.9
Toluene	108-88-3	215	USEPA III Marine	72	1	0.2
trans-1,2-Dichloroethene	156-60-5	680	USEPA III Marine	230	1	0.19
trans-1,3-Dichloropropene(2)	**10061-02-6**	**0.055**	**SCV**	**0.02**	**1**	**0.19**
Trichloroethene	79-01-6	1,000	C RBC	330	1	0.28
Trichlorofluoromethane	75-69-4	640	NOAA Marine(1)	210	2	0.24

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Katahdin	
					QL (µg/L)	MDL (µg/L)
Vinyl Chloride	75-01-4	50	C RBC	17	2	0.21
Xylenes (Total)	1330-20-7	19	USEPA III Marine	6.3	3	0.56

The project action limit represents the lower of human health and ecological screening levels.
Shaded row indicates Project Action Limit is less than the Laboratory MDL.
Bolded row indicates Project Action Limit is between the Laboratory QL and MDL.

1 - Acute LOAEL multiplied by 0.01 to estimate chronic NOAEL.
2 - Not a significant site-related chemical. Chemical has not been detected in any media at Site 16 during any previous investigation (included soil samples from source areas). It should be noted that selected water samples were submitted for selective ion monitoring (SIM) analysis in preceding investigations.

NA - Not available
QL – Quantitation Limit
MDL – Method Detection Limit
Human Health Screening Criteria:
C RBC - Carcinogenic risk based criteria (calculated based on an estimated ILCR of 10-6),
N RBC - Noncarcinogenic risk based criteria (calculated based on an estimated HQ of 0.1)

Ecological Screening Criteria:
USEPA III Marine - USEPA Region III Marine Screening Benchmarks (USEPA, July 2006a)
USEPA III Freshwater - USEPA Region III Freshwater Screening Benchmarks (USEPA, July 2006b)
NOAA Marine - Screen Quick Reference Table, Marine Surface Waters (Buchman, 2008)
SCV – Secondary chronic value (Suter and Tsao, 1996)
RIDEM Freshwater - Rhode Island Department of Environmental Management Ambient Water Quality Criteria and Guidelines, Freshwater (RIDEM, July 2006)

Matrix: Groundwater (Monitoring wells)
Analytical Group: Volatiles

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Katahdin	
					QL (µg/L)	MDL (µg/L)
1,1,1-Trichloroethane	71-55-6	200	MCL/RIDEM	67	1	0.2
1,1,2,2-Tetrachloroethane[1]	**79-34-5**	**0.067**	**USEPA RSL**	**0.02**	**1**	**0.17**
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	5900	USEPA RSL	2000	1	0.18
1,1,2-Trichloroethane[2]	**79-00-5**	**0.24**	**USEPA RSL**	**0.08**	**1**	**0.29**
1,1-Dichloroethane	75-34-3	2.4	USEPA RSL	0.8	1	0.16
1,1-Dichloroethene	75-35-4	7	MCL/RIDEM	2	1	0.19
1,2,4-Trichlorobenzene	**120-82-1**	**0.82**	**USEPA RSL**	**0.3**	**1**	**0.16**
1,2-Dibromo-3-chloropropane[1]	**96-12-8**	**0.00032**	**USEPA RSL**	**0.0001**	**1**	**0.37**
1,2-Dibromoethane[1]	**106-93-4**	**0.0065**	**USEPA RSL**	**0.002**	**1**	**0.22**
1,2-Dichlorobenzene	95-50-1	37	USEPA RSL	12	1	0.15
1,2-Dichloroethane[2]	**107-06-2**	**0.15**	**USEPA RSL**	**0.05**	**1**	**0.2**
1,2-Dichloropropane	**78-87-5**	**0.39**	**USEPA RSL**	**0.1**	**1**	**0.18**
1,3-Dichlorobenzene	541-73-1	600	MCL/RIDEM	200	1	0.18
1,4-Dichlorobenzene	**106-46-7**	**0.43**	**USEPA RSL**	**0.1**	**1**	**0.16**
2-Butanone	78-93-3	710	USEPA RSL	240	5	1 25
2-Hexanone	591-78-6	NC	USEPA RSL	TBD	5	1.07
4-Methyl-2-pentanone	108-10-1	200	USEPA RSL	66. 7	5	1.32
Acetone	67-64-1	2200	USEPA RSL	730	5	2.11
Benzene	**71-43-2**	**0.41**	**USEPA RSL**	**0.1**	**1**	**0.17**
Bromodichloromethane[2]	**75-27-4**	**0.12**	**USEPA RSL**	**0.04**	**1**	**0.23**
Bromoform	75-25-2	8 5	USEPA RSL	3	1	0.18
Bromomethane	**74-83-9**	**0.87**	**USEPA RSL**	**0.3**	**2**	**0.11**

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Katahdin	
					QL (µg/L)	MDL (µg/L)
Carbon Disulfide	75-15-0	100	USEPA RSL	33	1	0.19
Carbon Tetrachloride[2]	**56-23-5**	**0.2**	**USEPA RSL**	**0.07**	**1**	**0.22**
Chlorobenzene	108-90-7	9.1	USEPA RSL	3	1	0.17
Chloroethane	75-00-3	2100	USEPA RSL	700	2	0.23
Chloroform[2]	**67-66-3**	**0.19**	**USEPA RSL**	**0.06**	**1**	**0.2**
Chloromethane	74-87-3	19	USEPA RSL	6	2	0.17
cis-1,2-Dichloroethene	156-59-2	37	USEPA RSL	12	1	0.16
cis-1,3-Dichloropropene	**10061-01-5**	**0.43**	**USEPA RSL**	**0.1**	**1**	**0.18**
Cyclohexane	110-82-7	1300	USEPA RSL	430	1	0.17
Dibromochloromethane	**124-48-1**	**0.15**	**USEPA RSL**	**0.05**	**1**	**0.21**
Dichlorodifluoromethane	75-71-8	39	USEPA RSL	13	2	0.19
Ethylbenzene	100-41-4	1.5	USEPA RSL	0.5	1	0.18
Isopropylbenzene	98-82-8	68	USEPA RSL	22. 7	1	0.19
Methyl Acetate	79-20-9	3700	USEPA RSL	1200	1	0.37
Methyl tert-Butyl Ether	1634-04-4	12	USEPA RSL	4	1	0.27
Methylcyclohexane	108-87-2	NC	NC	TBD	1	0.11
Methylene Chloride	**75-09-2**	**4.8**	**USEPA RSL**	**2**	**5**	**0.21**
Styrene	100-42-5	100	MCL/RIDEM	33	1	0.19
Tetrachloroethene[2]	**127-18-4**	**0.11**	**USEPA RSL**	**0.04**	**1**	**0.9**
Toluene	108-88-3	230	USEPA RSL	76. 7	1	0.2
trans-1,2-Dichloroethene	156-60-5	11	USEPA RSL	3. 7	1	0.19
trans-1,3-Dichloropropene	10061-02-6	NC	USEPA RSL	TBD	1	0.19
Trichloroethene	79-01-6	1.7	USEPA RSL	0.6	1	0.28
Trichlorofluoromethane	75-69-4	130	USEPA RSL	43	2	0.24

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Katahdin	
					QL (µg/L)	MDL (µg/L)
Vinyl Chloride[2]	**75-01-4**	**0.016**	**USEPA RSL**	**0.005**	**2**	**0.21**
Xylenes (Total)	1330-20-7	20	USEPA RSL	6. 7	3	0.56

The project action limit represents the lower of human health screening levels.
Shaded row indicates Project Action Limit is less than the Laboratory MDL.
Bolded row indicates Project Action Limit is between the Laboratory QL and MDL.

1 – Not a significant site-related chemical. Chemical has not been detected in any media at Site 16 during any previous investigation. It should be noted that selected water samples were submitted for selective ion monitoring (SIM) analysis in preceding investigations.
2 – Project action limit is based on the USEPA RSL for tap water. However, based on remedial goals selected for groundwater at other NCBC Davisville Sites, the actual clean-up levels will be USEPA MCL, which is greater than the QL and MDL, or some value higher than the MCL (e.g., a RIDEM GB Groundwater Objective).

USEPA RSL - USEPA Regional Screening Level, tap water, 1/10th screening value for noncarcinogens (April 2009, Update May 19, 2009)
MCL - USEPA Drinking Water Standards (August 2006)
RIDEM - Rhode Island Department of Environmental Management GA Groundwater Objective (February 2004)

QL – Quantitation Limit
MDL – Method Detection Limit

SAP Worksheet #12 - Measurement Performance Criteria Table –Soil, Groundwater, Surface Water and Sediment

(UFP-QAPP Manual Section 2.6.2)

Measurement Performance Criteria Table – Field QC Samples

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria (MPC)	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)	
Field Blank	All Fractions	One per source water.	Accuracy/Bias/ Contamination	No analytes ≥ ½ QL, except common lab contaminants, which must be < QL.	S&A	NA
Equipment Rinsate Blanks	All Fractions	One per 20 field samples per matrix per sampling equipment[1].	Accuracy/Bias/ Contamination	No analytes ≥ ½ QL, except common lab contaminants, which must be < QL.	S&A	NA
Trip Blanks	VOCs	One per cooler containing VOC samples.	Accuracy/Bias/ Contamination	No analytes ≥ ½ QL, except common lab contaminants, which must be < QL.	S&A	✓
Field Duplicate	All Fractions[2]	One per 10 field samples collected.	Precision	Values > 5X QL: Relative Percent Difference (RPD) ≤ 30%[3, 4] (aqueous); ≤ 50% (soil)[3, 4]	S	✓
Matrix Spike (MS)	All Fractions	One per 20 field samples per matrix.	Accuracy/Bias	Within laboratory statistically derived percent recovery (%R) limits.	A	✓
Matrix Spike Duplicate (MSD)	Organics	One per 20 field samples per matrix.	Accuracy/Bias/ Precision	Within statistically derived %R limits; RPD of ≤ 30%[3] (aqueous); ≤ 50% (soil).	A	✓
Laboratory Duplicate	Metals	One per 20 field samples per matrix.	Precision	RPD of ≤ 30%[4] (aqueous); ≤ 50% (soil).	A	
Cooler Temperature Indicator	All Fractions	One per cooler.	Representativeness	Temperature between 2 and 6 degrees Celsius (4 ± 2 °C).	S	✓

1 – Equipment rinsate blanks will be collected if non-dedicated submersible pumps or other equipment are used.
2 – Field duplicates will be collected on field screening methods of Color-Tec® (for VOCs) and FPXRF (Metals – As, Pb).
3 – If duplicate values for non-metals are < 5x QL, the absolute difference should be < 2x QL.
4 – If duplicate values for metals are < 5x QL, the absolute difference should be < 4x QL.

ATTACHMENT C

VAPOR INTRUSION GUIDANCE
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
OCTOBER 2005

VAPOR INTRUSION GUIDANCE

NEW JERSEY DEPARTMENT
OF ENVIRONMENTAL PROTECTION

OCTOBER 2005

Clean Water Lens Impeding Diffusion to Vadose Zone

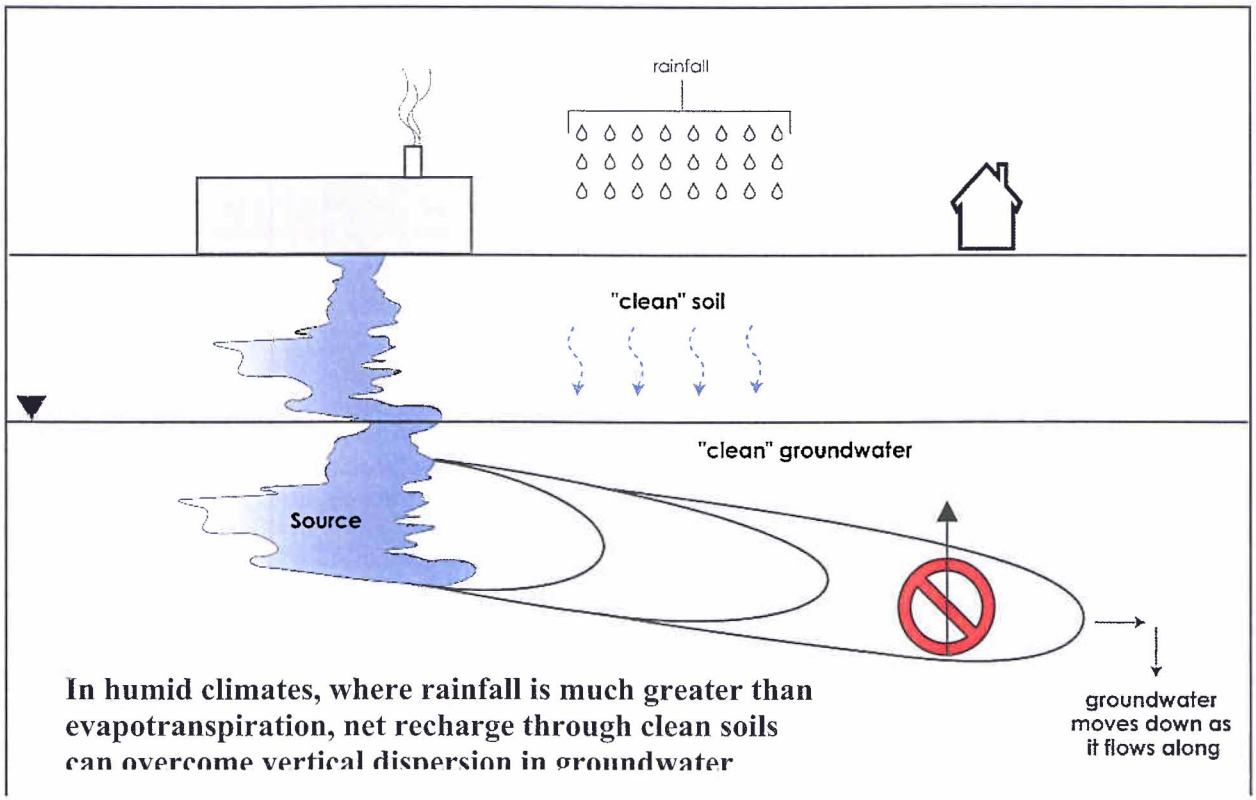

Figure 2-6. Clean water Lens Impeding Diffusion to Vadose Zone

Source: McAlary 2003

Because the rate of diffusion of contaminants through the overlying clean ground water is so slow, the overlying ground water can greatly impede or prevent volatiles in deeper ground water from reaching the unsaturated zone, thus possibly preventing a vapor intrusion situation (Fitzpatrick and Fitzgerald 2002; McAlary et al. 2004).

2.4.4 Fluctuations in Water Table Elevation

Even where a clean water lens has been created as described above, changes in the elevation of the static water level may affect whether VI occurs. A significant drop in water table elevation (e.g., during a prolonged drought) can expose an area of contaminated ground water previously separated from the vadose zone by a clean water lens resulting in a potential VI situation.

Falling Water Table

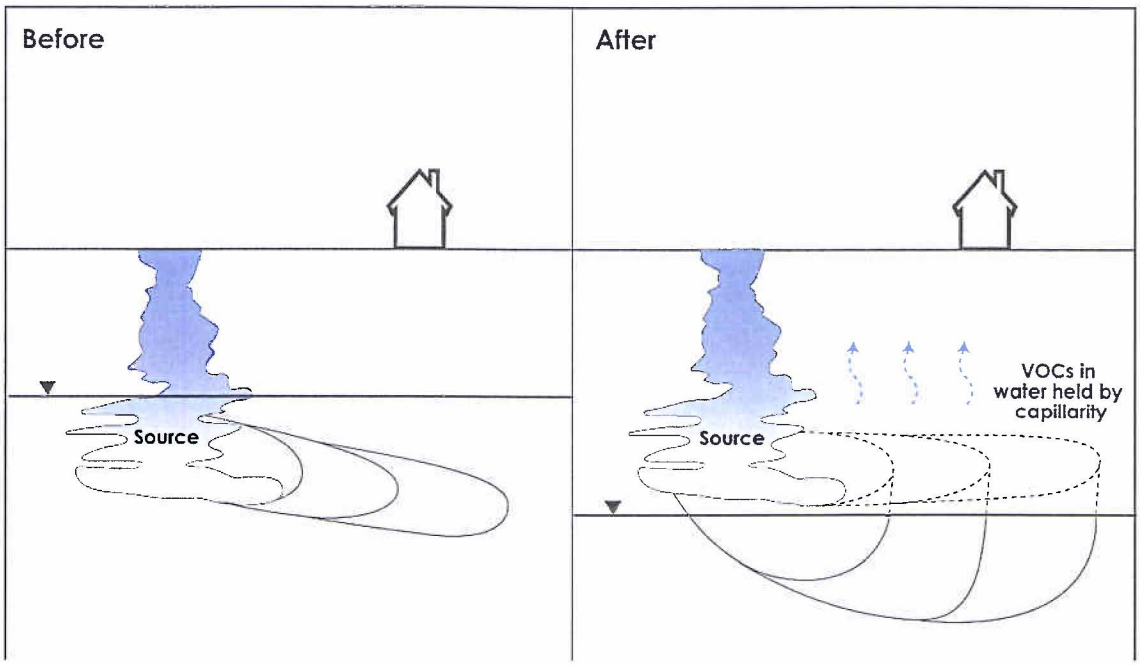

Figure 2-7. Falling Water Table Exposes Dissolved Plume to Vadose Zone

Source: McAlary 2003

If seasonal water table fluctuations are small relative to the thickness of the clean water lens, then off gassing will be impeded. Where the lens is thin (2 to 3 feet) even normal water level changes may result in the vertical movement of volatiles as depicted in Figure 2-7. This situation increases the contaminated surface area where diffusion into the unsaturated zone can occur. Some of those vapors may migrate far enough to cause VI into buildings and some can move into and above the depth interval where the clean water lens previously existed and subsequently partition back into the dissolved phase, contaminating capillary water and fresh recharge water (Mendoza and McAlary 1990). Water table fluctuations may result in short term variation in volatilization to the vadose zone over a few weeks to months. This variation could affect indoor air concentrations where the pathway is already complete or change whether VI occurs. These phenomena can have important implications for appropriate ground water sampling procedures and for when soil vapor sampling is important.

Figure 2-8 illustrates a situation where NAPL reaches the capillary fringe and/or soil is contaminated with residual NAPL in the zone surrounding the capillary fringe. Fluctuations in the water table could smear the product vertically and greatly enhance the phase transfer "vertical mixing" between vapor and dissolved contamination discussed in the previous

paragraph. As the plume moves in the downgradient direction, these processes would result in much higher volatile concentrations near the water table than in deeper intervals not within the zone of fluctuation. Vapors would be likely to migrate much further in this scenario than one where NAPL and high levels of contaminants do not reach the moist transition zone just above the capillary fringe. This phenomenon has been called an interface zone ground water plume, with the interface zone being defined "to include the upper ground water zone in close proximity to the water table, the fully saturated capillary fringe and the transition zone to residual water saturation" (Rivett 1995).

Water Table Fluctuations

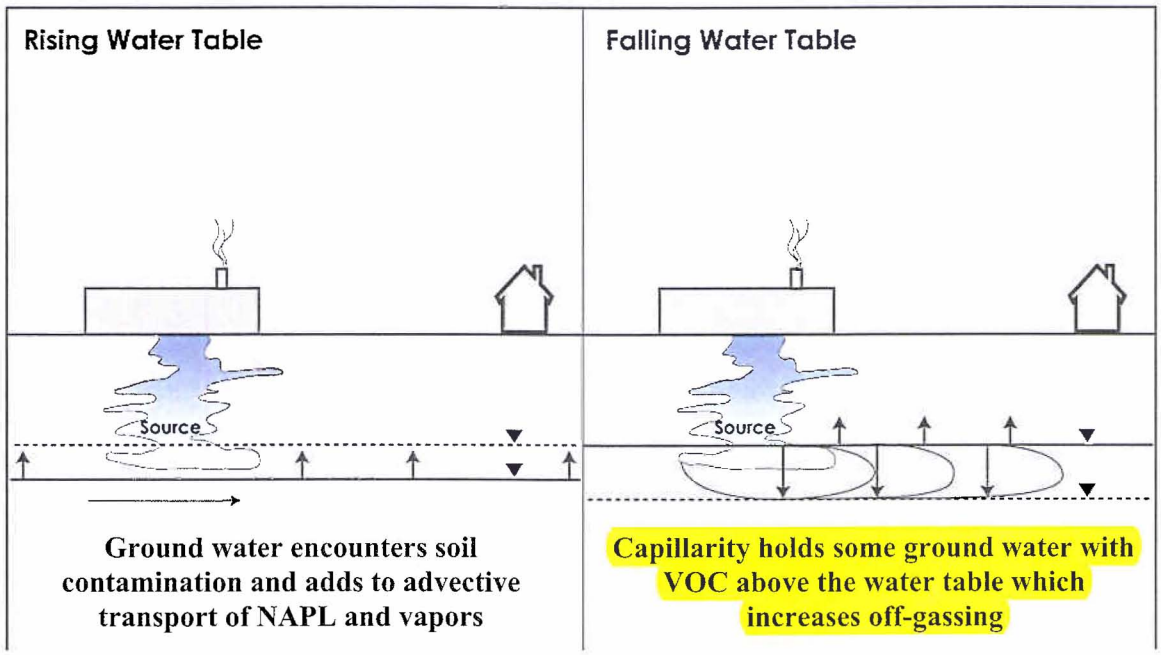

Figure 2-8. Fluctuations in Water Table Create Interface Zone Vapor Plume

Source: McAlary 2003

2.4.5 Ventilation Systems in Commercial/Industrial Buildings

Commercial and industrial buildings often are designed with higher air exchange rates than residential structures, which may reduce the potential for VI. However, heating, ventilating and air conditioning (HVAC) systems in these buildings may intentionally, or inadvertently, result in either building depressurization or positive indoor air pressure relative to outdoors. Also, a mix

used the Johnson and Ettinger (J&E) Model with New Jersey specific parameters, when appropriate, in the development of the screening levels.

4.2.1 Application of the Ground Water Screening Levels

The USEPA states in its Draft Vapor Intrusion Guidance that the J&E model should not be used when the distance between the water table and the building foundation is less than five feet (USEPA, 2002b). Reasons for this include 1) the potential for seasonal fluctuations in the water table to bring ground water in direct contact with the building foundation, and 2) the potential for fill material, rather than native soil, to be present immediately under building foundations, and 3) the potential for the soil capillary zone to extend up the building foundation. The difficulty with the five-foot requirement is that New Jersey has many areas in the state with shallow ground water and the five-foot requirement would result in many locations being eliminated from consideration when using the ground water screening criteria. Since the screening level is relatively insensitive to the groundwater depth (see Appendix G), the Department has adopted slightly more liberal criteria for use of screening numbers calculated using the J&E model.

The Department's ground water screening criteria may be used where the ground water is as close as two feet below the building foundation when 1) the seasonal high water table does not reach the building foundation, 2) the water table does not extend into fill material directly under the building foundation, and 3) the top of the capillary zone does not reach the building foundation. Regarding Item 3, the capillary zone does not normally extend through fill material under buildings, which is typically coarse in nature. For situations where no fill material is present under a building's foundation, the top of the capillary zone may be estimated using Table 4-1. The capillary zone heights were calculated with the J&E model.

Table 4-1

Capillary Zone Heights for Select Soil Textures

Soil Texture	*Capillary Zone Height (cm)*	*Capillary Zone Height (feet)*
Sand	17	0.6
Loamy Sand	19	0.6
Sandy Loam	25	0.8
Sandy Clay Loam	26	0.9
Sandy clay	30	1.0
Loam	38	1.2
Clay Loam	47	1.5
Silty Loam	68	2.2
Clay	82	2.7
Silty Clay Loam	134	4.4
Silt	163	5.3
Silty clay	192	6.3

As indicated in Table 4-1, the capillary zone is greater than two feet in height for some soils with silt and clay content. Therefore, the water table must be greater than two feet below the building foundation in those situations. Site specific field determinations may be made in these circumstances for soil texture.

Provided the above conditions are met, the Department's GWSL are judged to be adequately conservative for use at sites where unsaturated soil is present below the building foundation.

GWSL should not be applied where a building foundation is in direct contact with competent, massive bedrock containing discrete fractured zones if vertical fractures are very likely to act as preferential pathways for vapors (i.e., directly connecting contaminated ground water with building foundations). The GWSL may be used for soils that contain gravel, assuming they exhibit relatively homogeneous, isotropic conditions. The GWSL can also be applied (with Department approval) where the water table is in bedrock and nearby site specific data indicate there is unsaturated soil, fill, or geologic material below a building foundation through which subsurface air flow would approximate, or approach, porous media conditions. In many areas bedrock in the vadose zone and at the water table is so highly weathered and/or densely fractured that these conditions will be met even if deeper, more competent bedrock creates very heterogeneous flow conditions.

ATTACHMENT D

TABLE 3-1
MONITORING WELL CONSTRUCTION DATA
PHASE III RI FOR IR PROGRAM SITE 16
FORMER NCBC, DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

TABLE 3-1

MONITORING WELL CONSTRUCTION DATA
PHASE III RI FOR IR PROGRAM SITE 16
FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Well Number	Date Installed	Rhode Island Grid Coordinates NAD 1983		Ground Elevation NAVD 1988 (ft above MSL)	PVC Elevation NAVD 1988 (ft above MSL)	Screen or Open Borehole Depth (ft bgs)		Screen Elevation (ft MSL)		Depth of Pump Intake (ft bgs)	Elevation of Pump Intake (ft above MSL)	Depth to Top of Weathered Bedrock (ft bgs)	Depth to Top of Competent Bedrock (ft bgs)	Elevation to Top of Weather Bedrock (ft above MSL)	Elevation to Top of Competent Bedrock (ft above MSL)	Bedrock Core Data (Depths in ft bgs, Elevations in ft above MSL)						Geologic Deposits Screened
		Northing	Easting			Top	Bottom	Top	Bottom							Depth to Top of Core	Depth to Bottom of Core	Elevation of Top of Core	Elevation of Bottom of Core	% Recovery	% RQD	
MW16-01S	12/20/2000	194123.333	350946.095	33.03	35.03	17.5	27.5	15.53	5.53	25.5	7.53											Sand (10)
MW16-01D	5/16/2000	194116.713	350949.535	33.06	35.17	48.5	58.5	-15.47	-25.47	56	-22.97		57.2		-24.14	62.5	67.5	-29.44	-34.44	99	63	Silt and sand (3), Sandy cobbly gravel (5.7), bedrock (1.3)
MW16-01R	5/19/2004	194122.353	350952.855	32.53	34.34	60	85	-27.47	-52.47	61	-28.47											Quartzite (based on drill cuttings) (25)
MW16-02S	5/23/2000	194208.740	351435.354	20.01	22.85	5	15	15.03	5.03	13.5	6.53											Sand (10)
MW16-02I	8/30/2002	194210.936	351418.583	20.20	22.30	32	37	-11.77	-16.77	36	-15.77											Gravelly sand (4), silty clay (1)
MW16-02D	5/25/2000	194208.330	351442.784	20.07	22.18	56.5	66.5	-36.47	-46.47	58.5	-38.47		66.7		-46.63	71	75.3	-50.93	-55.23	88	41	Gravelly sand (1.5), sand (1), sandy silt (1), gravelly sand (6.5)
MW16-02R	2/1/2001	194210.210	351428.413	20.30	22.12	70	95	-49.67	-74.67	80	-59.67											Quartzite (6), phyllite (19)
MW16-02R2	9/18/2002	194212.151	351410.378	20.37	21.91	96	121	-75.67	-100.67	105	-84.67											Bedrock (25)
MW16-03S+	6/12/2000	194703.164	351303.577	10.37	13.27	3	13	7.33	-2.67	8	2.33											Silty sand (9), sandy silt (1)
MW16-03D+	6/1/2000	194703.394	351308.958	10.21	12.60	38.5	48.5	-28.27	-38.27	43	-32.77	37.5	48.5	-27.29	-38.29	51.5	56.5	-41.29	-46.29	100	0	Weathered bedrock (10)
MW16-03R+	5/10/2004	194698.533	351297.607	10.63	12.81	52	77	-41.37	-66.37	64	-53.37											Phyllite (10.5), quartzite (14.5) (based on drill cuttings)
MW16-04S+	6/14/2000	194691.426	351493.131	9.43	9.05	3	13	6.43	-3.57	11.5	-2.07											Fill (5.2), boulder (4.8)
MW16-04I+	9/6/2002	194694.184	351490.155	9.23	10.89	22	32	-12.77	-22.77	29	-19.77											Silty sand (10)
MW16-04D+	6/13/2000	194689.286	351487.161	9.56	11.04	43	53	-33.47	-43.47	50	-40.47	51.5	53	-41.94	-43.44	56	61	-46.44	-51.44	92	63	Silty sand (1), sand (3), boulder (2), silty gravelly sand (2.5), weathered bedrock (1.5)
MW16-05S+	12/20/2000	194597.809	351789.447	12.91	14.91	8	18	4.93	-5.07	16	-3.07											Fill (2.5), silty sand (1), sandy silt (2.5), sand (0.5), sandy silt (1), sand (2.5)
MW16-05I+	9/5/2002	194598.839	351785.348	13.01	14.91	22	36	-8.97	-22.97	34.5	-21.47											Sand (1), silty sand (1), sand (2.5), sandy silt (0.5), sand (3.5), sandy silt (0.5), sand (5)
MW16-05D+	5/26/2000	194603.149	351790.517	12.82	15.33	42	52	-29.17	-39.17	46	-33.17	62	62.5	-49.18	-49.68	65.5	70.5	-52.68	-57.68	99	88	Sand (2.5), sandy silt (1), sand (0.5), sandy silt (1.5), sand (1.5), silty sand (1), silty gravelly sand (2)
MW16-05R+	8/20/2002	194603.565	351785.897	13.08	15.09	66	91	-52.97	-77.97	69	-55.87											Phyllite (25)
MW16-05R2+	5/25/2004	194603.705	351802.846	12.33	14.17	91	116	-78.67	-103.67	113.5	-101.17											Quartzite (1), phyllite (24) (based on drill cuttings)
MW16-06S	6/21/2000	194493.157	350999.023	24.33	26.56	7	17	17.33	7.33	16	8.33											Sand (1), silty sand (2), sandy silt (1.25), gravel (0.25), sandy silt (2.5), silt (2), gravel (1)
MW16-06D	6/22/2000	194497.778	350999.773	24.32	26.88	38.5	44.5	-14.17	-20.17	41.5	-17.17		44.5		-20.18	47.5	52.5	-23.18	-28.18	98	79	silty gravelly sand (3.5), gravelly sandy silt (2.5)
MW16-06R	8/16/2002	194497.603	350995.876	24.77	26.56	49	74	-24.27	-49.27	58	-33.27											Quartzite (based on drill cuttings) (25)
MW16-07S	6/19/2000	194464.669	351126.556	18.73	21.40	7	17	11.73	1.73	12	6.73											Fill and/or reworked soil (9.5), sandy silt (0.5)
MW16-07D	6/16/2000	194458.159	351127.006	18.59	21.50	27.5	37.5	-8.87	-18.87	35	-16.37	28	38	-9.41	-19.41	41	46	-22.41	-27.41	98	78	Silt (0.5), weathered rock (sandy silt with rock fragments) (2), weathered rock (silty sandy gravel)(2), weathered bedrock (sandy silt and gravel) (5.5)
MW16-08S	8/9/2004	194164.846	351128.168	26.33	28.35	16	26	10.33	0.33	22	4.33											Sand (6.5), silty sand (2), sand (0.5), sandy silt (1)
MW16-08D	2/5/2001	194162.385	351124.598	27.08	29.52	40	55	-12.97	-27.97	42	-14.87		55.1		-28.02	58.5	63.5	-31.42	-36.42	95	88	Sand to silty sand (8), silty sand and gravel (6), sand and gravel (1)
MW16-09D	12/6/2001	193786.705	350592.521	33.48	33.03	57	67	-23.57	-33.57	61.8	-28.27		64.8		-31.32	68.1	73.1	-34.62	-39.62	97	90	Gravel (2), sandy silt and gravel (3), gravelly sand (4.75), bedrock (0.25)
MW16-10I	10/9/2007	193565.709	350531.877	30.78	30.41	29	39	1.78	-8.22	34	-3.22											Gray very fine to fine sand with silt (10)
MW16-10D	12/6/2001	193558.601	350536.522	30.75	30.53	48.5	58.5	-17.77	-27.77	52.5	-21.77	50	59	-19.25	-28.25	62	67	-31.25	-36.25	93	91	Silt (1.5), weathered rock (silt with rock fragments) (4), rock (1), weathered bedrock (silty sand and gravel) (3.5)

TABLE 3-1

MONITORING WELL CONSTRUCTION DATA
PHASE III RI FOR IR PROGRAM SITE 16
FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Well Number	Date Installed	Rhode Island Grid Coordinates NAD 1983		Ground Elevation NAVD 1988 (ft above MSL)	PVC Elevation NAVD 1988 (ft above MSL)	Screen or Open Borehole Depth (ft bgs)		Screen Elevation (ft MSL)		Depth of Pump Intake (ft bgs)	Elevation of Pump Intake (ft above MSL)	Depth to Top of Weathered Bedrock (ft bgs)	Depth to Top of Competent Bedrock (ft bgs)	Elevation to Top of Weather Bedrock (ft above MSL)	Elevation to Top of Competent Bedrock (ft above MSL)	Bedrock Core Data (Depths in ft bgs, Elevations in ft above MSL)						Geologic Deposits Screened
		Northing	Easting			Top	Bottom	Top	Bottom							Depth to Top of Core	Depth to Bottom of Core	Elevation of Top of Core	Elevation of Bottom of Core	% Recovery	% RQD	
MW16-10R	12/15/2001	193552.641	350539.342	30.69	30.51	66	91	-35.27	-60.27	69.5	-38.77											Phyllite (8), quartzite (17)
MW16-11S	9/11/2002	193822.627	350755.321	28.89	28.56	10	20	18.93	8.93	18.5	10.43											Sand (10)
MW16-11D	12/8/2001	193826.457	350763.944	28.91	28.70	53.5	63.5	-24.57	-34.57	58	-29.07		62.4		-33.49	66	70.8	-37.09	-41.89	93	95	Silty sand and gravel (4.5), gravel (2), sand (2.5), bedrock (1)
MW16-12S	8/9/2004	193683.417	350885.407	29.41	28.94	14.4	24.4	12.36	2.36	20	6.76											Sand (7.5), silt (1), sand (1.5)
MW16-12D	12/20/2001	193680.067	350882.757	29.39	28.98	52	62	-25.37	-35.37	57	-30.37		62		-32.61	66	71	-36.61	-41.61	95	88	Sandy silt (2), sand (4), silty sand and gravel (2), sand (1), sandy gravel (1)
MW16-13I	9/11/2002	193764.790	350699.638	29.02	28.84	24	34	5.03	-4.97	29	0.03											Sand (2), silty sand (2), sand (2), silty sand (4)
MW16-13D	1/17/2001	193764.676	350708.633	29.09	28.53	57	67	-27.87	-37.87	62	-32.87		66.8		-37.71	70	75	-40.91	-45.91	98	78	Sand (1), sand and gravel (4), gravelly sand (1.25), sand and gravel (0.75), sandy gravel (2.75), bedrock (0.25)
MW16-13R	10/19/2007	193761.896	350704.331	29.12	28.73	69	84	-39.88	-54.88	79.5	-50.38		66			67, 72, 77, 82, 87	72, 77, 82, 87, 92			94, 100, 100, 100, 100	78, 88, 58, 22, 44	Quartzite and Phyllite (25)
MW16-14I	9/13/2002	193783.291	351008.580	29.11	28.93	26	36	3.13	-6.87	31	-1.87											Sand (6.5), silty sand (1.5), sand (2)
MW16-14D	1/30/2001	193787.230	351014.499	29.13	28.83	52	62	-22.87	-32.87	60.5	-31.37		62.7		-33.57	66	71	-36.87	-41.87	88	60	Gravelly sand (4), boulder (1.5), gravelly sand (4.5)
MW16-14R	8/6/2004	193791.080	351019.629	28.63	28.38	65	90	-36.37	-61.37	77	-48.37											Phyllite (5.5), quartzite (19.5) (based on drilling cuttings)
MW16-15S	8/2/2004	193871.712	351094.230	28.23	28.10	16	26	12.23	2.23	22	6.23											Sand (1), sandy silt (0.5), sand (8.5)
MW16-15D	1/17/2001	193872.202	351098.060	28.45	28.00	46	56	-17.57	-27.57	52	-23.57		56.3		-27.85	61	66	-32.55	-37.55	98	60	Silty sand (1), sand and gravel (9)
MW16-15R	1/26/2001	193874.632	351100.340	28.43	27.77	60.5	86	-32.07	-57.57	62.5	-34.07											Quartzite (25.5)
MW16-15R2	9/18/2002	193867.726	351095.120	28.52	27.85	86	111	-57.47	-82.47	108.5	-79.97											Quartzite and Phyllite (25)
MW16-16I	9/9/2002	193808.899	351182.310	23.01	22.81	32	42	-11.36	-21.36	40	-19.36											Sand (2) and Silty sand (8)
MW16-16D	1/9/2001	193823.063	351201.542	23.04	22.81	54	64	-33.30	-43.30	59	-38.30	61	64	-37.96	-40.96	67	72	-43.96	-48.96	95	68	Boulder (0.5), silty gravelly sand (1), boulder (2.5), silty sand (3), weathered bedrock (3)
MW16-17S	9/18/2002	193476.615	351120.245	23.74	23.35	6	16	15.17	5.17	14	7.17											Sand (2), silty sand (6), sand (2)
MW16-17I	9/19/2002	193473.627	351114.358	23.80	23.53	28	40	-6.09	-18.09	30	-8.09											Silty sand (4.5), sandy silt (2), silty sand (5.5)
MW16-17D	1/4/2001	193485.228	351117.313	23.90	23.59	57	67	-35.92	-45.92	64.5	-43.42		66		-42.10	70	75	-46.10	-51.10	78	19	Boulder (1), sand (0.5), gravel (1.5), silty sand (1), boulder (1), silty sand (4), phyllite (1)
MW16-17R	9/18/2002	193478.370	351115.658	23.81	23.54	73	98	-51.43	-76.43	82	-60.43											Phyllite (25)
MW16-18I	9/4/2002	193690.370	351389.333	20.68	20.29	22	34	-1.32	-13.32	24	-6.16											Sand (8), Silty sand (4)
MW16-18D	1/4/2001	193692.474	351384.166	20.81	20.32	42.5	52.5	-24.53	-34.53	47.5	-29.43		52.5		-31.69	56	61	-35.19	-40.19	95	46	Gravelly sand (10)
MW16-19I	9/5/2002	193813.822	351530.663	19.33	18.97	30	40	-13.51	-23.51	34	-17.51											Silt and sand (6), silt (4)
MW16-19D	1/11/2001	193812.657	351537.838	19.12	18.78	45.5	54.5	-29.31	-38.31	47	-30.81	46.5	48.8	-27.38	-29.68	55	60	-35.88	-40.88	98	86	Silt (1), weathered phyllite (3), phyllite (5)
MW16-20I	9/6/2002	193997.290	351702.590	17.12	16.71	24	34	-6.96	-16.96	29	-11.96											Sand (2), sand and gravel (1), sand (5.5), sand and gravel (1.5)
MW16-20D	1/9/2001	194004.531	351706.360	17.09	16.79	39.5	49.5	-22.37	-32.37	44.5	-27.37	48	48.8	-30.91	-31.71	52	57	-34.91	-39.91	100	93	Sand & silt (4.5),gravelly sand and silt (4), weathered bedrock (1.5)
MW16-21I	9/11/2002	193960.992	351289.527	21.62	21.29	26.5	36.5	-4.87	-14.87	34.5	-12.87											Sand (1.5), sandy silt (0.5), sand (8)
MW16-21D	1/8/2001	193956.045	351291.473	21.68	21.35	51	61	-29.37	-39.37	54	-32.27		60.8		-39.12	65	70	-43.32	-48.32	98	87	Sand to gravelly sand (10)
MW16-22I	9/10/2002	193960.992	351289.527	29.19	28.90	34	44	-4.77	-14.77	43	-13.77											Sand (9), sandy silt (1)
MW16-22D	1/16/2001	194024.774	351160.870	29.17	28.86	52	62	-22.87	-32.87	58	-28.87		62		-32.83	66	71	-36.83	-41.83	99	40	Silty sand (1), sand and gravelly sand (3.5), sandy silt (0.5), silty gravelly sand (5)
MW16-23S	7/19/2004	194058.447	351317.522	24.23	23.75	14	24	10.23	0.23	20	4.23											Sand (10)

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FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Well Number	Date Installed	Rhode Island Grid Coordinates NAD 1983		Ground Elevation NAVD 1988 (ft above MSL)	PVC Elevation NAVD 1988 (ft above MSL)	Screen or Open Borehole Depth (ft bgs)		Screen Elevation (ft MSL)		Depth of Pump Intake (ft bgs)	Elevation of Pump Intake (ft above MSL)	Depth to Top of Weathered Bedrock (ft bgs)	Depth to Top of Competent Bedrock (ft bgs)	Elevation to Top of Weather Bedrock (ft above MSL)	Elevation to Top of Competent Bedrock (ft above MSL)	Bedrock Core Data (Depths in ft bgs, Elevations in ft above MSL)						Geologic Deposits Screened
		Northing	Easting			Top	Bottom	Top	Bottom							Depth to Top of Core	Depth to Bottom of Core	Elevation of Top of Core	Elevation of Bottom of Core	% Recovery	% RQD	
MW16-23D	1/12/2001	194057.907	351313.892	24.61	24.45	50	65	-25.37	-40.37	52	-27.37	60.5	64.9	-35.89	-40.29	69	74	-44.39	-49.39	98	45	Sand (5.5), weathered phyllite (gravelly sand) (4.5)
MW16-24I	9/11/2002	194079.436	351476.411	20.56	20.35	18	28	2.53	-7.47	23	-2.47											Gravelly sand (3), silty sand (1), sand (6)
MW16-24D	1/22/2001	194077.579	351471.515	20.38	20.09	50	62	-29.67	-41.67	51	-30.57	58.5	62.4	-38.12	-42.02	65	70	-44.62	-49.62	93	67	Sand (2.5), sandy gravel (5.5), sand (0.5), weathered phyllite (3.5)
MW16-25S	8/2/2004	193842.735	351375.895	21.60	21.26	9	19	10.43	0.43	17.5	1.93											Fine to medium sands with silt and gravel (10)
MW16-25I	9/12/2002	193845.289	351373.300	21.55	21.09	32	42	-12.78	-22.78	40	-20.78											Silty sand (9), gravelly sand (1)
MW16-25D	1/12/2001	193845.415	351361.705	21.74	21.34	46	58	-27.38	-39.38	47	-28.28	58	58.3	-36.26	-36.56	61	66	-39.26	-44.26	87	20	Silty sand (4), sand (2), gravelly sand (6)
MW16-25R	1/18/2001	193845.745	351368.365	21.63	21.26	61	86	-41.15	-66.15	80	-60.15											Phyllite (16.5), Quartzite (8.5) (based on drill cuttings)
MW16-26D	1/25/2001	194341.872	350668.908	15.88	18.33	40	49	-24.17	-33.17	44.5	-28.57		49		-33.12	53	58	-37.12	-42.12	97	88	Silty sand (1), sand (5.5), gravelly sand and silt (2.5)
MW16-27I	8/9/2004	194406.898	351919.871	12.43	12.19	34	44	-21.57	-31.57	39	-26.57											Silty sand (2), sand (8)
MW16-27D	12/12/2000	194409.168	351913.661	12.36	12.09	54	64	-41.67	-51.67	55.5	-43.17		64		-51.64	66	71	-53.64	-58.64	100	92	Layers of sand and silty gravel (2), boulder (3), gravelly sand (2), silty gravelly sand (3)
MW16-27R	12/18/2000	194404.208	351924.551	12.30	12.03	66.5	92	-54.17	-79.67	79	-66.67		61.5		-49.20							Quartzite (25.5) (based on drill cuttings)
MW16-28I	8/10/2004	194616.662	352011.481	11.63	11.40	22.5	32.5	-10.87	-20.87	28.5	-16.87											Sand (9), silty sand (1)
MW16-28D+	12/13/2000	194621.162	352002.361	11.55	11.15	54.5	64.5	-42.97	-52.97	57	-45.47		65		-53.45	69	74	-57.45	-62.45	97	93	Gravelly sand (10)
MW16-28R+	12/21/2000	194618.212	352008.841	11.58	11.15	68	93	-56.47	-81.47	82.5	-70.87		65		-53.42							Quartzite (8), phyllite (17) (based on drill cuttings)
MW16-29D	1/31/2001	194481.705	351630.135	13.57	15.25	44.5	54.5	-30.97	-40.97	51	-37.47		54.4		-40.83	57	62	-43.43	-48.43	62	16	Silty sand (3.5), sand to gravelly sand (6.5)
MW16-30D	2/20/2002	193721.283	350703.202	29.60	29.35	55	62.9	-25.37	-33.27	62	-32.37		65.1		-35.50	68	73	-38.40	-43.40	90	75	Sand (2), gravelly silt (8)
MW16-31D	2/28/2002	193783.675	350856.393	29.99	29.42	54	64	-23.97	-33.97	56	-25.97	58.9	62.2	-28.91	-32.21	67	71.8	-37.01	-41.81	97	72	Gravelly silt (2), silt (3), weathered bedrock (5)
MW16-32D	2/14/2002	193810.173	350955.789	29.77	29.27	50	62	-20.27	-32.27	51	-21.27	60	61.8	-30.23	-32.03	66	71.2	-36.23	-41.43	102	100	Sand (10) weathered Rock (2)
MW16-32R	8/5/2004	193796.360	350969.968	29.33	29.19	68	93	-38.67	-63.67	77	-47.67											Quartzite (4), phyllite (14), quartzite (4), phyllite (3) (based on drilling cuttings)
MW16-33S	9/12/2002	193440.116	350739.235	28.76	28.50	6.5	16.5	22.28	12.28	15.5	13.28											Sand (10)
MW16-33I	10/3/2002	193445.687	350734.275	28.86	28.50	34	44	-5.19	-15.19	42	-13.19											Sand (10)
MW16-33D	8/30/2002	193438.845	350734.521	28.82	28.53	61	71	-31.92	-41.92	66	-36.92		69		-40.18	74	79	-45.18	-50.18	100	35	Gravelly sand (5), boulder (2), gravel (1), weathered bedrock (2)
MW16-34S	9/13/2002	193594.842	350947.153	26.76	26.60	5	15	19.34	9.34	14.5	9.84											Sand (10)
MW16-34I	10/7/2002	193590.672	350950.933	26.64	26.39	25	35	-1.62	-11.62	30	-6.62											Sand (10)
MW16-34D	8/22/2002	193594.981	350951.698	26.67	26.41	44	58	-20.42	-34.42	51	-27.42	52	58	-25.33	-31.33	61	66	-34.33	-39.33	97	75	Sand (8), weathered bedrock (6)
MW16-35S	8/20/2002	193600.178	351185.526	23.38	23.14	6	16	14.62	4.62	14	6.62											Sand (10)
MW16-35I	10/1/2002	193595.374	351186.370	23.31	23.09	28	38	-7.23	-17.23	34	-13.13											Sand (10)
MW16-35D	8/15/2002	193600.296	351189.214	23.35	23.04	51.5	61.5	-30.65	-40.65	55	-34.15		61.4		-38.05	66	71	-42.65	-47.65	100	15	Sand (6.5), gravelly sand (3.5)
MW16-36D	8/15/2002	193243.558	351297.251	19.54	19.23	39.5	49.5	-23.47	-33.47	48	-31.97	47	54	-27.46	-34.46	54.5	59.5	-34.96	-39.96	100	87	Sand (4.5), silty gravelly sand (3), weathered phyllite (2.5)
MW16-36R	8/30/2002	193242.990	351291.485	19.65	19.35	53.5	78.5	-36.16	-61.16	63.5	-46.16											Quartzite and phyllite (25) (based on drill cuttings)
MW16-37S	8/13/2002	193702.725	351085.683	24.66	24.46	7	22	15.23	0.23	20	2.23											Gravelly sand (5), sand (10)
MW16-37I	8/13/2002	193704.474	351082.515	24.76	24.43	24	38	-1.79	-15.89	37	-14.79											Sand (6.5), silty sand (1.5), sand (2), silty sand (4)
MW16-37D	8/12/2002	193704.381	351086.449	24.68	24.25	44.7	54.7	-22.78	-32.78	46	-24.08		54.7		-30.02	57.7	62.1	-33.02	-37.42	94	40	Boulder (0.3), sand (9.7)
MW16-38I	9/17/2002	193841.835	351275.515	22.43	22.10	29	39	-9.24	-19.24	34	-14.24											Sand (9), Silt (1)
MW16-39I	10/8/2002	193790.164	352043.971	14.96	14.38	45	55	-30.07	-40.07	51	-36.07											Sand (10)
MW16-39D	8/5/2002	193795.028	352049.785	14.75	14.53	64	74	-49.27	-59.27	69	-54.27	74	74.5	-59.25	-59.75	77	82	-62.25	-67.25	93	33	Silty sand (2), Boulder (2), silty sand (2), gravelly sand (3.5), boulder (0.5)
MW16-40S	9/23/2002	194218.506	351291.026	22.84	25.19	6	22	16.83	0.83	19	3.83											Sand (12), sand with trace organics (2), sand (2)

TABLE 3-1

MONITORING WELL CONSTRUCTION DATA
PHASE III RI FOR IR PROGRAM SITE 16
FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Well Number	Date Installed	Rhode Island Grid Coordinates NAD 1983		Ground Elevation NAVD 1988 (ft above MSL)	PVC Elevation NAVD 1988 (ft above MSL)	Screen or Open Borehole Depth (ft bgs)		Screen Elevation (ft MSL)		Depth of Pump Intake (ft bgs)	Elevation of Pump Intake (ft above MSL)	Depth to Top of Weathered Bedrock (ft bgs)	Depth to Top of Competent Bedrock (ft bgs)	Elevation to Top of Weather Bedrock (ft above MSL)	Elevation to Top of Competent Bedrock (ft above MSL)	Bedrock Core Data (Depths in ft bgs, Elevations in ft above MSL)						Geologic Deposits Screened
		Northing	Easting			Top	Bottom	Top	Bottom							Depth to Top of Core	Depth to Bottom of Core	Elevation of Top of Core	Elevation of Bottom of Core	% Recovery	% RQD	
MW16-40I	4/29/2004	194226.738	351293.921	21.73	24.37	35	45	-13.27	-23.27	43	-21.27											Sand (10)
MW16-40D	4/28/2004	194221.688	351293.381	22.53	25.06	54	64	-31.47	-41.47	57	-34.47	58	63	-35.47	-40.47	67	72	-44.47	-49.47	93	51	Sand (2), till (2), boulders/cobbles (6)
MW16-41S	9/6/2002	194276.572	351309.655	19.86	21.79	7.5	17.5	12.33	2.33	16.5	3.33											Sand (6.5), Silty sand (2.5), silt (0.5), Peat (0.5)
MW16-41I	9/9/2002	194272.691	351304.218	19.92	21.86	19.5	29.5	0.43	-9.57	24	-4.07											Sand (10)
MW16-41D	8/7/2002	194282.500	351308.483	19.77	21.38	51	61	-31.27	-41.27	57	-37.27		61		-41.23	64	69	-44.23	-49.23	100	58	Gravelly sand (10)
MW16-42S	9/6/2002	194320.997	351458.616	17.15	19.28	5.5	15.5	11.63	1.63	14.5	2.63											Sandy fill (6.5), sand (2.5), silty with organic material (0.5), silt (0.5)
MW16-42I	9/9/2002	194315.622	351460.733	17.22	19.04	20	30	-2.77	-12.77	27	-9.77				17.22							Sand (10)
MW16-42D	8/8/2002	194325.675	351454.515	17.14	20.24	58	68	-40.87	-50.87	63	-45.87	58	(78+)	-40.86	(-60.86+)	73	78	-55.86	-60.86	85	7	Weathered / fractured bedrock and silt (10)
MW16-43S	8/7/2002	194448.097	351254.669	16.92	19.27	6	21	10.93	-4.07	17	-0.07											Sandy fill (8), sand (3), peat (1), sand (3)
MW16-43I	8/15/2002	194456.126	351257.160	16.22	18.11	25.5	33.5	-9.27	-17.27	32	-15.77											Sand (2.5), gravelly sand (4), sand (1.5)
MW16-43D	7/17/2002	194456.224	351252.085	16.23	19.44	37	43	-20.77	-26.77	40.5	-24.27		43.3		-27.07	46	51	-29.77	-34.77	95	95	Sand (6)
MW16-44S	8/5/2002	194449.373	351369.871	15.78	18.86	6	21	9.83	-5.27	16	-0.17											Sandy fill (8), silt? (2), peat (0.5), sand (1.5), silty sand (3)
MW16-44I	9/25/2002	194457.185	351364.288	15.48	17.91	23	33	-7.57	-17.57	28	-12.47											Silty sand (7), sand (3)
MW16-44D	7/23/2002	194446.108	351367.526	15.96	18.02	49.6	59.6	-33.67	-43.67	54.7	-38.77		59.6		-43.64	62.6	67.6	-46.64	-51.64	73	30	Gravelly sand (5.2), boulder (4.2), sand (0.6)
MW16-44R	8/28/2002	194453.962	351369.494	15.52	18.30	62	87	-46.47	-71.47	65	-49.47											Phyllite? (25) (based on drill wash)
MW16-45S	8/5/2002	194509.701	351289.272	13.97	17.23	6	21	7.93	-7.07	19	-5.07											Gravelly sandy fill (10.5), Peat (1.5), Sand (3)
MW16-45I	9/30/2002	194514.440	351293.400	13.83	16.48	32	42	-18.17	-28.17	33	-19.17											Sand (10)
MW16-45D	7/22/2002	194514.198	351287.483	13.80	16.77	48	58	-34.17	-44.17	51	-37.17		56.3		-42.50	61	66	-47.20	-52.20	96	87	Gravelly sand (3.8), boulders/cobbles (2.2), sandy silt (2.3), bedrock (1.7)
MW16-46S	8/8/2002	194568.159	351361.046	13.43	15.62	6	21	7.43	-7.57	16.5	-3.07											Fill (sand, rock fragments, wood, glass) (10.5), peat (0.5), silty sand (1), sand (3)
MW16-46I	9/26/2002	194571.075	351354.898	12.96	15.29	22	32	-9.07	-19.07	27	-14.07											Gravelly sand (2), sand (6), silty sand (2)
MW16-46D	7/18/2002	194576.460	351361.086	13.46	15.92	50.5	59	-37.07	-45.57	52	-38.57	52.2	59	-38.74	-45.54	62	67	-48.54	-53.54	95	25	Gravelly sand (2), weathered bedrock (6.5)
MW16-47S	9/17/2002	194610.996	351119.938	17.47	19.58	4	14	13.43	3.43	12.5	4.93											Gravelly sandy fill (0.5), sand (9.5)
MW16-47D	7/19/2002	194609.272	351125.865	17.33	19.63	26.3	36.3	-8.97	-18.97	32	-14.67		36.3		-18.97	39.3	44.3	-21.97	-26.97	100	90	Sand (1.8), silt (0.5), silty sand / sandy silt (3), silty gravelly sand (4.5), sandy silt (0.2)
MW16-48S	9/5/2002	194766.279	351392.730	7.79	7.50	4	14	3.83	-6.17	9	-1.17											Sandy fill (4), sand with organic material and seagrass (1.5), sandy silt (0.2), sand (4.5),
MW16-48I	9/5/2002	194764.502	351392.579	7.77	7.46	20	30	-12.27	-22.27	27	-19.27											Sand (4) gravel (2.5), sand (3.5)
MW16-48D	9/5/2002	194760.273	351391.321	7.81	7.47	35.4	45.4	-27.57	-37.57	40.5	-32.67		45.4		-37.59	48.4	53.4	-40.59	-45.59	100	65	Sand (4.6), gravelly sand (5.4)
MW16-49I	8/4/2004	194250.892	352312.890	12.93	12.59	37	47	-24.07	-34.07	42	-29.07											Sand (10)
MW16-49D	8/1/2002	194252.913	352314.095	12.83	12.26	62	76	-49.17	-63.17	70.5	-57.67	76	93	-63.17	-80.17	96	101	-83.17	-88.17	80	30	Sand (1), boulder (1), sand (2), boulder (2), sand (3.9), boulder (2.1), sand (2)
MW16-50I-XXX	8/5/2004	194571.877	352483.380	12.83	12.46	24	34	-23.63	-33.63	25	-24.63											Sand (4), silty sand (4), sand (2)
MW16-50D-XXX	7/25/2002	194569.534	352486.739	12.80	12.60	78	88	-77.77	-87.77	86.5	-86.27		87.4		-74.60	91	96	-78.20	-83.20	100	40	Gravelly sand (3), boulder (3), gravelly sand (3.5), bedrock (0.5)
MW16-51D	8/8/2002	195020.559	352108.598	12.26	14.75	65.5	75.5	-53.28	-63.28	70.5	-58.28		75.5		-63.24	78.6	83.6	-66.34	-71.34	100	92	Gravelly sand (2), boulder (1.5), gravelly sand (6.5)
MW16-51R	8/28/2002	195018.705	352115.744	12.01	14.05	78.5	103.5	-66.47	-91.47	81.5	-69.47											Phyllite and quartzite (25) (based on drilling fluid)

TABLE 3-1

MONITORING WELL CONSTRUCTION DATA
PHASE III RI FOR IR PROGRAM SITE 16
FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Well Number	Date Installed	Rhode Island Grid Coordinates NAD 1983		Ground Elevation NAVD 1988 (ft above MSL)	PVC Elevation NAVD 1988 (ft above MSL)	Screen or Open Borehole Depth (ft bgs)		Screen Elevation (ft MSL)		Depth of Pump Intake (ft bgs)	Elevation of Pump Intake (ft above MSL)	Depth to Top of Weathered Bedrock (ft bgs)	Depth to Top of Competent Bedrock (ft bgs)	Elevation to Top of Weather Bedrock (ft above MSL)	Elevation to Top of Competent Bedrock (ft above MSL)	Bedrock Core Data (Depths in ft bgs, Elevations in ft above MSL)						Geologic Deposits Screened
		Northing	Easting			Top	Bottom	Top	Bottom							Depth to Top of Core	Depth to Bottom of Core	Elevation of Top of Core	Elevation of Bottom of Core	% Recovery	% RQD	
MW16-52D	7/25/2002	195106.069	352624.947	12.07	11.83	60	74	-47.97	-61.97	63	-50.97		74		-61.93	78	83	-65.93	-70.93	40	0	Gravelly sand (8), sandy silt (2), silty gravelly sand (2), gravelly sand (2)
MW16-52R	8/2/2002	195109.214	352619.050	12.00	11.67	93	118	-80.97	-105.97	112	-99.97											Bedrock (25)
MW16-53S	8/1/2002	194489.042	351729.262	14.15	16.12	4	14	10.01	0.01	12	2.01											Sandy fill (2), sand and organic material (1), sand (7)
MW16-54D	8/13/2002	192986.407	350681.050	26.93	26.70	64	74	-51.77	-61.77	72.5	-60.27	73.3	74.2	-46.37	-47.27	77	82	-50.07	-55.07	93	0	Sand (9.25), weathered / fractured phyllite (0.75)
MW16-55I	7/1/2007	193838.744	349760.328	42.54	41.89	43	53	-0.46	-10.46	47	-4.46											Gray fine sand with trace silt (10)
MW16-55D	9/24/2002	193831.707	349771.987	41.69	43.90	90	105	-48.38	-63.38	92	-50.38	100	105.3	-58.31	-63.61	103.3	108.3	-61.61	-66.61	100	32	Gravelly sand (10), weathered phyllite (5)
MW16-55R	9/30/2002	193835.849	349767.541	41.89	43.85	108	133	-66.01	-91.01	121.5	-79.51											Phyllite and some quartzite (25) (based on drill cuttings)
MW16-55R2	10/10/2002	193831.740	349764.920	41.73	43.45	133	158	-91.13	-116.13	146	-104.13											Phyllite and quartzite (25) (based on drilling cuttings)
MW16-56I	7/28/2004	194216.805	351785.780	15.73	15.50	33	43	-17.27	-27.27	38	-22.27											Sand (10)
MW16-56D	7/27/2004	194218.815	351782.140	15.83	15.56	59	66	-43.17	-50.17	64.5	-48.67		66		-50.17	69	74	-53.17	-58.17	98	48	Gravelly sand (4), sand (1), gravelly sand (2)
MW16-56R	8/2/2004	194214.935	351790.000	15.73	15.50	69	94	-53.27	-78.27	69.5	-53.77											Quartzite (3), phyllite (7), quartzite (9), phyllite (5) (based on drill cuttings)
MW16-57I	7/22/2004	193780.196	352261.452	12.43	12.13	43	53	-30.57	-40.57	48	-35.57											Sand (10)
MW16-57D	7/21/2004	193782.136	352258.962	12.43	12.10	66.5	76.5	-54.07	-64.07	75	-62.57	72.5	78	-60.07	-65.57	79	84	-66.57	-71.57	98	85	Sand (3.5), silty sand (2.5), weathered phyllite (4)
MW16-58S	5/10/2004	194329.834	351610.126	16.43	19.00	6	16	10.43	0.43	13	3.43											Sand (5), silt (1), sand (1), silt (3)
MW16-58I1+	5/7/2004	194331.644	351609.336	16.43	19.06	21	31	-4.57	-14.57	27	-10.57											Sandy silt (1), Silty sand (8), sand (1)
MW16-58I2+	5/6/2004	194330.324	351612.806	16.43	19.10	36	46	-19.57	-29.57	39	-22.57											Sand (10)
MW16-58D+	5/5/2004	194332.894	351612.546	16.33	19.11	51	62	-34.67	-45.67	60.5	-44.17	55	63	-38.67	-46.67	58	68	-41.67	-51.67	98	90	Gravelly sand (2), boulder (1), gravelly sand (1), fractured phyllite (7)
MW16-58R+	5/21/2004	194331.684	351616.606	16.43	18.11	66	91	-49.57	-74.57	87.5	-71.07											Phyllite (25) (based on drilling cuttings)
MW16-59S	7/26/2004	194057.026	351218.191	27.53	26.92	14	24	13.53	3.53	22.5	5.03											Sand (10)
MW16-59I	7/26/2004	194054.591	351219.244	27.53	27.00	38	48	-10.47	-20.47	46.5	-18.97											Silty sand (2), sand (2), silty sand (4), sand (1), silty sand (1)
MW16-59D	7/22/2004	194051.093	351220.305	27.33	27.23	64	74	-36.67	-46.67	67	-39.67		68.75		-41.42	72	77	-44.67	-49.67	84	46	Sand (4), gravel and silt (1), fractured quartzite (5)
MW16-59R	8/6/2004	194055.376	351223.181	27.33	27.13	75	100	-47.67	-72.67	91.5	-64.17											Quartzite (25) (based on drilling cuttings)
MW16-60D	8/2/2004	193972.437	351155.383	27.43	27.19	51	61	-23.57	-33.57	59.5	-32.07		61		-33.57	64	69	-36.57	-41.57	95	32	Sand (10)
MW16-60R	8/17/2004	193974.504	351151.050	27.63	27.48	64	89	-36.37	-61.37	74	-46.37											Quartzite (25) (based on core data)
MW16-61I	7/30/2004	193869.153	351164.581	23.03	22.79	28	38	-4.97	-14.97	31	-7.97							23.03	23.03			Sand (10)
MW16-61D	8/2/2004	193865.550	351160.870	23.03	22.81	44	53	-20.97	-29.97	47	-23.97		52.75		-29.72	56	61	-32.97	-37.97	94	52	Silty sand (3), sand (6)
MW16-62I	8/5/2004	193912.433	351116.590	28.13	27.61	27.5	37.5	0.63	-9.37	35	-6.87											Sand (10)
MW16-62D	8/3/2004	193913.888	351119.887	27.95	27.43	47.5	57.5	-19.85	-29.85	52.5	-24.85		57.5		-29.55	57.5	65.5	-29.55	-37.55	80	40	Sand (10)
MW16-63I	7/29/2004	193954.913	351075.199	29.53	29.31	31	41	-1.47	-11.47	37.5	-7.97											Sand (10)
MW16-63D	7/28/2004	193951.426	351076.283	29.43	29.17	47	55	-17.57	-25.57	54	-24.57		54.5		-25.07	57.5	62.5	-28.07	-33.07	100	79	Sand (7), gravelly sand (1)
MW16-64I	7/29/2004	194013.963	351086.078	30.83	30.62	30	37.5	0.83	-6.67	34	-3.17											Silt (7.5)
MW16-64D	7/28/2004	194019.689	351084.329	30.93	30.64	46.5	56.5	-15.57	-25.57	55	-24.07		56.5		-25.57	59.5	64.5	-28.57	-33.57	92	61	Sand (0.5), silt (0.5), sand (4), silt (0.5), sand (4.5)
MW16-65S	8/24/2004	193938.269	350801.524	35.83	38.19	27	37	8.83	-1.17	32	3.83											Sand (10)
MW16-65I	8/19/2004	193934.399	350803.304	35.33	37.81	37	44	-1.67	-8.67	40.5	-5.17											Sand (4), gravelly sand (3)
MW16-65D	8/13/2004	193939.749	350792.254	36.13	38.79	70	75	-33.87	-38.87	73.5	-37.37		65.5		-29.37	70	80	-33.87	-43.87	100	55	Fractured quartzite (5)
MW16-65R	8/23/2004	193940.469	350799.264	36.03	38.33	77	102	-40.97	-65.97	90	-53.97											Quartzite (25) (based on drilling cuttings)
MW16-66S	8/25/2004	193919.460	350931.566	28.83	28.50	18	28	10.83	0.83	26.5	2.33											Sand (10)
MW16-66I	8/25/2004	193921.220	350926.186	28.73	28.39	30.5	40.5	-1.77	-11.77	38	-9.27											Sand (10)

TABLE 3-1

MONITORING WELL CONSTRUCTION DATA
PHASE III RI FOR IR PROGRAM SITE 16
FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Well Number	Date Installed	Rhode Island Grid Coordinates NAD 1983		Ground Elevation NAVD 1988 (ft above MSL)	PVC Elevation NAVD 1988 (ft above MSL)	Screen or Open Borehole Depth (ft bgs)		Screen Elevation (ft MSL)		Depth of Pump Intake (ft bgs)	Elevation of Pump Intake (ft above MSL)	Depth to Top of Weathered Bedrock (ft bgs)	Depth to Top of Competent Bedrock (ft bgs)	Elevation to Top of Weather Bedrock (ft above MSL)	Elevation to Top of Competent Bedrock (ft above MSL)	Bedrock Core Data (Depths in ft bgs, Elevations in ft above MSL)						Geologic Deposits Screened
		Northing	Easting			Top	Bottom	Top	Bottom							Depth to Top of Core	Depth to Bottom of Core	Elevation of Top of Core	Elevation of Bottom of Core	% Recovery	% RQD	
MW16-66D	8/11/2004	193912.663	350931.411	28.83	28.57	46	57	-17.17	-28.17	48	-19.17		56.8		-27.97	60	65	-31.17	-36.17	86	47	Silt (0.5), sand (10.5)
MW16-66R	8/25/2004	193916.480	350926.826	28.73	28.35	60	85	-31.27	-56.27	76.5	-47.77											Quartzite (25) (based on drilling cuttings)
MW16-67S	9/3/2004	193893.631	350981.317	29.53	29.40	14	24	15.53	5.53	22	7.53											Sand (10)
MW16-67I	9/3/2004	193897.281	350989.978	29.53	29.13	28	38	1.53	-8.47	36.5	-6.97											Sand (10)
MW16-67D	9/1/2004	193890.321	350980.287	29.53	29.30	51.5	61.5	-21.97	-31.97	56.5	-26.97		61.25		-31.72	64.5	69.5	-34.97	-39.97	100	37	Sand (1), gravelly sand (1.5), gravel (2), sand (0.5), gravelly sand (1.5), sand (3.5)
MW16-67R	9/7/2004	193893.851	350977.927	29.53	29.21	64	89	-34.47	-59.47	83	-53.47											Phyllite (3), quartzite (12), phyllite (3.5), quartzite (6.5) (based on drilling cuttings)
MW16-68S	8/13/2004	193843.911	351012.908	29.43	29.16	15	25	14.43	4.43	23.5	5.93											Sand (10)
MW16-68I	8/12/2004	193842.241	351010.858	29.43	29.15	28	38	1.43	-8.57	36	-6.57											Sand (2), silty sand (2), sand (6)
MW16-68D	8/10/2004	193838.007	351012.140	29.45	29.23	48.5	58.5	-19.49	-29.49	55.5	-26.49		58.25		-28.80	61.5	66.5	-32.05	-37.05	81	54	Sand (7.5), silt (2.5)
MW16-68R Upper/Lower	8/17/2004, 8/11/2007	193840.480	351017.500	29.33	29.12 / 29.42	61.5	86.5	-61.23	-86.23	77.5	-77.23											Quartzite (14.5), quartzite and phyllite (2.5), quartzite (8) (based on drilling cuttings)
MW16-69S	8/17/2004	193907.291	351015.808	29.53	29.28	15	25	14.53	4.53	23	6.53											Sand (10)
MW16-69I	8/19/2004	193912.521	351012.458	29.53	29.23	39	49	-9.47	-19.47	47	-17.47											Sand (4), sandy gravel (0.5), sand (4.5), sandy gravel (1)
MW16-69D	8/16/2004	193912.321	351017.943	29.53	29.11	51.5	61.5	-21.97	-31.97	54.5	-24.97	61	61.5	-31.47	-31.97	64.5	70	-34.97	-40.47	100	33	Gravel (2.5), gravelly sand (2), gravel (5.5)
MW16-69R	8/19/2004	193908.561	351023.288	29.13	29.27	64.5	89.5	-34.97	-59.97	76.5	-46.97											Quartzite and phyllite (3), phyllite (2.5), quartzite (2), phyllite and quartzite (2), phyllite (15.5)
MW16-70S	8/11/2004	193874.151	351041.639	29.23	29.06	10	25	19.23	4.23	23	6.23											Sand (15)
MW16-70I	8/12/2004	193870.221	351044.029	29.33	29.02	28	38	1.33	-8.67	36	-6.67											Sand (10)
MW16-70D	8/10/2004	193879.662	351040.766	29.33	28.68	46	56	-16.67	-26.67	54	-24.67		58.3		-28.97	61.3	66.3	-31.97	-36.97	100	8	Sand (10)
MW16-70R Upper/Lower	8/12/2004, 8/10/2007	193877.500	351037.560	29.33	29.06 / 28.74	61	86	-60.68	-85.68	81	-80.68		61		-31.67	61	70	-31.67	-40.67	98	76	Quartzite (1), phyllite (0.5), quartzite (5), phyllite (1.5), quartzite (2), phyllite (2.5), quartzite and phyllite (1.5), quartzite (11)
MW16-71S	8/24/2004	193845.841	351061.209	29.03	28.76	15	25	14.03	4.03	23	6.03											Sand (10)
MW16-71I	8/24/2004	193842.521	351062.959	29.03	28.55	28	38	1.03	-8.97	36	-6.97											Silty sand (1), sand (4), silty sand (1), sand (3), silty sand (0.5), silt (0.5)
MW16-71D	8/19/2004	193839.501	351057.799	29.03	28.90	46	57	-16.97	-27.97	56	-26.97		57.3		-28.27	60.5	65.5	-31.47	-36.47	96	52	Sand (7.5), boulders (2.5), gravelly sand (1)
MW16-71R	8/25/2004	193841.181	351060.349	29.03	28.88	59.5	84.5	-30.47	-55.47	70.5	-41.47											Quartzite (25) (based on drilling cuttings)
MW16-72D	6/30/2007	193843.818	351775.088	16.03	18.26	37	47	-20.97	-30.97	38, 42, 46	-21.97, -25.97, -29.97											Very fine sand with silt to silty verfy fine sand (10)
MW16-73D	7/9/2007	193379.940	349694.378	32.77	32.44	73.5	83.5	-40.73	-50.73	81.35	-48.58											Very fine to coarse sands with occaisional gravel (10)
MW16-74D	7/9/2007	193588.455	349677.305	36.56	36.29	61	71	-24.44	-34.44	69	-32.44											Very fine to coarse sands with occaisional gravel (10)
MW16-75D	7/10/2007	193218.107	349706.525	30.77	30.55	50	60	-19.23	-29.23													Very fine to coarse sands with occaisional gravel (10)
MW16-76I	7/23/2007	193574.504	351868.857	14.79	16.87	30	40	-15.21	-25.21	35	-20.21											Very fine sand with trace silt (3), very fine sand with much silt and gravel (7)
MW16-77I	7/27/2007	193726.245	350784.499	29.99	29.64	32	37	-2.01	-7.01	34.5	-4.51											Fine to very fine sands (5)
MW16-78S	7/27/2007	193729.532	350723.369	29.71	29.45	22	27	7.71	2.71	24.5	5.21											Fine to very fine sands with trace silts (5)
MW16-79I	7/28/2007	193692.643	350621.515	29.42	29.06	30	40	-0.58	-10.58	35	-5.58											Very fine sand and silty sand (10)
MW16-80S	8/1/2007	194706.139	351381.672	9.35	9.08	9	14	0.35	-4.65	11.5	-2.15											Poorly graded sand and gravel (5)
MW16-81S	8/1/2007	194644.917	351231.469	13.13	12.87	9	14	4.13	-0.87	11.5	1.63											Poorly graded sand and gravel (5)

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PHASE III RI FOR IR PROGRAM SITE 16
FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

Well Number	Date Installed	Rhode Island Grid Coordinates NAD 1983		Ground Elevation NAVD 1988 (ft above MSL)	PVC Elevation NAVD 1988 (ft above MSL)	Screen or Open Borehole Depth (ft bgs)		Screen Elevation (ft MSL)		Depth of Pump Intake (ft bgs)	Elevation of Pump Intake (ft above MSL)	Depth to Top of Weathered Bedrock (ft bgs)	Depth to Top of Competent Bedrock (ft bgs)	Elevation to Top of Weather Bedrock (ft above MSL)	Elevation to Top of Competent Bedrock (ft above MSL)	Bedrock Core Data (Depths in ft bgs, Elevations in ft above MSL)						Geologic Deposits Screened
		Northing	Easting			Top	Bottom	Top	Bottom							Depth to Top of Core	Depth to Bottom of Core	Elevation of Top of Core	Elevation of Bottom of Core	% Recovery	% RQD	
MW16-82D	10/16/2007	193725.271	349723.207	38.50	38.28	79	94	-40.50	-55.50	87	-48.50											Silty sand to silt, angular rock fragments (15)
MW16-82R	10/12/2007	193729.031	349732.322	38.70	38.57	97	112	-58.30	-73.30	99	-60.30	88	94	-49.30	-55.30	96, 101, 106, 111, 116	101, 106, 111, 116, 121			80, 100, 100, 96, 100	30, 48, 76, 21, 48	Quartzite and Phyllite (25)
MW16-83D	10/30/2007	193201.881	349931.083	31.38	30.80	40	55	-8.62	-23.62	49.5	-18.12				31.38							Fine to coarse sands, silts and angular gravel (15)
MW16-83R	10/29/2007	193205.021	349939.492	31.37	31.16	57	62	-25.63	-30.63	60	-28.63	54	58	-22.63	-26.63	61, 66, 71, 76, 81	66, 71, 76, 81, 86			100, 100, 100, 100, 100	100, 93, 100, 100, 100	Quartzite and Phyllite (25)
MW16-84D	10/12/2007	193701.915	350479.279	33.15	32.81	46	56	-12.85	-22.85	51	-17.85											Very fine silty sand with abundant rock, gravel (10)
MW16-84R	10/11/2007	193689.231	350480.910	32.98	32.40	59.5	69.5	-26.52	-36.52	62.5	-29.52	55	58	-22.02	-25.02	58, 60, 65, 70, 75, 80	60, 65, 70, 75, 80, 84.6			90, 96, 100, 100, 100, 100	83, 75, 94, 94, 100, 100	Quartzite and Phyllite (25)
MW16-85D	10/9/2007	193742.409	350812.840	30.02	29.48	38	48	-7.98	-17.98	42	-11.98											Very fine silty sand (2), very fine silty sand with abundant rock, gravel (8)
MW16-86D	10/23/2007	193520.246	350670.413	28.92	28.39	46.5	61.5	-17.58	-32.58	55	-26.08											Silt and clay (3), silty sand and gravel (12)
MW16-86R	10/25/2007	193515.340	350663.362	28.98	28.56	63	68	-34.02	-39.02	67	-38.02	61.5	69	-32.52	-40.02	69, 74, 79, 84, 89	74, 79, 84, 89, 94			100, 100, 100, 100, 86	82, 85, 90, 98, 80	Quartzite and Phyllite (25)
MW16-87I	11/6/2007	193425.337	352488.552	11.51	13.76	50	60	-38.49	-48.49	55	-43.49	82	84	-70.49	-72.49	86	90	-74.49	-78.49	83	21	Very fine to fine sand with silt (10)
MW16-88I	11/8/2007	193592.481	352809.218	10.23	9.45	50	60	-39.77	-49.77	56	-45.77		72.5		-62.27	74.5	79.5	-64.27	-69.27	40	0	Very fine to fine sand and silt with gravels (10)
MW16-89I	11/15/2007	193959.228	352738.242	11.19	10.67	36	46	-24.81	-34.81	41	-29.81	74.5	83	-63.31	-71.81	85	90	-73.81	-78.81	96	38	Silty very fine to fine sands to very fine to fine sands with minor silts (10)
MW16-90D	11/13/2007	194313.832	352730.525	11.33	11.00	61	71	-49.67	-59.67	66	-54.67		73		-61.67	73	78	-61.67	-66.67	90	93	Medium to coarse sands, gravels and minor silts (10)
MW16-91S	6/23/2010	194424.310	351139.030	19.81	22.10	6.5	21.5	13.31	-1.69	12.5	7.31	38.5	38.5		-18.69							Very fine to fine sands with some mediums sands (14.5)
MW16-91I	6/24/2010	194432.880	351140.000	18.56	20.95	25	30	-6.44	-11.44	27.5	-8.94	38.5	38.5		-19.94							Dark gray silt with trace gravel (5)
MW16-91D-XXX	6/28/2010	194439.100	351148.410	18.73	21.48	32	37	-13.27	-18.27			38.5	38.5		-19.77							Very fine to fine with some subangular to angular gravel (5)
MW16-92S	10/3/2007	194578.477	351050.685	20.48	20.10	14	19	6.48	1.48	16.5	3.98							20.48	20.48			Poorly graded sand and gravel (5)
MW16-93S	6/25/2010	193423.480	353170.820	9.46	9.12	3	13	6.46	-3.54	8	1.46											Dark gray fine sand and some silty vf sand (10)
MW16-93I	6/22/2010	193420.630	353175.030	9.21	8.97	50	60	-40.79	-50.79	57	-47.79											Dark gray vf sand with silt (5), fine to coarse sand and trace silt (5)
TW16-19	6/17/2010	194707.620	352141.000	11.44	11.27	3	13	8.44	-1.56	8	3.44											Very fine to medium sands with minor coarse sands (10)
TW16-20	6/21/2010	194727.710	352097.800	11.48	11.32	3	13	8.48	-1.52	8	3.48											Very fine to medium sands (10)
TW16-21	6/15/2010	194534.140	352191.960	12.05	11.64	3	13	9.05	-0.95	8	4.05											Fine to medium sands with minor coarse sands (10)
TW16-22	6/17/2010	194486.100	352294.590	12.86	12.65	4	14	8.86	-1.14	9	3.86											Very fine to medium sands (9), gray silt (1)
TW16-23	6/15/2010	194436.210	352395.800	13.00	12.75	3	13	10.00	0.00	8	5.00											Very fine to fine sands with trace pea gravels (10)
TW16-24	6/11/2010	193876.280	352932.380	8.22	7.86	2	12	6.22	-3.78	7	1.22											Fine to medium sands with trace pea gravels (9), gray silt (1)
TW16-25	6/14/2010	193790.140	352883.230	8.63	8.32	2	12	6.63	-3.37	7	1.63											Fine to medium sands and silty very fine sands (10)
TW16-26	6/15/2010	193668.560	352794.910	10.52	10.43	3	13	7.52	-2.48	8	2.52											Very fine to medium sands with trace shell fragments (10)

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NORTH KINGSTOWN, RHODE ISLAND

Well Number	Date Installed	Rhode Island Grid Coordinates NAD 1983		Ground Elevation NAVD 1988 (ft above MSL)	PVC Elevation NAVD 1988 (ft above MSL)	Screen or Open Borehole Depth (ft bgs)		Screen Elevation (ft MSL)		Depth of Pump Intake (ft bgs)	Elevation of Pump Intake (ft above MSL)	Depth to Top of Weathered Bedrock (ft bgs)	Depth to Top of Competent Bedrock (ft bgs)	Elevation to Top of Weather Bedrock (ft above MSL)	Elevation to Top of Competent Bedrock (ft above MSL)	Bedrock Core Data (Depths in ft bgs, Elevations in ft above MSL)						Geologic Deposits Screened
		Northing	Easting			Top	Bottom	Top	Bottom							Depth to Top of Core	Depth to Bottom of Core	Elevation of Top of Core	Elevation of Bottom of Core	% Recovery	% RQD	
TW16-27	6/14/2010	193674.380	352931.120	10.77	10.44	2	12	8.77	-1.23	7	3.77											Very fine to medium sands with trace coarse sands (10)
TW16-28	6/15/2010	193586.550	352981.420	9.30	9.06	3	13	6.30	-3.70	8	1.30											Very fine to medium sands with trace coarse sands and shell fragments (10)
TW16-29	6/17/2010	194215.240	352705.130	11.25	10.95	4	14	7.25	-2.75	9	2.25											Very fine to fine sand with some coarse sand (10)
INJ16-01D	9/9/2004	193914.171	350979.407	29.33	29.11	47.5	57.5	-18.17	-28.17	55.5	-26.17		59		-29.67	62.5	67.5	-33.17	-38.17	100	48	Sand (6.5), gravelly sand (2), sand (1), gravelly sand (0.5)
INJ16-02D	8/26/2004	193894.041	350967.027	29.43	29.31	44.5	54.5	-15.07	-25.07	48.7	-19.27		55.6		-26.17	59	64	-29.57	-34.57	85	41	Sand (10)
INJ16-03D	9/13/2004	193902.731	350999.088	29.53	29.08	46	56	-16.47	-26.47	54	-24.47		61		-31.47	65	75	-35.47	-45.47	95	53	Sand (3), silt (0.5), sand (0.5), gravel (4), sand (2)
INJ16-04D	9/8/2004	193876.891	350978.538	29.53	29.20	42.5	52.5	-12.97	-22.97	50.5	-20.97	59.7	61	-30.17	-31.47	64	69	-34.47	-39.47	96	43	Sand (4), silt (6?)
INJ16-05D	9/9/2004	193880.661	350980.368	29.63	28.95	44	54	-14.37	-24.37	52	-22.37		61.5		-31.87	64.5	69.5	-34.87	-39.87	96	48	Sand (6.5), gravelly sand (2.5), sand (0.5), gravelly sand (0.5)
INJ16-06D	8/30/2004	193859.380	350989.148	29.63	29.43	50.5	60.5	-20.87	-30.87	59	-29.37		64		-34.37	64	69	-34.37	-39.37	93	27.5	Sand (0.5), gravelly sand (1), sand (5), gravelly sand (1), sand (2.5)
INJ16-07D	9/2/2004	193863.671	351011.298	29.53	28.88	51.5	61.5	-21.97	-31.97	59.5	-29.97		61.5		-31.97	64.5	69.5	-34.97	-39.97	88	83	Gravel (1), sandy gravel (2.5), boulder (3), sand (0.5), sandy gravel (2.5), sand (0.5)
INJ16-08D	8/20/2004	193841.800	351000.478	29.53	28.90	54	64	-24.47	-34.47	62	-32.47		64.6		-35.07	68	78	-38.47	-48.47	100	70	Sand (2.9), boulder (3.1), sand (4)
INJ16-09D	8/25/2004	193847.371	351022.549	29.43	28.92	48.5	58.5	-19.07	-29.07	56.5	-27.07		58.4		-28.97	62	67	-32.57	-37.57	95	80	Sand (7.5), boulder (1), gravelly sand (1.5)
INJ16-10D	8/30/2004	193824.270	351011.699	29.33	29.05	49.5	59.5	-20.17	-30.17	57.5	-28.17	59	59.5	-29.67	-30.17	62.5	67.5	-33.17	-38.17	94	74.5	Boulder (1), gravel (1), sand (0.5), gravel (1), sand (2), sandy gravel (2), sandy silt (0.5), sand (1.5), gravelly sand (0.5)
INJ16-11D	9/3/2004	193829.381	351032.639	29.23	29.17	50.5	60.5	-21.27	-31.27	59	-29.77		60.5		-31.27	63.3	68.3	-34.07	-39.07	97	44	Sand (6), gravelly sand (4)
INJ16-12D	8/31/2004	193807.830	351022.359	29.03	28.54	48	58	-18.97	-28.97	55	-25.97		61.3		-32.27	64.5	69.5	-35.47	-40.47	93	79	Gravelly sand (1), sand (2), gravelly sand (5.75), boulder (1.25)

NOTES:
Bgs = Below ground surface.
MSL = Mean sea level.
+ = Monitoring well that is tidally influenced.
XXX = Monitoring well has been destroyed.
% RQD = Rock quality designation.
% Recovery = Percent of rock core.
NAD = North American Datum.
NAVD = North American Vertical Datum.
PVC = Polyvinyl chloride.
Null cells = Data not applicable.

ATTACHMENT E

MAPS FM 445404 0005 B (FIRMETTE)
and
FM 445404 0005 B (KEY)

APPROXIMATE SCALE

400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

TOWN OF
NORTH
KINGSTOWN,
RHODE ISLAND
WASHINGTON
COUNTY

PANEL 5 OF 22

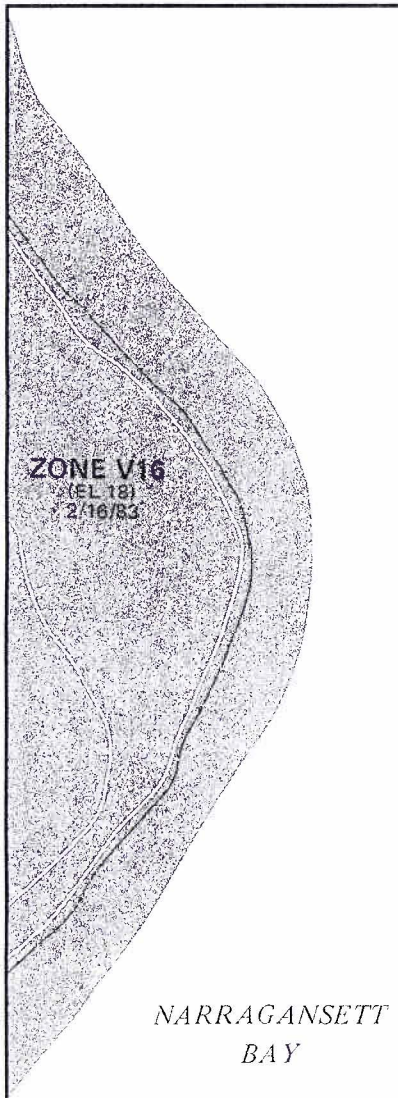
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
445404 0005 B

MAP REVISED:
FEBRUARY 16, 1983

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



TAL BASE FLOOD ELEVATIONS
Y ONLY LANDWARD OF THE
ELINE SHOWN ON THIS MAP.

KEY TO MAP

500-Year Flood Boundary	ZONE B
100-Year Flood Boundary	
Zone Designations* With Date of Identification e.g., 12/2/74	ZONE A1 DATE / ZONE A5 DATE
100-Year Flood Boundary	
500-Year Flood Boundary	ZONE B
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Zone D Boundary	
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

N

APPROXIMATE SCALE

400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
NORTH
KINGSTOWN,
RHODE ISLAND
WASHINGTON
COUNTY

PANEL 5 OF 22
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
445404 0005 B

MAP REVISED:
FEBRUARY 16, 1983

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

ENCLOSURE 2

NAVY RESPONSE TO RIDEM COMMENTS ON THE REVISED DRAFT FEASIBILITY STUDY FOR SITE 16 OF THE FORMER NAVAL CONSTRUCTION BATTALION CENTER, DAVISVILLE NORTH KINGSTOWN, RHODE ISLAND (RIDEM CORRESPONDENCE DATED JUNE 14, 2011)

Navy Response to RIDEM Comments on Revision 1 of the Feasibility Study Report for IRP Site 16 (Dated February 2011) Former Naval Construction Battalion Center Davisville Davisville, Rhode Island (RIDEM Correspondence Dated June 14, 2011)

RIDEM GENERAL COMMENTS:

RIDEM General Comment No. 1: The soil alternatives address residential and commercial/industrial use, but note that residential use is not permitted on the MARAD property. This is true. What the soil alternatives do not address is the existing and anticipated future recreational use of the MARAD property. There is a small portion of the marina and also contained within the Site 16 boundaries that is currently recreational in land use and will remain so well into the future. The feasibility study must address this land use and be accounted for in the soil alternatives.

Navy Response to RIDEM General Comment No. 1: As noted in Table 2-3 of the Revised Draft FS for Site 16, the current and potential future recreational land use at Site 16 has been considered in the development of preliminary remediation goals for soils at Site 16. Specifically, note the information presented in the last three column headings of the referenced table:

- Selected Preliminary Remediation Goal – Industrial or Recreational Scenario
- Selected Preliminary Remediation Goal – Residential Scenario
- Rationale for Selected Preliminary Remediation Goal

Please note that, for example, the rationale presented for the selection of PRGs for the carcinogenic PAHs (presented in terms of benzo(a)pyrene equivalents [BaPeqs]):

> "The lower of the calculated PRGs for the industrial or recreational land use scenarios for the 1E-05 cancer risk level is the primary recommended soil PRG for the carcinogenic PAHs at Site 16. Note that all calculated PRGs/published RIDEM direct contact criteria for the residential land use scenario are less than typical anthropogenic background levels."

Please also see response to RIDEM Specific Comment No. 4 and RIDEM Specific Comment No. 7.

RIDEM General Comment No. 2: To save the Navy responses for the soil alternatives, where direct contact only is an issue, RIDEM could accept 6" of clean soil underlain with a minimum of 4" of asphalt or concrete or 1' of clean soil underlain with a geo-fabric material and an appropriate ELUR to maintain said covers.

Navy Response to RIDEM General Comment No. 2: Comment acknowledged. This will be noted in the text and considered in the design phase.

RIDEM SPECIFIC COMMENTS:

RIDEM Comment No. 1: Page 1-12, Section 1.2.3.2, Site 16 Geology, Paragraph 2, Sentence 3: *"Also in the North Central Area of the site and toward Allen Harbor, relatively recent material was deposited on top of the undisturbed deposits but below the reworked soil and fill material (including the observed waste materials))."* Please clarify this sentence as it is not clear how recently deposited materials are below reworked soil and fill materials.

Navy Response to Comment No. 1: The "reworked soil and fill materials" are above the "relatively recent materials" which are above the "undisturbed deposits". The "recent materials" are "relatively recent materials" in a geological/depositional sense only. In contrast, "reworked soil and fill materials" were probably added to the North Central Area within the past 100 years as the area was altered during human activities such the filling in of wetland areas or as the result of Navy use of the area. This wording will be clarified in Section 1.2.3.2.

RIDEM Comment No. 2: Page 1-20, Section 1.2.4, Nature and Extent of Contamination, Metals: this section notes the EPA Industrial/Commercial screening criteria for lead as 800 mg/kg. Please be advised that the RIDEM Industrial/Commercial direct exposure criteria for lead is 500 mg/kg. Please revise this section accordingly.

Navy Response to Comment No. 2: A sentence will be added to the referenced text acknowledging the RIDEM Method 1 Industrial/Commercial direct exposure criteria of 500 mg/kg (also see Table 2-3 of the Feasibility Study). However, as allowed by Method 3 of the RIDEM Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (i.e., the RIDEM Remediation Regulations), the Navy has conducted a site-specific, baseline risk assessment using current risk assessment methodology.

Consequently, the remedial goals presented in Table 2-3 of the FS document are also derived using the methodology specified in the site-specific baseline risk assessment. This methodology was specified in the Phase III remedial investigation report for NCBC Davisville Site 16 (March 2009). Specifically, current EPA models (i.e., the IEUBK Model and TRW model) were used to conduct the site-specific baseline risk assessment and, subsequently, calculate remedial goals for lead in soils.

RIDEM Comment No. 3: Page 1-23, Section 1.2.6.1.1, Soil Exposure Units, Bullet 3: This bullet states that a forensics analysis indicates that PAHs found in this area (south of Building 41) are from coal tar pitch and building materials rather than from fuel, therefore no remedial action is proposed. Since this is a public document, please explain the circumstances under which the decision was made not to remediate this contamination (additional sampling) since clean-up standards are based on level of contamination, irrespective of source.

Navy Response to Comment No. 3: The Navy's rationale for not recommending remediation of the polycyclic aromatic hydrocarbons (PAH) at location SB16-A3-12 is that, in contrast to the PAH contamination associated with the creosote dip tank area and the fire training area, the PAHs in soils to the south of Davisville Road appear to be most likely associated with the asphalt (which is everywhere in this portion of Site 16) and/or remnants of previously demolished buildings. Specifically, the PAHs do not appear to be related to releases from specific units or processes associated with past Navy operations. The PAHs detected south of Davisville Road are likely similar to those found in most developed areas across the United States and thus, because of their likely source, do not constitute a CERCLA release. The text will be updated with this information.

Also, it should be noted that it is very common to find polycyclic aromatic hydrocarbons (PAHs) in soils as a consequence of human activities that are not specifically associated with actual

chemical spills/releases at a site undergoing an environmental investigation. PAHs are components of many fuels and products used in our industrialized society, (e.g., crude oil, coal tar, creosote, asphalt, building materials). They are formed during the incomplete burning of organic material (e.g., coal, oil, gasoline, and garbage). They are associated with human activities such as cooking, heating homes and industries, operation of gasoline/diesel fueled vehicles, and the emptying of fireplaces and stoves, etc.

Therefore, the Navy believes that it is important to consider the probable source of PAHs in soils when making remedial decisions. Consequently, soil samples were collected in the developed portion of Site 16 (an area currently paved with asphalt) during the summer of 2010 and evaluated (using environmental forensics techniques) to determine the probable source of the PAHs detected in soil samples originally collected in 2007. As noted above and in Appendix G of Revision 0 of the Data Package for the 2010 Feasibility Study Support Field Investigation (November 2010), the environmental forensics evaluation concluded that the PAHs detected were consistent coal tar pitch and building materials (not site operations such as the creosote dip tank in the NCA or fuel spills) or associated with the asphalt in the developed portion of Site 16.

Therefore, the remediation of the PAH in the soils of the developed portion of Site 16 is not evaluated in the Revised FS for Site 16.

RIDEM Comment No. 4: Page 1-25, Section 1.2.6.1.2, Risk Summary, Paragraph 1: This paragraph notes that Site 16 is not currently used for residential purposes and the anticipated future use of the land is commercial/industrial. A portion of the site is currently a marina and is expected to remain so well into the future. Section 3.58 of the RIDEM Remediation Regulations notes that recreational areas are subject to residential direct exposure criteria. Please revise this paragraph to note that recreational criteria (residential direct exposure criteria) apply to the portion of the site that is leased by the Yacht Club that lies within the boundaries of IR Site 16.

Navy Response to Comment No. 4: Agree that a portion of Site 16 is currently used as a marina. However, as indicated in the following discussion, both Section 3.5.8 and Section 3.3.4 of the RIDEM regulations provide guidance regarding the recreational land use scenario.

Section 3.5.8 of the RIDEM regulations states that:

> Residential Activity shall mean any activity related to a (1) residence or dwelling, including but not limited to a house, apartment, or condominium, or (2) school, hospital, day care center, playground, or **unrestricted outdoor recreational area** (emphasis added).

Section 3.3.4 of the RIDEM regulations states that:

> Industrial/Commercial Activity shall mean any activity related to the commercial production, distribution, manufacture, or sale of goods or services, or any other activity which in not a traditional residential activity as defined by this Section **including activities related to outdoor recreational areas with restrictions in place to limit potential exposure** (emphasis added).

The following restrictions already apply per the lease (wording from page 3-14 of the FS):

> Parcel 7 has been approved for a port facility PBC through MARAD. The purpose of the conveyance must be for the development or operation of a port facility in perpetuity. MARAD has determined that the use of port property for residential use will not likely qualify as an acceptable use of PBC property; accordingly, any request for residential land use would require MARAD review and approval. Also, the lease requires than any

additions to, or alterations of the leased premises requires approval of the Government (Navy).

The environmental land use restriction (ELUR) developed for Parcel No. 7 will prohibit the activities specifically identified under Section 3.5.8 of the RIDEM regulations (housing, apartments, condominiums, schools, day care centers, playgrounds). Any structure or facility that might specifically allow/promote other recreational activities (e.g., playgrounds or formal beach areas and the associated structures, etc.), particularly those that would allow more intensive exposure to site soils than possible under the current land use and activities, would be prohibited.

RIDEM Comment No. 5: Page 2-1, Section 2.1, Media of Concern, Paragraph 2: It is stated in this paragraph that Rhode Island does not have an EPA-endorsed Comprehensive State Groundwater Protection Program so Rhode Island's GB groundwater classification was not used in the development of PRGs and remedial alternatives. Please be advised that standards for groundwater classified as GB are based on promulgated regulations and are therefore valid standards whether EPA endorses them or not. Please revise this paragraph in addition to revising the PRGs to include the RIDEM GB groundwater classification.

Navy Response to Comment No. 5: The referenced text is a statement of fact and will not be changed. However, the Navy agrees that the groundwater underlying Site 16 is classified by the State of Rhode Island as GB and did include both RIDEM GA and GB criteria on Table 2-4 of the FS (Preliminary Remediation Goals – Groundwater). Thus, the RIDEM criteria were considered during the evaluation of potential groundwater PRGs for Site 16. However, as noted on page 2-1 of the FS, the groundwater underlying Site 16 is classified by EPA as EPA Class II groundwater. Thus, EPA SDWA MCLs (or risk-based numbers derived assuming domestic use of a water supply) were recommended as groundwater PRGs. These numbers are lower than (more conservative than) the GB criteria presented in Table 2-4.

RIDEM Comment No. 6: Page 2-5, Section 2.2.2, Chemicals of Concern in Groundwater, Bullet 2, Last Sentence: Based on this sentence it appears that only dissolved COCs that exceed either MCLs or RSLs are included for further consideration in the FS. Please be advised that Table 1, associated with Rule 11.3 of the RIDEM Groundwater Quality Regulations require that analysis be based on *unfiltered samples*. Please include aluminum, lead, silver and thallium in the analysis.

Navy Response to Comment No. 6: The Navy agrees that, ideally, remedial decisions should be based on unfiltered metals concentrations in groundwater. However, as discussed in the Phase III RI for Site 16 (March 2009), in Revision 1 of the FS for Site 16 at NCBC Davisville (February 2011) (see Appendix D), and in the Response-to-Comments (RTCs) for Revision 0 of the FS for Site 16 (February 2009), metals concentrations in some of the unfiltered groundwater samples collected at Site 16 appear to be a function of sample turbidity and/or salinity.

Additionally, the spatial distribution of metal concentrations in groundwater does not indicate that the metals concentrations in groundwater are associated with Site 16 source areas (based on review of both filtered and unfiltered data). Consequently, metals have not been identified as COCs in groundwater for Site 16. The lack of significant metals concentrations in Site 16 soil samples, particularly from locations in the developed portion of Site 16, supports this conclusion.

RIDEM Comment No. 7: Page 2-6, Section 2.3, Remedial Action Objectives, Paragraph 3: This paragraph states that the site will be used for commercial and industrial purposes only. Please revise this paragraph to note that a portion of the site is occupied by the Yacht Club, which under the RIDEM Remediation Regulations is defined as recreational use. Please note this will also affect the soil remedial action objectives in Section 2.3.1.1.

Navy Response to Comment No. 7: Please see response to RIDEM General Comment No. 1, and RIDEM Specific Comment No. 4.

Also, the text will be updated to acknowledge the recreational use of the land in the immediate vicinity of the marina.

RIDEM Comment No. 8: Action Specific ARARs: A Table needs to be included for action specific ARARs. The following items need to be placed in this table:

Process	Requirement	Status	Synopsis	Action to be Taken to Meet ARAR
Groundwater Monitoring	Rules and regulations for Groundwater Quality (12-100-006)	Applicable	Rules and regulations intended to protect and restore the quality of the State's groundwater. Includes groundwater monitoring requirements and monitoring well construction abandonment. Also establishes groundwater quality standards and/or requirements.	Groundwater monitoring program will comply with these regulations.
	Rhode Island Hazardous Waste Management Act of 1978 (RIGL 23-19.1 et seq)	Relevant and Appropriate	Rules and regulations for hazardous waste generation, transportation, treatment, storage, and disposal. They incorporate, by reference, the Federal RCRA requirements.	Wastes generated during monitoring and excavation activities will be managed in accordance with these regulations.
	Water Pollution Control (RIGL 46-12 et seq) and Water Quality Standards and Ambient Water Quality Guidelines	Relevant and Appropriate	Establishes water use classification and water quality criteria for all waters of the State. Establishes acute and chronic ambient water quality criteria for the protection of aquatic life.	Discharges of groundwater from the site to surface water will comply with the substantive portions of these regulations to the extent they are more stringent than federal standards.
	State of Rhode Island Rules and Regulations for the Investigation and Remediation of hazardous material Releases; DEM-DSR-01-93 - Sections 9, 10, 11 and 12	Relevant and Appropriate	Establishes minimum requirements for a remedial action work plan, approvals, the remedial action and requirements for managing arsenic in soil.	These sections are required in order to insure proper steps are accomplished to successfully implement the ultimate remedial response and arsenic is a COC.

Navy Response to Comment No. 8: The Navy agrees/disagrees as follows:

- Groundwater Monitoring: The Navy agrees to add the first part as Rule 12 (substantive requirements only). However, the second part is Appendix I which is already included on the table.

- Hazardous Waste Management: Hazardous Waste Identification and Generator Requirements are already on table. Transportation and Disposal are excluded because they are off-site activities.

- Water Pollution Control: Regulations for RIPDES and RI Water Quality Criteria are already on table.

- Remediation Regulations Rules 9 (Work Plan), 10 (Approvals), 11 (Remedial Action), and 12 (Special Requirements for Managing Arsenic in Soil): Disagree with including Rules 9, 10, and 11 because they are primarily administrative or include subjects that are covered by the CERCLA process. Disagree with Rule 12 because it covers sampling activities that would have been performed in the Remedial Investigation stage. In addition, Rule 12 is based on the RIDEM Method 1 for arsenic and the proposed PRG for arsenic is greater than the RIDEM Method 1 value.

RIDEM Comment No. 9: Table 2-2, Location Specific ARARs: The following needs to be added to this table:

Process	Requirement	Status	Synopsis	Action to be Taken to Meet ARAR
	Rhode Island Historic Preservation Act (RIGL 42-45 et seq)	Applicable	This act requires the recovering and preservation of archeological and historic data and artifacts when threatened by a publicly funded action.	Compliance with this requirement in the event historical or archeological artifacts are discovered during remedial activities.

Navy Response to Comment No. 9: Disagree. Existing site information (Archaeological Sensitivity Assessment and Archeological Survey for Base Closure and Realignment, Redevelopment, and Reuse at the Naval Construction Battalion center Davisville, Rhode Island, October 1994) and previous site activities do not suggest the presence of historic features at Site 16.

RIDEM Comment No. 10: Table 2-3; Preliminary Remediation Goals – Soil – Under the column for RIDEM Direct Contact Risk – Under this column PRGs are provided for Residential, Commercial and Recreational scenarios. For the recreational scenario it is consistently labeled as NA (Not Applicable). Please revise this to be the same value as the residential PRG since Section 3.58 of the RIDEM Remediation Regulations defines recreational use as having the same maximum exposure criteria as residential use.

Navy Response to Comment No. 10: Please see response to RIDEM General Comment No. 1, and RIDEM Specific Comment No. 4.

RIDEM Comment No. 11: Page 2-14, Section 2.5.2, Action Specific ARARs, Paragraph 1, Sentence 1: "Action-specific ARARs and TBCs are technology or activity based regulatory requirements or guidance that would control or restrict remedial action." Please change this to: "Action-specific ARARs and TBCs are technology or activity based regulatory requirements or guidance that would provide upper or lower boundaries on the implementation of remedial actions." The ARARs and TBCs do not restrict one's choice of a reasonable remedial action; they just place boundaries on what is acceptable.

Navy Response to Comment No. 11: Disagree. This current text is a variation of text that appears in guidance documents for ARARs.

RIDEM Comment No. 12: Page 3-5, Section 3.2.2.1, LUCs, Effectiveness – Arsenic, lead, benzene, TPH, PAHs and other organics remain at the site. It is pointed out that prohibiting residential use would prevent the occurrence of unacceptable risk to human receptors from direct

exposure to contaminated soil. Please revise this paragraph to state that at various locations all the above mentioned COCs also exceed commercial/industrial direct exposure criteria. It would follow then that commercial/industrial use would also need to be prohibited. Clearly this is not reasonable. Perhaps the entire paragraph should be revised to state that LUCs, by themselves are not effective in protecting human health and the environment, but instead could be used to supplement a more aggressive remedial action.

Navy Response to Comment No. 12: Agree. The subject text will be revised to state that LUCs can also be used restrict other activities. However, please note that this is a general text, and specific LUCs are discussed with the alternatives. The "Conclusion" section already notes that LUCs would be used in combination with other process options.

RIDEM Comment No. 13: Page 3-6, Section 3.2.3, Containment, Effectiveness, Last Sentence: This sentence points out that capping and covering is typically incompatible with residential development that would make maintenance very difficult. Please revise the sentence to point out that under the industrial/commercial scenario the same could also be said where development of the land is likely. There is no guarantee on how long NORAD will remain at the site and many portions of Parcels 7 and 8 have yet to be developed.

Navy Response to Comment No. 13: The text will be revised to note that caps/covers can sometimes be difficult to maintain in industrial/commercial scenarios, although such cases are typically under single ownership and easier to control. It is assumed that LUCs will be applied to all parcels.

RIDEM Comment No. 14: Page 3-7, Section 3.2.4, Removal, Paragraph 1: Please explain and provide a reference as to why the load bearing capacity of the soil must be greater than 1,500 lbs/ft^2 in order to consider a removal action. In addition, please provide the test results that Navy has taken of the load bearing capacity of the soil at Site 16 along with a map delineating areas of less than 1,500 lbs/ft^2 since apparently this will have an impact on where removal actions can be implemented. As a reminder to the Navy, at Tank Farm 4 at Naval Education and Training Center in Newport an oil/water separator and oil contaminated soil was removed from wetlands. In addition, as part of an NRDA claim from the U.S. Fish and Wildlife Service muck was dug out of the wetlands that lie between Calf Pasture Point and Allen Harbor Landfill to improve flora quality. It is highly unlikely that the local bearing capacity of these soils was in excess of 1,500 lbs/ft^2. Perhaps the Navy should consider the use of a lighter piece of equipment for soil removal.

Navy Response to Comment No. 14: The section provides a general discussion of technologies and the example 1,500 lb/sf value is not meant to be absolute. The subject text will be deleted.

RIDEM Comment No. 15: Table 3-2; Preliminary Screening of Remedial Technologies and Process Options for Groundwater, LUCs, Passive Controls, Screening Comment: This section notes that groundwater use is restricted through the MARAD and LIFOC. The LIFOC ends once the land is transferred and MARAD use is not guaranteed (QDC could decide to just purchase the land). Please revise to state that depending on alternative selected an **environmental** groundwater restriction would need to be placed on the land in accordance with RIDEM Remediation Regulations.

Navy Response to Comment No. 15: The text will be revised to note that the existing LUCs will be used until final LUCs for the site are prepared as part of the ROD and LUC Remedial Design.

RIDEM Comment No. 16: Page 3-14, Section 3.5.2.1, LUCs, Bullet 1, Parcel 7 – This paragraph states that MARAD has determined that residential use of the property would likely not qualify as

an acceptable use of the property. While this is true, MARAD does approve of the use of the property for marinas (information obtained from RIDEC). As the Navy is well aware, under the RIDEM Remediation Regulations, a marina is considered recreational use. The clean-up standards for recreational use are the same as the residential clean-up standards. Please note this in this paragraph.

Navy Response to Comment No. 16: Please see response to RIDEM General Comment No. 1, RIDEM Specific Comment No. 4, and RIDEM Specific Comment No. 7.

RIDEM Comment No. 17: Page 3-18, Section 3.5.3.1, Extraction Wells, Implementability, Paragraph 2 – The last sentence states that BRAC PMO approval is required prior to the implementation of this alternative. This statement should be removed as it makes it sound as though the Navy is proposing an alternative they cannot implement.

Navy Response to Comment No. 17: Agree. The referenced text regarding the BRAC PMO will be deleted.

RIDEM Comment No. 18: Page 3-23, Section 3.5.5.1, Filtration, Implementability, Paragraph 2 – See Comment No. 17. In addition, given the nature of groundwater contamination, it would seem that filtration would not be a stand alone alternative, but rather would be used in conjunction with another alternative. Please explain why the Navy feels this technology would require special approval from the BRAC PMO.

Navy Response to Comment No. 18: Please see response to RIDEM Specific Comment No. 17. The referenced text regarding the BRAC PMO will be deleted.

RIDEM Comment No. 19: Page 3-25, Section 3.5.5.2, Air Stripping, Implementability, Paragraph 1 – See Comment No. 17.

Navy Response to Comment No. 19: Please see response to RIDEM Specific Comment No. 17.

RIDEM Comment No. 20: Page 3-25, Section 3.5.5.3, Liquid-Phase GAC Adsorption, Paragraph 3 – Please change NPDES to RIPDES as Rhode Island has an EPA approved program.

Navy Response to Comment No. 20: Agree.

RIDEM Comment No. 21: Page 3-26, Section 3.5.5.3, Liquid-Phase GAC Adsorption, Implementability, Paragraph 2 – See Comment No. 17.

Navy Response to Comment No. 21: Please see response to RIDEM Specific Comment No. 17.

RIDEM Comment No. 22: Page 3-28, Section 3.5.5.5, Neutralization/pH Adjustment, Implementability, Paragraph 2 – See Comment No. 17.

Navy Response to Comment No. 22: Please see response to RIDEM Specific Comment No. 17.

RIDEM Comment No. 23: Page 3-30, Section 3.5.6.1, Direct Surface Discharge, Effectiveness & Implementability – Please change NPDES to RIPDES as Rhode Island has an EPA approved program.

Navy Response to Comment No. 23: Agree.

RIDEM Comment No. 24: Page 4-3, Section 4.1.1.7, Cost – This section notes a planning horizon of 30 years, but does not include an interest rate. Please provide the interest rate used to generate present value costs for the alternatives. The interest rate used can have an impact on alternative selection.

Navy Response to Comment No. 24: Agree. The interest rate is noted on the cost estimate spreadsheets, and will be added to the text. The value is 2.3%.

RIDEM Comment No. 25: Page 4-6, Section 4.2.1.1, Alternative S-1: No action, Description – This section notes that residential use, groundwater extraction and uses limited to port activities are included as restrictions on property use, though they are not environmental in nature. Please note that recreational use of the property exists and is permitted as noted in Comment No. 16.

Navy Response to Comment No. 25: Please see response to RIDEM General Comment No. 1, RIDEM Specific Comment No. 4, and RIDEM Specific Comment No. 7.

RIDEM Comment No. 26: Page 4-8, Section 4.2.2.1, Alternative S-2, Description – Six major components are stated, but only five are presented. Please correct.

Navy Response to Comment No. 26: Agree.

RIDEM Comment No. 27: Page 4-10, Section 4.2.2.1, Alternative S-2, Component 3: Excavation near Marina – The Marina, under RIDEM Remediation Regulations, is considered recreational use and therefore Residential Direct exposure (RDEC) criteria apply. The depth of excavation would be until the RDEC are met or groundwater is encountered. Whichever is first. The depth of groundwater in this area is not deep and allowances for the structural integrity of Building E-107 can be made. Please revise this section accordingly.

Navy Response to Comment No. 27: Please see response to RIDEM General Comment No. 1, RIDEM Specific Comment No. 4, and Specific Comment No. 7.

RIDEM Comment No. 28: Page 4-10, Section 4.2.2.1, Alternative S-2, Component 4: Monitoring – The last paragraph, of this section, states that monitoring would be quarterly for the first year, semi-annual for the next 2 years and annual thereafter. RIDEM typically monitors on a quarterly basis for two years (to get seasonal variations among other things) and evaluates the data to determine subsequent monitoring frequency. Please revise accordingly.

Navy Response to Comment No. 28: Comment noted. The frequency and scope can be discussed at the appropriate time during development of a monitoring program. For the purposes of this FS the text will not be changed.

RIDEM Comment No. 29: Page 4-11, Section 4.2.2.1, Alternative S-2, Component 5: LUCs, Bullet 1 – This bullet states that the purpose of the conveyance of the property is for development and operation of a port facility perpetuity and that residential use of the property would not likely be an accepted use of the property. This is true. The paragraph should also note that recreational use of the property can be an accepted use. As noted in Comment No. 16, a marina is a permitted use. In addition a bicycle path traverses the northern border of the MARAD property. Please revise this paragraph to reflect the recreational use of the property.

Navy Response to Comment No. 29: Please see response to RIDEM General Comment No. 1, RIDEM Specific Comment No. 4, and RIDEM Specific Comment No. 7.

RIDEM Comment No. 30: Page 4-11, Section 4.2.2.1, Alternative S-2, Component 5: LUCs, Last Paragraph, Second Sentence – This sentence states that an LUC would be added to protect the caps and covers. Since the purpose of this land is for development please state if the LUC would preclude development of construction over the caps and covers.

Navy Response to Comment No. 30: Agree. The text will be revised to state clearly that the LUC is not intended to prevent development and that if the development plans affect cover/cap systems, their functions must be restored.

RIDEM Comment No. 31: Page 4-12, Section 4.2.2.2, Alternative S-2, Detailed Analysis, Overall Protection of Human Health and Environment – This paragraph describes protection for residential and industrial use, but does not address the existing and anticipated future recreational use. Please address the recreational use of Site 16 (marina).

Navy Response to Comment No. 31: Please see response to RIDEM General Comment No. 1, RIDEM Specific Comment No. 4, and RIDEM Specific Comment No. 7.

RIDEM Comment No. 32: Page 4-14, Section 4.2.3.1, Alternative S-3, Description, Component 1: Excavation – The first sentence states that COC concentrations greater than industrial PRGs would be excavated to a depth of 2 feet bgs. Please revise this to account for the recreational use associated with the marina. In the marina area the soil would need to be excavated to a depth sufficient to meet RDEC or to the water table, whichever occurs first.

Navy Response to Comment No. 32: Please see response to RIDEM General Comment No. 1, RIDEM Specific Comment No. 4, and RIDEM Specific Comment No. 7.

RIDEM Comment No. 33: Page 4-16, Section 4.2.3.2, Alternative S-3, Detailed Analysis, Overall Protection of Human Health and the Environment, Paragraph 1, Sentence 1 – This sentence states that Alternative S-3 would be protective of human health and the environment. At this time RIDEM does not agree with this statement as Alternative S-3 does not address the recreational land use of the marine within the boundaries of Site 16.

Navy Response to Comment No. 33: Please see response to RIDEM General Comment No. 1, RIDEM Specific Comment No. 4, and RIDEM Specific Comment No. 7.

RIDEM Comment No. 34: Page 4-17, Section 4.2.3.2, Alternative S-3, Detailed Analysis, Implementability, Last Sentence – This sentence notes that there are few structures near the excavation areas, therefore the need for shoring is limited. For consistency, the concerns associated with the marina should be mentioned in this section.

Navy Response to Comment No. 34: Agree. Protection of the marina building by shoring will be specifically identified.

RIDEM Comment No. 35: Page 4-19, Section 4.2.4.1, Alternative S-4, Description, Component 1: Excavation – Based on Figure 4-4 there will be a 10' excavation adjacent to the marina building. For consistency the concerns of excavating by this building should be mentioned.

Navy Response to Comment No. 35: Agree. Protection of the marina building by shoring will be specifically identified.

RIDEM Comment No. 36: Page 4-19, Section 4.2.4.1, Alternative S-4, Description, Component 2: Excavation near Marina – "This component would be similar to Component 3 of

Alternative S-3." It is assumed Component 2 is in reference to the remedy. Component 3 of Alternative S-3 which in turn references Component 5 of Alternative S-2 relate to LUCs which would cover excavations resulting from development of this land. It is not clear how LUCs are a factor in the excavation associated with the remedy for this site. Please explain.

Navy Response to Comment No. 36: The referenced text is not correct. The text will be revised to: "..Component 3 of Alternative S-2."

RIDEM Comment No. 37: Page 4-20, Section 4.2.4.2, Alternative S-4, Detailed Analysis, Overall Protection of Human Health and Environment – This section states that an LUC would be placed on the site limiting its use to industrial scenarios. A portion of the site is currently and in the foreseeable future going to be used for recreational purposes. This paragraph must recognize this. Please revise accordingly.

Navy Response to Comment No. 37: Please see response to RIDEM General Comment No. 1, RIDEM Specific Comment No. 4, and RIDEM Specific Comment No. 7.

RIDEM Comment No. 38: Page 4-27, Section 4.3.1.1, Alternative G-1, No Action, Description, Paragraph 1, Sentence 2 – This sentence notes that LUCs are in place to prevent residential uses of the property and to prevent groundwater use for the portion of the site north of Davisville Road. Please note that RIEDC also has restrictions on groundwater use for the property south of Davisville Road. In addition, for this groundwater alternative, as well as the others, please remove references to land use (residential, commercial, industrial or otherwise) as they have no bearing on RIDEM Remediation Regulations Groundwater Objectives or EPA MCLs.

Navy Response to Comment No. 38: (First part) Agree with clarification. Per the deed, installation of wells south of Davisville Road only requires that the Navy be notified. However, RIEDC requires tenants to purchase water from RIEDC and does not permit the installation of water supply wells. The subject text will be revised to indicate the RIEDC restriction.

(Second Part) Disagree with clarification. Although the land use does not determine the RIDEM Groundwater Objectives, reference to land use is included for overall context. In addition, land use will affect how vapor intrusion-based PRGs are calculated.

RIDEM Comment No. 39: Page 4-30, Section 4.3.2.1, Alternative G-2, MNA & LUCs, Component 1 MNA, Paragraph 4 – This paragraph states that monitoring would be conducted annually. Typically, RIDEM requires quarterly sampling for the first two years at which time the data is reviewed to determine subsequent monitoring frequency. Please revise accordingly.

Navy Response to Comment No. 39: Please refer to the response to RIDEM Specific Comment No. 28.

RIDEM Comment No. 40: Page 4-31, Section 4.3.2.1, Alternative G-2, MNA & LUCs, Component 2: LUCs, Bullet 1 – Please remove the references to land use as this has no basis with regard to groundwater issues.

Navy Response to Comment No. 40: Please refer to the response to RIDEM Specific Comment No. 38.

RIDEM Comment No. 41: Page 4-31, Section 4.3.2.1, Alternative G-2, MNA & LUCs, Component 2: LUCs Bullet 2 – Please note, in this bullet, that once a Record of Decision has been completed the Navy, within 18 months, is responsible for insuring that an Environmental Land Use Restriction (ELUR) has been placed on the property, north of Davisville Road, delineating the appropriate restrictions.

Navy Response to Comment No. 41: Agree with clarification. Per previous RIDEM comments, the LUC description will be revised to note that LUCs will be consistent with ELURs.

RIDEM Comment No. 42: Page 4-34, Section 4.3.2.2, Alternative G-2, MNA & LUCs, Implementability, Paragraph 2 – This paragraph states that LUCs would be incorporated into the LUCIP for the property under Navy control, however, the administrative aspects for property not under Navy control will require coordination with the current property owner and/or local or state officials. Please remove the and/or local or state officials. With respect to local officials the only coordination would be the recording of an ELUR at the town hall. With respect to state officials the only coordination would be to insure the ELUR addresses what it needs to. Neither the Town nor the State can place an ELUR on the property in question without the consent of the property owner.

Navy Response to Comment No. 42: Disagree. The subject text was added at the request of USEPA. Refer to the Response to USEPA Comment No. 107 in the August 24, 2009 response-to-comments document.

RIDEM Comment No. 43: Page 4-34, Section 4.3.3.1, Alternative G-3, In-Situ Chemical Oxidation, MNA and LUCs, Paragraph 1 – Please change "four major components" to "three major components".

Navy Response to Comment No. 43: Agree.

RIDEM Comment No. 44: Page 4-35, Section 4.3.3.1, Alternative G-3, In-Situ Chemical Oxidation, MNA and LUCs Component 2: MNA – It is proposed for Alternative G-2 that 36 wells would be needed for monitoring purposes. It is stated in this paragraph that it is assumed that only 28 wells would need to be monitored, presumably because of the treatment. Until one knows how well the sodium permanganate is being distributed within the plume 36 wells should be monitored. After a certain period of time the data can be evaluated, and if appropriate, the number of monitoring wells could be reduced (or increased) for both Alternatives G-2 and G-3. This should be incorporated into the description of the respective components of the alternatives.

Navy Response to Comment No. 44: Disagree. The number of wells is for long-term monitoring. Short-term monitoring during treatment is included in the treatment capital costs. The assumption is that treatment will be successful and that long-term monitoring will be performed. Therefore, the number of long-term monitoring wells for active treatment alternatives is less than the number of wells in the MNA-only alternative (Alternative G-2) because fewer wells are required in the former high concentration area. Optimization of long-term monitoring, such as changes in frequency, analytes, and/or number of wells is understood as a typical part of the process and has not been noted.

RIDEM Comment No. 45: Page 4-35, Section 4.3.3.1, Alternative G-3, In-Situ Chemical Oxidation, MNA and LUCs, Component 3: LUCs, - See Comment No. 41 regarding ELURs.

***Navy* Response to Comment No. 45:** Please refer to response to RIDEM Specific Comment No. 41.

RIDEM Comment No. 46: Page 4-36, Section 4.3.3.2, Alternative G-3, Overall protection of Human health and the Environment, Paragraph 2, Last Sentence – This sentence states that vapor intrusion would be controlled by building construction methods. Since the plume is moving please state if contingencies have been made for addressing existing buildings.

Navy Response to Comment No. 46: Disagree. The extent of the LUC boundaries will be based on extent of contamination, with considerations for plume migration. The LUC boundaries developed as part of the LUC design are assumed to be sufficient to cover/account for migration, so no contingencies were included in the description.

RIDEM Comment No. 47: Page 4-36, Section 4.3.3.2, Alternative G-3, Long-Term Effectiveness and Permanence, Paragraph 4, Last Sentence – See Comment No. 46 regarding existing buildings and vapor intrusion.

Navy Response to Comment No. 47: Please refer to response to RIDEM Specific Comment No. 46.

RIDEM Comment No. 48: Page 4-36 & 37, Section 4.3.3.2, Alternative G-3, Reduction of Toxicity, Mobility, or Volume Through Treatment, Paragraph 1 – This paragraph states that arsenic would be addressed through biological and abiotic processes. Please explain how this would occur since it is not clear that either process addresses metals. This comment also applies to Alternative G-2.

Navy Response to Comment No. 48: Agree with clarification. The text will be revised to indicate that TCE and other VOCs would be degraded though biological and abiotic processes, and that dissolved arsenic will be immobilized through abiotic processes (such as redox reactions and pH changes).

RIDEM Comment No. 49: Page 4-38, Section 4.3.3.2, Alternative G-3, Implementability, Paragraph 1 – See Comment No. 42 regarding ELURs.

Navy Response to Comment No. 49: Please refer to response to RIDEM Specific Comment No. 42.

RIDEM Comment No. 50: Page 4-40, Section 4.3.4.2, Alternative G-4, Overall Protection of Human health and the Environment, Paragraph 4, Last Sentence – See Comment No. 46 regarding vapor intrusion and existing buildings.

Navy Response to Comment No. 50: Please refer to response to RIDEM Specific Comment No. 46.

RIDEM Comment No. 51: Page 4-40 & 41, Section 4.3.4.2, Alternative G-4, Long-Term Effectiveness and Permanence – See Comment No. 46 regarding vapor intrusion of existing buildings.

Navy Response to Comment No. 51: Please refer to response to RIDEM Specific Comment No. 46.

RIDEM Comment No. 52: Page 4-42, Section 4.3.5.1, Alternative G-5, Groundwater Extraction and Treatment, MNA, and LUCs, Description – Please add a sixth component – Discharge of VOCs to Atmosphere.

Navy Response to Comment No. 52: Disagree. VOCs in the air stream from the stripper will most likely be treated by GAC. In any case, the air stream from the stripper is considered to be part of the overall air treatment component and not a separate component.

RIDEM Comment No. 53: Page 4-46, Section 4.3.5.2, Alternative G-5, Long-Term Effectiveness and Permanence, Paragraph 4, Last Sentence – See Comment No. 46 regarding existing buildings and vapor intrusion.

Navy Response to Comment No. 53: Please refer to response to RIDEM Specific Comment No. 46.

RIDEM Comment No. 54: Page 4-48, Section 4.3.5.2, Alternative G-5, Implementability, Paragraph 3, Last Sentence – Please see Comment No. 17 regarding BRAC PMO level approval.

Navy Response to Comment No. 54: Please see response to RIDEM Specific Comment No. 17.

RIDEM Comment No. 55: Page 4-50, Section 4.3.6.1, Alternative G-6, Components 1 and 2: Both of these Components state that sampling would be quarterly for the first year and annually thereafter. Please revise to state that sampling would be quarterly for the first year at which time sampling results will be reviewed to determine subsequent sampling frequency.

Navy Response to Comment No. 55: Please refer to response to RIDEM Specific Comment No. 28.

RIDEM Comment No. 56: Page 4-50, Section 4.3.6.1, Alternative G-6, Component 3 MNA – For alternatives G-3, G-4 and G-5 which have some form of treatment as a component, 28 monitoring wells are proposed for the MNA component. Please explain why only 15 wells are proposed for Alternative G-6 MNA component.

Navy Response to Comment No. 56: Please refer to response to RIDEM Specific Comment No. 44.

RIDEM Comment No. 57: RIDEM reserves the right to re-review ARARs at the time of the proposed plan and ROD phases.

Navy Response to Comment No. 57: Comment acknowledged.