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LETTER AND COMMENTS FROM U S NAVY ON DRAFT FIVE-YEAR REVIEW REPORT WITH ENCLOSURES NCBC DAVISVILLE RI (PUBLIC DOCUMENT)
3/13/2013
BASE REALIGNMENT AND CLOSURE PROGRAM MANAGEMENT OFFICE NORTHEAST

DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE, NORTHEAST
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Ser BPMOE/13-059
March 13, 2013

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
235 Promenade Street
Providence, RI 02908-5767

Dear Ms. Williams and Mr. Gottlieb:

This letter is to provide the Navy responses to your comments on the draft Five Year Review report. The Navy appreciates your timely review in providing these initial comments and looks forward to resolving any remaining concerns. As you know the necessary completion date for this 3rd Five Year Review is March, 28, 2013.

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

Sincerely,

DAVID BARNEY
BRAC Environmental Coordinator
By direction of BRAC PMO

Enclosures:
1. Navy Response to U.S. Environmental Protection Agency, Region I Comments on Draft Third Five Year Review Report Dated December, 2012, for the Former Naval Construction Battalion Center Davisville North Kingstown, Rhode Island
2. Navy Response to Rhode Island Department of Environmental Management Comments on Draft Third Five Year Review Report Dated December, 2012, for the Former Naval Construction Battalion Center Davisville North Kingstown, Rhode Island

Copy to:
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ENCLOSURE 1

NAVY RESPONSE TO U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 1 COMMENTS ON DRAFT THIRD FIVE YEAR REVIEW REPORT DATED DECEMBER, 2012 FOR THE FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE NORTH KINGSTOWN, RHODE ISLAND

March 2013

Navy Response to United States Environmental Protection Agency (USEPA) New England - Region I Comments on Draft Third Five Year Review Report Dated December, 2012, for the Former Naval Construction Battalion Center (NCBC) Davisville North Kingstown, Rhode Island (USEPA Region I Correspondence Dated February 6, 2013)

General Comments

EPA General Comment No. 1 – Based on a review of the subject FYR and without any independent investigation or verification of the data contained therein, EPA concurs that the information presented in the FYR, once the attached comments are satisfactorily addressed, is sufficient to support a finding of currently protective for the Site. The remedy at the OU1 Allen Harbor Landfill (site 9) is protective in the long term and the remedy at the OU8 Calf Pasture Point Solvent Disposal Area (site 7) is currently protective.

Navy Response to General Comment No. 1: *Comment acknowledged. The Navy concurs with the EPA conclusion that the remedy at OU1 Allen Harbor Landfill (Site 9) is protective in the long term. The following text edits will be made to reflect this protectiveness evaluation:*

Five-Year Review Summary Form (page vi), first sentence of protectiveness statement for Allen Harbor Landfill

*"*The remedy at Allen Harbor Landfill is protective in the long term of human health and the environment, and exposure pathways that could result in unacceptable risks are being addressed through remedy-related institutional controls and a state-enforced prohibition of shellfishing in Allen Harbor."

Executive Summary, page ES-2, first sentence of final paragraph

*"*Based on the data review and technical assessment performed for this five-year review, the remedy at Allen Harbor Landfill is protective in the long term of human health and the environment, and exposure pathways that could result in unacceptable risks are being addressed through remedy-related institutional controls and a state-enforced prohibition on shellfishing in Allen Harbor."

Section 3.9 Protectiveness Statement, page 3-49, first sentence

*"*The remedy at Allen Harbor Landfill is protective in the long term of human health and the environment, and exposure pathways that could result in unacceptable risks are being addressed through remedy-related institutional controls and a state-enforced prohibition of shellfishing in Allen Harbor."

EPA General Comment No. 2 – The 1999 OU8 ROD (site 7) is not consistent with EPA groundwater guidance in that it does not require groundwater to achieve federal drinking water standards. No chemical specific ARARs are identified in the ROD that require groundwater cleanup (consisting of MCLs, non-zero MCLGs, federal risk –based standards, and more stringent State groundwater standards). The identified RAO is only to "prevent human exposure to CoCs in deep and bedrock groundwater and to ensure that the discharge of groundwater to wetlands and offshore areas continues to pose no

unacceptable risks from COCs.", so the remedy's RAO needs to be modified to be consistent with the groundwater RAOs created for OU9 (site 16). To meet guidance standards the Navy would need to demonstrate that under the current monitoring remedy the groundwater would eventually meet federal drinking water standards through natural attenuation. While this is a long term protectiveness issue, it does not affect current protectiveness. The soil ESD proposed should be expanded to include the groundwater cleanup standards and timeframe. This is the only issue EPA believes should be in the issue and recommendations table. The other concerns should be listed separately.

Navy Response to General Comment No. 2: *The Navy does not agree that the planned ESD for soil should be expanded to include groundwater cleanup standards and timeframe. Under Section 121(c) of CERCLA the purpose of the five-year review is to ensure that human health and the environment are being protected by the selected remedial action. There is no new site information, nor is there anything in the EPA's June 26, 2009 "Summary of Key Existing EPA CERCLA Policies for Groundwater Restoration", that calls into question the protectiveness of the remedy being implemented at Site 07.*

The Record of Decision explained why restoration of the groundwater under Site 07 to achieve drinking water standards was not necessary since it was determined that the aquifer was unsuitable for drinking water supply:

> *"Although Calf Pasture Point may be developed for recreational use in the future, it is unlikely that ground water at Site 07 will be used as a drinking water supply because (1) the aquifer beneath the southern portion of Calf Pasture Point (i.e. Site 07) is naturally brackish or saline and is not potable without treatment; (2) public water service is currently available nearby in the adjacent community to the north of Calf Pasture Point; and (3) during the Navy's investigations, the groundwater aquifer at Site 07 was found to be low-yielding and, therefore, would not be an effective water supply."*
>
> *Additionally, ROD, page 38, Section IX Statutory Determinations: "The Expected Outcome from the Implementation of Alternative 2: The expected future use would not pose any unacceptable risks to human health or the environment as long as the ground-water and land-use restrictions are abided by.* ***Ground Water will not be available for beneficial use****" (emphasis added).*

In other words, this portion of the groundwater is not a potential source of drinking water. As a result, EPA correctly notes in its comment that the identified RAO is to "prevent human exposure to COCs in deep and bedrock groundwater and to ensure that the discharge of groundwater to wetlands and offshore areas continues to pose no unacceptable risks from COCs.", There is no new information available that would cause the EPA or Navy to reconsider the rationale and objective memorialized in the ROD, in particular where the protectiveness of the selected remedy is not in question.

Furthermore, the EPA Guidance is not a new ARAR or promulgated environmental standard. In fact EPA notes on the first page that the Guidance is not "a regulation itself. Thus it cannot impose legally binding requirements on EPA, states, or the regulated community, and may not apply to a particular situation based on the circumstances. Any decisions regarding a particular situation will be made based on the statute and the regulations…." Even if it were an enforceable standard, there is nothing in the Guidance that is inconsistent with the remedy selected at Site 07. The Guidance states merely that potential sources of drinking water should be restored to beneficial use when practicable. As noted above, it was determined in the ROD signed by the Navy and EPA that the groundwater at Site 07 is not a potential source of groundwater.

Lastly, even if the Guidance constituted a new promulgated standard or requirement, the NCP, the EPA's "Comprehensive Five-Year Review Guidance", and the Navy Policy for Conducting CERCLA Five-Year

Reviews all clearly state that additional actions are required only when the remedy is not protective. Quoting from the NCP preamble: "….the five-year review is not intended as an opportunity to consider an alternative to a protective remedy that was originally selected (p.152)….Once a ROD is signed and a remedy chosen, EPA will not reopen that decision unless the new or modified requirement calls into question the protectiveness of the selected remedy." (p. 211) Again, no information has come to light to suggest that the remedy selected at Site 07 is not protective of human health and the environment. The Navy therefore does not feel it is necessary to expand the ESD to include a modification to the groundwater remedy.

EPA General Comment No. 3 – The Navy should add text to clarify the ROD for OU4 (sites 6, 11, &13). This ROD was written without a discussion of whether or not the groundwater meets MCLs or inorganic background levels. To meet current guidance and the NCP, since the groundwater is designated by EPA as a potential drinking water supply, the Navy needs to state that the groundwater is potable. While this is a concern, it does not affect protectiveness. A very short Memo to the File should be prepared.

Navy Response to General Comment No. 3: *Disagree.The EPA's "Comprehensive Five-Year Review Guidance" and the Navy Policy for Conducting CERCLA Five-Year Reviews all clearly state that additional actions are required only when the remedy is not protective. Quoting from the NCP preamble: "….the five-year review is not intended as an opportunity to consider an alternative to a protective remedy that was originally selected (p.152)….Once a ROD is signed and a remedy chosen, EPA will not reopen that decision unless the new or modified requirement calls into question the protectiveness of the selected remedy." (p. 211). Again, no information has come to light to suggest that the remedy selected at Sites 6, 11, and 13 is not protective of human health and the environment. The Navy therefore does not feel it is necessary to prepare a memo to file.*

EPA General Comment No. 4 – Navy needs to add text clarifying the OU2 (sites 12 &14) ESD. At site 14 building 38 has been torn down; the asphalt floor has been removed. Therefore, the ESD should be clarified that the 95% UCL of the soil at both sites 12 and 14 has PCBs remaining at less than 2 ppm and that the 95% UCL of the concrete at site 12 is 1 ppm PCBs remaining. While this is a concern, it does not affect protectiveness. A very short Memo to the File should be prepared.

Navy Response to General Comment No. 4: *Disagree, the* ***ROD for Sites 12 and 14 (1993)*** *specified a deed restriction (prohibition of residential land use) as well as the removal of soil and asphalt/concrete that contained concentrations for PCBs greater than 10 ppm. However, the* ***1998 ESD*** *published for Sites 12 and 14 (post a removal action) indicated that, "Institutional controls to restrict Sites 12 and 14 from future residential use will not be implemented and a 5-year review will not be required. Due to the amount of PCB removal that the Navy has completed, the conditions at Site 12 and 14 are now acceptable for unrestricted future use." The removal of additional structures, foundation, or asphalt does not fundamentally change this determination. Also refer to the response to General Comment #3 regarding a lack of any new or modified requirements.*

Specific Comments

EPA Specific Comment No. 5 – Summary Form: While I appreciate the need for a ("enforceable") schedule to keep us all honest, if the concerns aren't effecting protectiveness they should not be in the issues section of the FYR. I also appreciate that writing them down provides clarity to the team (tier 1 & 2) and to the public hence this compromise Army & I worked out last year. Please see document below. Pages 6 & 7 are the summary form where it is noted that there are no issues effecting protectiveness, but general concerns Army plans to 'remedy'.

http://www.epa.gov/region1/superfund/sites/sudburyannex/448389.pdf

Navy Response to Specific Comment No. 5: *The Navy concurs with EPA that if the issues are not affecting the protectiveness of the remedies, they should not be listed as issues. For any issues that do not affect the protectiveness of the remedies, the Navy will re-name them as concerns. Appropriate changes will be made throughout the Five-Year Review Report to reflect this re-classification of issues to concerns (e.g. removal of issues from the Summary Form, modification of Sections 2.7, 2.8, 3.7 and 3.8). Edits to the various sections will be completed as outlined below:*

Five-Year Review Summary Form (page iv)

Five-Year Review Summary Form, cont'd.

Issues:

Calf Pasture Point:

1. Implement EPA Region 1 request to complete an ESD to document the removal action (excavation and off-site removal) of the source area that was not a component of the 1999 Site 07 ROD.

Allen Harbor Landfill:

There are no protectiveness issues identified in this review.

Five-Year Review Summary Form (page v)

Five-Year Review Summary Form, cont'd.

Recommendations and Follow-up Actions:

Calf Pasture Point:

1. Prepare ESD to document the removal action (excavation and off-site removal) of the source area that was performed in summer to fall 2011.

Allen Harbor Landfill:

None.

Five-Year Review Summary Form (page vi)

Five-Year Review Summary Form, cont'd.

Protectiveness Statements:

Calf Pasture Point:

The remedy at Calf Pasture Point is currently protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being addressed through institutional controls. These controls are effectively preventing exposure to site-related contaminants in groundwater.

Allen Harbor Landfill:

The remedy at Allen Harbor Landfill is protective in the long term of human health and the environment, and exposure pathways that could result in unacceptable risks are being addressed through remedy-related institutional controls and a state-enforced prohibition of shellfishing in Allen Harbor. These controls are effectively preventing exposure to site-related contaminants.

Other Comments:

The following are specific recommendations for Calf Pasture Point:

1. a) Schedule a DQO meeting to discuss optimization of the LTMP and establish the objectives and scope of the LTMP.
   b) Prepare a revised UFP-SAP for Long-Term Monitoring at Site 07.

2. Schedule a DQO meeting to discuss reporting requirements for data reports and schedule for comprehensive data reviews.

The following are specific recommendations for Allen Harbor Landfill:

1. a) Schedule a DQO meeting to discuss optimization of the LTM program and establish the objectives and scope of the LTM program.
   b) Prepare a revised Work Plan/SAP for Long-Term Monitoring at Site 09.

2. Schedule a DQO meeting to discuss reporting requirements for data reports and schedule for comprehensive data reviews.

3. Prepare a Technical Memorandum based on data collected in offshore area in October 2012 and include evaluation of date through ME 40 with conclusions and recommendations for future long-term sampling.

The following edits will be made to Sections 2.7 and 2.8:

"

2.7 ISSUES

Issue	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)

1. Implement EPA Region 1 request to complete an ESD to document the removal action (excavation and off-site removal) of the source area that was not a component of the 1999 Site 07 ROD.	N	N

2.7.1 CONCERNS

The following concerns are identified for Calf Pasture Point:

Concern	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1. LTM program needs to be reviewed/updated, including updating PALs based on new MCLs or EPA RSLs (as appropriate).	N	N
2. LTM ME data reporting and LTM comprehensive reviews of site data need to be reviewed/updated to ensure appropriate data is shared with BCT in a timely manner to ensure continued protectiveness.	N	N

2.8 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Issue	Recommendations/Follow-Up Actions	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1	Prepare ESD to document the removal action (excavation and off-site removal) of the source area that was performed in summer to fall 2011.	Navy	EPA/ RIDEM	3/1/14	N	N

Concern	Recommendations/Follow-Up Actions	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future

1	a) Schedule a DQO meeting to discuss optimization of the LTMP and establish the objectives and scope of the LTMP. b) Prepare a revised UFP-SAP for Long-Term Monitoring at Site 07.	Navy	EPA/ RIDEM	a) 7/1/13 b) 11/30/13	N	N
2	Schedule a DQO meeting to discuss reporting requirements for data reports and schedule for comprehensive data reviews.	Navy	EPA/ RIDEM	6/1/13	N	N

"

The following edits will be made to Sections 3.7 and 3.8:

"

3.7 ISSUES

There were no protectiveness issues identified in this review.

3.7.1 CONCERNS

The following concerns are identified for Allen Harbor Landfill:

Concern	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1. LTM program needs to be reviewed/updated, including updating PALs based on new MCLs or EPA RSLs (as appropriate).	N	N
2. LTM ME Data reporting and LTM comprehensive reviews of site data need to be reviewed/updated to ensure appropriate data is shared with BCT in a timely manner to ensure continued protectiveness.	N	N
3. Evaluation of area downgradient and offshore (beyond breakwater) of MW09-20I needs to be completed.	N	N

3.8 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Concern	Recommendations/Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future

1.	a) Schedule a DQO meeting to discuss optimization of the LTM program and establish the objectives and scope of the LTM program. b) Prepare a revised Work Plan/SAP for Long-Term Monitoring at Site 09.	Navy	EPA/ RIDEM	7/1/13 11/30/13	N	N
2.	Schedule a DQO meeting to discuss reporting requirements for data reports and a schedule for comprehensive data reviews.	Navy	EPA/ RIDEM	6/1/13	N	N
3.	Prepare a Technical Memorandum based on data collected in offshore area in October 2012 and include evaluation of date through ME 40 with conclusions and recommendations for future long-term sampling.	Navy	EPA/ RIDEM	6/1/13	N	N

“

EPA Specific Comment No. 6 – Page iii, under the heading of due date, there is a typo. The report should be due 3/28/2013

Navy Response to Specific Comment No. 6: *Agree. The due date will be updated to 3/28/13. The summary form will be edited to read as follows:*

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Former Naval Construction Battalion Center Davisville		
EPA ID: RI6170022036		
Region: 1	**State:** RI	**City/County:** Washington
SITE STATUS		
NPL status: Final		
Remediation status: Operating		
Multiple OUs? Yes		**Construction completion date:**
Has site been put into reuse? Yes		
REVIEW STATUS		
Lead agency: U.S. Department of the Navy		
Author name: Prepared by Tetra Tech under contract to the Navy		

Author title:	Author affiliation:
EPA's Review period: January 2008 to December 2012	
Date(s) of site inspection: Various dates.	
Type of review: Post-SARA	
Review number: 3 (Third)	
Triggering action: Second Five-Year Review – March 28, 2008	
Triggering action date *(from WasteLAN)*: 03/28/2008	
Due date *(five years after triggering action date):* 03/28/2013	

EPA Specific Comment No. 7 – Page iv (and incorporate into the rest of the document): Need to add an issue for OU8 (site 7) to issue an ESD to add cleanup timeframes and standards.

Navy Response to Specific Comment No. 7: *Please see Navy Response to General Comment No. 2.*

EPA Specific Comment No. 8 – Page iv (and incorporate into the rest of the document): Need to add a concern for OU2 to issue and Memo to the File to clarify that the 95% UCL for soil and concrete is less than 1 ppm PCBs and that the asphalt has been removed at site 14.

Navy Response to Specific Comment No. 8: *Please see Navy response to EPA General Comment No. 4.*

EPA Specific Comment No. 9 – Page iv (and incorporate into the rest of the document): Need to add a concern for OU4 to issue a Memo to the File to clarify that the groundwater is potable.

Navy Response to Specific Comment No. 9: *Please see Navy response to EPA General Comment No. 3.*

EPA Specific Comment No. 10 – Page vi and Section 3.9: The protectiveness statement for Allen Harbor Landfill indicates that a state-enforced prohibition on shell fishing in Allen Harbor effectively prevents exposure to site-related contaminants. This is doubtful because there is evidence of ongoing shell fishing along the shoreline at the Allen Harbor Landfill despite signage forbidding it. The remedy may not be protective unless shell fishing is somehow prevented. Please explain the steps Navy has taken to reduce the trespassing.

Navy Response to Specific Comment No. 10: *The Navy acknowledges that enforcement of the shell fishing ban in Allen Harbor has not been as effective as desired since limited evidence of shell fish harvesting has been observed. During the February 12, 2013 BCT meeting held in North Kingstown, Rhode Island, several potential actions to regarding the shell fishing ban were discussed – 1) calculation of the human health risk associated with the chemical concentrations detected in the shellfish samples collected in October 2012; 2) installation of a fence; 3) additional warning/notification signs (including languages other than English); and, 4) more aggressive monitoring of the area by local officials. Actions 2 through 4 may limit the shell fishing that is currently occurring; however, none of these actions would absolutely prevent future collection of shell fish along the Site 09 shoreline.*

The Navy will complete a human health risk assessment of the chemical concentrations detected in the shellfish samples collected in October 2012 (ME 40). Based on a preliminary review of the data, the risk estimates for consumption-of-shellfish exposure pathway are not expected to exceed EPA risk management benchmarks (i.e., the EPA cancer risk range [$1x10^{-4}$ to $1x10^{-6}$] or a hazard index of 1). This

human health risk assessment will be submitted for regulatory review as part of the Technical Memorandum summarizing all site data for Allen Harbor Landfill through ME 40 (submission in May/June 2013 based on February 12, 2013 BCT Meeting notes and action items).

No changes are proposed to the Five Year Review.

EPA Specific Comment No. 11 – P 1-3, §1.2, please state that the Navy is the responsible party who will approve the TetraTech FYR and that under CERCLA the Navy is the lead agency responsible for the remedies. Also include that the Navy and EPA inspected the facility on February 13, 2013 and found the remedies intact.

Navy Response to Specific Comment No. 11: *Agree. Section 1.2 will be modified as follows:*

"Tetra Tech was contracted by the Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic to perform the five-year review and prepare this Five-Year Review Report with their review and input. The review team for this document includes EPA and RIDEM. The Navy is the responsible party and will approve the Five-Year Review Report. Concurrence on the Final Five-Year Review Report is expected from EPA and RIDEM upon addressing and integrating their respective comments.

In accordance with CERLA, the Navy is the lead agency responsible for the enactment and maintenance of the selected remedies for the effected sites as outlined in Section 1.1. On February 13, 2013, EPA inspected the facility and found the remedies to be intact. The Navy routinely inspects and confirms the remedies to be intact during long-term monitoring events. The most recent inspections occurred in June 2012 for Site 7 and September 2012 for Site 9."

EPA Specific Comment No. 12 – Table 1-1, please add a column to this table to indicate which OU relates to which site:

Site	OU	Site Description
01*	7	Construction Equipment Department Drum Storage Area
02	7	Construction Equipment Department Battery Acid Disposal Area
03	7	Construction Equipment Department Solvent Disposal Area
04*	7	Construction Equipment Department Asphalt Disposal Area
05	3	Transformer Oil Disposal Area
06	4	Solvent Disposal Area
07	8	Calf Pasture Point

		Solvent Disposal Area
08	Soil: 3 Groundwater: 5	Defense Property Disposal Office (DPDO) Film Processing Disposal Area
09	1	Allen Harbor Landfill
10	5	Camp Fogarty Disposal Area
11	4	Former Fire Fighting Training Area
12	2	Building 316, DPDO Transformer Oil Spill Area
13	4	Disposal Area Northwest of Buildings W-3, W-4, and T-1
14	2	Building 38, Transformer Oil Leak
15*	00	Building 56
16*	9	Creosote Dip Tank and Fire Training Area

Navy Response to Specific Comment No. 12: *Agree. A column indicating which OU each site is associated with will be added as requested (see Attachment 1).*

CALF PASTURE POINT

EPA Specific Comment No. 13 – P 2-5 Table: last entry please update with actual date document was submitted.

Navy Response to Specific Comment No. 13: *Agree. The date will be changed to "2/12/13" since this was the actual date the document was submitted.*

EPA Specific Comment No. 14 – P 2-6 3rd ¶ last sentence, add "under CERCLA after the word, "Additionally".

Navy Response to Specific Comment No. 14: *Agree. The last sentence will be edited to read:*

*"*Additionally, under CERCLA, land use restrictions with compliance monitoring have been placed on the property to ensure that future use will not conflict with the remedy."

EPA Specific Comment No. 15 – In §2.3.2.3, please also address the possible, but unprobable, ecological risk due to the exceedances in PALs noted in tables 2-2 and 3-2. The agreed to February 2011 SAP with field work in summer of 2012 addressed the nearshore risk uncertainty with the following problem statement and screening values:

redlined worksheet 11from the February 2011 draft final SAP states:

Problem 3: Evaluation of Risks Associated with CVOC-Contaminated Groundwater Discharging to the Entrance Channel. A salinity of 10 parts per thousand (ppt) will be used as the threshold for determining whether pore water field screening samples are representative of groundwater discharge to the Entrance Channel. The EPA Region III Marine Screening Benchmarks (EPA, 2006a) will be used as the Project Screening Levels (PSLs) for evaluating pore water and surface water laboratory data. If there are no Region III Marine Screening Benchmarks available for particular contaminants, the EPA Region III Freshwater Screening Benchmarks (EPA, 2006b) are the default PSL. EPA Region III Marine Sediment Screening Benchmarks (EPA, 2006a) are the PSLs for sediment. If there are no Region III Marine Sediment Screening Benchmarks available for particular contaminants, the EPA Region III Freshwater Sediment Screening Benchmarks (EPA, 2006b) or a Secondary Chronic Value (Suter and Tsao, 1996) are the default sediment PSLs.

The redlined worksheet table 15d gives the region 3 marine & freshwater numbers while the draft final includes mostly HHRA trigger levels which were used in the HHRA for the entrance channel.

The table 2-2 in the FYR used the CLTMP screening numbers from 2000 and there are a lot of exceedences for the area from P07-10 to P07-7 that need to be explained in an ERA type format.

Table 3-2 used SAIC derived numbers from 1998 and AWQC from 1999 and there seems to be less exceedances. Please reconcile the data tables and screening values used with the SAP.

Navy Response to Specific Comment No. 15: *Section 2.3.2.3 discusses the Shoreline Human Health Risk Assessment for Site 7. The PALs on Table 2-2 are human health PALs and therefore cannot be used to address potential ecological risks. Table 3-2 is discussed in Section 3.5.2.2 of the report, and includes a comparison of the chemical concentrations in the piezometers to the aquatic life criteria.*

The Problem 3 in the draft final SAP inadvertently did not mention the comparison to human health criteria. As mentioned in the footnote of Table 15d of the draft final SAP, the Trigger Levels developed from human health risk assessment data presented in Human Health Risk Assessment of Shoreline Surface Waters and Sediments, and Groundwater in Shallow Piezometers at Site 07, Calf Pasture Point dated February 28, 2007 used were more conservative than USEPA III Marine criteria. However, the PALs/screening levels for evaluating groundwater/piezometer data will be presented in the LTM plans that will be prepared for Sites 7 and 9 (spring/summer 2013).

The screening numbers in Table 2-2 (from the 2001 CLTMP) were used because those are the currently approved screening levels for Site 7. The screening numbers in Table 3-2 (from the SAIC derived numbers from 1998 and the 1999 AWQC) were used because those are the currently approved screening levels for Site 07. The draft final SAP was never approved so the values from that SAP were not used for the screening values for Tables 2-2 or 3-2. However, as discussed above, the PALs/screening levels for evaluating groundwater/piezometer data will be presented in the LTM plans that will be prepared for Sites 7 and 9 (spring/summer 2013).

EPA Specific Comment No. 16 – Section 2.3.2.1, Page 2-12: Edit the first two sentences of the last paragraph.

Navy Response to Specific Comment No. 16: *Agree. The first two sentences of the last paragraph will be edited to read:*

*"*During March and April 2004, eight monitoring wells were installed at Site 07, as recommended in the first *Five-Year Review Report for Former NCBC Davisville* (EA, 2003c). In addition, a monitoring well was added based on field-screening information obtained during drilling."

EPA Specific Comment No. 17 – Section 2.3.2.2, page 2-13: Edit the second sentence where "-24" is written.

Navy Response to Specific Comment No. 17: *Agree. The second sentence will be edited to read:*

*"*After similar magnitude detections during the August 2004 sampling event were observed in October 2004, the Navy commenced supplementary bi-monthly sampling of shallow water from eight piezometers and sampling of surface water locations adjacent to these piezometers."

EPA Specific Comment No. 18 – Section 2.3.2.3, page 2-14: Edit the last sentence in the second paragraph where "wherein" is written.

Navy Response to Specific Comment No. 18: *Agree. The last sentence in the second paragraph will be edited to read:*

*"*A review of source area data for Calf Pasture Point and background data for sediments and shellfish indicated that the presence of these chemicals is not a consequence of disposal activities at Site 07 (Tetra Tech, 2007l)."

EPA Specific Comment No. 19 – §2.3.2.3, HHRA for site 7 uses sediment data from previous years since that was the maximum concentration found, however, the surface water COPCs were determined from data collected in 2012, EPA has only recently had the opportunity to evaluate the July 2012 data collection.

Navy Response to Specific Comment No. 19: *Comment acknowledged. However, as discussed during the monthly BCT teleconference calls, no unacceptable CERCLA risks were estimated for receptor exposure to chemicals of potential concern detected in the 2012 surface water samples collected at Site 07.*

EPA Specific Comment No. 20 – §2.4, Issues from the previous FYR: EPA agrees with the Navy that all recommendations have been implemented. However, the use of documentation from draft documents that were not followed through to the "official" final document (pages from the SAP dated March 2009) is not appropriate. EPA believes the 2011 SAP, the data dump provided in the fall of 2012, and the HHRAs performed in appendices E & F satisfactorily addressed most of the issues that effected protectiveness. The remaining important issue of the implementation of the ICs was addressed in May 2009 as noted in the report with the recording of the ELUR.

Navy Response to Specific Comment No. 20: *Comment acknowledged. The Navy will augment the text within Section 2.4 to reflect the documentation/sources cited by EPA so that the text does not rely solely on draft documents. Modifications to the text within Section 2.4 are provided in Navy Responses to Specific Comment Nos. 21, 22 and 23.*

Section 2.4.2, Issue 2: Uncertainty Regarding CVOC Source Area, Page 2-19

EPA Specific Comment No. 21 – The last sentence of this section (page 2-20) indicates that the Navy published the Draft Final Document (SAP for Source Area Investigation) in February 2010. The Navy should verify that the Draft Final SAP for Source Area Investigation was published in February 2010 and not February 2011.

Navy Response to Specific Comment No. 21: *The Draft Final SAP for the Source Area Investigation at Site 7 was published in February2011. The last paragraph of Section 2.4.2 will be edited to read:*

*"*Results of Actions: To facilitate completion of the Draft Final version of the document, a teleconference was held on January 11, 2011 to discuss/resolve comments received on the Draft document (see above). The Navy published the Draft Final document in February 2011."

EPA Specific Comment No. 22 – P2-21 for issue 3 there is a note that the draft sap had a figure 4 which was a decision matrix and on p 2-20 there is a note that worksheet 11 contains evaluation criteria for the sentinel well. Please re-write as referencing a document that was never used or agreed to is inappropriate. In addition, the tables in this draft 5-YR use criteria noted in the original LTMs as screening criteria. This issue should have been addressed with new screening criteria EPA has published on our website. Please clarify.

Navy Response to Specific Comment No. 22: *Comment acknowledged. Section 2.4.3 will be re-written as follows:*

"To address the issue of historical increases of CVOC concentrations in the Entrance Channel piezometers, the following recommendations were made:

1. *At the DQO meeting for LTMP, establish the objectives and scope for future shoreline monitoring.*

Actions Taken: During the aforementioned DQO meetings (see Section 2.4.1), the objectives and scope of future shoreline monitoring were discussed and incorporated into the Draft SAP (Field Sampling Plan and QAPP), Long-Term Monitoring, Site 07, Calf Pasture Point. The Draft SAP (Field Sampling Plan and QAPP), Long-Term Monitoring, Site 07, Calf Pasture Point was not completed.

Results of Actions: Worksheets #11, #14, and #17 of the Draft SAP (Field Sampling Plan and QAPP), Long-Term Monitoring, Site 07, Calf Pasture Point summarized the objectives and scope of the future shoreline monitoring. However, as summarized in Section 2.4.1, a significant number of comments were received from EPA and RIDEM and a revised LTMP was not completed. The BCT agreed that no further work on modifications to the LTMP would be pursued until the Source Area Investigation report was completed and the CSM for Site 07 was updated.

2. *Develop trigger values for shoreline media to verify that CVOCs reaching the shoreline continue to pose no unacceptable risks.*

Actions Taken: During development of the Draft SAP (Field Sampling Plan and QAPP), Long-Term Monitoring, Site 07, Calf Pasture Point, a trigger value for a sentinel well was developed for each COC; the trigger value is intended to alert the BCT to potentially unacceptable CVOC concentrations in groundwater (from a risk assessment point of view), should the groundwater discharge to surface water. The Draft SAP (Field Sampling Plan and QAPP), Long-Term Monitoring, Site 07, Calf Pasture Point was not completed.

Results of Actions: The BCT agreed that no further work on modifications to the LTMP would be pursued until the Source Area Investigation report was completed and the CSM for Site 07 was updated.

3. *Develop decision matrix to guide decision-making for shoreline monitoring program.*

Actions Taken: During development of the Draft SAP (Field Sampling Plan and QAPP), Long-Term Monitoring, Site 07, Calf Pasture Point, a decision matrix was prepared. The Draft SAP (Field Sampling Plan and QAPP), Long-Term Monitoring, Site 07, Calf Pasture Point was not completed.

Results of Actions: The BCT agreed that no further work on modifications to the LTMP would be pursued until the Source Area Investigation report was completed and the CSM for Site 07 was updated."

EPA Specific Comment No. 23 – P 2-24 please provide a schedule for submission of the document noted as "in process"

Navy Response to Specific Comment No. 23: *Agree. The final sentence of Section 2.5.2.1 will be edited to read:*

*"*A comprehensive summary of the work performed is provided under separate cover (Source Area Investigation and Long-Term Monitoring Data Summary Report for Site 7 Calf Pasture Point, Tetra Tech 2013).

Section 2.5.2.1.1, EPA Region 1 and EPA Kerr Research Center, Page 2-26

EPA Specific Comment No. 24 – The discussion of the EPA Region 1 Investigative Work concludes with the statement that "additional details regarding the work completed, interpretations and conclusions have been provided under separate cover (Shaw, 2012)." However, the Shaw, 2012 document is the Removal Action Completion Report for the Site 7 Removal Action. The FYR should be revised to provide the correct reference for the EPA Region 1 Investigative Work.

Navy Response to Specific Comment No. 24: *Agree. The final sentence of Section 2.5.2.1.1 will be edited to read:*

*"*Additional details regarding the work completed, interpretations and conclusions have been provided under separate cover (Source Area Investigation and Long-Term Monitoring Data Summary Report for Site 7 Calf Pasture Point, Tetra Tech 2013) and EPA-New England in consultation with Gannett Fleming/CDW."

EPA Specific Comment No. 25 – P 2-26 Please revise the reference from Shaw to "EPA-New England in consultation with Gannett Fleming/CDW"

Navy Response to Specific Comment No. 25: *Please see Navy response to EPA Specific Comment No. 24.*

EPA Specific Comment No. 26 – P 2-26 last ¶remove the last sentence as the Navy's opinion of the work EPA has funded at the site has no place in this document as it is a combative statement. It is inconceivable to EPA that Navy would not utilize the data collected in either a subjective or substantive manner to improve the remedy at the site.

Navy Response to Specific Comment No. 26: *Comment acknowledged. The last sentence will be removed so that the paragraph reads:*

*"*Researchers from the University of Florida (UF) and the EPA's Kerr Research Center, in coordination with EPA Region 1 and the Navy, have performed several phases of hydrogeological investigations since the fall of 2010. The focus of the UF and EPA Kerr Research Center's work is source decay and contaminant flux evaluation; the objective of better understanding the long-term flow and transport mechanisms of the primary site contaminants, the CVOCs."

EPA Specific Comment No. 27 – The discussion of the Kerr Research Center Work (page 2-29, paragraph 3) indicates that the data analysis of the tidal study is presented in Section 3.5.2.1. However, the tidal study is discussed in Section 2.5.2.3.4 of the FYR. Please correct the above reference to the tidal study.

Navy Response to Specific Comment No. 27: *Agree. The final sentence of the third paragraph on page 2-29 will be edited to read:*

*"*Data analysis of the tidal study is presented in Section 2.5.2.3.4."

EPA Specific Comment No. 28 – Page 2-29, the tidal study reference in chapter 3 should be changed to 2.5.2.3.4

Navy Response to Specific Comment No. 28: *Agree. Please see Navy response to EPA Specific Comment No. 27.*

Section 2.5.2.3.2, Deep Zone, Page 2-39

EPA Specific Comment No. 29 – The discussion of the groundwater flow in the deep zone should be revised to acknowledge the upward flow of groundwater from the deep zone into the shallow zone in the area upgradient and adjacent to the Allen Harbor Entrance Channel where the silt confining layer is absent.

Navy Response to Specific Comment No. 29: *Agree. The third paragraph of Section 2.5.2.3.2 will be edited to read:*

*"*In general, while it appears that groundwater is converging toward the Spink Neck and the Entrance Channel area (flowing south from Site 07 and flowing north from Site 16), the precise discharge location

of shallow groundwater from Site 07 is not known; it may be within the Entrance Channel or near Spink Neck. Regardless, groundwater along this pathway at Site 7 (from central portion of site to Allen Harbor Entrance Channel) migrates from the deep to shallow overburden groundwater zones (where the silt confining layer is absent). Deep groundwater migrating toward Narragansett Bay would flow towards and beneath Narragansett Bay since a confining silt layer is present, preventing effective upward migration from the deep to shallow overburden groundwater zones."

Section 2.5.2.3.4, Tidal Study, Page 2-41

EPA Specific Comment No. 30 – To avoid any confusion, the discussion of the tidal study should include a bullet that clearly indicates that while tidal cycles are observed to induce temporary reversals in flow directions in portions of the Site 07 study area, the predominate flow direction remains radial to the west, south, and east.

Navy Response to Specific Comment No. 30: *Agree. A bullet will be added after the first bullet at the bottom of page 2-41 to read:*

- "While tidal cycles are observed to induce temporary reversals in flow directions in portions of the Site 07 study area, the predominate groundwater flow direction remains radial to the west, south, and east."

EPA Specific Comment No. 31 – The discussion of the tidal study (page 2-42) states that "the collection of groundwater elevations at a specific point in the tidal cycle may not provide the correct data to interpret the groundwater flow paths," and that "it is more useful to interpret spatial contaminant distribution to determine actual contaminant migration pathways." While the distribution of contaminants is an important element in determining contamination migration pathways, water level data can also provide useful information regarding the migration of contaminants, particularly the future migration of contaminants. While tidal effects complicate the analysis of flow directions at Site 07, it is customary to adjust water level data at such tidally influenced sites based on tidal studies conducted at such sites. The data obtained from the tidal study conducted at Site 07 should provide the basis for adjusting measured water levels according to the point in the tidal cycle and the size of the tidal fluctuation.

Since the data and analysis of the tidal study has not been fully reviewed by the BCT team, and a consensus has not been reached regarding the conclusions regarding the study; it does not appear appropriate to include the above statement in current FYR.

Navy Response to Specific Comment No. 31: *Comment acknowledged. The final bullet of Section 2.5.2.3.4 will be removed from the Five-Year Review Report.*

EPA Specific Comment No. 32 – Page 2-41, the tidal figures should be included in the FYR, if the Navy includes the tidal discussion in the text.

Navy Response to Specific Comment No. 32: *Agree. The figures supporting the tidal study will be added to the Five-Year Review Report (see Attachment 1). The single sentence after the first paragraph in Section 2.5.2.3.4 will be edited to read:*

*"*The following observations are based on the spatial analyses of data collected during the four distinct tidal ranges (Figures 2-40 through 2-75):"

Section 2.5.2.3.5, Impacts of Tidal Study on Primary Migration Pathways, Page 2-42

EPA Specific Comment No. 33 – The Draft FYR provides estimates of migration rates and travel times from areas of the highest concentrations to the shoreline along the pathway to the Allen Harbor Entrance Channel. The discussion indicates that tides significantly impact the groundwater movement along this pathway. The discussion also implies that the rate and travel times estimates provided in this section are developed based on considerations of the impact of the tides. However, as noted in the presentation made previously to the BCT group on September 20, 2012, the effect of the tides is complex and temporary in nature. Little documentation has, as yet, been provided regarding the approach used to arrive at the above estimates. Accordingly, a consensus has not been developed regarding the impact of migration rates and travel times based on consideration of tidal fluctuations. Until the data and analysis of the tidal study are fully presented to the BCT team, presumably in the Long-Term Monitoring Data Summary Report that is in preparation, it appears most appropriate to refer to the migration rates and travel times in the current FYR in general terms. Perhaps, a statement indicating only that, "based on tidal considerations, travel times from the area of highest contaminant concentrations to the Allen Harbor entrance channel is expected to be on the order of decades" would be sufficient for the FYR.

Navy Response to Specific Comment No. 33: *Comment acknowledged. The first paragraph, including the two bullets, will be edited to read:*

*"*As summarized in Section 2.5.2.2, there is only one migration pathway that results in elevated groundwater contaminant concentrations potentially discharging to the shoreline: this occurs along cross-section A-A'. As noted in the previous section, the tides also significantly impact the groundwater movement along this pathway. Based on tidal considerations, travel times from the area of highest contaminant concentrations to the Allen Harbor entrance channel is expected to be on the order of decades (approximately 30 to 40 years). Additional details regarding the estimation of contaminant migration travel times have been provided under separate cover (Source Area Investigation and Long-Term Monitoring Data Summary Report for Site 7 Calf Pasture Point, Tetra Tech 2013)."

The two bullets will be removed.

EPA Specific Comment No. 34 – When discussing the impact contaminant migration from MW07-42I to the shoreline, the Draft FYR (page 2-43) suggests that "contaminant migration (and contaminant mass/concentrations) approaching the shoreline environment are impeded, and concentration at the shoreline (are), in effect diluted and dispersed, when the tidal action results in a flow from the surface water system to the groundwater system." It does not appear appropriate to imply that the tidal cycle impedes groundwater flow and the associated discharge of contaminants to surface water. The above statement only refers to the period of high tides. During periods of low tide, groundwater flow and associated contaminant discharge is actually facilitated by the tidal cycle. The net result is that plume discharge is based on upgradient average gradients not impeded by the tidal cycle. It is correct that a limited portion of nearshore area exists where fresh and saline groundwater will be exchanged during each tidal cycle. There may be some dilution due to dispersion in this area. However, the extent of this area is likely to be limited. Moreover the impact on contaminant concentration discharged to the surface water is uncertain. It is likely that the contaminant concentration of the discharge will vary with the tidal cycle, with few contaminants discharged during periods of high tide, some diluted discharge occurring during mid-tide periods, and contaminant concentrations reflective of the upgradient plume concentration during low tide. Such a discharge scenario would emphasize the importance of sampling near shore piezometers during or slightly after low tide. The Draft FYR review should be revised to more accurately reflect the impact of tidal cycles on the discharge of contaminants in the nearshore area. Perhaps it would be sufficient to say that tidal cycles will impact the contaminant concentrations observed in

nearshore groundwater by introducing greater variability in the contaminant concentrations discharging to surface water.

Navy Response to Specific Comment No. 34: *Comment acknowledged. The second paragraph will be edited to read:*

*"*While contaminant migration from MW07-42I to the shoreline is estimated to be approximately 1.5 years, a significant ebb and flow action occurs between the groundwater and surface water systems as a consequence of the tides (observed most strongly between MW07-19 and MW07-21). Contaminants migrating in groundwater are not consistently flowing and discharging at the shoreline; rather, the concentrations of contaminants reaching the shoreline are a function of *both* the predominant groundwater flow patterns at Site 07 (i.e., from the source areas to the Entrance Channel) *and* the impact of the tidal cycle on groundwater/surface water flow systems at Site 07. During periods of high tide, contaminant migration (and contaminant mass/concentrations) approaching the shoreline environment are impeded and depending on magnitude of high tide even reversed, and concentrations at the shoreline, in effect are diluted, and dispersed. During periods of low tide, contaminant migration (and contaminant mass/concentrations) approaching the shoreline environment is facilitated by the tidal cycle. Due to the tidal cycles, there is a limited area in the near shore area where fresh and saline groundwater is exchanged and contaminant concentrations are impacted (degree to which is uncertain). Therefore, it is likely that the contaminant concentration of the discharging groundwater will vary with the tidal cycle, with few contaminants discharged during periods of high tide (or none based on elevations), some diluted discharge occurring during mid-tide periods, and highest contaminant concentrations during low tide. At a minimum, the tidal cycles will impact the contaminant concentrations observed in the near shore groundwater by introducing greater variability in the contaminant concentrations discharging to surface water."

EPA Specific Comment No. 35 – The FYR (page 2-43) states that "tidal cycles also impact groundwater elevations, flow and migration towards Narragansett Bay as far inland as MW07-11D, while also dominantly maintaining a downward gradient between MW07-11D and MW07-20S." While this statement does not appear to be supported by any data provided in the FYR, water level contours maps for the shallow and deep groundwater zones included as part of the tidal study presentation made to the BCT team on September 20 2012 appear to indicate that vertical gradients in vicinity of MW07-11D are downward. However, the tidal cycles appear to have little influence on these downward gradients. These gradients are controlled by some other feature of the hydrogeologic system. The FYR review should be revised to more accurately reflect the flow regime in shallow and deep groundwater zones in the vicinity of MW07-11D. The FYR should reference or include any data in the FYR and/or analysis that is needed to support the analysis and conclusions regarding vertical groundwater flow in the vicinity of MW07-11D.

Navy Response to Specific Comment No. 35: *Comment acknowledged. The addition of Figures 2-40 through 2-75 (see Navy Response to Specific Comment No. 32) provides support for the interpretations and conclusions of the tidal impacts at MW07-11D and MW07-20S. EPA is also correct that "some other feature of the hydrogeologic system" is controlling the downward gradients in this area, most notably the presence of a silt layer approximately 10 to 15 feet thick (Figure 2-21). Density differences due to saline versus fresh water are also likely playing a role in controlling the downward gradients as well. Regardless of the feature responsible for the controlling factor, observations of groundwater elevations between MW07-20S and MW07-11D consistently exhibit downward gradients (with the limited exception of some minor upward gradient present during extreme low tides).*

The third (last) paragraph will be edited to read:

*"*The tidal cycles also impact groundwater elevations, flow, and migration towards Narragansett Bay as far inland as MW07-11D. While the tides may impact as far inland as MW07-11D, a nearly consistent downward gradient occurs between MW07-20S and MW07-11D. Upward gradients only occur for a limited time during extreme low tides. In addition to the nearly consistent downward gradient, a silt layer approximately 10 to 15 feet thick (see Figure 2-21) is also present in this area. Therefore, hydraulic connection between the source areas and the shoreline that could result in a significant discharge of contamination at the Narragansett Bay shoreline are not present."

EPA Specific Comment No. 36 – P 2-43,§ 2.5.2.3.5 please clarify the statement "no consistent hydraulic connection between the source areas and the shoreline that would result in significant discharge of contamination at the Narragansett Bay shoreline"

Navy Response to Specific Comment No. 36: *Please see Navy Response to Specific Comment No. 35.*

Section 2.5.2.4, Groundwater Sampling Data, Page 2-43

EPA Specific Comment No. 37 – The text (page 2-44) indicates "increasing trends for several principle CVOCs are consistently observed principal(ly) at MW07-11D, -19D, and -34D, each located immediately downgradient of elevated CVOC concentration areas, along each of the respective migration pathways." The text continues by concluding that "this demonstrates that CVOC contamination continues to move along various identified migration pathways." This language is somewhat ambiguous. It may be more appropriate to conclude that these increases in contaminant concentrations indicate that the main area of contaminant mass continues to migrate toward the shoreline. Since these increases in contaminant concentrations, most notably TCE, have been significant, it might be appropriate to quantify in the text the increase in primary contaminants that have been observed at these locations.

Navy Response to Specific Comment No. 37: *Comment acknowledged.*

The first paragraph on page 2-44 will be edited to read:

*"*In general, the statistical analyses indicate that the parent chemical concentrations are decreasing while the daughter product concentrations are slightly increasing. Further, increasing trends for several principle CVOCs are consistently observed principally at MW07-11D, -19D and -34D, each located immediately downgradient of elevated CVOC concentration areas, along each of the respective migration pathways. This demonstrates that CVOC contamination continues to move along the various identified migration pathways toward the shoreline(s)."

EPA Specific Comment No. 38 – The text (page 2-44) states that "while increasing trends are observed for daughter products along the leading edges of the plume, no significant trends are occurring where the concentrations (parent and daughter products) are persistently elevated." Based on this observation, the text concludes "this suggests that large-scale migration of the plume is not occurring, or is not occurring at a rate that is discernible, based on current LTM data." The logic behind this statement is unclear. First, this conclusion appears to contradict the data discussed previously in the same paragraph (see Specific Comment No. 46). In addition, a pattern of increasing daughter products may indicate that the plume is passing through a nearshore environment where the primary contaminants are more readily degraded (e.g., a more reducing environment), resulting in the discharge of more daughter products rather than primary contaminants (PCA and TCE). The Draft FYR should be revised to clarify the meaning of the above cited statement.

Navy Response to Specific Comment No. 38: *Comment acknowledged. The Navy agrees that the pattern of increasing daughter products may indicate that the plume is passing through a near shore environment where the primary contaminants are more readily degraded and that may also account for their increasing trends. Overall, the paragraph cited was intended to spatially analyze site-wide trends between parent and daughter products. Additional details regarding site-wide trend analyses has been provided in the Draft Source Area Investigation and Long-Term Monitoring Data Summary Report for Site 7 Calf Pasture Point, submitted February 2013.*

The second paragraph on page 2-44 will be edited to read:

*"*Based on data presented in Table 2-1 and Appendix B, CVOC levels in the high concentration areas (e.g., MW07-17D, -39I and -39D) generally do not demonstrate many significant statistical trends. However, this conclusion is somewhat impacted by the limited amount of data available for some locations (e.g., DPT-39-3D and DPT-39-4D). The few trends that have been observed are primarily downward trends (1,1,2,2-PCA); very few increasing trends have been observed. While increasing trends are observed for daughter products along the leading edges of the plume, no significant trends are occurring where the concentrations (parent and daughter products) are persistently elevated. This suggests that large-scale migration of the plume is likely not occurring, or is not occurring at a rate that is discernible, based on current LTM data."

EPA Specific Comment No. 39 – P 2-45 last ¶ in §2.5.2.4 since Calf Pasture Point ground water quality designation is a potential drinking water source and the State has classified the area as a potable water supply, EPA requests Navy continue to analyze for metals (at least to support the FYR) until such time as metals are below MCLs.

Navy Response to Specific Comment No. 39: *Disagree. The Record of Decision explained why restoration of the groundwater under Site 07 to achieve drinking water standards was not necessary since it was determined that the aquifer was unsuitable for drinking water supply.*

The Navy did consider the EPA request to continue to analyze for metals in support of Five-Year Reviews as part of the recommendations to changes in the long-term monitoring as outlined in the Source Area Investigation and Long-Term Monitoring Data Summary Report for Site 7 Calf Pasture Point (submitted February 2013). The rationale to exclude analysis for metals was provided.

EPA Specific Comment No. 40 – P 2-48, §2.5.2.7 the conclusions drawn here would be more persuasive with figures from each of the FYRs for the overall plume. How has the extent of the CVOC contamination changed over the past 15 years? Figures from 1 monitoring event do not illustrate the Navy's conclusion that the plume has not significantly advanced.

Navy Response to Specific Comment No. 40: *Comment acknowledged. While not formally presented as individual figures in the Draft Third Five-Year Review Report, the second paragraph of Section 2.5.2.7 spatially analyzes CVOC plumes since ME 02 (May 2002) for the shallow and deep groundwater and since pre-Remedy in December 1995/January 1996 for cross-sections. Figures 2-25 through 2-34 were provided to demonstrate that the extent of contamination of the various principle CVOCs from the most recent monitoring event (ME 16, June 2012) are not significantly different when compared to previous monitoring events, most notably those since 2007.*

No changes are suggested/proposed.

EPA Specific Comment No. 41 – P 2-51 Last bullet, please provide the rationale for why the FYRs have concluded the remedy is not protective, i.e. plume movement could impact the shoreline with concentrations above 50,000 ppb CVOCs which could impact the benthic receptors negatively?

Navy Response to Specific Comment No. 41: *Comment acknowledged. The previous two Five-Year Review Reports have concluded that the remedy is currently protective. Neither previous two Five-Year Review Reports have concluded that the remedy is not protective. The last bullet states:*

"The remedy has been protective over the past 13 years even though previous Five-Year Reviews have suggested that the remedy may not be protective in the future. The remedy will continue to be evaluated every five years as required."

The intention of the text of the bullet was to point out that even though the two previous Five-Year Reviews concluded that the remedy is currently protective, the remedy has actually been protective in the long term. Further, the Navy believes that the remedy will remain protective in the long term as well based on current site-conditions.

EPA Specific Comment No. 42 – Section 2.6.2, page 2-57: Edit the last sentence of the next to last paragraph in this section where "39I" is written.

Navy Response to Specific Comment No. 42: *Agree. The text will be edited to read:*

*"*Therefore, the selected remedy is protective of exposures associated with the vapor intrusion pathway (there can only be risk of vapor intrusion where the plume is present at the water table, which is only a small area of the large plume - near the source and from MW07-39I to the shoreline)."

EPA Specific Comment No. 43 – Section 2.6.3, page 2-57: EPA does not agree with the last sentence of the second paragraph. The migration from the source area through MW07-11D indicates that the extent of the plume is not stable, although it is agreed that the discharge would not affect protectiveness.

Navy Response to Specific Comment No. 43: *Comment acknowledged. The intent of the paragraph cited states that concentrations are increasing at MW07-11D (first sentence), though this was known during previous monitoring events and does not alter the interpretation that contamination continues to migrate in this area. The Navy concurs that migration/advancement of the plume extent at MW07-11D will not affect protectiveness.*

EPA Specific Comment No. 44 – P 2-57, §2.6.3, second¶, last sentence should be removed since the next paragraph explains why migration along this pathway does not affect protectiveness.

Navy Response to Specific Comment No. 44: *Agree. The second paragraph of Section 2.6.3 will be edited to read:*

*"*With the exception of the migration pathway from the source area through MW07-11D toward Narragansett Bay, there have been no changes regarding our understanding of the extents of the leading edges of the plumes, even though long-term trends are increasing at several locations along certain migration pathways (MW07-11D, -19D and -34D)."

EPA Specific Comment No. 45 – P 2-57, please add some clarification about the geology along the Narragansett Bay shoreline, i.e.; contamination beneath the silt layer possibly impeding contaminant migration.

Navy Response to Specific Comment No. 45: *Agree. The third paragraph of Section 2.6.3 will be edited to read:*

"Of particular note, the contamination in areas where migration may be occurring (MW07-11D, -19D and -34D) is all within the deep overburden groundwater aquifer. Along two of these pathways, MW07-19D (along cross-section A-A') and MW07-34D (in the eastern portion of cross-section B-B'), contamination has already been detected beyond these locations, demonstrating that the extent of contamination is not changing; however, the distribution along the migration pathways may be changing. The only identified migration pathway where the overall extent is likely changing is the pathway from the source area through MW07-11D, where the plume is getting closer to Narragansett Bay over time. However, as determined through the tidal study, upward gradients in this area are infrequent (only occurring over short periods of time under certain low tides). Additionally, as determined from soil borings and well installations, a laterally extensive confining silt layer is present and typically is at least 10 to 15 feet thick. Consequently, the connection and discharge of deep groundwater to the shoreline environment are very complicated and limited. CVOC contamination may eventually reach the Narragansett Bay shoreline; however, the contaminant migration rate towards the shoreline is likely to be very slow as a consequence of both the gradient and laterally extensive silt layer. Also, the same groundwater/surface water interactions observed along the Entrance Channel are likely to impact both groundwater flow and contaminant discharge along the Narragansett Bay shoreline (see Section 2.5.2.3.5 for details)."

Section 2.6.3, Question C: Has any other information come to light that could call into question the protectiveness of the remedy? Page 2-57.

EPA Specific Comment No. 46 – When discussing the migration of the contamination recently observed at MW07-11D, the FYR (page 2-58, last sentence, first paragraph) concludes that "the same groundwater/surface water interactions observed along the Entrance Channel are likely to impede both groundwater flow and contaminant discharge along the Narragansett Bay shoreline." However, as indicated in Specific Comment No. 34 regarding discharges to the Entrance Channel, tidal fluctuations are not likely to impede the discharge to contaminant to the nearshore environment. Rather, tidal cycles will impact the contaminant concentrations observed in nearshore groundwater by introducing greater variability in the contaminant concentrations discharging to surface water. The draft FYR should be revised to accurately reflect in the impact of tidal cycles on the discharge of contaminants in the nearshore environment downgradient from MW07-11D.

Navy Response to Specific Comment No. 46: *Agree. The last sentence will be edited as shown in the Navy Response to Specific Comment No. 45.*

EPA Specific Comment No. 47 – P 2-58 second ¶, please note that the Navy has produced a recent HHRA with the conclusion that the contamination in the entrance channel does not pose a risk. When will an ecological risk evaluation be performed?

Navy Response to Specific Comment No. 47: *As noted above, the Navy will begin preparation of an updated Long-Term Monitoring Plan (LTMP) for Site 07 in April 2013. Data Quality Objective (DQO) planning meetings will be held with the EPA and RIDEM to discuss the scope of the updated LTMP (e.g., the target analyte list, the frequency of monitoring, the wells/surface water and sediment locations to be sampled, etc). It is anticipated that the plan will be completed by August 2013 and, barring a significant change is site conditions, will present the LTMP going forward for Site 07. The Navy will update the ecological risk assessment for the Site 07 shoreline as a preliminary step in that process as an updated assessment may assist the project team in making decisions regarding the appropriate updates the LTMP*

for Site 07. Please note that, as stated in the EPA Comment No. 15, ecological risk is not considered probable for the environmental media along the Site 07 shoreline. The Navy agrees with this assessment.

EPA Specific Comment No. 48 – P 2-58 last paragraph, when will the most contaminated part of the plume discharge at either the entrance channel or Narragansett Bay?

Navy Response to Specific Comment No. 48: *Comment acknowledged. Large scale migration of the most contaminated portions of the plumes migrating toward the Entrance Channel and Narragansett Bay is addressed in the Draft Source Area Investigation and Long-Term Monitoring Data Summary Report for Site 7 Calf Pasture Point, submitted February 2013. From a simplification perspective, consistent with the intentions of the Third Five-Year Review Report, any migration of contamination from the highest concentration areas to the Entrance Channel is at least on the order of decades. Migration from the highest concentration areas toward Narragansett Bay do not demonstrate discharge to the shallow groundwater system is occurring (due in part to either consistent downward vertical hydraulic gradients and/or a laterally extensive confining silt layer at least 10 to 15 feet thick). Further discussions on this topic will occur as part of the Draft Source Area Investigation and Long-Term Monitoring Data Summary Report for Site 7 Calf Pasture Point.*

EPA Specific Comment No. 49 – Section 2.6.3, page 2-58: EPA asserts that ensuring "that the discharge of groundwater to wetlands and off-shore areas continues to pose no unacceptable risks from COCs" is not the only objective of the remedy. Another objective of the remedy is to ensure that the extent of the plume is stable or decreasing. The extent of the plume is clearly increasing as maintained by EPA in several rounds of comments. Although EPA agrees that unacceptable risk due to further migration of the plume is unlikely, Navy should include in an ESD cleanup timeframes and standards since the ROD did not include either.

Navy Response to Specific Comment No. 49: *Comment acknowledged. Please see the Navy response to General Comment No. 2.*

Additionally, while the Navy does not dispute that the extent of the plume near MW07-11D currently exhibits and will likely continue to exhibit an increasing extent of the CVOC plume at least for the near future (concentrations are currently increasing but may be leveling off), it is important to remember that several other contaminant pathways occur that are either stable or decreasing. In particular, the contaminant extents along the western arm (from former source area to Allen Harbor) primarily indicate that the extent is unchanged or contracting. Contaminant extents along the former source area to the Entrance Channel and along the northern route to Narragansett Bay are also stable (and may possibly exhibit early indications of contraction). Additionally, from a percentage perspective, most of the mass is within the central portions of the site, far away from MW07-11D. Therefore, when viewed as a large-scale, multi-pathway plume with consideration to mass, minor expansion in an area that is not likely to impact receptors (human or ecological) will be considered, but not trigger the Navy to conclude that the objective of the remedy is in failure (consistent with Section 2.6.3). The Navy does appreciate EPA's position and will continue to monitor and assess conditions at MW07-11D.

EPA Specific Comment No. 50 – On page 2-59, There seems to be an error on Issue 3 in the Table 2.7. The issue of an ESD for both soil and groundwater would affect future protectiveness.

Navy Response to Specific Comment No. 50: *Comment acknowledged. Please see the Navy response to General Comment No. 2.*

The Navy does not believe that removal of the source area in 2011 will affect future protectiveness since a potential continuing source and source mass has been removed.. While the Navy would not be surprised with temporary increases due to the source removal action, in the long-term, since mass and the source is removed, the Navy would not anticipate that conditions would worsen from current conditions.

EPA Specific Comment No. 51 – P 2-59 the issues 1 & 2 noted in this table do not affect the protectiveness of the remedy. These concerns, while valid and important are not the type of issues that should be noted in a FYR. The issue noted on the previous page may affect protectiveness. Will the core of the plume with contaminant concentrations above 50,000 ppb (figure 2-14) daylight in the Harbor or the Bay in an area where human or ecological receptors could be exposed? If so, this is an issue that would affect protectiveness of the remedy.

Navy Response to Specific Comment No. 51: *Agree. Please see Navy Response to Specific Comment No. 5 and 48. The area with the highest contaminant concentrations are not expected to migrate via advection directly to the harbor and so the Navy believes that future protectiveness would not be affected.*

EPA Specific Comment No. 52 – Appendix B figures were revised and sent electronically on Tuesday January 8, 2013. Please include the revised figures in the revised FYR.

Navy Response to Specific Comment No. 52: *Agree. The updated figures will be included in the Draft Final Third Five-Year Review Report.*

ALLEN HARBOR LANDFILL

EPA Specific Comment No. 53 – P 3-6 first sentence, add ROD to the list of documents requiring LUCs

Navy Response to Specific Comment No. 53: *Agree. The first sentence will be edited to read:*

*"*In accordance with the ROD (EA, 1997), deed, ELUR, and LUCIP (EA, 2002b), Parcel 10 (Site 9) includes the following environmental land use restrictions:"

EPA Specific Comment No. 54 – Section 3.3.2.3, page 3-16: Edit the next to last paragraph to correct the sentence "From 2007 through 2012, the Navy conducted annual has collected shellfish sampling from the landfill shoreline in the areas of P09-01, P09-09, and P09-10".

Navy Response to Specific Comment No. 54: *Agree. The sentence will be edited to read:*

*"*From 2007 through 2012, the Navy conducted annual shellfish sampling from the landfill shoreline in the areas of P09-01, P09-09, and P09-10."

Section 3.4.1, Issue 1, Page 3-17

EPA Specific Comment No. 55 – The Navy and EPA need to reschedule the DQO meeting to support preparation of the SAP to revise the LTMP. Additionally, a comprehensive work plan/SAP for a revised LTMP is outstanding.

Navy Response to Specific Comment No. 55: *Agree. As an action item from the February 12, 2013 BCT meeting held in North Kingstown, the Navy will be providing a Technical Memorandum that summarizes all of the site data through ME 40 (September/October 2012). This Technical Memorandum will provide a comprehensive, up-to-date evaluation of the site as well as a proposed long-term monitoring strategy. As stated in the BCT meeting, this work will begin in April once the Third Five-Year Review is finalized with anticipation that a long-term monitoring plan will be in place before the fall 2013 sampling event.*

Section 3.4.3, Issue 3, Page 3-18

EPA Specific Comment No. 56 – It is unclear whether the fact sheet posted at the public trail and bike path entrance in August 2009 is still present. The Navy should provide confirmation in the revised Five Year Review report. If a fact sheet is no longer present, a permanent fact sheet should be posted, especially in light of evidence of shellfishing in areas where such activity is banned.

Navy Response to Specific Comment No. 56: *The fact sheet is present (and laminated) and posted at the gate at the entrance to the public trail and bike path. A photograph showing the fact sheet at the entrance to Sites 07 and 09 will be added to Appendix C. The "Actions Taken" portion of the text will be edited to read:*

*"*Actions Taken: A fact sheet was posted at the public trail and bike path entrance to Site 09 in August of 2009 (see photograph 29 of Appendix C). The fact sheet summarizes the site history (including the environmental investigations conducted at Site 09, the scope of the LTM, provides contact information as additional resource, and the results of the five-year reviews for Site 09. The fact sheet is laminated to protect the sheet from adverse weather. During site visits and monitoring event sampling, the field operations leader verifies and if needed, replaces the fact sheet. This ensures that a fact sheet is present for public awareness throughout the year. Fact sheets are also available upon request from the public when Navy (or their contractor) is on-site."

Section 3.5.2, Data Review, Page 3-19

EPA Specific Comment No. 57 – The second sentence indicates that data from 40 rounds of sampling are included in the review, but ME 40 data are not included in statistical analyses or discussion of results elsewhere in the Five Year Review Report. Likewise, page 3-22 (Section 3.5.2.2) states that 39 monitoring events were reviewed. Also, the name of the report mentioned in Section 3.5.2, "Long-Term Monitoring Summary Data Report (TetraTech, 2012a)," is not consistent with the reference in the appendix.

Navy Response to Specific Comment No. 57: *Comment acknowledged. There is a typographical error in the second sentence of Section 3.5.2. The second sentence will be edited as follows:*

*"*Data from 39 rounds of sampling are included in the review (validated analytical data for ME 40 data are not yet available because sampling occurred in September/October 2012)."

The reference of the use of 39 monitoring events on page 3-22, Section 3.5.2.2 is correct as written.

The third sentence will be edited as follows to correct the inaccurate report reference:

"In general, results and conclusions from the comprehensive Draft Long Term Monitoring Annual Report – 2009 to 2010 for Site 09 Allen Harbor Landfill (Tetra Tech, 2012a) have been updated (or re-iterated, as appropriate, when no significant changes occurred)."

Section 3.5.2.1, Hydrogeology, Item 2, Page 3-20

EPA Specific Comment No. 58 – P 3-20 please include some examples for the conclusions listed by way of data, graphs, or figures.

Navy Response to Specific Comment No. 58: *Comment acknowledged. The conclusions in Section 3.5.2.1 were reached by comparing data from 2011 and 2012 to the data presented in the Draft Long Term Monitoring Annual Report – 2009 to 2010 for Site 09 Allen Harbor Landfill. No significant deviations were identified. The text will be edited as follows to reflect this additional analysis:*

"Potentiometric data collected from 2011 and 2012 (tables, graphs and figures) were compared to data presented in the Draft Long Term Monitoring Annual Report – 2009 to 2010 for Site 09 Allen Harbor Landfill (Tetra Tech, 2012a). No significant variations were noted. The following items summarize the site data review from ME 01 through ME 39."

EPA Specific Comment No. 59 – Item 2 concludes that since implementation of the landfill cap the vertical hydraulic gradients are upward in the southern portion of the landfill, suggesting that potential discharge zone may have shifted closer to the shoreline/landfill. However, it is unclear what evidence the Navy has that delineates the farthest eastern extent of the plume discharge location (1) prior to implementing the remedy and, likewise, (2) that the plume is no longer detected in these monitoring locations. If no such data exists to support this statement, then this statement should be revised accordingly.

Navy Response to Specific Comment No. 59: *Comment acknowledged. The intent of the section (Section 3.5.2.1) is to provide a hydrogeologic summary of conditions, not evaluate the extent or plume/contaminant discharge locations. As such, bullet 2 (item 2 as referenced in the EPA comment) generally compares potential groundwater discharge locations that likely occurred prior to enactment of the remedy based on the observation of changes in vertical gradients at well clusters along the landfill/surface water boundary. No conclusions on contaminant discharge should be made with the data as presented in this section as numerous other factors influence contaminant discharge beyond just hydrogeologic information.*

Section 3.5.2.1, Hydrogeology, Item 5, Page 3-20

EPA Specific Comment No. 60 – Item 5 concludes that established monitoring locations will continue to adequately monitor groundwater at the site. However, given the Navy's uncertainty regarding the groundwater flow east of MW-20 and east of the breakwater, consideration should be given to performing additional groundwater monitoring (including piezometers) to confirm contaminant transport in groundwater through deeper stratigraphy beyond the breakwater.

Navy Response to Specific Comment No. 60: *Comment acknowledged. As summarized in the Navy Response to Specific Comment No. 55, the Navy will be providing a comprehensive evaluation of the site upon completion of the Third Five-Year Review Report. The Navy does not perceive uncertainty regarding groundwater flow to the east of MW09-20I.*

Section 3.5.2.1, Hydrogeology, Page 3-20

EPA Specific Comment No. 61 – In the final paragraph on this page, the text discusses hydraulic gradients based on data including three synoptic rounds of groundwater level measurements at low, mid, and high tide during ME40. While the text indicates that this is a preliminary discussion, the Five Year Review Report does not include the ME40 data on which the preliminary discussion is based. The Five Year Review needs to include the data that underlies a discussion in the text or the text should be revised and the discussion provided in the annual report.

Navy Response to Specific Comment No. 61: *Comment acknowledged. Similar to the Navy Response to Specific Comment No. 59, only the hydrogeological data is presented and summarized in Section 3.5.2.1. Figures 3-4 through 3-12 provides the data from ME 40 upon which the preliminary discussion is based. Therefore, no changes are suggested.*

EPA Specific Comment No. 62 – Section 3.5.2.1, page 3-21: Please revise the incomplete sentence in item 3 "The potentiometric low for the whole site during high tide."

Navy Response to Specific Comment No. 62: *Agree. The final sentence in item 3 will be edited to read:*

*"*The potentiometric low for the whole site during high tide in the shallow zone is near MW09-23S."

EPA Specific Comment No. 63 – §3.5.2.1, P3-22, #6, include the word "be" in the 2nd sentence, "Based on the surface water elevation at mid and low tides, the potential groundwater discharge area is interpreted to near the Allen Harbor side of the breakwater structure and the adjacent areas."

Navy Response to Specific Comment No. 63: *Agree. The second sentence in item 6 will be edited to read:*

"Based on the surface water elevation at mid and low tides, the potential groundwater discharge area is interpreted to be near the Allen Harbor side of the breakwater structure and the adjacent areas."

Section 3.5.2.1, Hydrogeology, Page 3-22

EPA Specific Comment No. 64 – P 3-22 concluding paragraph of 3.5.2.1 seems to be premature since the conclusions are based on one set of measurements. Remove this section until such time as Navy has taken more measurements similar to the work done during the Calf Pasture Point tidal study.

Navy Response to Specific Comment No. 64: *Comment acknowledged. While preliminary, the Navy does not feel that the conclusions are premature as they are based in analysis of multiple synoptic tidally influenced events during the ME 40 (September/October 2012) event. However, the Navy will edit the concluding paragraph of Section 3.5.2.1 as follows to provide a more simplistic conclusion:*
*"*The primary effect of the tides on groundwater flow at the site and, more importantly, on the impact of contaminant migration, is that a uniform, constant groundwater flow and discharge between areas of elevated contaminant concentrations and the offshore is not apparent. While groundwater flow and the subsequent diffuse discharge of groundwater from the landfill is to Allen Harbor, the actual pathway that contamination follows is longer (physically and temporally) and more contorted than previously understood based on the analyses of pre-ME 40 mid-tide potentiometric maps. Further analyses of the

tidal effects on the landfill and contaminant transport are outlined in Sections 3.7 and 3.8."

Section 3.5.2.2, Groundwater Sampling Data, Page 3-23

EPA Specific Comment No. 65 – In the first paragraph, the text states that the 1993 and 1995 RIs identified the CVOC groundwater plume extending beyond the footprint of the landfill to the south and east. At the end of the same paragraph the Navy indicates that 10 years of LTMP data do not indicate a spatially extensive plume. However, none of the LTMP sampling locations are outside of the landfill boundary. As a result, it is unclear if the Navy has data from beyond the landfill boundary to demonstrate that the plume is not spatially extensive.

Navy Response to Specific Comment No. 65: *Comment acknowledged. Conclusion 1 states that "groundwater sampling data collected during the LTM program have confirmed the nature and extent of VOCs in groundwater identified during the Phase II and III RIs…" and that the CVOC contaminant plume remains in the shallow and deep overburden in the southern portion of the landfill and extends beyond the footprint of the landfill to the south and east. The final sentence that refers to the lack of a spatially extensive plume(s) does not state or refer that the plume does not extend beyond the landfill boundary. Rather, the statement is a simple conclusion based on the limited-spatial extent of the plume since it is confined to a small physical area.*

No changes are proposed.

Section 3.5.2.2, Groundwater Sampling Data, Page 3-23

EPA Specific Comment No. 66 – In the second bullet the text indicates that CVOC concentrations in groundwater are stable or decreasing. While this may be true at selected groundwater monitoring locations, quite the opposite is true for CVOCs in MW-20. This statement gives the impression that the source of CVOC contamination would not present a future risk should the remedy fail. For example, the CVOC concentrations are indicative of a DNAPL source near MW-20. CVOC concentrations at MW-20I that increased over time include tetrachloroethene (PCE) and total 1,2-DCE. Likewise, total COVC concentrations at MW-20I are so highly elevated that the variation in concentrations over time is likely represent normal "noise" as opposed to a clear trend in concentration. A downward trend was reported for TCE at MW-2ID, yet concentrations are within a consistent range over time. Likewise, a downward trend was reported for 1,1,2,2-TCA at MW-20I, yet very high concentrations detected since 2003 do not appear to show a clearly increasing or decreasing trend. While the purpose of the Mann-Kendall analysis is not in dispute, the interpretation of downward trends for selected locations where contaminant concentrations are very high is somewhat misleading. Furthermore, the Navy should clarify whether a decreasing trend indicates a decrease in potential contaminant migration beyond the landfill.

Navy Response to Specific Comment No. 66: *Comment acknowledged. Overall, the second bullet addresses increasing, decreasing and stable trends in CVOC concentrations; it does not make the statement that all CVOC concentrations are either stable or decreasing. Further, the second bullet does not make any conclusions regarding future risk if the remedy were to fail as the bullet simply offers observations of various CVOC trends in groundwater.*

The Navy does concur with EPA that interpreting trends where significant concentrations occur (most notably MW09-20I) can be misleading. As such, the Navy does not rely simply on trend analyses alone

when evaluating the current and potential future concentrations. The Navy also considers spatial analysis, hydrogeological factors, and relative relationships between the various media (e.g. is contaminant that is in groundwater also in the piezometers and sediment data?).

No changes are proposed.

Section 3.5.2.2, Groundwater Sampling Data, Page 3-23

EPA Specific Comment No. 67 – In the second bullet, the text states that well locations where an increase in an individual contaminant concentration is observed, the Navy interprets this as continued degradation of parent chlorinated ethenes within well clusters rather than advancement of contamination from upgradient locations. However, while it may be true, this statement overlooks the potential migration of this degradation beyond these sentinel wells. It is unclear if the Navy has data to that demonstrates the full extent of these degradation products beyond the sentinel wells, particularly in deep and intermediate stratigraphy. Additionally, the increasing concentration of vinyl chloride in MW-20 and MW-21 well clusters presents a greater risk than the parent compound. There is no discussion in the text regarding this issue. As a result, the text should be revised as appropriate.

Navy Response to Specific Comment No. 67: *Comment acknowledged. The intent of this section (Section 3.5.2.2) and specifically the second bullet referenced in the EPA specific comment is to summarize trends in groundwater and provide an evaluation of the trends.* The migration potential is presented and discussed in Section 3.5.2.4.

No changes are proposed.

Section 3.5.2.2, Groundwater Sampling Data, Page 3-24

EPA Specific Comment No. 68 – In the first sentence on this page, it is unclear what the Navy attributes the elevated concentrations of arsenic to in the well in which the concentration exceeds the PAL.

Navy Response to Specific Comment No. 68: *Comment acknowledged. The last sentence of bullet 2 will be edited to read:*

*"*Given the few locations where arsenic exceeds the PALs, it is likely that the observed concentrations are not due to transport processes (likely due to elevated background conditions).

Section 3.5.2.2, Groundwater Sampling Data, Page 3-24

EPA Specific Comment No. 69 – In item 3, the text indicates that selected SVOCs and PCBs have been detected in shellfish samples collected within and beyond the breakwater. What is the Navy's interpretation of the source of these compounds in shellfish, if not from the migration of contaminated groundwater into sediment and porewater? The Navy needs to provide an analysis of the ME40 data and indicate whether contaminants in shellfish present an ecological risk or a risk to human consumption, and, if a risk is present, what steps may be needed to achieve protectiveness. This discussion should take place in the annual report since the data is not included in this report.

Navy Response to Specific Comment No. 69: *Comment acknowledged. The conclusion drawn by EPA for item 3 is incorrect in that the item refers specifically to SVOCs and PCBs in groundwater samples*

collected during the LTM program. Shellfish is not considered or discussed in this section (shellfish is discussed in Section 3.5.2.6).

Concerning the need for the Navy to provide an analysis of the ME 40 data, please see Navy response to EPA Specific Comment No. 55.

Section 3.5.2.2, Piezometers, Page 3-28

EPA Specific Comment No. 70 – In item 3, the text indicates that metals, namely nickel, detected in piezometer samples are not present due to migration of contaminated groundwater from the landfill. What does the Navy attribute the elevated metals concentrations to? Additionally, the text does not adequately discuss the risk from contaminants exceeding PALs.

Navy Response to Specific Comment No. 70: *Comment acknowledged. Generally, the Navy attributes the elevated nickel and arsenic identified in the piezometers as being due to the dredged fill material origin of the created wetlands. In addition to the dredge material origin of the elevated metals, the Navy also believes that they may be present from being mobilized by the reducing conditions of the groundwater caused by the CVOC plume (e.g. leaching from the created wetlands).*

Risk due to exceedances of the PALs is discussed in Section 3.2.5. As part of the planned updated LTM program to be completed spring/summer 2013, the Navy will perform an updated ecological risk evaluation to help guide decisions in the LTM program.

EPA Specific Comment No. 71 – P 3-27, §3.5.2.2, 3rd sentence, please add the phrase, "one foot long" before the word "screened" for clarity.

Navy Response to Specific Comment No. 71: *Agree. The third sentence will be edited to read:*

*"*The one foot long screened interval of the piezometers is 2 to 3 feet below the sediment surface."

EPA Specific Comment No. 72 – P 3-27, #1, remove the last sentence since the Allen Harbor Landfill tidal study was performed with only one set of data and as such may not be scientifically valid.

Navy Response to Specific Comment No. 72: *Agree. The last sentence of item 1 will be removed.*

EPA Specific Comment No. 73 – P 3-29 top of page, please clarify that the risk assessment was performed during the RI in the 1990s, not recently.

Navy Response to Specific Comment No. 73: *Agree. The final sentence will be edited as follows to reference that the risk assessment was conducted in the 1990's during the RI. The edited text will read as follows:*

*"*There are no PALs for VOCs detected in sediment samples because there were no unacceptable risks associated with exposure to VOCs in sediment (risk was evaluated as part of the RI in 1996)."

EPA Specific Comment No. 74 – Section 3.5.2.6, page 3-31: Please include a discussion of the chemical analytical results from the recent shellfish sampling beyond the Allen Harbor breakwater, including the VOCs that were analyzed.

Navy Response to Specific Comment No. 74: *Comment acknowledged. Please see Navy Response to EPA Specific Comment No. 55.*

EPA Specific Comment No. 75 – P 3-34, §3.5.2.8.1, concluding sentence, it is interesting to note that even with the high CVOC contamination upgradient at MW20I there is still a lack of confidence that the landfill contamination is migrating to the created wetlands. What is the Navy's plan to determine if the landfill contamination is migrating into the wetlands?

Navy Response to Specific Comment No. 75: *Comment acknowledged. The intent of the final sentence was to acknowledge the uncertainty of the origin of the low-level concentrations observed in the created wetland. To determine/evaluate if landfill contamination is migrating into the created wetlands, the Navy will continue to monitor piezometers and the seep sampling locations.*

Section 3.5.2.8.4, Color-Tec Surface Water Field Screening Beyond the Breakwater of the Constructed Wetland, Page 3-36

EPA Specific Comment No. 76 – In the third paragraph the text indicates that Color-tec screening results from the surface water investigation will be compared to results for piezometer and shellfish samples collected within the same area. What is the status of this analysis?

Navy Response to Specific Comment No. 76: *This analysis is currently being performed and the results will be included in the updated Technical Memorandum that summarizes all of the site data through ME 40 (September/October 2012). As stated in the BCT meeting, this work will begin in April once the Third Five-Year Review is finalized with anticipation that a long-term monitoring plan will be in place before the fall 2013 sampling event.*

Section 3.5.2.9, Summary of Data Review, Page 3-36

EPA Specific Comment No. 77 – The Navy states that the VOC plume in shallow groundwater extends to the south of the landfill, but that the groundwater does not transport significant concentrations of landfill constituents into near-shore sediments. While EPA partially agrees with these statements, it is unclear what data the Navy has used to either support or refute the delineation of the CVOC plume beyond the near-shore sediments.

Navy Response to Specific Comment No. 77: *Comment acknowledged. The Navy used all data available (ME 01 through ME 39) as summarized overall in Section 3.5.2 to reach this conclusion.*

EPA Specific Comment No. 78 – P 3-38, §3.6.1, 2nd ¶, RAOs do not need the word "objectives" after it, please correct the first sentence.

Navy Response to Specific Comment No. 78: *Agree. The first sentence of the second paragraph will be edited to read:*

*"*The RAOs stated in the ROD for surface soil include a) the prevention of human and terrestrial animal exposure to contaminants in surface soil and b) the prevention of offsite migration of surface soil and surface soil constituents through overland runoff."

Section 3.6.1, Question A, Page 3-39

EPA Specific Comment No. 79 – For Sediment, the second paragraph indicates that PALs have been

exceeded for PCBS in sediment, yet later in the same paragraph is the statement that the remedial action has reduced contaminant levels below PALs and sediments are not being re-contaminated by landfill constituents. While the landfill may not be currently re-contaminating sediment with PCBs, the PALs have been exceeded; as such, this sentence should be revised accordingly.

Navy Response to Specific Comment No. 79: *Agree. The second paragraph will be edited to read:*

*"*The evaluation of long-term monitoring data collected during the first 39 events of quarterly monitoring indicates exceedances of PALs in sediment samples are infrequent, with the exception of PCBs in SED09-01 (Table 3-3 and Appendix D). Remedial actions along the shoreline (i.e. sediment removal and wetland construction) have reduced contaminant levels below PALs for all locations except SED09-01 and sediments are not being re-contaminated by landfill constituents."

EPA Specific Comment No. 80 – Section 3.6.1, page 3-39: In the section on wetlands, edit the 4th sentence "Over the past several years, concentrations in piezometer samples are at near long-term lows and there are no increasing trends for any CVOCs."

Navy Response to Specific Comment No. 80: *Agree. The fourth sentence will be edited to read:*

*"*Over the past several years, concentrations in piezometer samples are at or near long-term lows and there are no increasing trends for any CVOCs."

Section 3.6.1, Question A, Page 3-40

EPA Specific Comment No. 81 – In the second paragraph the text indicates a lack of vegetation is likely due to dead grass/vegetation accumulation. Is the dead grass/vegetation accumulated from the site, or off-site vegetation present in wrack debris?

Navy Response to Specific Comment No. 81: *The dead grass/vegetation originates from off-site and is introduced during either high tides and/or storm events. The final sentence of the second paragraph will be edited to read as follows:*

*"*Presently, only minimal areas devoid of vegetation occur in the southern most portions of the constructed wetland; the lack of vegetation in these areas is likely due to dead grass/vegetation accumulation (accumulates during high tides and/or storm events) and/or wave action during storms rather than stresses related to landfill constituents."

Section 3.6.1, Question A, Page 3-40

EPA Specific Comment No. 82 – For Shellfish, the text should indicate that evidence of shellfish harvesting from the landfill has been documented. While "no shellfishing" signs are present, it may be appropriate for Navy to recommend and take additional action to prevent future shellfishing at the site.

Navy Response to Specific Comment No. 82: *Agree. The second paragraph will be edited to read:*

*"*The comparison of shellfish sampling data collected during 2007 to 2011 to reference sample results and data (from the same species) collected during the RI in 1995 from similar locations indicates that the remedy is controlling contamination of shellfish from landfill constituents. There are three signs present along the landfill shoreline notifying trespassers and the public of the state-imposed shellfishing ban that is in place for Allen Harbor. All three signs are in good condition. However, over the past few years,

limited evidence of shellfish harvesting has been noted. While it is not known where the shellfish originated from (Site 9 or Site 7), it should be assumed that they were obtained from somewhere within Allen Harbor or along the Narragansett shoreline where shellfishing is not prohibited. Further actions to inform/notify the public of the shellfish ban in Allen Harbor are currently being considered."

See Navy Response to Specific Comment No. 10.

Section 3.6.2, Question B, Page 3-41

EPA Specific Comment No. 83 – In the third bullet, the Navy should confirm whether the values in Table 8-2D need to be updated in the revised report.

Navy Response to Specific Comment No. 83: *Agree. The Navy will confirm and update the values in Table 8-2D as appropriate when preparing the Technical Memorandum that summarizes all of the site data through ME 40 (September/October 2012). This Technical Memorandum will provide a comprehensive, up-to-date evaluation of the site as well as a proposed long-term monitoring strategy. As stated in the BCT meeting, this work will begin in April once the Third Five-Year Review is finalized with anticipation that a long-term monitoring plan will be in place before the fall 2013 sampling event.*

EPA Specific Comment No. 84 – Section 3.6.2, page 3-41: In the first bullet it is stated that aquatic RSLs were reviewed by Tetra Tech in 2010 and determined that they were appropriate for all three sites with VOCs discharging to marine waters. Please provide documentation the Navy agrees with this determination and confirm that there are no changes appropriate since 2010.

Navy Response to Specific Comment No. 84: *The text is referring to ecological screening levels presented in a technical memorandum reviewed with USEPA Region I and RIDEM in 2010. The memorandum was prepared to recommend ecological screening levels that may be used by the project team to evaluate the primary volatile organic chemicals (VOCs) present in the groundwater plumes at Site 07, Site 09, and Site 16 and, thus, potentially migrating to the adjoining marine surface waters of Allen Harbor and Narragansett Bay. Those screening levels were reviewed again during the recent preparation of the Proposed Plan (PP) for Site 16 and are the basis of the "trigger level" concentrations developed in support the Site 16 PP. No changes to the screening levels provided in 2010 were identified. The text in the Five-Year Review report will be modified to clarify that the referenced numbers are "ecological screening levels for the primary VOCs detected in the groundwater plumes Site 09." It is anticipated that these ecological screening levels will also be useful to the project team as it updates the LTMP for Site 09 in 2013. The text in the first bullet will be edited to read:*

*"*Groundwater quality was to be monitored using USEPA Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) and State Groundwater Quality Standards listed in Table 1 of RIDEM's Rules and Regulations for Groundwater Quality. The current USEPA MCLs are presented in EPA's Drinking Water and Health Advisory Table (USEPA, April 2012) and the State Groundwater Quality Standards were updated in March 2005. The groundwater monitoring criteria were presented in Table 8-2A of the *QAPP for the Long Term Monitoring Plan for Site 09* (EA, 2001b and 2003b). A comparison of the old and current groundwater monitoring criteria indicates that there have been no changes in the groundwater monitoring criteria for Site 09 (ecological screening levels for the primary VOCs detected in the groundwater plumes Site 09) since the last review (Table 3-5). Additionally, aquatic RSLs were reviewed by Tetra Tech in 2010 and determined that they were appropriate for all three sites with VOCs discharging to marine waters (no changes to RSLs were identified)."

EPA Specific Comment No. 85 – Section 3.6.2, page 3-41: In the 3rd bullet it is stated that RIDEM

Allowable Emission Rates for some chemicals may have changed and therefore it may be necessary to update Table 8-2D of the QAPP. Please ensure that this action item is addressed in Section 3.7.

Navy Response to Specific Comment No. 85: *Please see Navy Response to EPA Specific Comment No.83.*

EPA Specific Comment No. 86 – Section 3.6.2, page 3-42: In the 2nd bullet on this page in the section entitled "Changes in Toxicity and Other Contaminant Characteristics", please edit "The CSFs currently recommend by the USEPA for PCE and TCE…"

Navy Response to Specific Comment No. 86: *Agree. The second bullet will be edited to read:*

*"*The CSFs currently recommended by the USEPA for PCE and TCE have increased by an order of magnitude or more since 1995. In addition TCE is now considered to be a mutagenic chemical. Therefore, the risks calculated for these COCs would increase. However, these changes would not alter the results and conclusions of the risk assessment and do not affect the protectiveness of the remedy.

EPA Specific Comment No. 87 – Section 3.6.2, page 3-43: In the section entitled "Changes in Risk Assessment Methods" it is asserted that the dermal risks of arsenic and PAHs would increase previously calculated risks. Please provide documentation for these calculations as an appendix.

Navy Response to Specific Comment No. 87: *The requested documentation is already included in Appendix E. The referenced text will be modified to note that the risk calculations are presented in Appendix E. The first bullet will be edited to read:*

"

- The implementation of the USEPA's Dermal Guidance (RAGS-Part E) which was finalized in July 2004 (http://www.epa.gov/oswer/riskassessment/ragse/index.htm). The risk assessment for Site 09 evaluated risks for dermal contact with soil, sediment, surface water, and groundwater. Based on several USEPA guidance documents published in 1993 and 1994, risks for dermal contact with carcinogenic PAHs were not evaluated in the risk assessment. Dermal contact with arsenic in soil and sediment was also not evaluated in the risk assessment. The 2004 dermal guidance recommends evaluation of PAHs and arsenic and this could impact risks for construction workers in soil and risks for recreational users in soil and sediment (see Appendix E). If the risks for construction workers were reevaluated including dermal contact with carcinogenic PAHs and arsenic in soil, total risks for soil would increase from $2x10^{-6}$ to approximately $3x10^{-6}$ for the RME case. The risks for recreational exposure to soil would increase from $4x10^{-5}$ to $5x10^{-5}$ and risks for sediment would increase from $1x10^{-5}$ to $2x10^{-5}$, if an updated evaluation of the dermal contact pathway was included. These calculations indicate that the results and conclusions of the risk assessment for Site 09 have not been significantly affected by omitting the dermal evaluation of PAHs and arsenic."

Section 3.6.2, Question B, Page 3-44

EPA Specific Comment No. 88 – In the first paragraph the text indicates that the effects of using the new guidance on the Site 09 data are not known. The Navy should confirm the effects in the revised report.

Navy Response to Specific Comment No. 88: *Comment acknowledged. However, the referenced text further states that "…it is unlikely that soil risks were underestimated by using the 1992 guidance." This is because, as stated in the text, risks for the RME receptor were based on the maximum detected concentrations or the lognormal 95 percent UCLs. These concentrations are likely to be higher (more conservative than) an exposure point concentration developed using the newer Pro-UCL guidance.*

No changes are proposed.

EPA Specific Comment No. 89 – Section 3.6.4, page 3-47: in the last paragraph on this page, it is indicated that changes in risk assessment methods and toxicity may have increased the risk of recreational exposure to surface soils and sediment above 10E-4, however, remedial actions taken at the site have addressed these exposures and do not present a protectiveness concern. This should be confirmed by collecting and analyzing sediment in the area(s) where there is evidence that trespassers have been shell fishing despite the signage. Alternatively, such trespassing and shell fishing should be prevented by extension of fencing into the intertidal zone at both ends of the landfill and between the breakwater, riprap area and the landfill proper.

Navy Response to Specific Comment No. 89: *The LTMP sediment samples have targeted areas likely to demonstrate the highest potential residual (post remediation) contamination. Thus, if the risk analysis presented in Appendix E indicates that recreational/trespass risks are "not unacceptable" for the targeted LTM sample locations, it is very unlikely that unacceptable site-related risks would be predicted for other areas, particularly for areas beyond the created wetlands.*

Section 3.6.4, Technical Assessment Summary, Page 3-47

EPA Specific Comment No. 90 – The third paragraph indicates the RIDEM Allowable Emissions Rates used to evaluate gas vent emissions may need to be adjusted to reflect recent changes to RIDEM Air Resource Regulations. The Navy should confirm whether the adjustment is necessary and the impacts in the revised report.

Navy Response to Specific Comment No. 90: *Please see Navy Response to EPA Specific Comment No. 83.*

Section 3.6.4, Technical Assessment Summary, Page 3-48

EPA Specific Comment No. 91 – The third paragraph indicates "…the lack of increasing concentration trends in sediments/piezometers…" This statement should be revised to indicate that increasing trends are generally not observed. For example, upward trends for total arsenic in piezometers have been documented during the LTMP.

Navy Response to Specific Comment No. 91: *Agree. The third paragraph will be edited to read:*

*"*Statistically-significant (95 percent confidence) increasing concentrations of VOCs have been observed in MW09-09S, MW09-20D, and MW09-21D over the course of the LTMP. These increases are likely due to the vertical or horizontal migration of contaminants within the landfill. Presently, the increase in VOC concentrations in these wells does not present a protectiveness issue since the use of on-site

groundwater is prohibited by the land use restrictions. The spatial distribution of the data and the general lack of increasing concentration trends (only few increasing concentration trends are observed) in sediments/piezometers strongly suggest that no significant migration of CVOCs from the landfill to the constructed wetlands is occurring. Additional sampling and trend analysis will be utilized in the future to monitor changes in VOC concentrations in these and other on-site wells to evaluate potential risks associated with groundwater contamination.

Section 3.6.4, Technical Assessment Summary, Page 3-48

EPA Specific Comment No. 92 – The fourth paragraph indicates that further study to delineate the extent of CVOCs in groundwater beneath the harbor may be appropriate if CVOC concentrations increase from their current levels and unacceptable risks as suspected. It is unclear how and when the Navy would make this determination. Additionally, it is unclear how the Navy has concluded that unacceptable risks are not currently present beneath the harbor. Clarification is needed.

Navy Response to Specific Comment No. 92: *The trigger for the Navy to make this determination is provided in the final sentence of the fourth paragraph, "*Nevertheless, further study to delineate the extent of CVOCs in groundwater beneath the Harbor may be appropriate if CVOC concentrations increase from their current levels and unacceptable risks are suspected." *The Navy would make this determination in either Long-Term Monitoring Reports that update and evaluate long-term trends and/or Five-Year Review Reports. If deemed necessary, an appropriate investigation would be proposed and scoped with concurrence from the BCT.*

The Navy does not make any current conclusions concerning risk beneath the harbor in this fourth paragraph. Since no risks were previously identified to the harbor and site conditions have not worsened since enactment of the remedy, the Navy would not assume conditions in the harbor have worsened. If during future long-term monitoring sampling events concentrations are observed to increase (in wells, piezometers and/or sediments), potential impacts of these increased concentration with respect to risk will then be evaluated. However, the Navy has concluded that unacceptable risks are unlikely based on the "weight of evidence" available regarding the source of the CVOC plume and shoreline area characteristics at Site 09:

- *The analytical data presented in the Section 3 tables for piezometer, sediment, and shellfish samples collected at Site 09 strongly support the conclusion that CVOCs are not impacting the human or ecological receptors contacting environmental media along the Site 09 shoreline. (Based on the Site 09 ROD and the Site 09 LTMP, the LTM program was obviously designed to protect these receptors.)*
- *The surface water samples collected in Allen Harbor in the fall of 2012 (screening level samples analyzed using Color-Tec© technology) further indicate that CVOCs are not significantly impacting the surface waters in Allen Harbor within approximately 50 feet of the Site 09 shoreline.*
- *Beyond 50 feet from the Site 09 shoreline, discharges from the groundwater to the surface water may (or may not) result in elevated concentrations in surface waters and sediments. However, it is anticipated that such concentrations would be quickly diluted such that human receptors (e.g., swimmers) would not be exposed to unacceptable CVOC concentrations. Any significant elevated concentrations are expected at the surface water/sediment interface, not in the portion of the water column that a swimmer may contact.*
- *Beyond 50 feet from the Site 09 shoreline, discharges from the groundwater to the surface water may (or may not) result in elevated concentrations in surface waters and sediments. However, with regards to ecological receptors who may be exposed (in particular) to pore water and to surface waters/sediments at the surface water/sediment interface, it is anticipated that only a*

limited area(s) of elevated CVOC concentrations (if any) would occur out in the Harbor because the MW09 location is the only Site 09 location demonstrating significant CVOC contamination (i.e., the CVOC "hot spot" is very limited in nature). Significant ecological impacts to large portions of Allen Harbor are not anticipated.

- *The results of the tidal study conducted at Site 09 indicate that a complex tidal cycle is impacting the migration of the CVOC plume. The tidal cycle does not prevent CVOC plume migration to the off-shore area, but, it does, in effect, suppress/mitigate CVOC plume migration to the off-shore area and, thus, the CVOC concentrations to which receptors may be exposed.*
- *While an extensive off-shore sampling investigation has not been conducted at Site 09, the investigative work conducted at Site 07 and Site 16 suggests that there is significant attenuation between the groundwater plume and the actual concentrations in shoreline and off shore surface water sediment concentrations. There is no site-specific reason to conclude that such attenuation is also not occurring at Site 09.*

The Navy recommends that the project team discuss and select appropriate "trigger levels" for the Site 09 CVOC plume during the 2013 update to the LTMP for Site 09.

Please also see Navy response to EPA Specific Comment No. 60.

EPA Specific Comment No. 93 – 3-48 the issues noted in this table does not affect the protectiveness of the remedy. These concerns, while valid and important, are not the type of issues that should be noted in a FYR.

Navy Response to Specific Comment No. 93: *Agree. Please see Navy Response to EPA Specific Comment No. 5.*

EPA Specific Comment No. 94 – Appendix A Interview Records, no page numbers- electronic page 469, there is no time or date on the form and the header indicates the form was for the interview of Philip Bergeron but the text seems to be with the National Park Service, please clarify and correct. In addition, please clarify if the condition of the conveyance for both OUs is that they are not open to the public. It seems that Ms LaForest should be included on the RAB minutes mailing list to provide her with up to date information concerning the OUs.

Navy Response to Specific Comment No. 94: *Comment acknowledged. The Interview Record for Ms. Laforest will be updated as appropriate (time and date will be completed and correct name will be provided). Tetra Tech will contact Ms. Laforest and ask if she would like to be on the mailing list for RAB minutes.*

ENCLOSURE 2

NAVY RESPONSE TO RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT COMMENTS ON DRAFT THIRD FIVE YEAR REVIEW REPORT DATED DECEMBER, 2012 FOR THE FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE NORTH KINGSTOWN, RHODE ISLAND

March 2013

Navy Response to Rhode Island Department of Environmental Management (RIDEM) Comments on Draft Third Five Year Review Report Dated December, 2012, for the Former Naval Construction Battalion Center (NCBC) Davisville North Kingstown, Rhode Island (RIDEM Correspondence Dated February 19, 2013)

RIDEM Comment No. 1 – Page iii, Five-Year Review Summary Form, Last Line – Please change due date from 03/28/2012 to 03/28/2012. This would then be five years from the triggering action of March 28, 2008.

Navy Response to Comment No. 1: *Agree. The due date will be updated to 3/28/13. The summary form will be edited to read as follows:*

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: Former Naval Construction Battalion Center Davisville		
EPA ID: RI6170022036		
Region: 1	**State:** RI	**City/County:** Washington
SITE STATUS		
NPL status: Final		
Remediation status: Operating		
Multiple OUs? Yes	**Construction completion date:**	
Has site been put into reuse? Yes		
REVIEW STATUS		
Lead agency: U.S. Department of the Navy		
Author name: Prepared by Tetra Tech under contract to the Navy		
Author title:	**Author affiliation:**	
EPA's Review period: January 2008 to December 2012		
Date(s) of site inspection: Various dates.		
Type of review: Post-SARA		
Review number: 3 (Third)		
Triggering action: Second Five-Year Review – March 28, 2008		
Triggering action date *(from WasteLAN)*: 03/28/2008		
Due date *(five years after triggering action date):* 03/28/2013		

RIDEM Comment No. 2 – Page v, Five-Year Review Summary Form, Allen Harbor Landfill, Item 3 – This item states that a technical memorandum will be prepared for data collected in the offshore area during October 2012. It is assumed that this is in reference to the shellfish data. If this is the case then perhaps

this item should be revised to state that the technical memorandum will be prepared after the fourth round of data is collected.

Navy Response to Comment No. 2: *As an action item from the February 12, 2013 BCT meeting held in North Kingstown, the Navy will be providing a Technical Memorandum that summarizes all of the site data through ME 40 (September/October 2012). This Technical Memorandum will provide a comprehensive, up-to-date evaluation of the site as well as a proposed long-term monitoring strategy (including three additional rounds of shellfish sampling in front of the breakwater). As stated in the BCT meeting, this work will begin in April once the Third Five-Year Review is finalized with anticipation that a long-term monitoring plan will be in place before the fall 2013 sampling event.*

RIDEM Comment No. 3 – Page 2-6, Section 2.2.2, Land and Resource Use, Paragraph 4, Sentence 3 – This sentence notes that Allen Harbor was closed to shellfishing primarily due to discharge from a sewage treatment plant. The sewage treatment plant never discharged to Allen Harbor. Please revise this to state that the main reason Allen Harbor was closed to shellfishing was due to surface runoff from Allen Harbor Landfill, though there were other sources of contamination.

Navy Response to Comment No. 3: *Partially agree. The third sentence will be edited to read:*

*"*In 1984, RIDEM closed much of Allen Harbor to shellfishing due to suspected bacterial contamination. Subsequently, an additional basis for closure was due to surface runoff which included Allen Harbor Landfill and other source areas".

The following is noted from the ATSDR Public Health Assessment, Summary Section: "ATSDR concludes that shellfish contamination from NCBC,Davisville posed a public health hazard prior to 1984, when the Rhode Island Department of Environmental Management (RIDEM) instituted a shellfishing ban in Allen Harbor due to bacteriological contamination. Shellfish data collected in the 1990s indicated a chemical hazard driven primarily by methylmercury, and to a lesser extent by PCBs. Although the original ban was based on bacteriological contamination, ATSDR concludes that a current and future public health hazard could exist from chemical contamination in shellfish if the ban is not continued or adhered to".

RIDEM Comment No. 4 – Figure 2-19, Cross Section Line #1 – Please change the color scheme to match the other four companion Figures. For example silt in X-Section Line #1 is a tan color while in the other four C-Sections it is a brown color. This can be confusing since from Well MW07-1 to MW07-05 all five Figures (2-19 thru 2-23) are the same.

Navy Response to Comment No. 4: *Agree. The color of the silt in Figure 2-19 will be changed to match color scheme in the other companion figures (see Attachment 1).*

RIDEM Comment No. 5 – Page 2-47, Section 2.5.2.6, Sediment and Surface Water Sampling Data, Paragraph 1, Sentence 2 – This sentence states that there are no PALs for sediment because the RI did not identify unacceptable risk associated with exposure to the sediment. PALs should be developed for sediment as concentrations could increase to unacceptable levels as the plume migrates to the shore of the site. The sediment PALs could be added in at the same time the ESD is being prepared for the source removal action.

Navy Response to Comment No. 5: *The referenced text on page 2-47 is correct, "There are no PALs for sediment because the Site 07 RI did not identify unacceptable risks associated with exposure to sediment." The BCT can discuss the need for sediment PALs during the development of a revised Long-Term Monitoring Plan for Site 07.*

RIDEM Comment No. 6 – Page 2-53, Section 2.6.2, Changes in Standards and TBCs, Last Paragraph, Last Sentence – This sentences notes that federal AWQS were last updated in 2009 and Rhode Island WQS were last updated in 2006. A comparison of these changes are reflected in Table 2-4. Upon inspection of Table 2-4 there is no reference to the Rhode Island WQS. Please include this in Table 2-4.

Navy Response to Comment No. 6: Agree. *Table 2-4 was updated as requested (see Attachment 1).*

RIDEM Comment No. 7 – Page 3-14, Section 3.3.2.3, Long-Term Monitoring, Bullets – Please add a bullet for the collection of 4 rounds of shellfish sampling in front of the created wetlands as previously agreed to.

Navy Response to Comment No. 7: *Comment acknowledged. The section of the text that RIDEM cites in their comment refers to work that was previously completed at Site 09. Therefore, it is not appropriate to add the agreement of collecting 4 rounds of shellfish sampling at this location within the text. However, please see Navy Response to Comment No. 2 (above).*

RIDEM Comment No. 8 – Page 3-15, Section 3.3.2.3, Long-Term Monitoring, Paragraph 2, Sentence 2 – Please note that there will be four rounds of sampling shellfish in front of the created wetlands. Sentence 3 seems to indicate that the October 2012 sampling event is the only event for sampling shellfish in front of the created wetland.

Navy Response to Comment No. 8: *Comment acknowledged. As with RIDEM Comment No. 7, this section refers to sampling that has already been completed at Site 09. Therefore, the RIDEM interpretation that sentence 3 indicates that the October 2012 sampling event is the only event for sampling shellfish in front of the created wetland is accurate. However, please see Navy Response to Comment No. 2 (above).*

RIDEM Comment No. 9 – Page 3-28, Section 3.5.2.2, Item 3 – This section notes that the PAL for nickel in piezometers has been exceeded on numerous occasions, but that groundwater samples have not exceeded the nickel PAL. Based on this the Navy draws the conclusion that nickel PAL exceedances are not due to migration from the landfill. The piezometers are located in the created wetlands. The substrate for the wetlands was the dredge material from the entrance channel to Allen Harbor. Five samples were collected from the dredge material on 25 July 1996. With respect to nickel, the five samples ranged from 4.0 to 11.4 ppm. While this appears to be a very low concentration when compared to RIDEM residential direct exposure criteria of 1,000 ppm perhaps the Navy should determine if nickel is leaching from the created wetlands as this would appear to be the only other potential source of nickel. It should also be noted that there have only been two exceedances of the 51.6 mg/kg PAL for nickel in sediment (MW08, SED09-07@94J and ME23, SED09-12@78.8J).

Navy Response to Comment No. 9: *Comment acknowledged. In addition to the dredge material origin of the elevated metals, the Navy concurs with RIDEM that they may be mobilized by the reducing conditions of the groundwater caused by the CVOC plume (e.g. leaching from the created wetlands). In either case, the primary goal of monitoring piezometer and sediment data is to evaluate whether contamination from the landfill is actively migrating into the created wetland and causing adverse impacts. Currently, based on distribution of metal data, there does not appear to be any effective migration of metals, particularly for those that also exceed their PALs.*

RIDEM Comment No. 10 – Page 3-37, Section 3.5.3.2, Tetra Tech Site Inspections, Bullets – A bullet should be added for inspections for the drainage channel in the northern portion of the site.

Navy Response to Comment No. 10: *Agree. The first bullet will be edited to read:*

"

- Condition of the stone drainage channels located in the southeastern corner and northern portion of the landfill"

RIDEM Comment No. 11 – Page R-6 – The August 2004 RIDEM Remediation Regulations are referenced. In the future please reference the November 2011 version of the RIDEM Remediation Regulations.

Navy Response to Comment No. 11: *Agree. The reference will be added to the references to read:*

*"*RIDEM, 2011. Rules and Regulations for the Investigation of Hazardous Material Releases (Remediation Regulations), November."

RIDEM Comment No. 12 – Appendix A – There is no record of an interview with Jonathan Reiner of North Kingstown and Philip Bergeron is listed on the interview for Elyse LaForest. In addition, please explain why the Long-Term Monitoring Questionnaire format is not followed in the Interview Record.

Navy Response to Comment No. 12: *Comment acknowledged. The interviews concerning Jonathan Reiner and Elyse LaForest will be updated as appropriate based on the RIDEM comment. While the Long-Term Monitoring Questionnaire format was followed during the interview process, an overall summary of the interview was provided in the Interview Record to more accurately reflect the topics discussed during the interview.*

ATTACHMENT 1

TABLES

TABLE 1-1

SUMMARY OF CERCLA SITES AT NCBC DAVISVILLE
FORMER NCBC DAVISVILLE, NORTH KINGSTOWN, RHODE ISLAND

Site	OU	Site Description	Current Status	Phase	Date Completed
01*	7	Construction Equipment Department Drum Storage Area	RI	Under Investigation	Ongoing
02	7	Construction Equipment Department Battery Acid Disposal Area	RI	Under Investigation	Ongoing
03	7	Construction Equipment Department Solvent Disposal Area	RI	Under Investigation	Ongoing
04*	7	Construction Equipment Department Asphalt Disposal Area	RI	Under Investigation	Ongoing
05	3	Transformer Oil Disposal Area	NFA ROD	AR, UU	September 1995
06	4	Solvent Disposal Area	NFA ROD	AR, UU	September 1998
07	8	Calf Pasture Point	LTM	ROD Requirement	Ongoing
08	Soil: 3 Groundwater: 5	Defense Property Disposal Office (DPDO) Film Processing Disposal Area	NFA ROD	AR, UU	Soils: September 1995 Groundwater: June 1998
09	1	Allen Harbor Landfill	LTM	ROD Requirement	Ongoing
10	5	Camp Fogarty Disposal Area	NFA ROD	RA, AR, UU	June 1998
11	4	Former Fire Fighting Training Area	NFA ROD	AR, UU	September 1998
12	2	Building 316, DPDO Transformer Oil Spill Area	NFA ESD	Rem. Action, AR, UU	ROD: September 1993 ESD: September 1998
13	4	Disposal Area Northwest of Buildings W-3, W-4, and T-1	NFA ROD	RA, AR, UU	September 1998
14	2	Building 38, Transformer Oil Leak	NFA ESD	RA, Rem. Action, AR, UU	ROD: September 1993 ESD: September 1998
15*	00	Building 56	NFA DD	RA, AR, UU	May 1998
16	9	Creosote Dip Tank and Fire Training Area	FS	Negotiating PP	Ongoing

Notes:

* = Study Area
RI = Remedial Investigation
NFA ROD = No Further Action Record of Decision
NFA ESD = No Further Action Explanation of Significant Differences
NFA DD = No Further Action Decision Document
LTM = Long-Term Monitoring
AR = Acceptable Risks (human health and ecological risks within acceptable ranges)
UU = Suitable for Unrestricted Use (five-year reviews not required)
RA = Removal Action performed to achieve condition of no unacceptable risks
Rem. Action = Remedial Actions performed to achieve condition of no unacceptable risks
PP = Proposed Plan

TABLE 2-4

COMPARISON OF AWQC USED IN SITE 07 RISK ASSESSMENT WITH CURRENT VALUES
FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

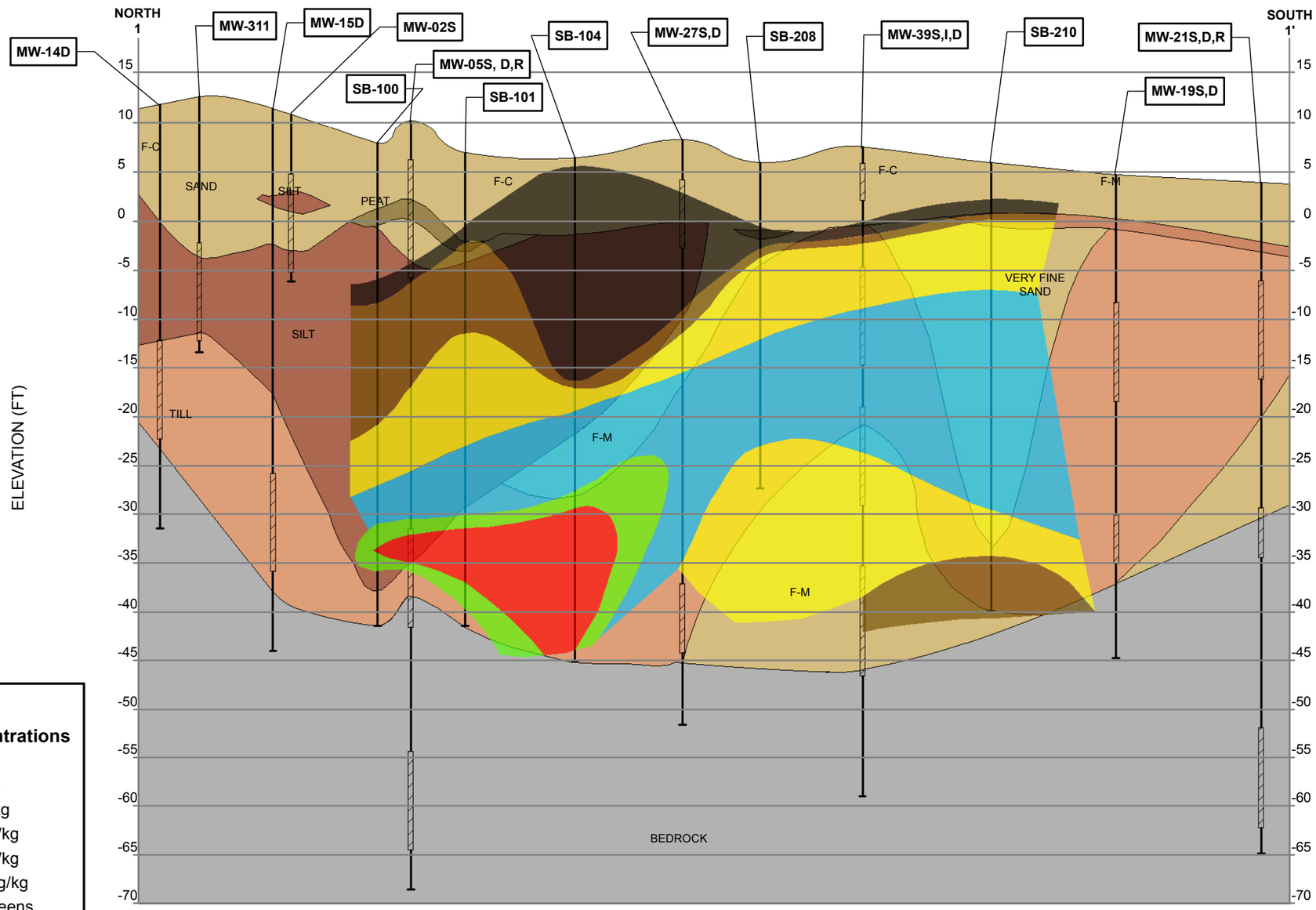
Parameter	**AWQC** [(1)] (ug/L)	**AWQC** [(2,3)] (ug/L)
1,1,2,2-Tetrachloroethane	2400	NA
1,1,2-Trichloroethane	9400	NA
1,1-Dichloroethane	20000	NA
1,1-Dichloroethene	580	NA
1,2-Dichloroethane	20000	NA
1,2 Dicholoethene (total)	580	NA
1,2-Dichloropropane	3040	NA
cis -1,2-Dichloropropene	244	NA
2-Butane	6000	NA
Benzene	700	NA
Bromodichloromethane	15215	NA
Carbon Disulfide	210	NA
Chlorobenzene	50	NA
Chloroform	1240	NA
Styrene	201	NA
Tetrachloroethene	450	NA
Toluene	5000	NA
Trichloroethene	100	NA
Xylenes (total)	1340	NA
Site 07 Metals - Saltwater AWQC		
Arsenic	36	36
Barium	340	NA
Beryllium	5.3	NA
Cobalt	250	NA
Copper	2.9	3.1
Iron	1000	NA
Manganese	2500	NA
Mercury	0.025	0.94
Nickel	8.3	8.2
Selenium	71	71
Thallium	107	NA
Zinc	86	81

Notes:

1. Aquatic Water Quality Criteria (AWQC) listed in Table 5-6 of 1998 RI Report for Site 07 (EA, 1998a). Please note that most of the AWQC listed in Table 5-6 of the Site 07 report are not published AWQC. Rather the values are taken from a variety of references as indicated on the table.
2. Aquatic Water Quality Criteria from National Recommended Water Quality Criteria (USEPA, 2009)

FIGURES

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_CROSS_SECTION_1-1'_COLOR_TEC.MXD 02/27/13 JN



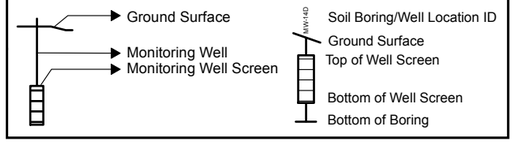
N

Legend

Soil Concentrations

- 1 µg/kg
- 10 µg/kg
- 100 µg/kg
- 1000 µg/kg
- 5000 µg/kg
- 10000 µg/kg
- Well Screens
- Soil Borings
- Bedrock
- Peat
- Sand
- Sand & Gravel
- Silt
- Till

Key



Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

TETRA TECH

CROSS SECTION LINE #1
COLOR-TEC SOIL VOC CONCENTRATION
THIRD FIVE-YEAR REVIEW
FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 02/27/13
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ____

FIGURE NUMBER
2-19

REVISION
0

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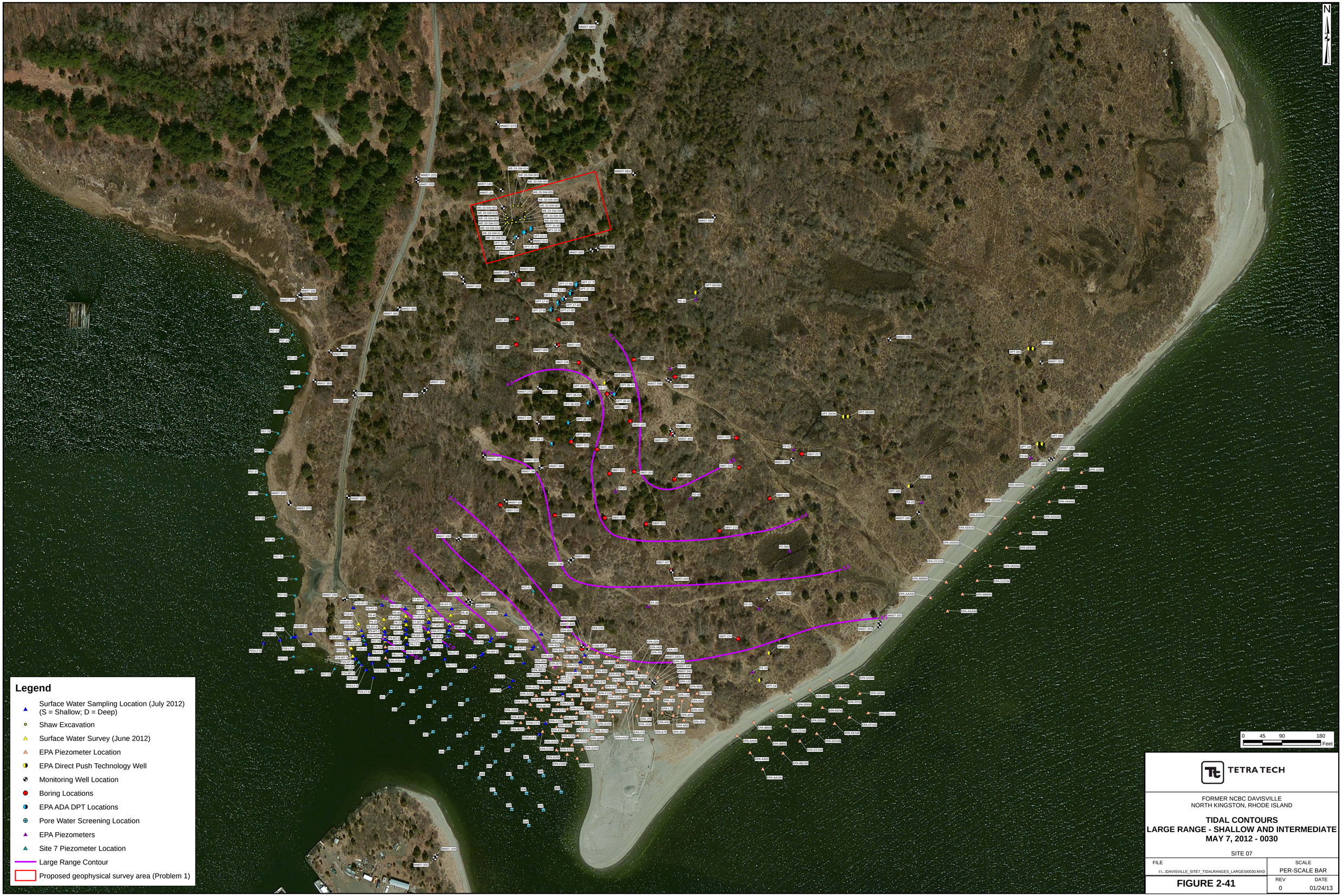

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
LARGE RANGE - SHALLOW AND INTERMEDIATE
MAY 7, 2012 - 0030

SITE 07

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FIGURE 2-41	REV 0 / DATE 01/24/13

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TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
LARGE RANGE - SHALLOW AND INTERMEDIATE
MAY 7, 2012 - 0400

SITE 07

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FIGURE 2-42	REV 0 / DATE 01/24/13

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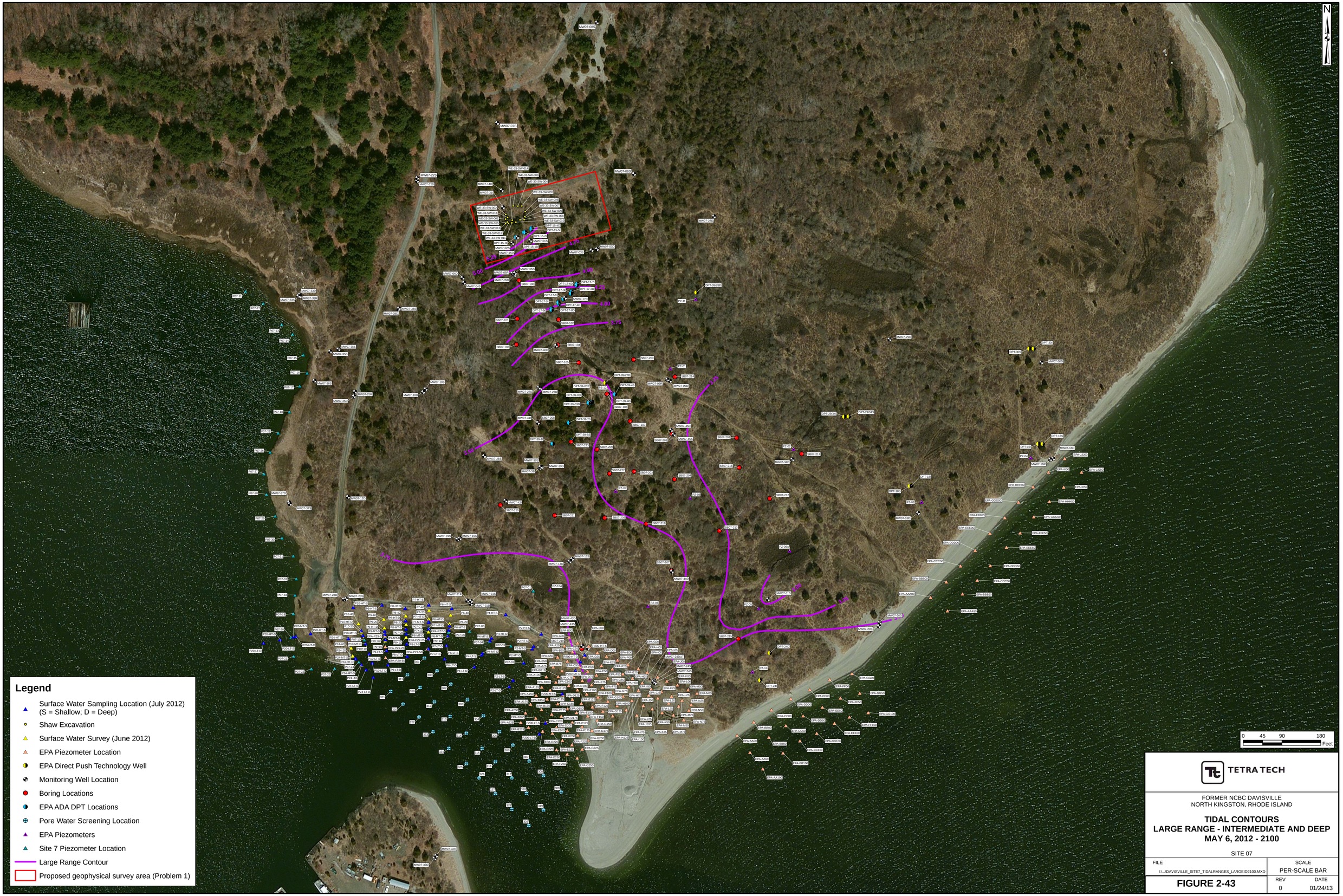

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
LARGE RANGE - INTERMEDIATE AND DEEP
MAY 6, 2012 - 2100

SITE 07

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FIGURE 2-43	REV 0 / DATE 01/24/13

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TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
LARGE RANGE - INTERMEDIATE AND DEEP
MAY 7, 2012 - 0030

SITE 07

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FIGURE 2-44	REV 0 / DATE 01/24/13

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Legend

- Surface Water Sampling Location (July 2012) (S = Shallow; D = Deep)
- Shaw Excavation
- Surface Water Survey (June 2012)
- EPA Piezometer Location
- EPA Direct Push Technology Well
- Monitoring Well Location
- Boring Locations
- EPA ADA DPT Locations
- Pore Water Screening Location
- EPA Piezometers
- Site 7 Piezometer Location
- Large Range Contour
- Proposed geophysical survey area (Problem 1)

0 45 90 180 Feet

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
LARGE RANGE - INTERMEDIATE AND DEEP
MAY 7, 2012 - 0400

SITE 07

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I:\...\DAVISVILLE_SITE7_TIDALRANGES_LARGEID0400.MXD	PER-SCALE BAR
FIGURE 2-45	REV 0 / DATE 01/24/13

I:\0191304S2\DAVISVILLE_SITE7_TIDALRANGES_LARGEID0400.MXD DWHAYNEC 01/24/13

TETRA TECH

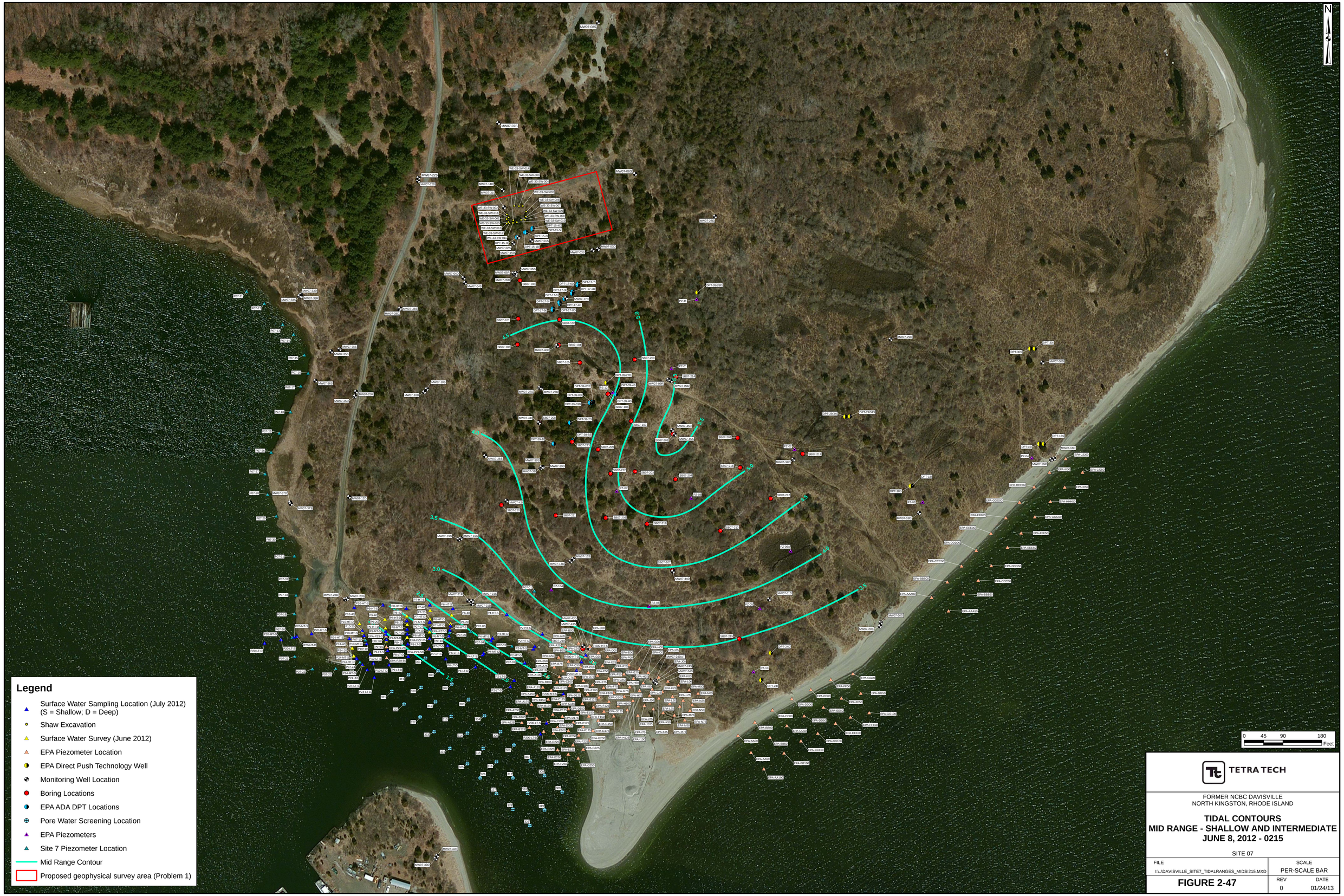
FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
MID RANGE - SHALLOW AND INTERMEDIATE
JUNE 7, 2012 - 2315

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_MIDSI2315.MXD	PER-SCALE BAR
FIGURE 2-46	REV 0 / DATE 01/24/13

I:\01812\04520\DAVISVILLE_SITE7_TIDALRANGES_MIDSI2315.MXD DWINNEC 01/24/13



TETRA TECH

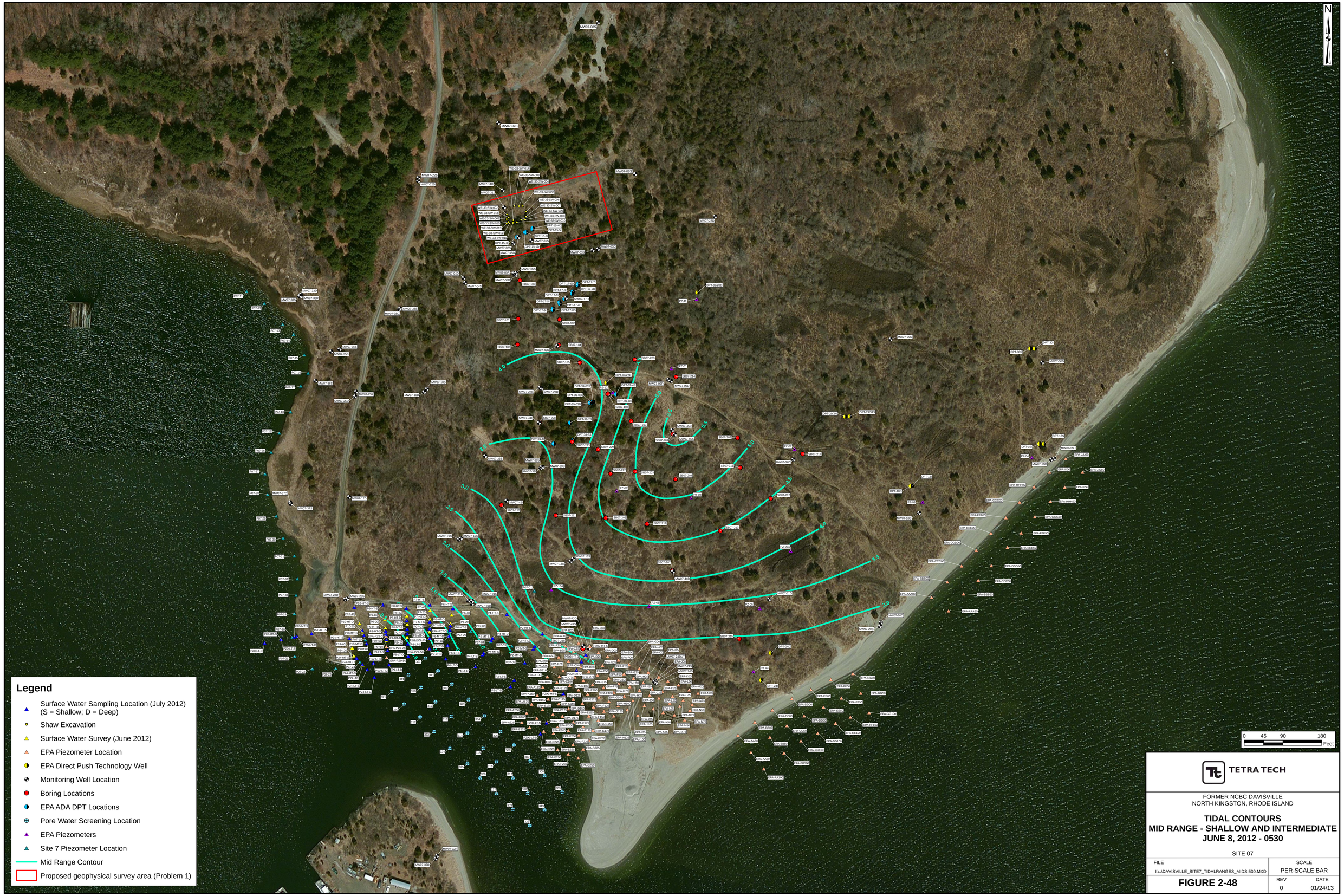
FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
MID RANGE - SHALLOW AND INTERMEDIATE
JUNE 8, 2012 - 0215

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_MIDSI215.MXD	PER-SCALE BAR
FIGURE 2-47	REV 0 / DATE 01/24/13

I:\01812\04\52\DAVISVILLE_SITE7_TIDALRANGES_MIDSI215.MXD DWAINNEC 01/24/13



TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
MID RANGE - SHALLOW AND INTERMEDIATE
JUNE 8, 2012 - 0530

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_MIDSI530.MXD	PER-SCALE BAR
FIGURE 2-48	REV 0 / DATE 01/24/13

I:\01812\04\52\DAVISVILLE_SITE7_TIDALRANGES_MIDSI530.MXD DWAINNEC 01/24/13

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
MID RANGE - INTERMEDIATE AND DEEP
JUNE 7, 2012 - 2315

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_MIDID2315.MXD	PER-SCALE BAR
FIGURE 2-49	REV 0 / DATE 01/24/13

I:\01612\04\52\DAVISVILLE_SITE7_TIDALRANGES_MIDID2315.MXD DWINNEC 01/24/13

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
MID RANGE - INTERMEDIATE AND DEEP
JUNE 8, 2012 - 0215

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_MIDID215.MXD	PER-SCALE BAR
FIGURE 2-50	REV 0 / DATE 01/24/13

I:\01812\0452\DAVISVILLE_SITE7_TIDALRANGES_MIDID215.MXD DWHINNEC 01/24/13

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
MID RANGE - INTERMEDIATE AND DEEP
JUNE 8, 2012 - 0530

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_MIDID530.MXD	PER-SCALE BAR
FIGURE 2-51	REV 0 / DATE 01/24/13

I:\01812\0452\DAVISVILLE_SITE7_TIDALRANGES_MIDID530.MXD DWANNEC 01/24/13

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
AVERAGE RANGE - SHALLOW AND INTERMEDIATE
MAY 20, 2012 - 2030

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_AVGSI2030.MXD	PER-SCALE BAR
FIGURE 2-52	REV 0 / DATE 09/19/12

I:\018120452\DAVISVILLE_SITE7_TIDALRANGES_AVGSI2030.MXD DWAINNEC 09/19/12

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
AVERAGE RANGE - SHALLOW AND INTERMEDIATE
MAY 20, 2012 - 2300

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_AVGSI2300.MXD	PER-SCALE BAR
FIGURE 2-53	REV 0 / DATE 01/24/13

I:\018139452\DAVISVILLE_SITE7_TIDALRANGES_AVGSI2300.MXD DWINNEC 01/24/13

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

TIDAL CONTOURS
AVERAGE RANGE - SHALLOW AND INTERMEDIATE
MAY 21, 2012 - 0130

SITE 07

FILE	SCALE
I:\...\DAVISVILLE_SITE7_TIDALRANGES_AVGSI130.MXD	PER-SCALE BAR
FIGURE 2-54	REV 0 / DATE 01/24/13

I:\01813\04\ZDAVISVILLE_SITE7_TIDALRANGES_AVGSI130.MXD DWAINNEC 01/24/13

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
AVERAGE RANGE - INTERMEDIATE AND DEEP
MAY 20, 2012 - 2030

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_AVGID2030.MXD	PER-SCALE BAR
FIGURE 2-55	REV 0 / DATE 01/24/13

I:\018130452\DAVISVILLE_SITE7_TIDALRANGES_AVGID2030.MXD DWAN/NEC 01/24/13

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
AVERAGE RANGE - INTERMEDIATE AND DEEP
MAY 20, 2012 - 2300

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_AVGID2300.MXD	PER-SCALE BAR
FIGURE 2-56	REV 0 / DATE 01/24/13

I:\018130452\DAVISVILLE_SITE7_TIDALRANGES_AVGID2300.MXD DWAINNEC 01/24/13

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
AVERAGE RANGE - INTERMEDIATE AND DEEP
MAY 21, 2012 - 0130

SITE 07

FILE	SCALE
I:\...\DAVISVILLE_SITE7_TIDALRANGES_AVGID130.MXD	PER-SCALE BAR
FIGURE 2-57	REV 0 / DATE 01/24/13

I:\01813\04520\DAVISVILLE_SITE7_TIDALRANGES_AVGID130.MXD DWAYNEC 01/24/13

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
LOW RANGE - SHALLOW AND INTERMEDIATE
MAY 15, 2012 - 0445

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_LOWSI445.MXD	PER-SCALE BAR
FIGURE 2-58	REV 0 / DATE 01/24/13

I:\01813\0452\DAVISVILLE_SITE7_TIDALRANGES_LOWSI445.MXD DWINNEC 01/24/13

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
LOW RANGE - SHALLOW AND INTERMEDIATE
MAY 15, 2012 - 0715

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_LOWSI715.MXD	PER-SCALE BAR
FIGURE 2-59	REV 0 / DATE 01/24/13

I:\01813\04\2\DAVISVILLE_SITE7_TIDALRANGES_LOWSI715.MXD DWM/MEC 01/24/13

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
LOW RANGE - SHALLOW AND INTERMEDIATE
MAY 15, 2012 - 0945

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_LOWSI945.MXD	PER-SCALE BAR
FIGURE 2-60	REV 0 / DATE 01/24/13

I:\01813\0452\DAVISVILLE_SITE7_TIDALRANGES_LOWSI945.MXD DWWINEC 01/24/13

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
LOW RANGE - INTERMEDIATE AND DEEP
MAY 15, 2012 - 0445

SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_LOWID445.MXD	PER-SCALE BAR
FIGURE 2-61	REV 0 / DATE 01/24/13

I:\0191304520\DAVISVILLE_SITE7_TIDALRANGES_LOWID445.MXD DWWINEC 01/24/13

Legend

- Surface Water Sampling Location (July 2012) (S = Shallow; D = Deep)
- Shaw Excavation
- Surface Water Survey (June 2012)
- EPA Piezometer Location
- EPA Direct Push Technology Well
- Monitoring Well Location
- Boring Locations
- EPA ADA DPT Locations
- Pore Water Screening Location
- EPA Piezometers
- Site 7 Piezometer Location
- Low Range Contour
- Proposed geophysical survey area (Problem 1)

TETRA TECH

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
LOW RANGE - INTERMEDIATE AND DEEP
MAY 15, 2012 - 0715

SITE 07

FILE	SCALE	
I:\..\DAVISVILLE_SITE7_TIDALRANGES_LOWID715.MXD	PER-SCALE BAR	
FIGURE 2-62	REV 0	DATE 01/24/13

I:\01813\0452\DAVISVILLE_SITE7_TIDALRANGES_LOWID715.MXD DWM/NEC 01/24/13

FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

TIDAL CONTOURS
LOW RANGE - INTERMEDIATE AND DEEP
MAY 15, 2012 - 0945

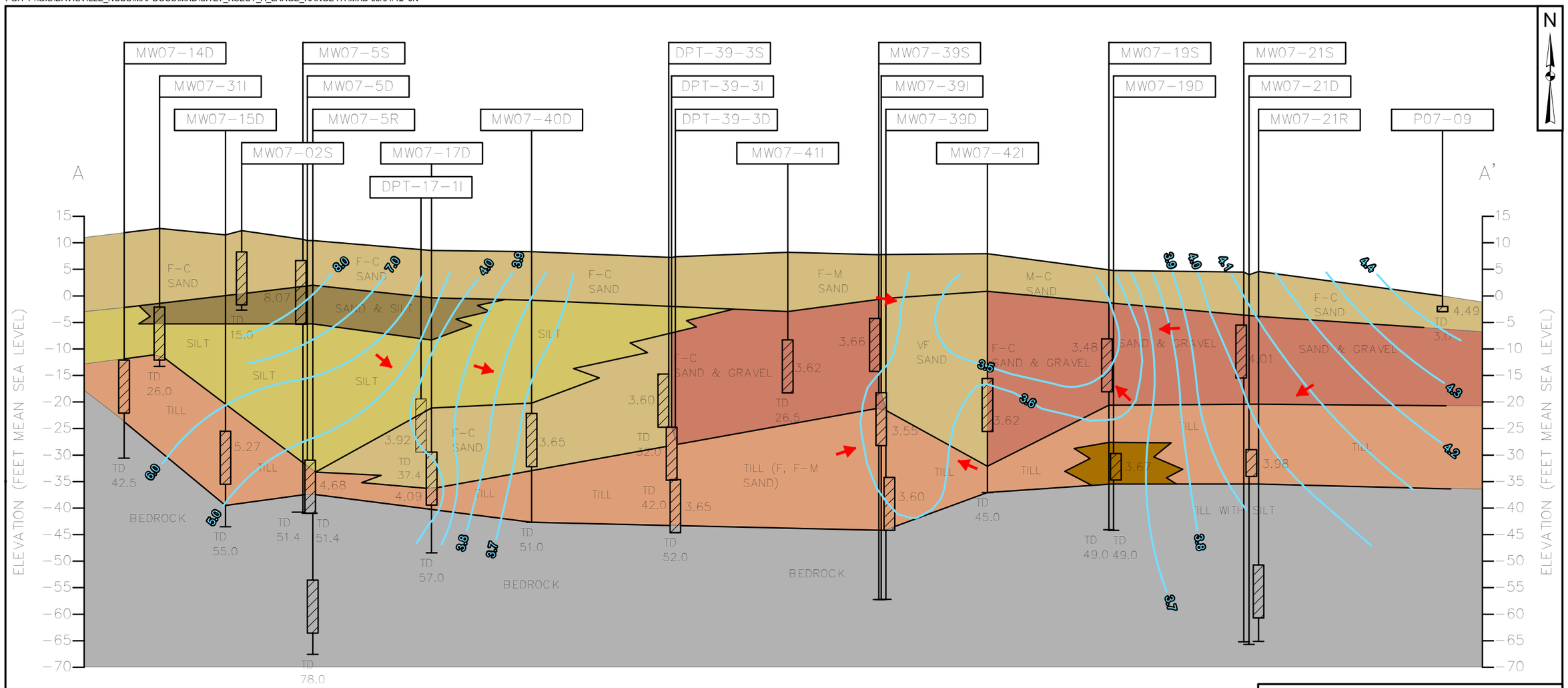
SITE 07

FILE	SCALE
I:\..\DAVISVILLE_SITE7_TIDALRANGES_LOWID945.MXD	PER-SCALE BAR

FIGURE 2-63	REV	DATE
	0	01/24/13

I:\01813\0452\DAVISVILLE_SITE7_TIDALRANGES_LOWID945.MXD DWM/NEC 01/24/13

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_XSECT_A_LARGE_RANGE HT.MXD 09/04/12 JN



Key

- Ground Surface
- Monitoring Well
- Monitoring Well Screen
- Soil Boring/Well Location ID (e.g. MW-14D)
- Ground Surface
- Top of Well Screen
- Bottom of Well Screen
- Bottom of Boring

Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

Legend

- Isocontours Tidal Ranges
- Soil Boring
- Well Screens
- Bedrock
- Sand
- Sand & Gravel
- Sand & Silt
- Silt
- Till
- Till with Silt

TETRA TECH

CROSS SECTION LINE A
LARGE RANGE - HT
21:00 - 05/06/2012
SITE 07, FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

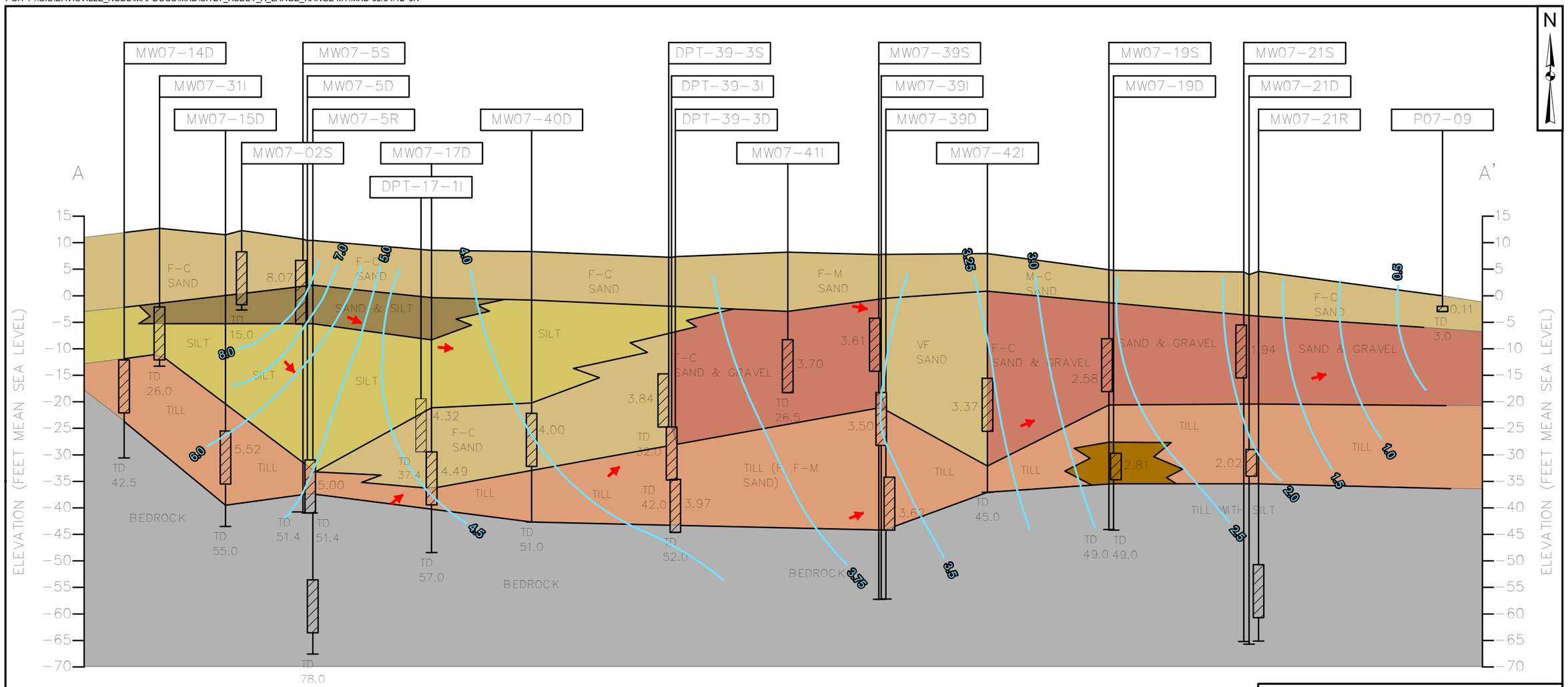
DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 09/04/12
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ___

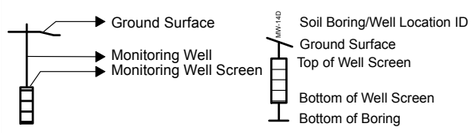
FIGURE 2-64

REVISION 0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_XSECT_A_LARGE_RANGE MT.MXD 09/04/12 JN



Key



Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

Legend

- Isocontours Tidal Ranges
- Soil Boring
- Well Screens
- Bedrock
- Sand
- Sand & Gravel
- Sand & Silt
- Silt
- Till
- Till with Silt

TETRA TECH

CROSS SECTION LINE A
LARGE RANGE - MT
00:30 - 05/07/2012
SITE 07, FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

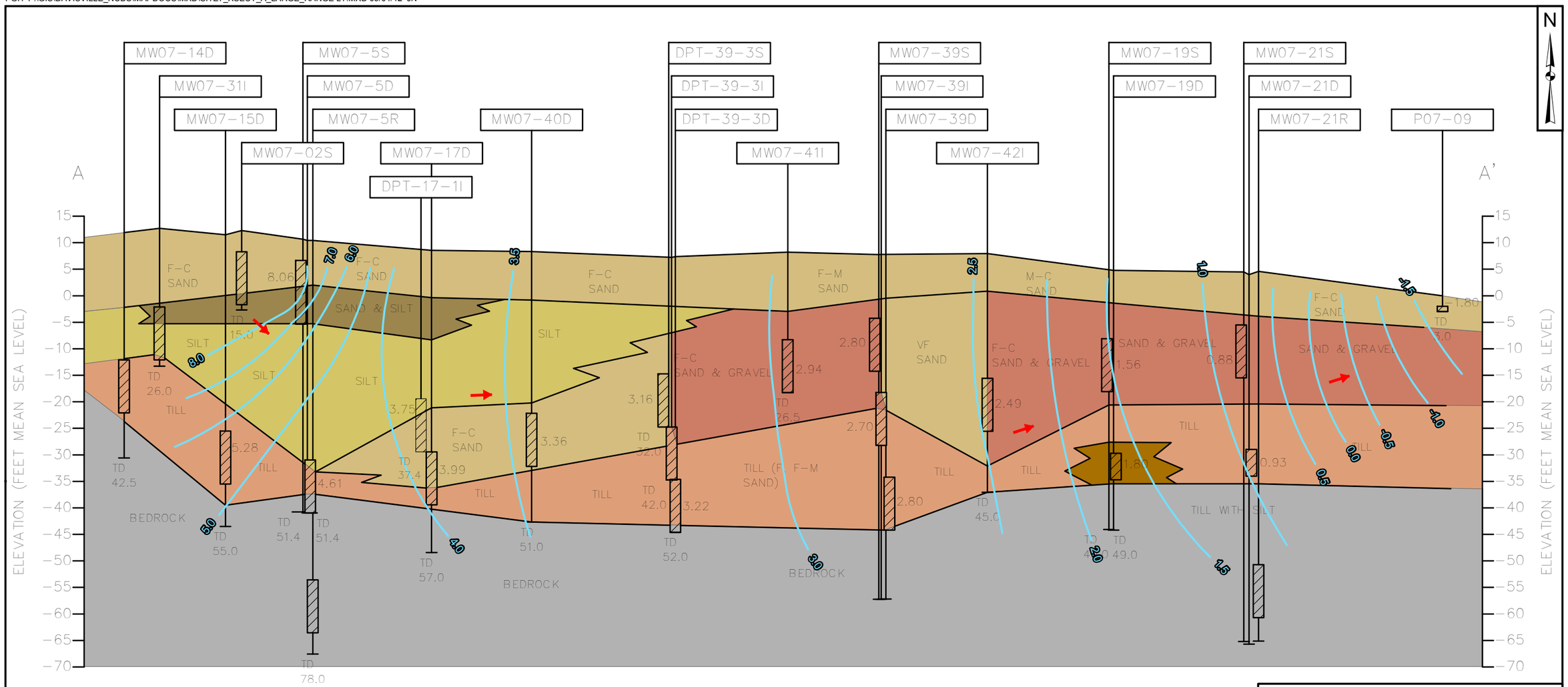
DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 09/04/12
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ___

FIGURE 2-65

REVISION
0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_XSECT_A_LARGE_RANGE LT.MXD 09/04/12 JN



Key

- Ground Surface
- Monitoring Well
- Monitoring Well Screen
- Soil Boring/Well Location ID (e.g. MW-14D)
- Ground Surface
- Top of Well Screen
- Bottom of Well Screen
- Bottom of Boring

Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

Legend

- Isocontours Tidal Ranges
- Soil Boring
- Well Screens
- Bedrock
- Sand
- Sand & Gravel
- Sand & Silt
- Silt
- Till
- Till with Silt

TETRA TECH

CROSS SECTION LINE A
LARGE RANGE - LT
04:00 - 05/07/2012
SITE 07, FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

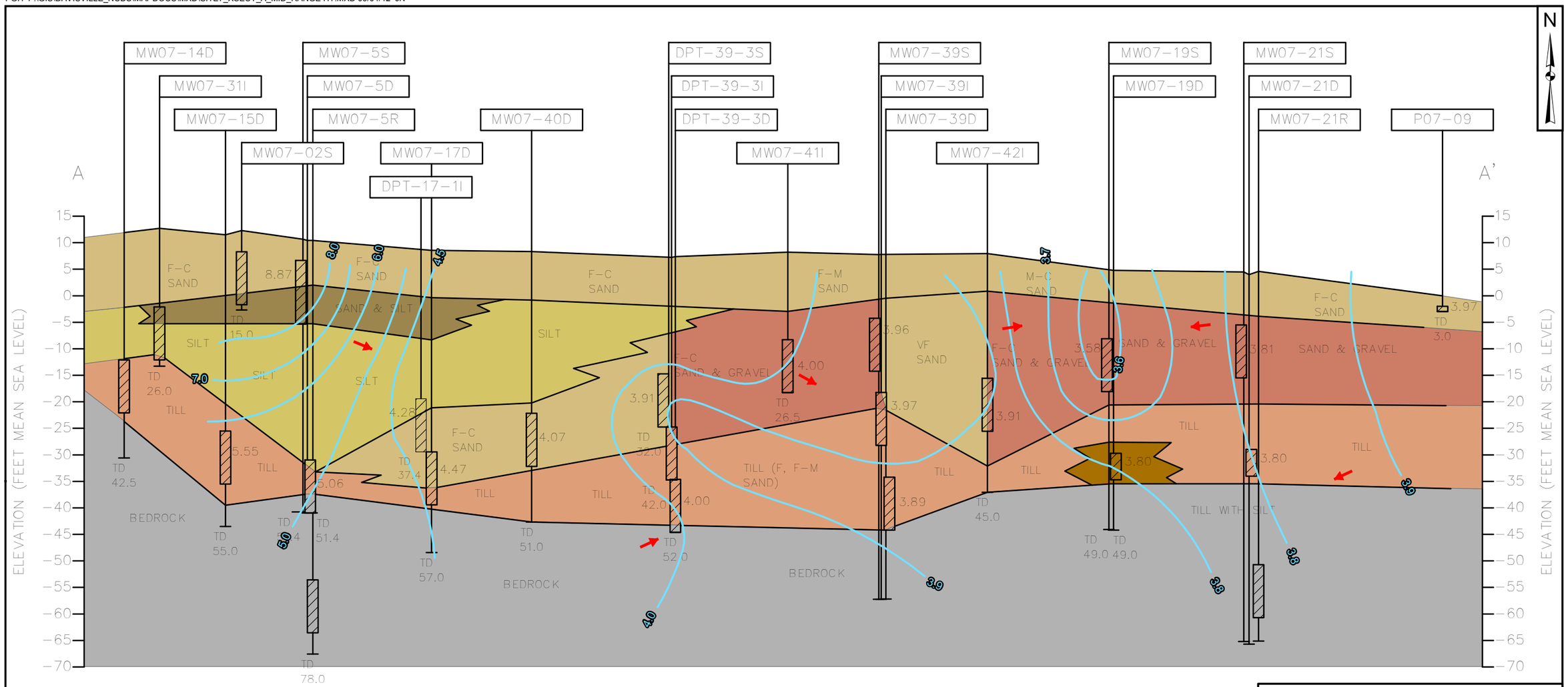
DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 09/04/12
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ___

FIGURE 2-66

REVISION 0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_XSECT_A_MID_RANGE HT.MXD 09/04/12 JN



Key

- Ground Surface
- Monitoring Well
- Monitoring Well Screen
- Soil Boring/Well Location ID (MW-14D)
- Ground Surface
- Top of Well Screen
- Bottom of Well Screen
- Bottom of Boring

Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

Legend

- Isocontours Tidal Ranges
- Soil Boring
- Well Screens
- Bedrock
- Sand
- Sand & Gravel
- Sand & Silt
- Silt
- Till
- Till with Silt

TETRA TECH

CROSS SECTION LINE A
MID RANGE - HT
23:15 - 06/07/2012
SITE 07, FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

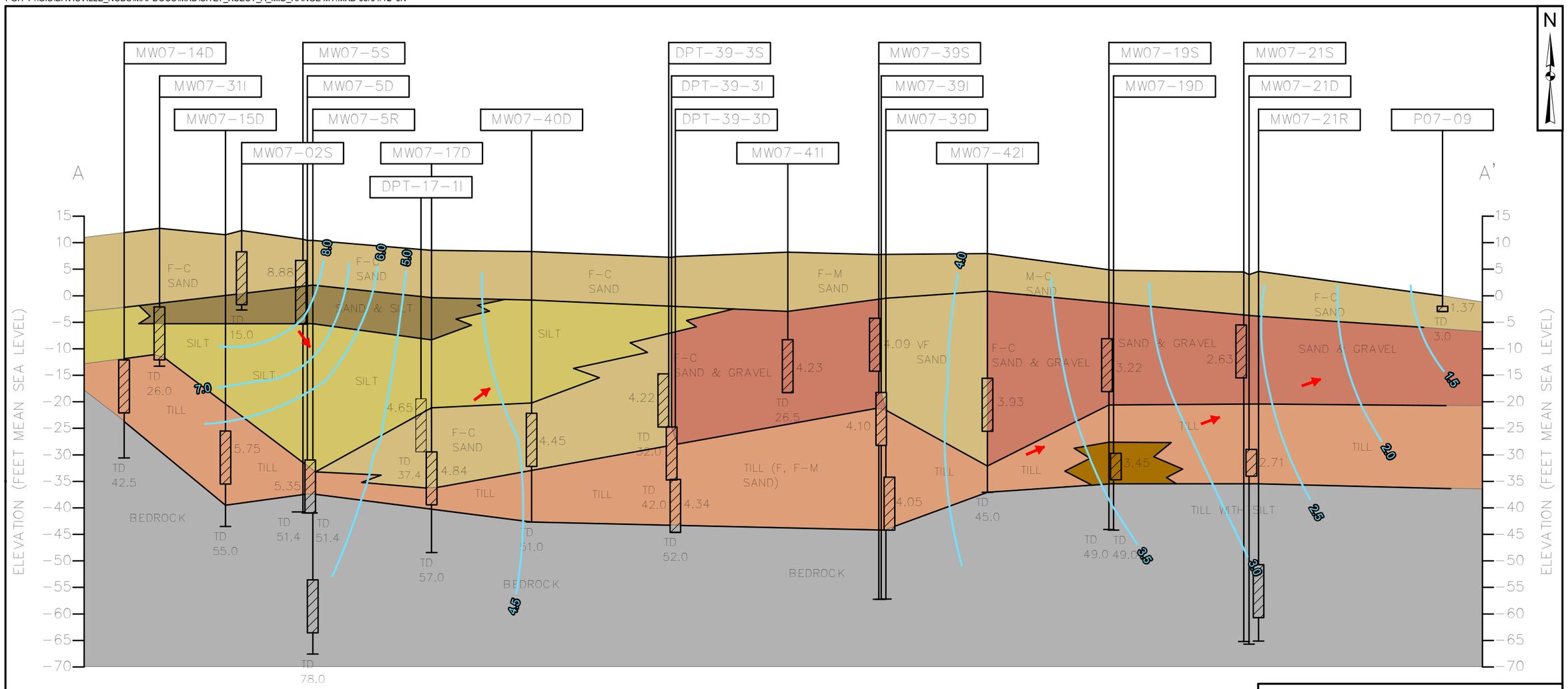
DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 09/04/12
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ___

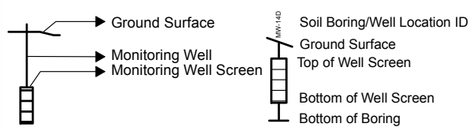
FIGURE 2-67

REVISION
0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_XSECT_A_MID_RANGE MT.MXD 09/04/12 JN



Key



Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

Legend

- Isocontours Tidal Ranges
- Soil Boring
- Well Screens
- Bedrock
- Sand
- Sand & Gravel
- Sand & Silt
- Silt
- Till
- Till with Silt

TETRA TECH

CROSS SECTION LINE A
MID RANGE - MT
02:15 - 06/08/2012
SITE 07, FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

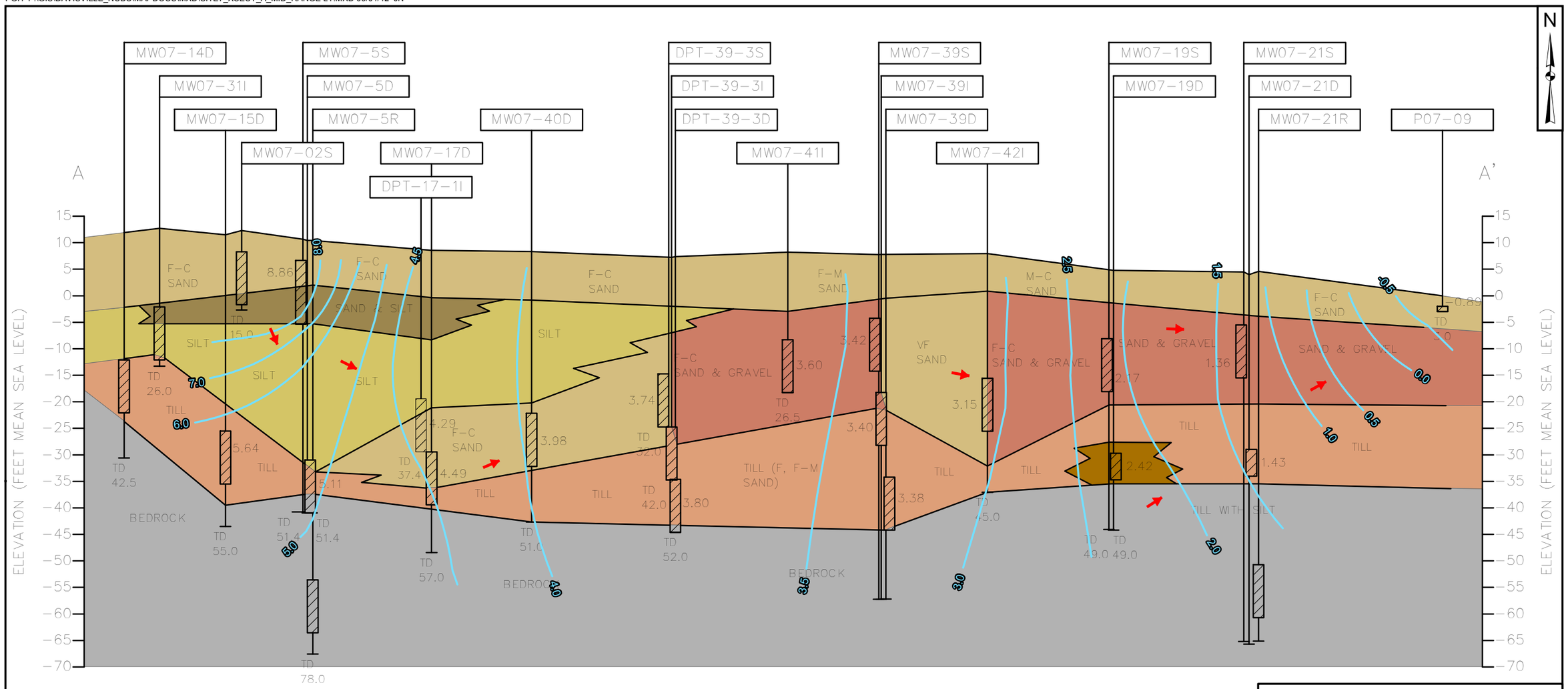
DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 09/04/12
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ___

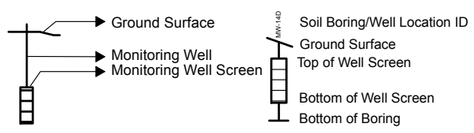
FIGURE 2-68

REVISION
0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_XSECT_A_MID_RANGE LT.MXD 09/04/12 JN



Key



Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

Legend

- Isocontours Tidal Ranges
- Soil Boring
- Well Screens
- Bedrock
- Sand
- Sand & Gravel
- Sand & Silt
- Silt
- Till
- Till with Silt

TETRA TECH

CROSS SECTION LINE A
MID RANGE - LT
05:30 - 06/08/2012
SITE 07, FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

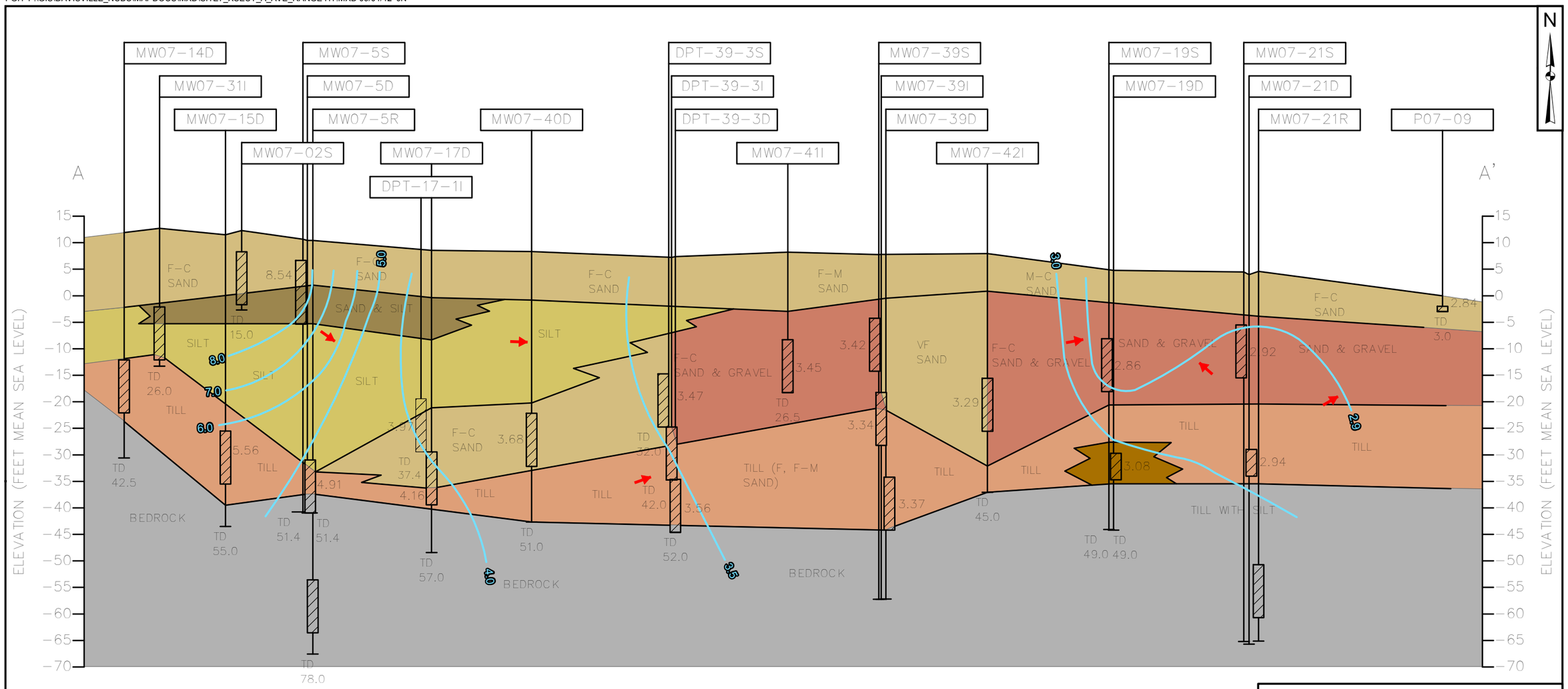
DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 09/04/12
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ___

FIGURE 2-69

REVISION
0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_XSECT_A_AVE_RANGE HT.MXD 09/04/12 JN



Key

- Ground Surface
- Monitoring Well
- Monitoring Well Screen
- Soil Boring/Well Location ID (e.g. MW-14D)
- Ground Surface
- Top of Well Screen
- Bottom of Well Screen
- Bottom of Boring

Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

Legend

- Isocontours Tidal Ranges
- Soil Boring
- Well Screens
- Bedrock
- Sand
- Sand & Gravel
- Sand & Silt
- Silt
- Till
- Till with Silt

TETRA TECH

CROSS SECTION LINE A
AVERAGE - HT
20:30 - 05/20/2012
SITE 07, FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

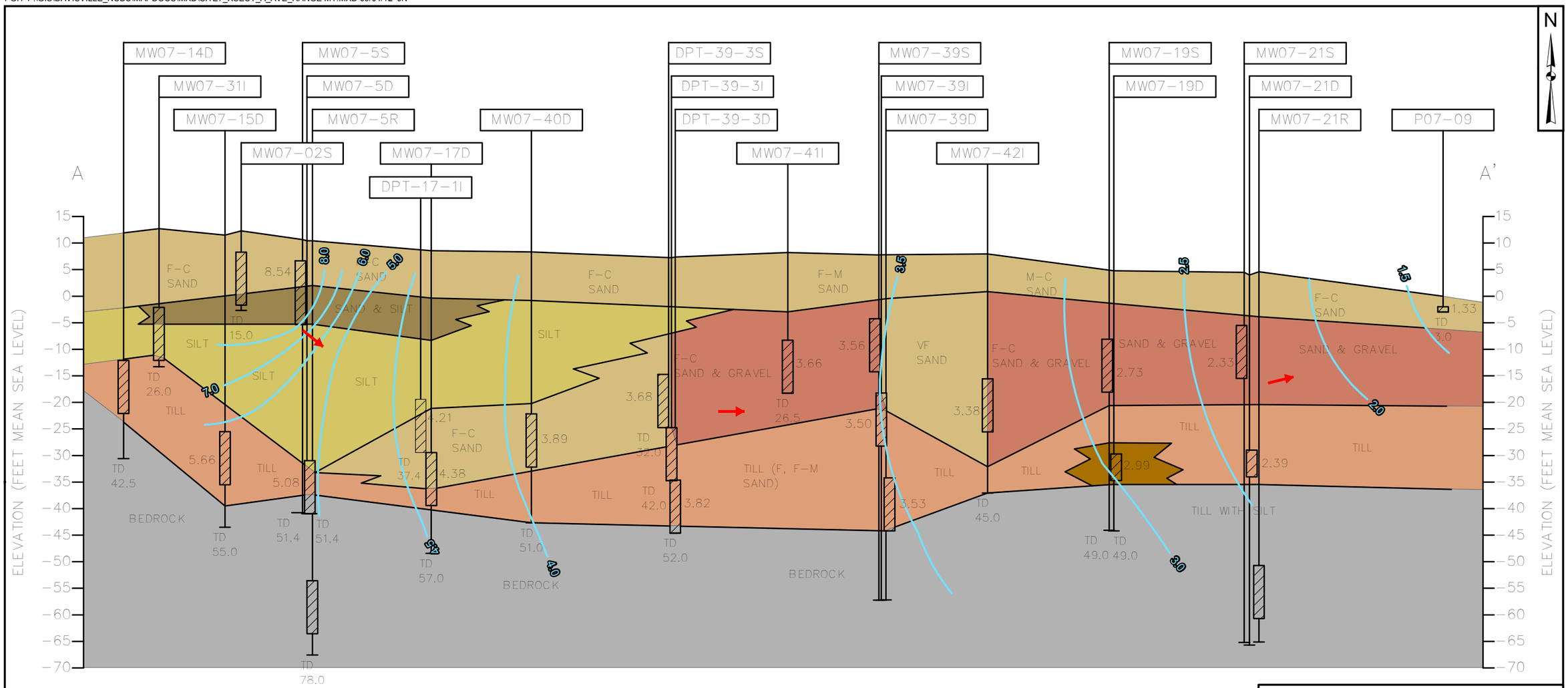
DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 09/04/12
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ___

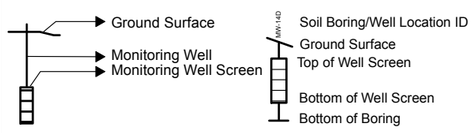
FIGURE 2-70

REVISION 0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_XSECT_A_AVE_RANGE MT.MXD 09/04/12 JN



Key



Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

Legend

- Isocontours Tidal Ranges
- Soil Boring
- Well Screens
- Bedrock
- Sand
- Sand & Gravel
- Sand & Silt
- Silt
- Till
- Till with Silt

TETRA TECH

CROSS SECTION LINE A
AVERAGE - MT
23:00 - 05/20/2010
SITE 07, FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

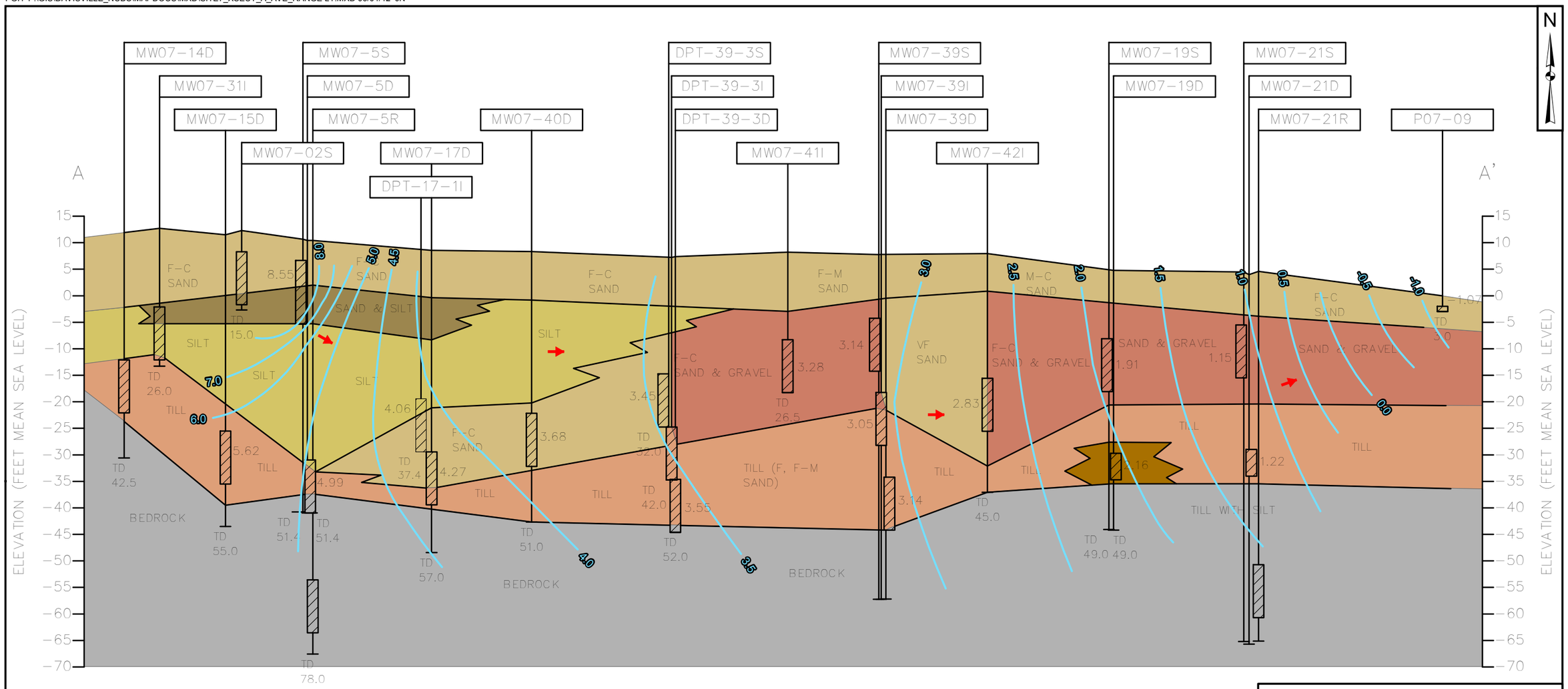
DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 09/04/12
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ___

FIGURE 2-71

REVISION
0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_XSECT_A_AVE_RANGE LT.MXD 09/04/12 JN



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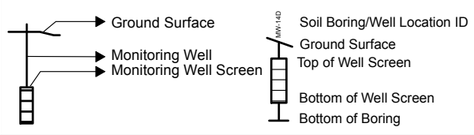


Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

Legend

- Isocontours Tidal Ranges
- Soil Boring
- Well Screens
- Bedrock
- Sand
- Sand & Gravel
- Sand & Silt
- Silt
- Till
- Till with Silt

TETRA TECH

CROSS SECTION LINE A
AVERAGE - LT
01:30 - 05/21/2012
SITE 07, FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

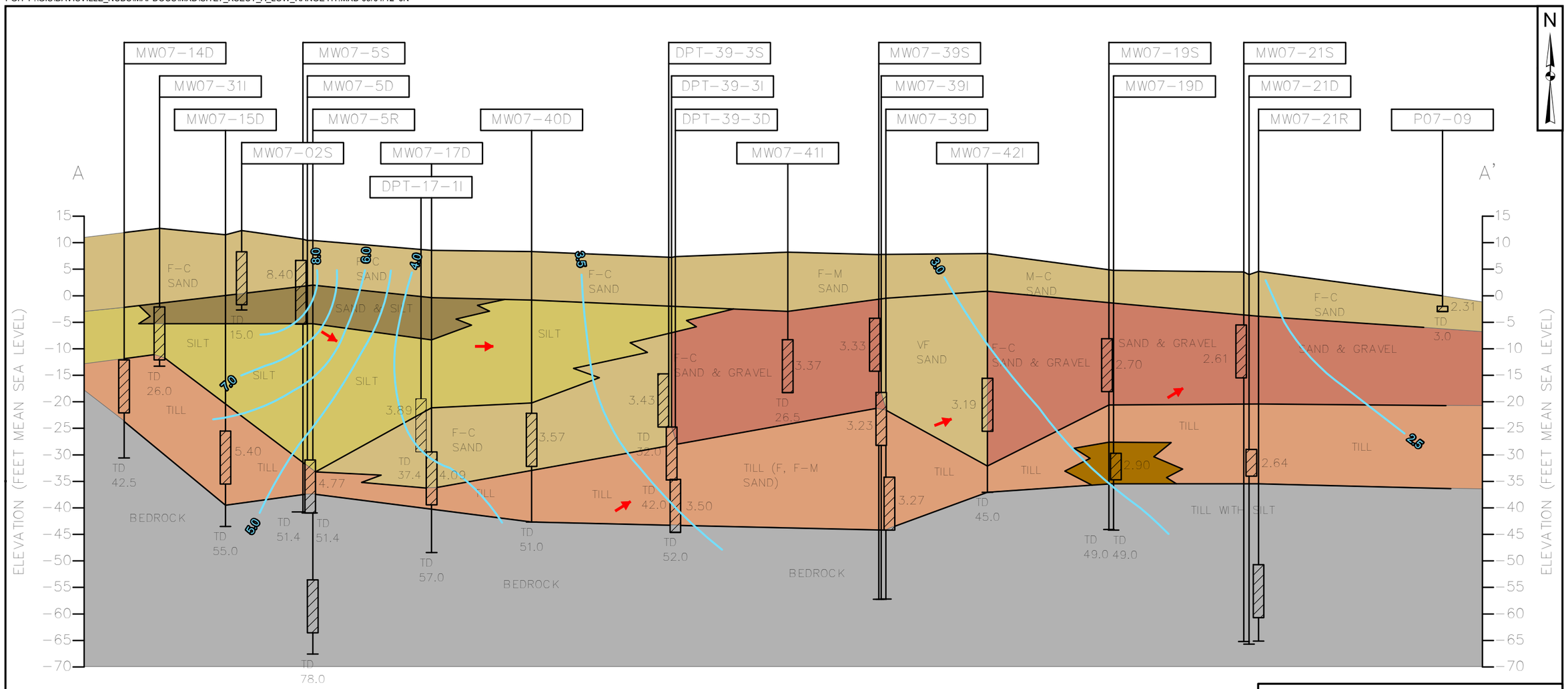
DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 09/04/12
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ___

FIGURE 2-72

REVISION
0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_XSECT_A_LOW_RANGE HT.MXD 09/04/12 JN



Key

- Ground Surface
- Monitoring Well
- Monitoring Well Screen
- Soil Boring/Well Location ID (e.g. MW-14D)
- Ground Surface
- Top of Well Screen
- Bottom of Well Screen
- Bottom of Boring

Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

Legend

- Isocontours Tidal Ranges
- Soil Boring
- Well Screens
- Bedrock
- Sand
- Sand & Gravel
- Sand & Silt
- Silt
- Till
- Till with Silt

TETRA TECH

CROSS SECTION LINE A
LOW RANGE - HT
04:45 - 05/15/2012
SITE 07, FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

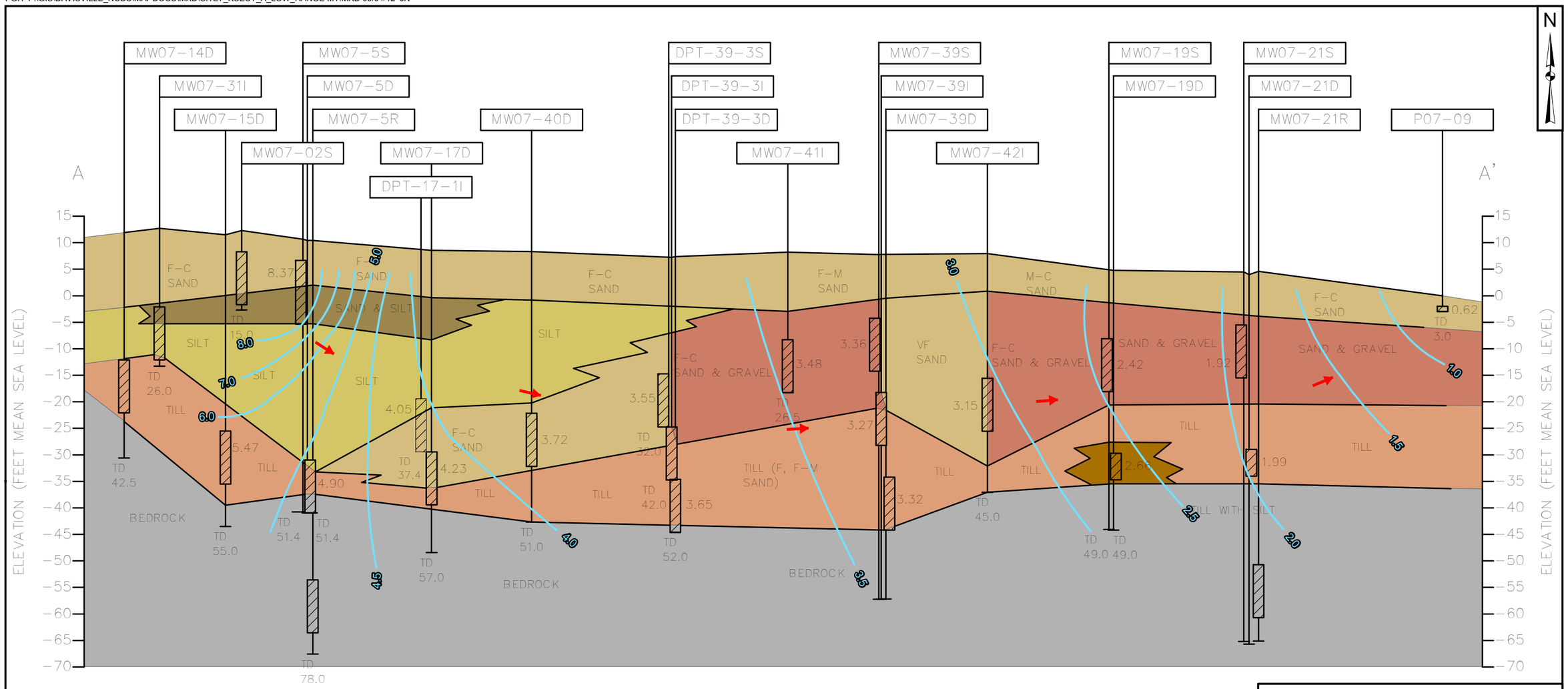
DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 09/04/12
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ___

FIGURE 2-73

REVISION 0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_XSECT_A_LOW_RANGE MT.MXD 09/04/12 JN



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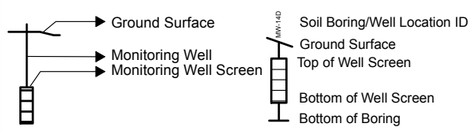


Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

Legend

- Isocontours Tidal Ranges
- Soil Boring
- Well Screens
- Bedrock
- Sand
- Sand & Gravel
- Sand & Silt
- Silt
- Till
- Till with Silt

TETRA TECH

CROSS SECTION LINE A
LOW RANGE - MT
07:15 - 05/15/2012
SITE 07, FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

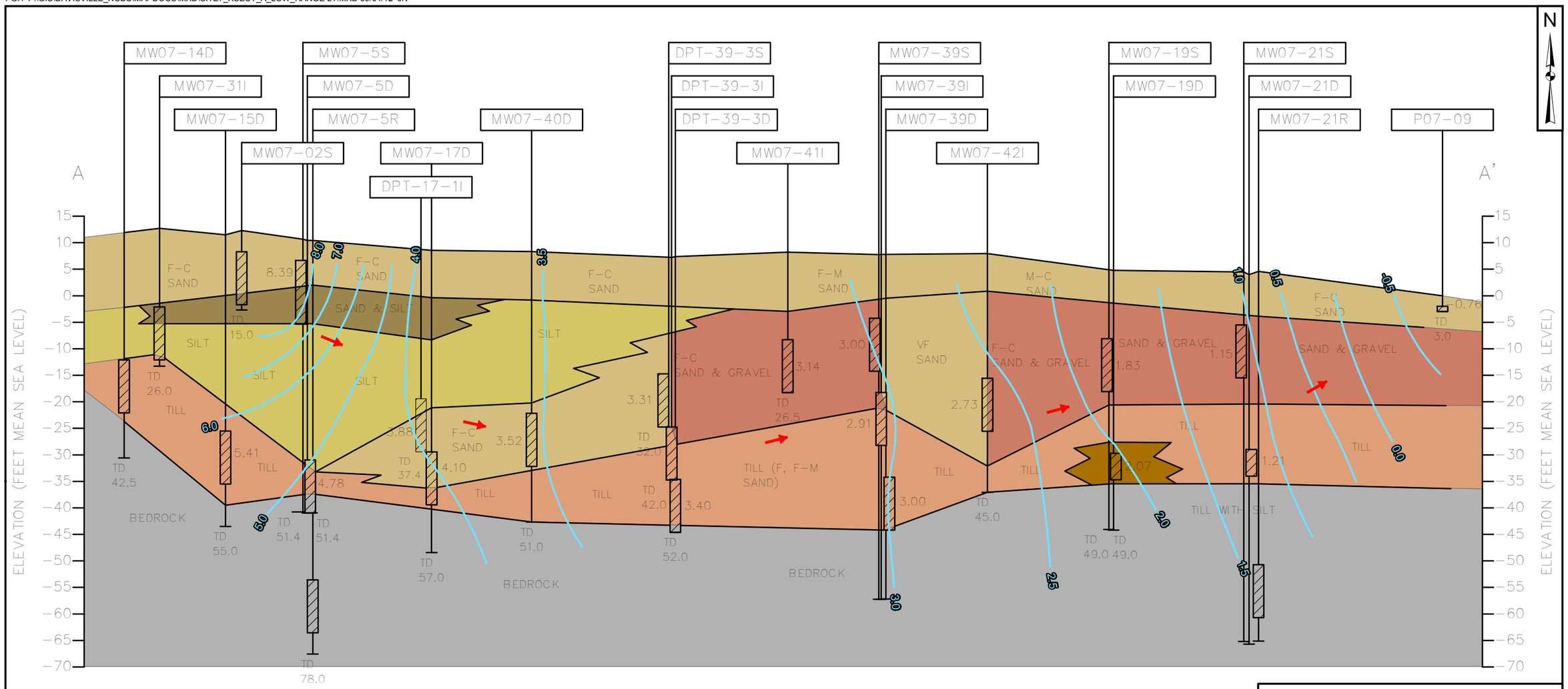
DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 09/04/12
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ___

FIGURE 2-74

REVISION
0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE7_XSECT_A_LOW_RANGE LT.MXD 09/04/12 JN



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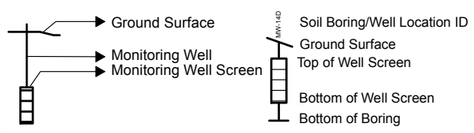


Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probable conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.

Legend

- Isocontours Tidal Ranges
- Soil Boring
- Well Screens
- Bedrock
- Sand
- Sand & Gravel
- Sand & Silt
- Silt
- Till
- Till with Silt

TETRA TECH

CROSS SECTION LINE A
LOW RANGE - LT
09:45 - 05/15/2012
SITE 07, FORMER NCBC DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND

DRAWN BY: J. NOVAK 07/24/12
CHECKED BY: S. ANDERSON 09/04/12
APPROVED BY:

CONTRACT NUMBER: 112G01813
CTO ___

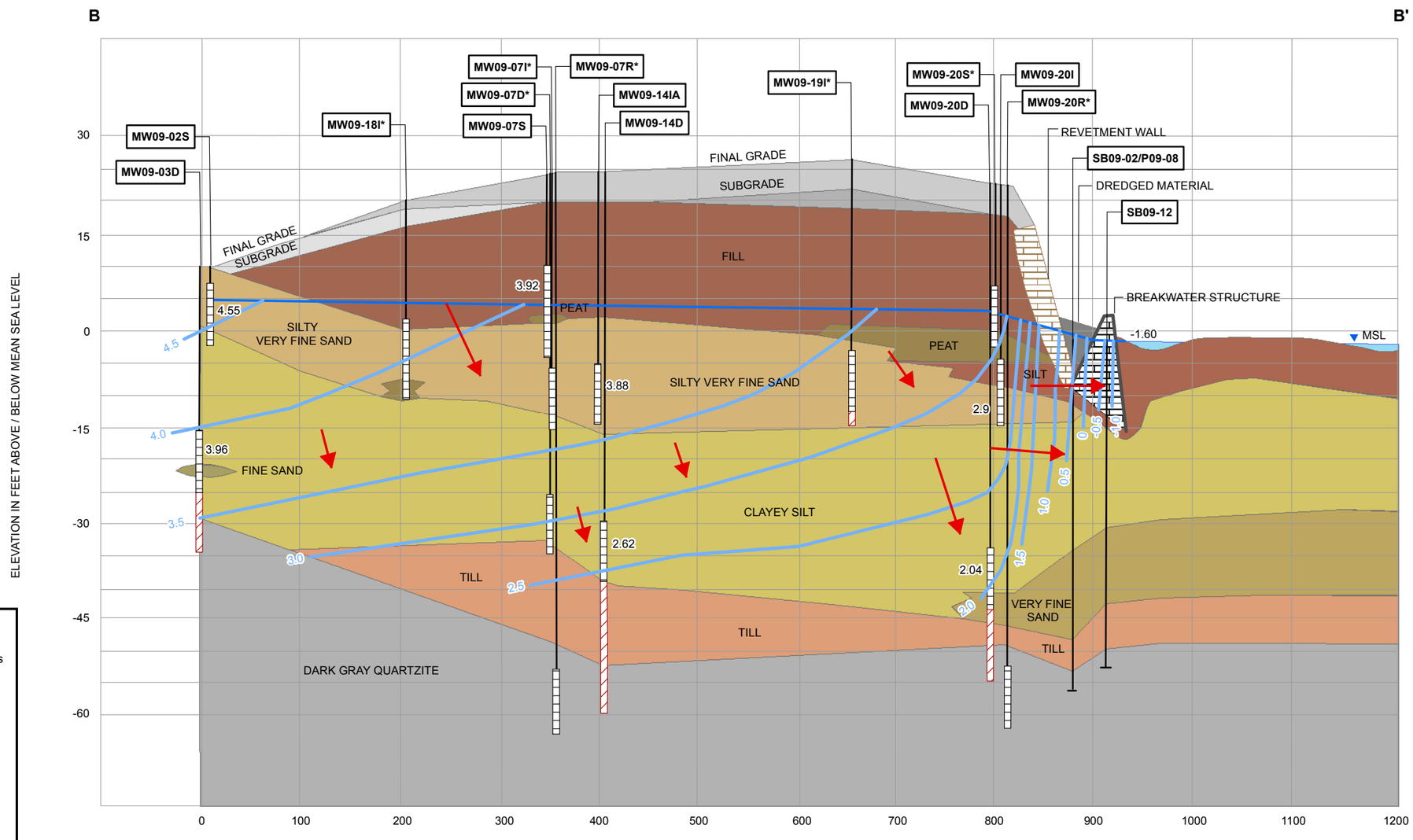
FIGURE 2-75

REVISION
0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE9_CROSS_SECTION_B-B'_LOW_TIDE.MXD 02/27/13 JN

Key

- Ground Surface
- Monitoring Well
- Monitoring Well Screen



Legend

- Groundwater Potentiometric Contours
- Bentonite Sealed Borehole
- Screened Interval of MW
- BREAKWATER STRUCTURE
- REVETMENT WALL
- CLAYEY SILT
- DARK GRAY QUARTZITE
- DREDGED MATERIAL
- FILL
- FINAL GRADE
- FINE SAND
- ORIGINAL GRADE
- PEAT
- SILT
- SILTY VERY FINE SAND
- SUBGRADE
- TILL
- VERY FINE SAND
- WATER

Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probably conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.
5) Elevation and subsurface of Allen Harbor beyond breakwater structure estimated based on as-built brawings, available bathymetry data and observations of the site (February 15, 2012).

SOURCE: EA Engineering, Science, and Technology; Geologic Cross-section B-B'; 8/18/03

DRAWN BY / DATE	J. NOVAK 11/28/12
CHECKED BY / DATE	S. ANDERSON 02/27/13
REVISED BY / DATE	J. NOVAK 02/27/13
SCALE	AS NOTED

TETRA TECH

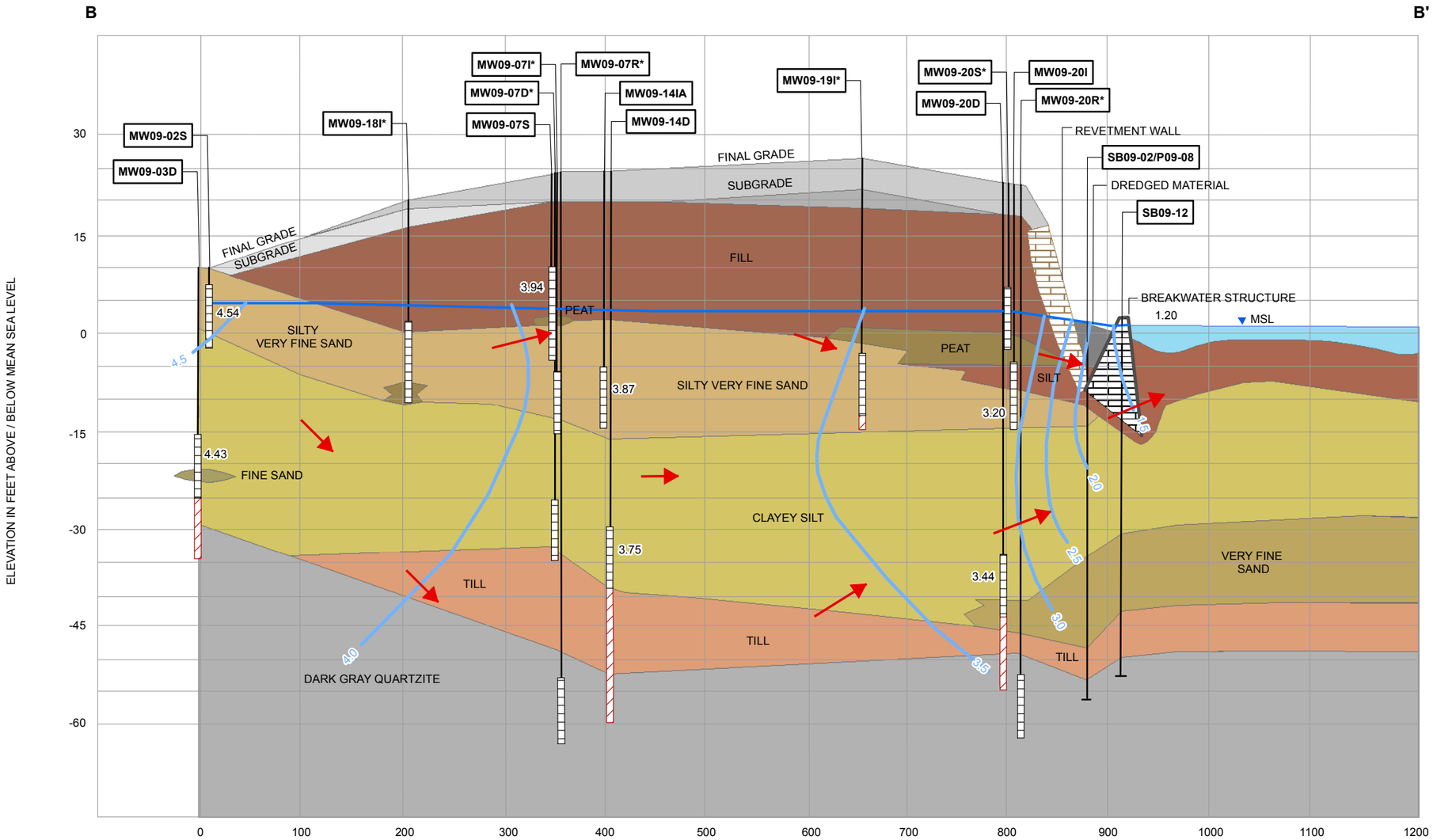
CROSS SECTION B-B' - LOW TIDE
THIRD FIVE-YEAR REVIEW
FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

CONTRACT NUMBER	1813
CTO NUMBER	WE01
APPROVED BY / DATE	— —
APPROVED BY / DATE	— —
FIGURE NO.	3-10
REV	0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE9_CROSS_SECTION_B-B'_MID_TIDE.MXD 03/11/13 JN

Key

- Ground Surface
- Monitoring Well
- Monitoring Well Screen



Legend

- Groundwater Potentiometric Contours
- Bentonite Sealed Borehole
- Screened Interval of MW
- BREAKWATER STRUCTURE
- REVETMENT WALL
- CLAYEY SILT
- DARK GRAY QUARTZITE
- DREDGED MATERIAL
- FILL
- FINAL GRADE
- FINE SAND
- ORIGINAL GRADE
- PEAT
- SILT
- SILTY VERY FINE SAND
- SUBGRADE
- TILL
- VERY FINE SAND
- WATER

Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probably conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.
5) Elevation and subsurface of Allen Harbor beyond breakwater structure estimated based on as-built brawings, available bathymetry data and observations of the site (February 15, 2012).

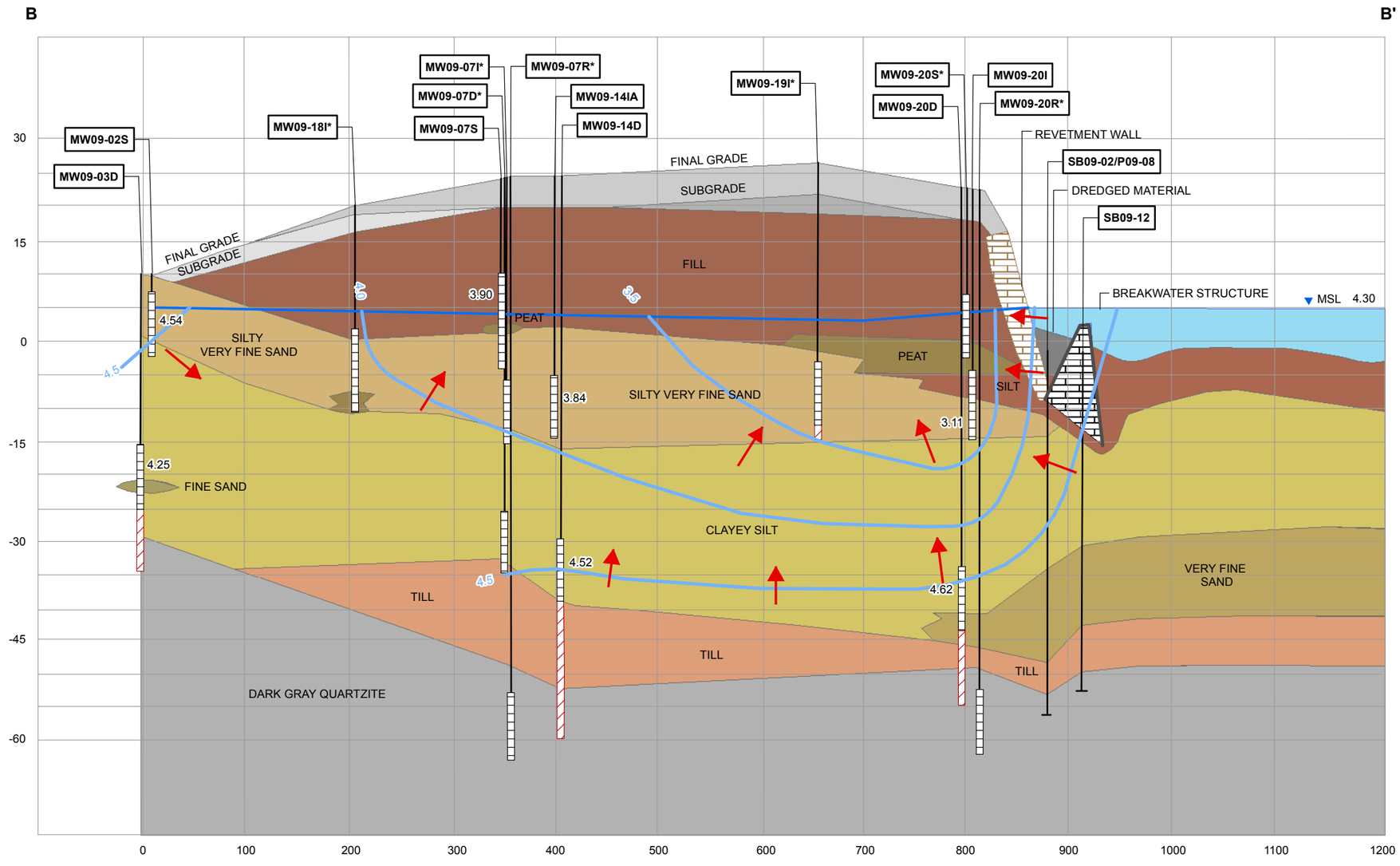
SOURCE: EA Engineering, Science, and Technology; Geologic Cross-section B-B'; 8/18/03

DRAWN BY J. NOVAK	DATE 11/28/12	TETRA TECH	CONTRACT NUMBER 1813 / CTO NUMBER WE01
CHECKED BY S. ANDERSON	DATE 03/11/13	CROSS SECTION B-B' - MID TIDE THIRD FIVE-YEAR REVIEW FORMER NCBC DAVISVILLE NORTH KINGSTOWN, RHODE ISLAND	APPROVED BY — / DATE —
REVISED BY J. NOVAK	DATE 03/11/13		APPROVED BY — / DATE —
SCALE AS NOTED			FIGURE NO. 3-11 / REV 0

PGH P:\GIS\DAVISVILLE_NCBC\MAPDOCS\MXD\SITE9_CROSS_SECTION_B-B'_HIGH_TIDE.MXD 03/12/13 JN

Key

- Ground Surface
- Monitoring Well
- Monitoring Well Screen



Legend

- Groundwater Potentiometric Contours
- Bentonite Sealed Borehole
- Screened Interval of MW
- BREAKWATER STRUCTURE
- REVETMENT WALL
- CLAYEY SILT
- DARK GRAY QUARTZITE
- DREDGED MATERIAL
- FILL
- FINAL GRADE
- FINE SAND
- ORIGINAL GRADE
- PEAT
- SILT
- SILTY VERY FINE SAND
- SUBGRADE
- TILL
- VERY FINE SAND
- WATER

Notes:
1) Horizontal distance measured to left well of pairs; center well of clusters.
2) The subsurface sections shown represent our evaluation of the most probably conditions based upon interpretation of presently available data. Some variations from these conditions exist.
3) Rollerbit drilled and cored intervals backfilled with bentonite prior to monitoring well construction.
4) * indicates the monitoring well was abandoned during landfill cap construction.
5) Elevation and subsurface of Allen Harbor beyond breakwater structure estimated based on as-built brawings, available bathymetry data and observations of the site (February 15, 2012).

SOURCE: EA Engineering, Science, and Technology; Geologic Cross-section B-B'; 8/18/03

DRAWN BY / DATE	J. NOVAK 11/28/12
CHECKED BY / DATE	S. ANDERSON 03/12/13
REVISED BY / DATE	J. NOVAK 03/12/13
SCALE	AS NOTED

TETRA TECH

CROSS SECTION B-B' - HIGH TIDE
THIRD FIVE-YEAR REVIEW
FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

CONTRACT NUMBER	1813
CTO NUMBER	WE01
APPROVED BY / DATE	— —
APPROVED BY / DATE	— —
FIGURE NO.	3-12
REV	0

APPENDIX E

RISK ASSESSMENT SUPPORT DOCUMENTATION

TABLE E-1

SUMMARY OF CANCER RISKS AND HAZARD INDICES - 2007 HUMAN HEALTH RISK ASSESSMENT
SITE 7, CALF PASTURE POINT, SHORELINE RISK ASSESSMENT
FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

Scenario	Case	Incremental Lifetime Cancer Risk				Hazard Index			Comments
		Child	Adolescent	Adult	Lifelong	Child	Adolescent	Adult	
Groundwater									
Shell Fisherman	Case 1	NA	3E-06	5E-06	8E-06	NA	0.02	0.02	All VOC data for 2005 and 2006 for piezometer wells along southern boundary.
	Case 2	NA	3E-06	4E-06	7E-06	NA	0.02	0.02	VOC data for last quarter of sampling for piezometer wells along southern boundary.
	Case 3	NA	2E-06	4E-06	6E-06	NA	0.02	0.02	All 2005 and 2006 VOC data for all locations.
	Case 4	NA	9E-08	1E-07	2E-07	NA	0.0003	0.0003	All 2005 and 2006 VOC data for all locations excluding locations noted in Case 1 and 2.
Surface Water									
Swimmer	Case 1	3E-07	6E-07	8E-07	2E-06	0.01	0.005	0.004	All data for 2005 and 2006.
	Case 2	8E-07	1E-06	1E-06	2E-06	0.009	0.005	0.004	All data for last quarter of sampling.
Shell Fisherman	Case 1	NA	2E-07	2E-07	4E-07	NA	0.001	0.001	All data for 2005 and 2006.
	Case 2	NA	3E-07	4E-07	6E-07	NA	0.001	0.001	All data for last quarter of sampling.
Sediment									
Swimmer/Wader	Case 1	3E-06	2E-06	3E-07	5E-06	0.3	0.06	0.01	All 2004 and 2005 VOC data.
Shell Fisherman	Case 1	NA	4E-07	3E-07	8E-07	NA	0.04	0.01	All 2004 and 2005 VOC data.
Shellfish									
Ingestion	--	7E-05	2E-04	2E-04	4E-04	91	144	92	Data from Phase III Remedial Investigation Report.
Total for Swimmer[(1)]	--	4E-06	3E-06	1E-06	8E-06	0.3	0.07	0.02	
Total for Shell Fisherman[(1)]	--	NA	2E-04	2E-04	4E-04	NA	144	93	
Total for Shell Fisherman Minus Consumption of Fish[(1)]	--	NA	5E-06	7E-06	1E-05	NA	0.07	0.04	

NA - Not an applicable exposure pathway.
1 - Total risk is the sum of the maximum risk for each case.
Southern boundary piezometer wells = Locations P07-07 through P07-10 and P07-20 through P07-24.
Western boundary piezometer wells = Locations P07-01, P07-11 through P07-19, and P07-25 through P07-34.

TABLE E-2

CHEMICALS OF CONCERN FOR INGESTION OF SHELLFISH
SITE 07, CALF PASTURE POINT, SHORELINE RISK ASSESSMENT
FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

Chemical of Concern[(1)]	**Impact on Human Receptor**
Benzo(a)pyrene	Adolescent ILCR = 2E-06 Adult ILCR = 2E-6
Aroclor-1254	Child ILCR = 4E-6 Child HI = 1 Adolescent ILCR = 1E-05 Adolescent HI = 2 Adult ILCR = 1E-05 Adult HI = 1
Aroclor-1260	Child ILCR = 3E-6 Adolescent ILCR = 6E-06 Adult ILCR = 6E-06
Arsenic	Child ILCR = 6E-5 Child HI = 1 Adolescent ILCR = 1E-04 Adolescent HI = 2 Adult ILCR = 1E-04 Adult HI = 1
Mercury	Child HI = 86 Adolescent HI = 136 Adult HI = 87
Cadmium	Adolescent HI = 1
Silver	Child HI = 0.2 Adolescent HI = 0.3 Adult HI = 0.2

NOTES:
HQ = Hazard Quotient.
ILCR = Incremental Lifetime Cancer Risk
(1) - Any carcinogenic chemical with an ILCR greater than 1E-6 or a noncarcinogenic chemical contributing to target organ hazard indices (HI) greater than 1.

TABLE E-3

SUMMARY OF CANCER RISKS AND HAZARD INDICES - 2012 HUMAN HEALTH RISK ASSESSMENT
SITE 7, CALF PASTURE POINT, SHORELINE RISK ASSESSMENT
FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

Scenario	Case	Incremental Lifetime Cancer Risk				Hazard Index			Comments
		Child	Adolescent	Adult	Lifelong	Child	Adolescent	Adult	
Groundwater									
Shell Fisherman	Case 1	NA	1E-06	2E-06	3E-06	NA	0.2	0.2	Piezometer wells along southern boundary Pre-2010[1]
	Case 2	NA	5E-07	6E-07	1E-06	NA	0.09	0.08	Piezometer wells along southern boundary Post-2010[2]
	Case 3	NA	5E-07	6E-07	1E-06	NA	0.07	0.06	All piezometer wells.
	Case 4	NA	1E-08	2E-08	3E-08	NA	0.0007	0.0007	Piezometer wells along western boundary
Surface Water									
Swimmer	Case 1	1E-08	1E-08	1E-08	3E-08	0.006	0.003	0.002	Low Tide - Locations 2 and 3
	Case 2	5E-06	9E-08	1E-07	5E-06	0.008	0.004	0.003	Low, Middle, and High Tide - Locations 2 and 3
Wader	Case 3	3E-06	8E-08	9E-08	3E-06	0.02	0.008	0.007	Low Tide - Location 1
	Case 4	2E-06	4E-08	4E-08	2E-06	0.006	0.003	0.003	Low, Middle, and High Tide - Location 1
Shell Fisherman	Case 3	NA	9E-08	1E-07	2E-07	NA	0.01	0.009	Low Tide - Location 1
	Case 4	NA	5E-08	5E-08	1E-07	NA	0.004	0.004	Low, Middle, and High Tide - Location 1
Sediment									
Swimmer/Wader	Case 1	2E-06	1E-06	3E-07	3E-06	0.1	0.03	0.006	All sediment samples from 2006 to 2012
Shell Fisherman	Case 1	NA	1E-06	3E-07	2E-06	NA	0.03	0.006	All sediment samples from 2006 to 2012
Total for Swimmer/Wader[3]	-	7E-06	1E-06	4E-07	8E-06	0.1	0.03	0.01	
Total for Shell Fisherman[3]	-	NA	3E-06	2E-06	5E-06	NA	0.2	0.2	

NA - Not an applicable exposure pathway.
1 - Groundwater samples collected from November 2006 through 2009.
2 - Groundwater samples collected from 2010 through 2012.
3 - Total risk is the sum of the maximum risk for each case.
Southern boundary piezometer wells = Locations P07-07 through P07-10 and P07-20 through P07-24.
Western boundary piezometer wells = Locations P07-01, P07-11 through P07-19, and P07-25 through P07-34.

TABLE E-4

COMPARISON OF CANCER SLOPE FACTORS (CSFS) AND NONCARCINOGNENIC REFERENCE DOSES (RFDS)
USED IN THE SITE 7 AND 9 RISK ASSESSMENTS WITH CURRENT VALUES
FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

Chemical		CAS #	RfDo[1] mg/kg/day	Current RfDo[2] mg/kg/day	CSFo[1] (mg/kg/day)$^{-1}$	Current CSFo[2] (mg/kg/day)$^{-1}$	RfDi[1] mg/kg/day	Current RfC[2] mg/m^3	CSFi[1] (mg/kg/day)$^{-1}$	Current IUR[2] 1/(ug/m^3)
ACETONE		67-64-1	1.0E-01	9.0E-01 I	--	--	--	**3.1E+01** A	--	--
ALDRIN		309-00-2	3.0E-05	3.0E-05 I	1.7E+01	1.7E+01 I	--	--	--	**4.9E-03** I
ALUMINUM		7429-90-5	1.0E+00	1.0E+00 P	--	--	--	**5.0E-03** P	--	--
ANTIMONY		7440-36-0	4.0E-04	4.0E-04 I	--	--	--	--	--	--
ARSENIC		7440-38-2	3.0E-04	3.0E-04 I	1.8E+00	1.5E+00 I	--	**1.5E-05** C	1.5E+01	4.3E-03 I
BENZENE		71-43-2	--	**4.0E-03** I	**2.9E-02**	**5.5E-02** I	--	**3.0E-02** I	2.9E-02	7.8E-06 I
BERYLLIUM		7440-41-7	**5.0E-03**	**2.0E-03** I	4.3E+00	--	**5.0E-03**	**2.0E-05** I	8.4E+00	2.4E-03 I
BIS(2-CHLOROETHYL)ETHER		111-44-4	--	--	1.1E+00	1.1E+00 I	--	--	1.1E+00	3.3E-04 I
BIS(2-CHLOROISOPROPYL)ETHER		108-60-1	4.0E-02	4.0E-02 I	7.0E-02	7.0E-02 H	4.0E-02	--	3.5E-02	1.0E-05 H
CADMIUM-WATER		7440-43-9	5.0E-04	5.0E-04 I	--	--	**5.0E-04**	**2.0E-05** C	6.3E+00	1.8E-03 I
CADMIUM-FOOD		7440-43-9	1.0E-03	1.0E-03 I	--	--	**5.0E-04**	**2.0E-05** C	6.3E+00	1.8E-03 I
CHLOROBENZENE		108-90-7	2.0E-02	2.0E-02 I	6.1E-03	--	5.7E-03	5.0E-02 P	--	--
CHLOROFORM		67-66-3	1.0E-02	1.0E-02 I	**6.1E-03**	**3.1E-02** C	1.0E-02	9.8E-02 A	8.0E-02	2.3E-05 I
CHROMIUM VI		18540-29-9	5.0E-03	3.0E-03 I	--	**5.0E-01** J	**5.0E-03**	**1.0E-04** I	4.2E+01	**8.4E-02** S
COPPER		7440-50-8	3.7E-02	4.0E-02 H	--	--	--	--	--	--
DDE		72-55-9	--	--	3.4E-01	3.4E-01 I	--	--	3.4E-01	9.7E-05 C
DIBENZOFURAN		132-64-9	**4.0E-03**	**1.0E-03** X	--	--	--	--	--	--
1,4-DICHLOROBENZENE		106-46-7	--	**7.0E-02** A	2.4E-02	5.4E-03 C	2.3E-01	8.0E-01 I	--	**1.1E-05** C
1,2-DICHLOROETHANE		107-06-2	--	**6.0E-03** X	9.1E-02	9.1E-02 I	--	**7.0E-03** P	9.1E-02	2.6E-05 I
TOTAL 1,2-DICHLOROETHENE		540-59-0	9.0E-03	9.0E-03 H	--	--	9.0E-03	--	--	--
1,2-DICHLOROPROPANE		78-87-5	--	**9.0E-02** A	6.8E-02	3.6E-02 C	1.1E-03	4.0E-03 I	6.8E-02	1.0E-05 C
ETHYLBENZENE		100-41-4	1.0E-01	1.0E-01 I	--	**1.1E-02** C	2.9E-01	1.0E+00 I	--	**2.5E-06** C
MANGANESE-NONFOOD		7439-96-5	5.0E-03	2.4E-02 I	--	--	**5.0E-03**	**5.0E-05** I	--	--
MANGANESE-FOOD		7439-96-5	1.0E-03	1.4E-01 I	--	--	**1.0E-03**	**5.0E-05** I	--	--
MERCURIC CHLORIDE		7487-94-7	3.0E-04	3.0E-04 I	--	--	**3.0E-04**	**3.0E-05** C	--	--
MERCURY (elemental)		7439-97-6	--	--	--	--	8.6E-05	3.0E-04 I	--	--
METHYLMERCURY		22967-92-6	1.0E-04	1.0E-04 I	--	--	--	--	--	--
METHYLENE CHLORIDE	m	75-09-2	6.0E-02	**6.0E-03** I	7.5E-03	2.0E-03 I	8.6E-01	6.0E-01 I	1.6E-03	1.0E-08 I
2-METHYLPHENOL		95-48-7	5.0E-02	5.0E-02 I	--	--	--	**6.0E-01** C	--	--
4-METHYLPHENOL		106-44-5	5.0E-03	1.0E-01 A	--	--	**5.0E-03**	**6.0E-01** C	--	--
POLYCHLORINATED BIPHENYLS		1336-36-3	--	--	**7.7E+00**	**2.0E+00** I	--	--	--	**5.7E-04** I
AROCLOR-1254		11097-69-1	2.0E-05	2.0E-05 I	**7.7E+00**	**2.0E+00** S	--	--	--	**5.7E-04** S
ACENAPHTHENE		83-32-9	6.0E-02	6.0E-02 I	--	--	--	--	--	--
ANTHRACENE		120-12-7	3.0E-01	3.0E-01 I	--	--	--	--	--	--
BENZ[A]ANTHRACENE	m	56-55-3	--	--	7.3E-01	7.3E-01 E	--	--	--	**1.1E-04** C
BENZO[B]FLUORANTHENE	m	205-99-2	--	--	7.3E-01	7.3E-01 E	--	--	--	**1.1E-04** C
BENZO[K]FLUORANTHENE	m	207-08-9	--	--	7.3E-02	7.3E-02 E	--	--	--	**1.1E-04** C
BENZO[A]PYRENE	m	50-32-8	--	--	7.3E+00	7.3E+00 I	--	--	--	**1.1E-03** C
CARBAZOLE		86-74-8	--	--	**2.0E-02**	--	--	--	--	--
CHRYSENE	m	218-01-9	--	--	7.3E-03	7.3E-03 E	--	--	--	**1.1E-05** C
DIBENZ[A,H]ANTHRACENE	m	53-70-3	--	--	7.3E+00	7.3E+00 E	--	--	--	**1.2E-03** C

TABLE E-4

COMPARISON OF CANCER SLOPE FACTORS (CSFS) AND NONCARCINOGNENIC REFERENCE DOSES (RFDS)
USED IN THE SITE 7 AND 9 RISK ASSESSMENTS WITH CURRENT VALUES
FORMER NCBC DAVISVILLE
NORTH KINGSTON, RHODE ISLAND

Chemical		CAS #	RfDo[1] mg/kg/day	Current RfDo[2] mg/kg/day	CSFo[1] (mg/kg/day)$^{-1}$	Current CSFo[2] (mg/kg/day)$^{-1}$	RfDi[1] mg/kg/day	Current RfC[2] mg/m^3	CSFi[1] (mg/kg/day)$^{-1}$	Current IUR[2] 1/(ug/m^3)
FLUORANTHENE		206-44-0	4.0E-02	4.0E-02 I	--	--	4.0E-02	--	--	--
FLUORENE		86-73-7	4.0E-02	4.0E-02 I	--	--	4.0E-02	--	--	--
INDENO[1,2,3-C,D]PYRENE	m	193-39-5	--	--	7.3E-01	7.3E-01 E	--	--	--	**1.1E-04** C
NAPHTHALENE		91-20-3	**4.0E-02**	**2.0E-02** I	--	--	**4.0E-02**	**3.0E-03** I	--	**3.4E-05** C
PYRENE		129-00-0	3.0E-02	3.0E-02 I	--	--	--	--	--	--
2,3,7,8-TETRACHLORODIBENZODIOXIN		1746-01-6	--	**7.0E-10** I	1.5E+05	1.3E+05 C	--	**4.0E-08** C	1.5E+05	3.8E+01 C
1,1,2,2-TETRACHLOROETHANE		79-34-5	--	**2.0E-02** I	2.0E-01	2.0E-01 I	--	--	--	**5.8E-05** C
THALLIUM		7440-28-0	**8.0E-05**	**1.0E-05 X**	--	--	--	--	--	--
TOLUENE		108-88-3	**2.0E-01**	**8.0E-02** I	--	--	1.1E-01	5.0E+00 I	--	--
1,1,2-TRICHLOROETHANE		79-00-5	4.0E-03	4.0E-03 I	5.7E-02	5.7E-02 I	--	**2.0E-04** X	--	**1.6E-05** I
TRICHLOROETHENE	m	79-01-6	**6.0E-03**	**5.0E-04** I	**1.1E-02**	**4.6E-02** I	**6.0E-03**	**2.0E-03** I	**6.0E-03**	**4.1E-06** I
VINYL CHLORIDE inc earlylife	m	75-01-4	--	**3.0E-03** I	1.9E+00	1.4E+00 I	--	**1.0E-01** I	3.0E-01	8.8E-06 I
VINYL CHLORIDE: adult	m	75-01-4	--	**3.0E-03** I	1.9E+00	7.2E-01 I	--	**1.0E-01** I	3.0E-01	4.4E-06 I
ZINC		7440-66-6	3.0E-01	3.0E-01 I	--	--	--	--	--	--

1. Value used in Site 7 and Site 9 risk assessments.
2. Current values
Noteworthy differences are bolded (i.e., the current RfD or CSF is a factor of 2 (or more) more conservative than historical values.)
I = Integated Risk Information System (IRIS).
A = Agency for Toxic Substances and Disease Registry (ATSDR).
H = Health Effects Assessment Summary Tables.
P = Provisional Peer Reviewed Toxicity Value (PPRTV).
X = PPRTV Appendix value.
J = New Jersey Department of Environmental Protection.
E = Environmental Criteria and Assessment Office.
C = California Environmental Protection Agency.
m = chemical that acts by a mutagenic mode of action.

TABLE E-5

COMPARISON OF EXPOSURE FACTORS USED IN THE SITE 7 AND SITE 9 RISK ASSESSMENTS WITH CURRENTLY USED VALUES

GLOBAL VARIABLES	Values used in Site 7 and 9 Risk Assessments	Current Values	Reference
Body Weight			
Construction and Residential	70	No Change	
Recreation (youth)	36	No Change	
Shellfishing	59	No Change	
Exposure Duration			
Construction	1	No Change	
Recreation (youth)	16	No Change	
Shellfishing and Residential	30	No Change	
Averaging Times			
Cancer	25,550	No Change	
Noncancer			
Construction	365	No Change	
Recreation (youth)	5,840	No Change	
Shellfishing and Residential	10,950	No Change	
Relative Absorption Factors			
Ingestion of Soil and Shellfish			
VOCs	1	No Change	
PAHs	1	No Change	
PCBs	0.3	1	
Pesticides	0.3 to 1	1	
Inorganics	1	No Change	
Lead	0.3 or 0.5	1	
Dermal Contact with Soil			
VOCs	0.5	negligible	USEPA 2004
PAHs	0.05	0.13	USEPA 2004
PCBs	0.05	0.14	USEPA 2004
Pesticides	0.05 or 0.5	0.03 - 0.04	USEPA 2004
Inorganics	negligible	negligible	USEPA 2004
Inhalation of Dust and Volatiles	1	No Change	
Ingestion of Groundwater	1	No Change	
Adherence Factor for Soil	0.5	Child - 0.2	USEPA 2004
		Adult - 0.07	USEPA 2004
		Worker - 0.3	USEPA, 2002

FUTURE CONSTRUCTION SCENARIO			
Exposure Time (hrs/day)	8	No Change	
Exposure Frequency (day/yr)	85	No Change	
Soil Ingestion Rate (mg/day)	480	330	USEPA, 2002
Skin Surface Area (cm^2)	3,780	3300	USEPA, 2002
Incidental Ingestion of Groundwater (L/day)	0.05	No Change	

TABLE E-5

COMPARISON OF EXPOSURE FACTORS USED IN THE SITE 7 AND SITE 9 RISK ASSESSMENTS WITH CURRENTLY USED VALUES

GLOBAL VARIABLES	Values used in Site 7 and 9 Risk Assessments	Current Values	Reference
FUTURE RECREATION SCENARIO			
Exposure Time (hrs/day)			
Showering	0.2	0.58	USEPA 2004
Swimming	1	No Change	
Exposure Frequency (day/yr)			
Showering and Swimming	39	No Change	
Non-swimming Related Pathways	144	No Change	
Ingestion Rate of Soil (mg/day)	126	No Change	
Skin Surface Area for Soil (cm^2)	925	2230	USEPA, 2004, Exhibit C-1
Incidental Ingestion of Sediment (mg/day)	63	No Change	
Skin Surface Area for Sediment (cm^2)	463	1260	USEPA, 2004, Exhibit C-1
Skin Surface Area for Showering (cm^2)	14,600	11600	USEPA, 2004, Exhibit C-1
Incidental Ingestion of Surface Water (L/day)	0.05	No Change	
Skin Surface Area while Swimming (cm^2)			
Adult	23,000	18,000	USEPA, 2002
Child	10,600	6,600	USEPA, 2002

CONSUMPTION OF LOCALLY-CAUGHT SHELLFISH			
Exposure Frequency (day/yr)	350	No Change	
Ingestion Rate (g/day)	55	No Change	
Fraction of Ingested Shellfish Caught Locally	1	No Change	

HYPOTHETICAL RESIDENTIAL CONSUMPTION OF GROUNDWATER			
Exposure Frequency (day/yr)	350	No Change	
Ingestion Rate (L/day)	2	No Change	

References:
USEPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, December.

USEPA, 2004. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part E, (Supplemental Guidance for Dermal Risk Assessment), Final, July.

1: It should be noted that many of the exposure assumptions utilized to prepare the original risk assessments for Site 07 and Site 09 are based on professional judgment and are not a function of "old" versus "new" guidance. Please also note the exposure assumptions that are presented in the 2007 Site 07 shoreline risk assessment. These exposure factor values represent the most current values for the evaluation of a recreational receptor exposed to surface waters and sediments along a shoreline.

TABLE E-6

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA RSLS FOR INDUSTRIAL SOIL
SITE 7 - SEDIMENT

Chemical	CAS No.	Maximum Sediment Concentration (mg/kg)	1995 RBC for Industrial Soil[(1)] (mg/kg)		2012 RSL for Industrial Soil[(2)] (mg/kg)	
ALUMINUM	7429-90-5	14,400	100,000	N	99,000	N
ARSENIC	7440-38-2	22.1	**3.3**	C	**1.6**	C
BARIUM	7440-39-3	125	14,000	N	19,000	N
BERYLLIUM	7440-41-7	0.4	1.3	C	200	N
CADMIUM-FOOD	7440-43-9	3.9	100	N	80	N
CHLORDANE	57-74-9	0.00053	4.4	C	6.5	C
CHROMIUM VI	18540-29-9	40.2	1,000	N	**5.6**	C
COBALT	7440-48-4	83.3	12,000	N	**30**	N
COPPER	7440-50-8	50.4	8,200	N	4,100	N
DDD	72-54-8	0.003	24	C	7.2	C
DDE	72-55-9	0.011	17	C	5.1	C
ENDRIN	72-20-8	0.00078	61	N	18	N
BETA-HCH	319-85-7	0.0017	3.2	C	0.96	C
IRON	7439-89-6	70,200	NA		72,000	N
MANGANESE	7439-96-5	730	1,000	N	2,300	N
METHYL ETHYL KETONE	78-93-3	0.16	100,000	N	20,000	N
NICKEL	7440-02-0	121	4,100	N	2,000	N
AROCLOR-1260	11096-82-5	0.06	0.74	C	0.74	C
BENZ[A]ANTHRACENE	56-55-3	0.0342	7.8	C	2.1	C
BENZO[B]FLUORANTHENE	205-99-2	0.0556	7.8	C	2.1	C
BENZO[K]FLUORANTHENE	207-08-9	0.054	78	C	21	C
BENZO[A]PYRENE	50-32-8	0.0342	0.78	C	0.21	C
CHRYSENE	218-01-9	0.0386	780	C	210	C
DIBENZ[A,H]ANTHRACENE	53-70-3	0.00559	0.78	C	0.21	C
FLUORANTHENE	206-44-0	0.0775	8,200	N	2,200	N

TABLE E-6

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA RSLS FOR INDUSTRIAL SOIL
SITE 7 - SEDIMENT

Chemical	CAS No.	Maximum Sediment Concentration (mg/kg)	1995 RBC for Industrial Soil[1] (mg/kg)		2012 RSL for Industrial Soil[2] (mg/kg)	
FLUORENE	86-73-7	0.00243	8,200	N	2,200	N
INDENO[1,2,3-C,D]PYRENE	193-39-5	0.0219	7.8	C	2.1	C
NAPHTHALENE	91-20-3	0.00395	8,200	N	18	C
PYRENE	129-00-0	0.0721	6,100	N	1,700	N
SILVER	7440-22-4	1.1	1,000	N	510	N
THALLIUM	7440-28-0	5.5	16	N	**1**	N
VANADIUM	7440-62-2	27.4	1,400	N	520	N
ZINC	7440-66-6	591	61,000	N	31,000	N

NOTES:

Shaded values indicate that the maximum sediment concentration is greater than the specified RBC or RSL.

1. USEPA Region 3 RBC Tables, 1995 (screening values for noncarcinogens are based on a Hazard Index of 0.1).

2. USEPA Regional Screening Level (RSL) Tables, November 2012 (screening values for noncarcinogens are based on a Hazard Index of 0.1).

C - Carcinogenic.

N - Noncarcinogenic.

TABLE E-7

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA RSLS FOR TAP WATER
SITE 7 - GROUNDWATER

Chemical	CAS No.	Maximum GW Conc[1]	1995 RBC for Tap Water[2]		2012 RSL for Tap Water[3]	
		(ug/L)	(ug/L)		(ug/L)	
ACETONE	67-64-1	1,800	**370**	N	**1200**	N
ALUMINUM	7429-90-5	129,000	**3700**	N	**1600**	N
ARSENIC	7440-38-2	63.5	**0.045**	C	**0.045**	C
BARIUM	7440-39-3	253	260	N	290	N
BENZENE	71-43-2	550	**0.36**	C	**0.39**	C
BERYLLIUM	7440-41-7	6.4	**0.016**	C	**1.6**	N
BROMODICHLOROMETHANE	75-27-4	78	**0.17**	C	**0.12**	C
CARBON DISULFIDE	75-15-0	4	100	N	72	N
CHLOROBENZENE	108-90-7	100	**3.9**	N	**7.2**	N
CHLOROFORM	67-66-3	24	**0.15**	C	**0.19**	C
CHLOROMETHANE	74-87-3	98	**1.4**	C	**19**	N
CHROMIUM VI	18540-29-9	292	**18**	N	**0.031**	C
COBALT	7440-48-4	151	220	N	**0.47**	N
COPPER	7440-50-8	268	**150**	N	**62**	N
1,1-DICHLOROETHANE	75-34-3	74	81	N	**2.4**	C
1,2-DICHLOROETHANE	107-06-2	120	**0.12**	C	**0.15**	C
1,1-DICHLOROETHENE	75-35-4	16	**0.044**	C	26	N
TOTAL 1,2-DICHLOROETHENE	540-59-0	5,700	**5.5**	N	**13**	N
1,2-DICHLOROPROPANE	78-87-5	98	**0.16**	C	**0.38**	C
1,3-DICHLOROPROPENE	542-75-6	66	**0.077**	C	**0.41**	C
IRON	7439-89-6	295,000	NA		**1100**	N
MANGANESE	7439-96-5	15,500	**18**	N	**32**	N
MERCURY (AS MERCURIC CHLORIDE)	7487-94-7	0.15	1.1	N	0.43	N
METHYL ETHYL KETONE	78-93-3	34	190	N	490	N
NICKEL	7440-02-0	320	**73**	N	**30**	N

TABLE E-7

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA RSLS FOR TAP WATER
SITE 7 - GROUNDWATER

Chemical	CAS No.	Maximum GW Conc[1] (ug/L)	1995 RBC for Tap Water[2] (ug/L)		2012 RSL for Tap Water[3] (ug/L)	
SELENIUM	7782-49-2	5.3	18	N	7.8	N
STYRENE	100-42-5	72	160	N	110	N
1,1,2,2-TETRACHLOROETHANE	79-34-5	77,000	**0.052**	C	**0.066**	C
TETRACHLOROETHENE	127-18-4	1,000	**1.1**	C	**3.5**	N
THALLIUM	7440-28-0	31.6	**0.29**	N	**0.016**	N
TOLUENE	108-88-3	96	**75**	N	**86**	N
1,1,2-TRICHLOROETHANE	79-00-5	1,200	**0.19**	C	**0.041**	N
TRICHLOROETHENE	79-01-6	120,000	**1.6**	C	**0.26**	N
VANADIUM	7440-62-2	224	**26**	N	**7.8**	N
VINYL CHLORIDE	75-01-4	31	**0.019**	C	**0.015**	C
XYLENES	1330-20-7	220	1200	N	**19**	N
ZINC	7440-66-6	626	1100	N	**470**	N

NOTES:

Shaded values indicate that the maximum groundwater concentration is greater than the specified RBC or RSL.

1. Maximum of deep and shallow groundwater samples.

2. USEPA Region 3 RBC Tables, 1995 (screening values for noncarcinogens are based on a Hazard Index of 0.1).

3. USEPA Regional Screening Level Tables, November 2012 (screening values for noncarcinogens are based on a Hazard Index of 0.1).

C - Carcinogenic.

N - Noncarcinogenic.

TABLE E-8

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA REGION 3 RSLS FOR FISH TISSUE
SITE 7 - FISH

Chemical	CAS No.	Maximum Fish Concentration (mg/kg)	1995 RBC for Fish[1] (mg/kg)		2012 RSL for Fish[2] (mg/kg)	
ALDRIN	309-00-2	0.000244	**0.00019**	C	**0.00019**	C
ALUMINUM	7429-90-5	0.0314	140	N	140	N
ARSENIC	7440-38-2	2.5	**0.018**	C	**0.0021**	C
CADMIUM-FOOD	7440-43-9	2.39	**0.068**	N	**0.14**	N
CHLORDANE	57-74-9	0.00054	0.0024	C	0.009	C
CHROMIUM VI	18540-29-9	0.704	**0.68**	N	**0.0063**	C
COPPER	7440-50-8	126	**5.4**	N	**5.4**	N
DDD	72-54-8	0.00697	0.013	C	0.013	C
DDE	72-55-9	0.0228	**0.0093**	C	**0.0093**	C
DDT	50-29-3	0.00025	0.0093	C	0.0093	C
HEXACHLOROBENZENE	118-74-1	0.00101	0.002	C	0.002	C
ALPHA-HCH	319-84-6	0.00007	0.0005	C	0.0005	C
GAMMA-HCH (LINDANE)	58-89-9	0.00004	0.0024	C	0.0029	C
IRON	7439-89-6	800	NA		**95**	N
MANGANESE	7439-96-5	21.6	**19**	N	**19**	N
METHYLMERCURY	22967-92-6	49.1	**0.014**	N	**0.014**	N
MIREX	2385-85-5	0.0000928	0.0018	C	0.00018	C
NICKEL	7440-02-0	5	**2.7**	N	**2.7**	N
AROCLOR-1242	53469-21-9	0.022	**0.000041**	C	**0.0016**	C
AROCLOR-1254	11097-69-1	0.1335	**0.000041**	C	**0.0016**	C
AROCLOR-1260	11096-82-5	0.0849	**0.000041**	C	**0.0016**	C
ACENAPHTHENE	83-32-9	0.00846	8.1	N	8.1	N
ANTHRACENE	120-12-7	0.00625	41	N	41	N
BENZ[A]ANTHRACENE	56-55-3	0.003	0.0043	C	0.0043	C
BENZO[B]FLUORANTHENE	205-99-2	0.0358	**0.0043**	C	**0.0043**	C

TABLE E-8

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA REGION 3 RSLS FOR FISH TISSUE
SITE 7 - FISH

Chemical	CAS No.	Maximum Fish Concentration (mg/kg)	1995 RBC for Fish[1] (mg/kg)		2012 RSL for Fish[2] (mg/kg)	
BENZO[K]FLUORANTHENE	207-08-9	0.00596	0.043	C	0.043	C
BENZO[A]PYRENE	50-32-8	0.00606	**0.00043**	C	**0.00043**	C
CHRYSENE	218-01-9	0.0893	0.43	C	0.43	C
DIBENZ[A,H]ANTHRACENE	53-70-3	0.00128	**0.00043**	C	**0.00043**	C
FLUORANTHENE	206-44-0	0.216	5.4	N	5.4	N
FLUORENE	86-73-7	0.0107	5.4	N	5.4	N
INDENO[1,2,3-C,D]PYRENE	193-39-5	0.00416	0.0043	C	0.0043	C
PYRENE	129-00-0	0.0979	4.1	N	4.1	N
SILVER	7440-22-4	6.2	**0.68**	N	**0.68**	N
ZINC	7440-66-6	4730	**41**	N	**41**	N

NOTES:

Shaded values indicate that the maximum concentration is greater than the specified RBC or RSL.

1. USEPA Region 3 RBC Tables, 1995 (screening values for noncarcinogens are based on a Hazard index of 0.1).

2. USEPA Region 3 Fish Tissue Screening Levels, November 2012 (screening values for noncarcinogens are based on a Hazard index of 0.1).

C - Carcinogenic.

N - Noncarcinogenic.

TABLE E-9

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA RSLS FOR INDUSTRIAL SOIL
SITE 7 - SURFACE AND SUBSURFACE SOIL

Chemical	CAS No.	Maximum Soil Concentration[1] (mg/kg)	1995 RBC for Industrial Soil[2] (mg/kg)		2012 RSL for Industrial Soil[3] (mg/kg)	
ACETONE	67-64-1	6.1	20,000	N	63,000	N
ALUMINUM	7429-90-5	7,720	100,000	N	99,000	N
ANTIMONY	7440-36-0	3.9	82	N	41	N
ARSENIC	7440-38-2	2.2	3.3	C	**1.6**	C
BARIUM	7440-39-3	18.6	14,000	N	19,000	N
BERYLLIUM	7440-41-7	0.49	1.3	C	200	N
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	0.38	410	C	120	C
CADMIUM	7440-43-9	4.7	100	N	80	N
CHLOROFORM	67-66-3	0.001	940	C	1.5	C
CHROMIUM VI	18540-29-9	13.1	1,000	N	**5.6**	C
COBALT	7440-48-4	6.1	12,000	N	30	N
COPPER	7440-50-8	14.6	8,200	N	4,100	N
CYANIDE (FREE)	57-12-5	0.16	4,100	N	61	N
DDE	72-55-9	0.019	17	C	5.1	C
DDT	50-29-3	0.022	17	C	7	C
IRON	7439-89-6	15,600	NA		72,000	N
MANGANESE-NONFOOD	7439-96-5	137	1,000	N	2,300	N
NICKEL	7440-02-0	243	4,100	N	2,000	N
SELENIUM	7782-49-2	0.32	1,000	N	510	N
1,1,2,2-TETRACHLOROETHANE	79-34-5	0.015	29	C	2.8	C
THALLIUM	7440-28-0	0.87	16	N	1	N
TOLUENE	108-88-3	0.003	41,000	N	4,500	N
1,1,1-TRICHLOROETHANE	71-55-6	0.006	18,000	N	3,800	N
TRICHLOROETHENE	79-01-6	0.018	520	C	2	N[4]
VANADIUM	7440-62-2	14.3	1,400	N	520	N
ZINC	7440-66-6	33.6	61,000	N	31,000	N

TABLE E-9

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA RSLS FOR INDUSTRIAL SOIL
SITE 7 - SURFACE AND SUBSURFACE SOIL

NOTES:

Shaded values indicate that the maximum soil concentration is greater than the specified RBC or RSL.

1. Maximum detected concentration in surface and subsurface soil from 1 to 10 feet bgs.
2. USEPA Region 3 RBC Tables, 1995 (screening values for noncarcinogens are based on a Hazard Index of 0.1).
3. USEPA Regional Screening Level (RSL) Tables, November 2012 (screening values for noncarcinogens are based on a Hazard Index of 0.1).

4 - Ten percent of noncarcinogenic screening level is less than the carcinogenic screening level, therefore the noncarcinogenic value is presented.

C - Carcinogenic.

N - Noncarcinogenic.

TABLE E-10

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA RSLS FOR INDUSTRIAL SOIL
SITE 9 - SEDIMENT

Chemical	CAS No.	Maximum Sediment Concentration (mg/kg)	1995 RBC for Industrial Soil[1] (mg/kg)		2012 RSL for Industrial Soil[2] (mg/kg)	
ACETONE	67-64-1	0.37	20,000	N	63,000	N
ALUMINUM	7429-90-5	10,500	100,000	N	99,000	N
ANTIMONY	7440-36-0	65.3	82	N	**41**	N
ARSENIC	7440-38-2	32.5	**3.3**	C	**1.6**	C
BARIUM	7440-39-3	221	14,000	N	19,000	N
BENZENE	71-43-2	0.0072	200	C	5.4	C
BENZOIC ACID	65-85-0	0.21	100,000	N	250,000	N
BERYLLIUM	7440-41-7	2.2	**1.3**	C	200	N
BROMODICHLOROMETHANE	75-27-4	0.0072	92	C	1.4	C
BROMOFORM	75-25-2	0.0072	720	C	220	C
BROMOMETHANE	74-83-9	0.0072	290	N	3.2	N
BUTYLBENZYLPHTHALATE	85-68-7	0.6	41,000	N	910	C
CADMIUM	7440-43-9	11.2	100	N	80	N
CARBON DISULFIDE	75-15-0	0.034	20,000	N	370	N
CARBON TETRACHLORIDE	56-23-5	0.0072	44	C	3	C
CHLORDANE	57-74-9	0.001	4.4	C	6.5	C
CHLOROBENZENE	108-90-7	0.673	4,100	N	140	N
CHLOROETHANE	75-00-3	0.0072	82,000	C	6,100	N
CHLOROFORM	67-66-3	0.0072	940	C	1.5	C
CHROMIUM VI	18540-29-9	560	1,000	N	**5.6**	C
COBALT	7440-48-4	59.8	12,000	N	**30**	N
COPPER	7440-50-8	1,730	8,200	N	4,100	N
DDD	72-54-8	0.032	24	C	7.2	C
DDE	72-55-9	0.0038	17	C	5.1	C
DDT	50-29-3	3.40E-04	17	C	7	C

TABLE E-10

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA RSLS FOR INDUSTRIAL SOIL
SITE 9 - SEDIMENT

Chemical	CAS No.	Maximum Sediment Concentration (mg/kg)	1995 RBC for Industrial Soil[1] (mg/kg)		2012 RSL for Industrial Soil[2] (mg/kg)	
DIBENZOFURAN	132-64-9	0.84	820	N	100	N
1,1-DICHLOROETHANE	75-34-3	0.0072	20,000	N	17	C
1,2-DICHLOROETHANE	107-06-2	0.0072	63	C	2.2	C
1,1-DICHLOROETHENE	75-35-4	0.0072	9.5	C	110	N
CIS-1,2-DICHLOROETHENE	156-59-2	0.0072	33	N	200	N
TRANS-1,2-DICHLOROETHENE	156-60-5	0.0072	33	N	69	N
DIELDRIN	60-57-1	0.0029	0.36	C	0.11	C
ENDOSULFAN	115-29-7	0.003	1,200	N	370	N
ENDRIN	72-20-8	0.0094	61	N	18	N
ETHYLBENZENE	100-41-4	0.0072	20,000	N	27	C
HEPTACHLOR EPOXIDE	1024-57-3	0.0081	0.63	C	0.19	C
IRON	7439-89-6	369,000	NA	N	**72,000**	N
MANGANESE-NONFOOD	7439-96-5	1,160	10,000		2,300	N
MERCURY (AS MERCURIC CHLORIDE)	7487-94-7	1.4	61	N	31	N
METHYLENE CHLORIDE	75-09-2	0.19	760	C	310	N[3]
METHYL ETHYL KETONE	78-93-3	0.0144	100,000	N	20,000	N
METHYL ISOBUTYL KETONE	108-10-1	0.0072	16,000	N	5,300	N
NICKEL	7440-02-0	148	4,100	N	2,000	N
PHENOL	108-95-2	1.2	100,000	N	18,000	N
AROCLOR-1260	11096-82-5	0.25	0.74	C	0.74	C
ACENAPHTHENE	83-32-9	1.4	12,000	N	3,300	N
ANTHRACENE	120-12-7	2.2	61,000	N	17,000	N
BENZ[A]ANTHRACENE	56-55-3	7.2	7.8	C	**2.1**	C
BENZO[B]FLUORANTHENE	205-99-2	8.6	**7.8**	C	**2.1**	C
BENZO[K]FLUORANTHENE	207-08-9	8.6	78	C	21	C

TABLE E-10

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA RSLS FOR INDUSTRIAL SOIL
SITE 9 - SEDIMENT

Chemical	CAS No.	Maximum Sediment Concentration (mg/kg)	1995 RBC for Industrial Soil[1] (mg/kg)		2012 RSL for Industrial Soil[2] (mg/kg)	
BENZO[A]PYRENE	50-32-8	4.3	**0.78**	C	**0.21**	C
CARBAZOLE	86-74-8	1.9	290	C	NA	
CHRYSENE	218-01-9	5.4	780	C	210	C
DIBENZ[A,H]ANTHRACENE	53-70-3	0.99	**0.78**	C	**0.21**	C
FLUORANTHENE	206-44-0	11	8,200	N	2,200	N
FLUORENE	86-73-7	1.7	8,200	N	2,200	N
INDENO[1,2,3-C,D]PYRENE	193-39-5	3.1	7.8	C	**2.1**	C
2-METHYLNAPHTHALENE	91-57-6	0.23	8,200	N	220	N
NAPHTHALENE	91-20-3	0.53	8,200	N	18	C
PYRENE	129-00-0	9.2	6,100	N	1,700	N
SELENIUM	7782-49-2	4.4	1,000	N	510	N
SILVER	7440-22-4	6.5	1,000	N	510	N
STYRENE	100-42-5	0.0072	41,000	N	3,600	N
1,1,2,2-TETRACHLOROETHANE	79-34-5	0.0072	29	C	2.8	C
TETRACHLOROETHENE	127-18-4	0.0072	110	C	41	N[3]
THALLIUM	7440-28-0	3.5	16	N	**1**	N
TOLUENE	108-88-3	0.012	41,000	N	4,500	N
1,1,1-TRICHLOROETHANE	71-55-6	0.0072	18,000	N	3,800	N
1,1,2-TRICHLOROETHANE	79-00-5	0.0072	100	C	0.68	N[3]
TRICHLOROETHENE	79-01-6	0.003	520	C	2	N[3]
VANADIUM	7440-62-2	134	1,400	N	520	N
VINYL CHLORIDE	75-01-4	0.0072	3	C	1.7	C
XYLENES	1330-20-7	0.0072	10,000	N	270	N
ZINC	7440-66-6	247	61,000	N	31,000	N

TABLE E-10

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA RSLS FOR INDUSTRIAL SOIL
SITE 9 - SEDIMENT

Chemical	CAS No.	Maximum Sediment Concentration (mg/kg)	1995 RBC for Industrial Soil[(1)] (mg/kg)	2012 RSL for Industrial Soil[(2)] (mg/kg)

NOTES:

Shaded values indicate that the maximum sediment concentration is greater than the specified RBC or RSL.

1. USEPA Region 3 RBC Tables, 1995 (screening values for noncarcinogens are based on a Hazard index of 0.1).

2. USEPA Regional Screening Level Tables, November 2012 (screening values for noncarcinogens are based on a Hazard index of 0.1).

3 - Ten percent of noncarcinogenic screening level is less than the carcinogenic screening level, therefore the noncarcinogenic value is presented.

C - Carcinogenic.

N - Noncarcinogenic.

TABLE E-11

COMPARISON OF SCREENING CONCENTRATIONS BASED ON 1995 REGION 3 RBCS AND 2012 RSL FOR TAP WATER SITE 9 - GROUNDWATER

Chemical	CAS No.	Maximum GW Conc[1]	1995 RBC for Tap Water[2]		2012 RSL for Tap Water[3]	
		(ug/L)	(ug/L)		(ug/L)	
ACETONE	67-64-1	3,000	**370**	N	**1,200**	N
ALUMINUM	7429-90-5	37,700	**3,700**	N	**1,600**	N
ANTIMONY	7440-36-0	71	**1.5**	N	**0.6**	N
ARSENIC	7440-38-2	16.3	**0.045**	C	**0.045**	C
BARIUM	7440-39-3	753	**260**	N	**290**	N
BENZENE	71-43-2	170	**0.36**	C	**0.39**	C
BERYLLIUM	7440-41-7	2.7	**0.016**	C	**1.6**	N
BIS(2-CHLOROETHYL)ETHER	111-44-4	14	**0.0092**	C	**0.012**	C
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	3	**0.26**	C	**0.31**	C
CADMIUM-WATER	7440-43-9	5.2	**1.8**	N		
CHLORDANE	57-74-9	0.01	0.052	C	0.69	N
CHLOROBENZENE	108-90-7	1,200	**3.9**	N	**7.2**	N
CHLOROETHANE	75-00-3	9	860	C	2,100	N
2-CHLOROPHENOL	95-57-8	3	18	N	7.1	N
COBALT	7440-48-4	49.6	220	N	**0.47**	N
CHROMIUM VI	18540-29-9	9.5	18	N	**0.031**	C
COPPER	7440-50-8	72	150	N	**62**	N
DDD	72-54-8	3.7	**0.28**	C	**0.28**	C
DIBENZOFURAN	132-64-9	24	**15**	N	**0.58**	N
DIBUTYLPHTHALATE	84-74-2	1	370	N	67	N
1,2-DICHLOROBENZENE	95-50-1	8	27	N	28	N
1,3-DICHLOROBENZENE	541-73-1	83	**54**	N	**0.42**	C[4]
1,4-DICHLOROBENZENE	106-46-7	420	**0.44**	C	**0.42**	C
1,2-DICHLOROETHANE	107-06-2	320	**0.12**	C	**0.15**	C
TOTAL 1,2-DICHLOROETHENE	540-59-0	28,000	**5.5**	N	**130**	N

TABLE E-11

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 REGION 3 RBCS AND 2012 RSL FOR TAP WATER
SITE 9 - GROUNDWATER

Chemical	CAS No.	Maximum GW Conc[1]	1995 RBC for Tap Water[2]		2012 RSL for Tap Water[3]	
		(ug/L)	(ug/L)		(ug/L)	
2,4-DICHLOROPHENOL	120-83-2	4	11	N	**3.5**	N
1,2-DICHLOROPROPANE	78-87-5	940	**0.16**	C	**0.38**	C
DIELDRIN	60-57-1	2.4	**0.0042**	C	**0.0015**	C
DIETHYLPHTHALATE	84-66-2	2	2,900	N	1,100	N
2,4-DIMETHYLPHENOL	105-67-9	16	73	N	27	N
ETHYLBENZENE	100-41-4	87	130	N	**1.3**	C
HEXACHLOROETHANE	67-72-1	3	**0.75**	C	**0.51**	N[4]
IRON	7439-89-6	25,500	NA		**1,100**	N
MANGANESE	7439-96-5	1,910	**18**	N		
MERCURY (AS MERCURIC CHLORIDE)	7487-94-7	0.32	1.1	N	0.43	N
METHYLENE CHLORIDE	75-09-2	830	**4.1**	C	**8.4**	N[5]
METHYL ETHYL KETONE	78-93-3	4,500	**190**	N	**490**	N
2-METHYLPHENOL	95-48-7	350	**180**	N	**72**	N
4-METHYLPHENOL	106-44-5	370	**18**	N	**140**	N
NICKEL	7440-02-0	18.6	73	N	30	N
4-NITROANILINE	100-01-6	47	**11**	N	**3.3**	C
4-NITROPHENOL	100-02-7	3	230	N	NA	
N-NITROSODIPROPYLAMINE	621-64-7	1	**0.0096**	C	**0.0093**	C
PENTACHLOROPHENOL	87-86-5	2	**0.56**	C	**0.17**	C
PHENOL	108-95-2	66	2,200	N	450	N
ACENAPHTHENE	83-32-9	66	220	N	**40**	N
CARBAZOLE	86-74-8	11	**3.4**	C	NA	
FLUORANTHENE	206-44-0	2	150	N	63	N
FLUORENE	86-73-7	23	150	N	**22**	N
2-METHYLNAPHTHALENE	91-57-6	25	150	N	**2.7**	N

TABLE E-11

COMPARISON OF SCREENING CONCENTRATIONS BASED ON 1995 REGION 3 RBCS AND 2012 RSL FOR TAP WATER SITE 9 - GROUNDWATER

Chemical	CAS No.	Maximum GW Conc[1] (ug/L)	1995 RBC for Tap Water[2] (ug/L)		2012 RSL for Tap Water[3] (ug/L)	
NAPHTHALENE	91-20-3	47	150	N	**0.14**	C
PYRENE	129-00-0	3	110	N	8.7	N
SILVER	7440-22-4	0.54	18	N	7.1	N
1,1,2,2-TETRACHLOROETHANE	79-34-5	9	**0.052**	C	**0.066**	C
TETRACHLOROETHENE	127-18-4	670	**1.1**	C	**3.5**	N[5]
THALLIUM	7440-28-0	3.9	**0.29**	N	**0.016**	N
TOLUENE	108-88-3	310	**75**	N	**86**	N
1,2,4-TRICHLOROBENZENE	120-82-1	8	19	N	**0.39**	N[5]
1,1,2-TRICHLOROETHANE	79-00-5	84	**0.19**	C	**0.041**	N[5]
TRICHLOROETHENE	79-01-6	1,500	**1.6**	C	**0.26**	N[5]
VANADIUM	7440-62-2	23	26	N	**7.8**	N
VINYL CHLORIDE	75-01-4	20,000	**0.019**	C	**0.015**	C
XYLENES	1330-20-7	190	1,200	N	**19**	N
ZINC	7440-66-6	165	1,100	N	470	N

NOTES:

Shaded values indicate that the maximum groundwater concentration is greater than the specified RBC or RSL.

1. Maximum of deep and shallow groundwater samples.

2. USEPA Region 3 RBC Tables, 1995 (screening values for noncarcinogens are based on a Hazard index of 0.1).

3. USEPA Regional Screening Level Tables, November 2012 (screening values for noncarcinogens are based on a Hazard index of 0.1).

4 - Value is for 1,4-dichlorobenzene.

5 - Ten percent of noncarcinogenic screening level is less than the carcinogenic screening level, therefore the noncarcinogenic value is presented.

C - Carcinogenic.

N - Noncarcinogenic.

TABLE E-12

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 REGION 3 RBCS AND 2012 USEPA RSLS FOR INDUSTRIAL SOIL
SITE 9 - SURFACE AND SUBSURFACE SOIL

Chemical	CAS No.	Maximum Soil Concentration[1] (mg/kg)	1995 RBC for Industrial Soil[2] (mg/kg)		2012 RSL for Industrial Soil[3] (mg/kg)	
ACETONE	67-64-1	59	20,000	N	63,000	N
ALDRIN	309-00-2	0.026	0.34	C	0.1	C
ALUMINUM	7429-90-5	37,900	100,000	N	99,000	N
ANTIMONY	7440-36-0	89.2	**82**	N	**41**	N
ARSENIC	7440-38-2	28.3	**3.3**	C	**1.6**	C
BARIUM	7440-39-3	1,190	14,000	N	19,000	N
BENZENE	71-43-2	1.5	200	C	5.4	C
BENZOIC ACID	65-85-0	0.87	100,000	N	250,000	N
BERYLLIUM	7440-41-7	75.4	**1.3**	C	200	N
BIS(2-CHLOROETHYL)ETHER	111-44-4	0.065	5.2	C	1	C
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	33	410	C	120	C
BUTYLBENZYLPHTHALATE	85-68-7	13	41,000	N	910	C
CADMIUM	7440-43-9	172	**100**	N	**80**	N
CHLOROBENZENE	108-90-7	0.19	4,100	N	140	N
CHLOROFORM	67-66-3	0.002	940	C	1.5	C
CHROMIUM VI	18540-29-9	955	1,000	N	**5.6**	C
COBALT	7440-48-4	431	12,000	N	**30**	N
COPPER	7440-50-8	24,700	**8,200**	N	**4,100**	N
CYANIDE (FREE)	57-12-5	1.1	4,100	N	61	N
DDD	72-54-8	0.62	24	C	7.2	C
DDE	72-55-9	0.89	17	C	5.1	C
DDT	50-29-3	0.019	17	C	7	C
DIBENZOFURAN	132-64-9	120	820	N	**100**	N
DIBUTYLPHTHALATE	84-74-2	5.7	20,000	N	6,200	N
1,2-DICHLOROBENZENE	95-50-1	4.3	18,000	N	980	N
1,3-DICHLOROBENZENE	541-73-1	0.062	18,000	N	12	C[4]
1,4-DICHLOROBENZENE	106-46-7	0.84	240	C	12	C
TOTAL 1,2-DICHLOROETHENE	540-59-0	3.1	1,800	N	920	N

TABLE E-12

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 REGION 3 RBCS AND 2012 USEPA RSLS FOR INDUSTRIAL SOIL
SITE 9 - SURFACE AND SUBSURFACE SOIL

Chemical	CAS No.	Maximum Soil Concentration[1] (mg/kg)	1995 RBC for Industrial Soil[2] (mg/kg)		2012 RSL for Industrial Soil[3] (mg/kg)	
DIELDRIN	60-57-1	0.054	0.36	C	0.11	C
DIETHYLPHTHALATE	84-66-2	4.3	100,000	N	49,000	N
2,4-DIMETHYLPHENOL	105-67-9	4.8	4,100	N	1,200	N
ENDOSULFAN	115-29-7	0.013	1,200	N	370	N
ENDRIN	72-20-8	0.097	61	N	18	N
ETHYLBENZENE	100-41-4	910	20,000	N	**27**	C
HEPTACHLOR	76-44-8	0.015	1.3	C	0.38	C
HEPTACHLOR EPOXIDE	1024-57-3	0.029	0.63	C	0.19	C
ALPHA-HCH	319-84-6	0.00098	0.91	C	0.27	C
BETA-HCH	319-85-7	0.042	3.2	C	0.96	C
GAMMA-HCH (LINDANE)	58-89-9	0.014	4.4	C	2.1	C
IRON	7439-89-6	303,000	NA		**72,000**	N
MANGANESE-NONFOOD	7439-96-5	2,920	**1,000**	N	**2,300**	N
MERCURY (AS MERCURIC CHLORIDE)	7487-94-7	191	**61**	N	**31**	N
METHOXYCHLOR	72-43-5	0.63	1,000	N	310	N
METHYLENE CHLORIDE	75-09-2	56	760	C	310	N[5]
METHYL ETHYL KETONE	78-93-3	180	100,000	N	20,000	N
2-METHYLPHENOL	95-48-7	0.058	10,000	N	3,100	N
NICKEL	7440-02-0	4,210	**4,100**	N	**2,000**	N
N-NITROSODIPHENYLAMINE	86-30-6	0.12	1,200	C	350	C
PENTACHLOROPHENOL	87-86-5	0.098	48	C	2.7	C
PHENOL	108-95-2	77	100,000	N	18,000	N
AROCLOR-1254	11097-69-1	3.4	**0.74**	N	**0.74**	C
AROCLOR-1260	11096-82-5	30	**0.74**	C	**0.74**	C
ACENAPHTHENE	83-32-9	150	12,000	N	3,300	N
ANTHRACENE	120-12-7	340	61,000	N	17,000	N
BENZ[A]ANTHRACENE	56-55-3	420	**7.8**	C	**2.1**	C
BENZO[B]FLUORANTHENE	205-99-2	490	**7.8**	C	**2.1**	C

TABLE E-12

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 REGION 3 RBCS AND 2012 USEPA RSLS FOR INDUSTRIAL SOIL
SITE 9 - SURFACE AND SUBSURFACE SOIL

Chemical	CAS No.	Maximum Soil Concentration[1] (mg/kg)	1995 RBC for Industrial Soil[2] (mg/kg)		2012 RSL for Industrial Soil[3] (mg/kg)	
BENZO[K]FLUORANTHENE	207-08-9	490	**78**	C	**21**	C
BENZO[A]PYRENE	50-32-8	150	**0.78**	C	**0.21**	C
CARBAZOLE	86-74-8	160	290	C	NA	
CHRYSENE	218-01-9	320	780	C	**210**	C
DIBENZ[A,H]ANTHRACENE	53-70-3	29	**0.78**	C	**0.21**	C
FLUORANTHENE	206-44-0	1,000	8,200	N	2,200	N
FLUORENE	86-73-7	270	8,200	N	2,200	N
INDENO[1,2,3-C,D]PYRENE	193-39-5	79	**7.8**	C	**2.1**	C
2-METHYLNAPHTHALENE	91-57-6	78	8,200	N	220	N
NAPHTHALENE	91-20-3	260	8,200	N	**18**	C
PYRENE	129-00-0	660	6,100	N	1,700	N
SELENIUM	7782-49-2	3.2	1,000	N	510	N
SILVER	7440-22-4	34.9	1,000	N	510	N
2,3,7,8-TETRACHLORODIBENZODIOXIN	1746-01-6	0.00022	**0.00004**	C	**0.000018**	C
TETRACHLOROETHENE	127-18-4	0.012	110	C	41	N[5]
THALLIUM	7440-28-0	0.69	16	N	1	N
TOLUENE	108-88-3	15,400	41,000	N	**4,500**	N
1,2,4-TRICHLOROBENZENE	120-82-1	0.24	2,000	N	27	N[5]
1,1,1-TRICHLOROETHANE	71-55-6	0.013	18,000	N	3,800	N
TRICHLOROETHENE	79-01-6	3.8	520	C	**2**	N[5]
VANADIUM	7440-62-2	823	1,400	N	**520**	N
ZINC	7440-66-6	34,300	61,000	N	**31,000**	N

TABLE E-12

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 REGION 3 RBCS AND 2012 USEPA RSLS FOR INDUSTRIAL SOIL
SITE 9 - SURFACE AND SUBSURFACE SOIL

Chemical	CAS No.	Maximum Soil Concentration[1] (mg/kg)	1995 RBC for Industrial Soil[2] (mg/kg)	2012 RSL for Industrial Soil[3] (mg/kg)

NOTES:

Shaded values indicate that the maximum soil concentration is greater than the specified RBC or RSL.

1. Maximum detected concentration in surface and subsurface soil from 1 to 10 feet bgs.

2. USEPA Region 3 RBC Tables, 1995 (screening values for noncarcinogens are based on a Hazard Index of 0.1).

3. USEPA Regional Screening Level (RSL) Tables, November 2012 (screening values for noncarcinogens are based on a Hazard Index of 0.1).

4 - Value is for 1,4-dichlorobenzene.

5 - Ten percent of noncarcinogenic screening level is less than the carcinogenic screening level, therefore the noncarcinogenic value is presented.

TABLE E-13

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA RSLS FOR TAP WATER
SITE 9 - SURFACE WATER

Chemical	CAS No.	Maximum SW Conc	1995 RBC for Tap Water[1]		2012 RSL for Tap Water[2]	
		(ug/L)	(ug/L)		(ug/L)	
ALDRIN	309-00-2	0.0003	0.004	C	**0.00021**	C
ALUMINUM	7429-90-5	339	3,700	N	1,600	N
ARSENIC	7440-38-2	4.2	**0.045**	C	**0.045**	C
CADMIUM-WATER	7440-43-9	10.1	**1.8**	N	**0.69**	N
CARBON DISULFIDE	75-15-0	2	2.1	N	72	N
CARBON TETRACHLORIDE	56-23-5	6	**0.16**	C	**0.39**	C
CHROMIUM VI	18540-29-9	20.1	**18**	N	**0.031**	C
COPPER	7440-50-8	5.65	140	N	62	N
TOTAL 1,2-DICHLOROETHENE	540-59-0	6	**5.5**	N	13	N
HEXACHLOROBENZENE	118-74-1	0.0004	0.0066	C	0.042	C
IRON	7439-89-6	7,270	NA		**1,100**	N
MANGANESE-NONFOOD	7439-96-5	137	**18**	N	**32**	N
MIREX	2385-85-5	0.0003	0.037	C	0.0037	C
NICKEL	7440-02-0	21.4	73	N	30	N
AROCLOR-1242	53469-21-9	0.0092	**0.0087**	C	0.034	C
AROCLOR-1254	11097-69-1	0.0079	**0.00087**	N	0.031	N[3]
AROCLOR-1260	11096-82-5	0.0093	**0.0087**	C	0.034	C
ACENAPHTHENE	83-32-9	0.034	220	N	40	N
ANTHRACENE	120-12-7	0.001	110	N	130	N
BENZ[A]ANTHRACENE	56-55-3	0.0026	0.092	C	0.029	C
BENZO[B]FLUORANTHENE	205-99-2	0.006	0.092	C	0.029	C
BENZO[K]FLUORANTHENE	207-08-9	0.002	0.92	C	0.29	C
BENZO[A]PYRENE	50-32-8	0.0032	0.0092	C	**0.0029**	C
CHRYSENE	218-01-9	0.004	9.2	C	2.9	C
FLUORANTHENE	206-44-0	0.0099	150	N	63	N

TABLE E-13

COMPARISON OF SCREENING CONCENTRATIONS BASED ON
1995 USEPA REGION 3 RBCS AND 2012 USEPA RSLS FOR TAP WATER
SITE 9 - SURFACE WATER
PAGE 2 OF 2

Chemical	CAS No.	Maximum SW Conc	1995 RBC for Tap Water[1]		2012 RSL for Tap Water[2]	
		(ug/L)	(ug/L)		(ug/L)	
FLUORENE	86-73-7	0.0024	150	N	22	N
NAPHTHALENE	91-20-3	0.0291	150	N	0.14	C
PYRENE	129-00-0	0.0078	110	N	8.7	N
TRICHLOROETHENE	79-01-6	2	**1.6**	C	**0.26**	N[3]
VANADIUM	7440-62-2	12.1	26	N	**7.8**	N
ZINC	7440-66-6	7.01	1,100	N	470	N

NOTES:

Shaded values indicate that the maximum surface water concentration is greater than the specified RBC or RSL.

1. USEPA Region 3 RBC Tables, 1995 (screening values for noncarcinogens are based on a Hazard index of 0.1).

2. USEPA Regional Screening Level Tables, November 2012 (screening values for noncarcinogens are based on a Hazard index of 0.1).

3 - Ten percent of noncarcinogenic screening level is less than the carcinogenic screening level, therefore the noncarcinogenic value is presented.

C - Carcinogenic.

N - Noncarcinogenic.

TABLE E-14

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SEDIMENT
SITE 09 - ALLEN HARBOR LANDFILL
FORMER NCBC DAVISVILLE, NORTH KINGSTOWN, RHODE ISLAND

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Screening Toxicity Value[4]	COPC Flag	Rationale for Contaminant Deletion or Selection[5]
Volatile Organic Compounds											
78-93-3	2-Butanone	4.3 J	8.1 J	ug/kg	SED09-09	2/129	0.74 - 2900	8.1	2,800,000 N	No	BSL
591-78-6	2-Hexanone	110 J	110 J	ug/kg	SED09-12-071508	1/133	0.16 - 2900	110	21,000 N	No	BSL
108-10-1	4-Methyl-2-Pentanone	26,000 J	26,000 J	ug/kg	SED09-12-032609	1/133	0.19 - 2900	26,000	530,000 N	No	BSL
67-64-1	Acetone	0.94 J	197 J	ug/kg	SED09-09_20070307	30/132	0.88 - 2900	197	6,100,000 N	No	BSL
71-43-2	Benzene	0.25 J	6.1 J	ug/kg	SED09-10_20071106	6/133	0.081 - 580	6.1	1,100 C	No	BSL
74-83-9	Bromomethane	5	5	ug/kg	SED09-01-20051213	1/133	0.088 - 1200	5	730 N	No	BSL
75-15-0	Carbon Disulfide	1.5 J	330 J	ug/kg	SED09-12-092908	87/134	2.4 - 580	330	82,000 N	No	BSL
74-87-3	Chloromethane	0.95 J	0.95 J	ug/kg	SED09-02_20070619	1/133	0.088 - 1200	0.95	12,000 N	No	BSL
156-59-2	cis-1,2-Dichloroethene	310 J	600 J	ug/kg	SED09-08-032609-D	1/133	0.063 - 580	600	16,000 N	No	BSL
75-09-2	Methylene Chloride	0.69 J	170	ug/kg	SED09-12A-032712	3/133	0.27 - 2900	170	36,000 N[6]	No	BSL
127-18-4	Tetrachloroethene	52 J	52 J	ug/kg	SED09-12-020508-D	1/133	0.095 - 580	52	8,600 N[6]	No	BSL
108-88-3	Toluene	0.5 J	6,600	ug/kg	SED09-12-032609	2/133	0.078 - 580	6,600	500,000 N	No	BSL
540-59-0	Total 1,2-Dichloroethene	490 J	830 J	ug/kg	SED09-08-032609-D	1/133	0.0735 - 580	830	70,000 N	No	BSL
156-60-5	trans-1,2-Dichloroethene	180	230	ug/kg	SED09-08-032609-D	1/133	0.084 - 580	230	15,000 N	No	BSL
79-01-6	Trichloroethene	0.31 J	92 J	ug/kg	SED09-11-011110	4/133	0.085 - 580	92	440 N[6]	No	BSL
75-01-4	**Vinyl Chloride**	0.94 J	1,100	ug/kg	SED09-08-032609-D	3/133	0.098 - 1200	1,100	**60 C**	**Yes**	ASL
Semivolatile Organic Compounds											
91-57-6	2-Methylnaphthalene	2 J	350 J	ug/kg	SED09-10-031610	63/163	1.5 - 40	350	23,000 N	No	BSL
101-55-3	4-Bromophenyl Phenyl Ether	142 J	142 J	ug/kg	SED09-10_20070307	1/92	13 - 490	142	NA	No	NTX
83-32-9	Acenaphthene	2 J	1,500 J	ug/kg	SED09-10-092110	54/163	1.8 - 320	1,500	340,000 N	No	BSL
208-96-8	Acenaphthylene	1.4 J	59 J	ug/kg	SED09-08-042208-D	34/162	1 - 320	59	340,000 N[7]	No	BSL
120-12-7	Anthracene	1.3 J	3,500	ug/kg	SED09-10-031610	68/162	1 - 86	3,500	1,700,000 N	No	BSL
56-55-3	**Benzo(a)anthracene**	3 J	6,800	ug/kg	SED09-10-031610	119/163	0.48 - 80	6,800	**150 C**	**Yes**	ASL
50-32-8	**Benzo(a)pyrene**	3.3 J	4,700	ug/kg	SED09-10-031610	106/164	1.6 - 110	4,700	**15 C**	**Yes**	ASL
205-99-2	**Benzo(b)fluoranthene**	2.4 J	6,400	ug/kg	SED09-10-031610	112/163	1.3 - 82	6,400	**150 C**	**Yes**	ASL
191-24-2	Benzo(g,h,i)perylene	2.9 J	2,700	ug/kg	SED09-10-031610	105/163	1.4 - 84	2,700	170,000 N[8]	No	BSL
207-08-9	**Benzo(k)fluoranthene**	3.9 J	2,000	ug/kg	SED09-10-092110	103/163	1.3 - 106	2,000	**1,500 C**	**Yes**	ASL
117-81-7	Bis(2-ethylhexyl)phthalate	32.1 J	398	ug/kg	SED09-01-20061106	28/92	13 - 410	398	35,000 C	No	BSL
85-68-7	Butyl Benzyl Phthalate	31.3 J	165 J	ug/kg	SED09-09_20070307	15/92	10 - 490	165	260,000 C	No	BSL
86-74-8	Carbazole	78.2 J	230 J	ug/kg	SED09-010	8/92	7.1 - 490	230	NA	No	NTX
218-01-9	Chrysene	1.8 J	5,400	ug/kg	SED09-10-031610	102/163	0.61 - 110	5,400	15,000 C	No	BSL
53-70-3	**Dibenzo(a,h)anthracene**	1.6 J	900 J	ug/kg	SED09-10-031610	70/162	0.8 - 130	900	**15 C**	**Yes**	ASL
132-64-9	Dibenzofuran	38.4 J	113 J	ug/kg	SED09-010	6/92	6.2 - 490	113	7,800 N	No	BSL
84-66-2	Diethyl Phthalate	48.8 J	48.8 J	ug/kg	SED09-08_20070307-D	1/92	9.2 - 490	48.8	4,900,000 N	No	BSL
84-74-2	di-n-Butyl Phthalate	36 J	43.8 J	ug/kg	SED09-03-20050927	2/92	11 - 490	43.8	610,000 N	No	BSL
206-44-0	Fluoranthene	3.8 J	16,000	ug/kg	SED09-10-031610	133/163	2 - 12	16,000	230,000 N	No	BSL
86-73-7	Fluorene	1.3 J	2,100	ug/kg	SED09-10-031610	60/163	0.46 - 96	2,100	230,000 N	No	BSL
193-39-5	**Indeno(1,2,3-cd)pyrene**	3 J	2,000	ug/kg	SED09-10-092110	126/163	1 - 84	2,000	**150 C**	**Yes**	ASL
91-20-3	Naphthalene	2.1 J	1,100 J	ug/kg	SED09-10-031610	39/163	1.8 - 86	1,100	3,600 C	No	BSL

TABLE E-14

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SEDIMENT
SITE 09 - ALLEN HARBOR LANDFILL
FORMER NCBC DAVISVILLE, NORTH KINGSTOWN, RHODE ISLAND

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Screening Toxicity Value[4]	COPC Flag	Rationale for Contaminant Deletion or Selection[5]
87-86-5	Pentachlorophenol	298 J	298 J	ug/kg	SED09-05_20070307	1/92	15 - 980	298	890 C	No	BSL
85-01-8	Phenanthrene	2 J	14,000	ug/kg	SED09-10-031610	115/163	2 - 82	14,000	170,000 N[8]	No	BSL
129-00-0	Pyrene	4.9	12,000	ug/kg	SED09-10-031610	138/163	2 - 86	12,000	170,000 N	No	BSL
Polynuclear Aromatic Hydrocarbons											
91-57-6	2-Methylnaphthalene	190 J	190 J	ug/kg	SED09-10-101011	1/10	4.1 - 27	190	23,000 N	No	BSL
83-32-9	Acenaphthene	6.2 J	820 J	ug/kg	SED09-10-101011	3/10	4.1 - 27	820	340,000 N	No	BSL
120-12-7	Anthracene	2 J	1,400 J	ug/kg	SED09-10-101011	5/10	4.1 - 27	1,400	1,700,000 N	No	BSL
56-55-3	**Benzo(a)anthracene**	6.1	3,700 J	ug/kg	SED09-10-101011	10/10	-	3,700	**150 C**	**Yes**	ASL
50-32-8	**Benzo(a)pyrene**	5.8 J	2,300 J	ug/kg	SED09-10-101011	10/10	-	2,300	**15 C**	**Yes**	ASL
205-99-2	**Benzo(b)fluoranthene**	13 J	3,600 J	ug/kg	SED09-10-101011	10/10	-	3,600	**150 C**	**Yes**	ASL
191-24-2	Benzo(g,h,i)perylene	2.7 J	1,200 J	ug/kg	SED09-10-101011	10/10	24 - 24	1,200	170,000 N[8]	No	BSL
207-08-9	Benzo(k)fluoranthene	4.2 J	1,400 J	ug/kg	SED09-10-101011	8/10	12 - 24	1,400	1,500 C	No	BSL
218-01-9	Chrysene	9.8	3,900 J	ug/kg	SED09-10-101011	10/10	-	3,900	15,000 C	No	BSL
53-70-3	**Dibenzo(a,h)anthracene**	3.3 J	360 J	ug/kg	SED09-10-101011	4/10	4.1 - 27	360	**15 C**	**Yes**	ASL
206-44-0	Fluoranthene	5.7 J	9,800 J	ug/kg	SED09-10-101011	10/10	-	9,800	230,000 N	No	BSL
86-73-7	Fluorene	7.4 J	940 J	ug/kg	SED09-10-101011	3/10	4.1 - 27	940	230,000 N	No	BSL
193-39-5	**Indeno(1,2,3-cd)pyrene**	4.1 J	1,300 J	ug/kg	SED09-10-101011	6/10	12 - 27	1,300	**150 C**	**Yes**	ASL
91-20-3	Naphthalene	11 J	400 J	ug/kg	SED09-10-101011	2/10	4.1 - 27	400	3,600 C	No	BSL
85-01-8	Phenanthrene	3.9 J	7,100 J	ug/kg	SED09-10-101011	9/10	4.3 - 4.3	7,100	170,000 N	No	BSL
129-00-0	Pyrene	7.5 J	6,400 J	ug/kg	SED09-10-101011	10/10	-	6,400	170,000 N[8]	No	BSL
Pesticides/PCBs											
72-54-8	4,4'-DDD	0.55 J	26 J	ug/kg	SED09-01-101111	14/174	0.11 - 57	26	2,000 C	No	BSL
72-55-9	4,4'-DDE	0.2 J	7.4 J	ug/kg	SED09-09-20051213	43/174	0.11 - 35	7.4	1,400 C	No	BSL
50-29-3	4,4'-DDT	0.87 J	68.8 J	ug/kg	SED09-09-20051213	12/174	0.17 - 52	68.8	1,700 C	No	BSL
309-00-2	Aldrin	0.41 J	0.97 J	ug/kg	SED09-01-101111	3/174	0.15 - 18	0.97	29 C	No	BSL
319-84-6	alpha-BHC	0.68 J	0.69 J	ug/kg	SED09-11A-092110	2/174	0.18 - 18	0.69	77 C	No	BSL
5103-71-9	alpha-Chlordane	0.36 J	0.98 J	ug/kg	SED09-10-101909	4/174	0.11 - 18	0.98	1,600 C[9]	No	BSL
12674-11-2	Aroclor-1016	32 J	32 J	ug/kg	SED09-05_20070620	1/182	1.8 - 190	32	390 N	No	BSL
53469-21-9	Aroclor-1242	73.4 J	73.4 J	ug/kg	SED09-09-032205	1/182	1.8 - 190	73.4	220 C	No	BSL
12672-29-6	Aroclor-1248	7.3 J	37.8 J	ug/kg	SED09-09_20071106	24/182	1.8 - 160	37.8	220 C	No	BSL
11097-69-1	Aroclor-1254	26.6 J	110 J	ug/kg	SED09-09-032205	5/182	1.8 - 190	110	110 N[6]	No	BSL
11096-82-5	**Aroclor-1260**	9.3 J	790	ug/kg	SED09-01-101909	66/182	1.8 - 130	790	**220 C**	**Yes**	ASL
319-86-8	delta-BHC	0.39 J	2.4 J	ug/kg	SED09-10-101011, SED09-11A-032712-D	6/163	0.17 - 18	2.4	77 C[10]	No	BSL
60-57-1	Dieldrin	0.44 J	10	ug/kg	SED09-01-101909	11/174	0.12 - 35	10	30 C	No	BSL
959-98-8	Endosulfan I	1.1 J	42 J	ug/kg	SED09-10-031610	6/174	0.13 - 18	42	37,000 N[11]	No	BSL
33213-65-9	Endosulfan II	0.54 J	6.1 J	ug/kg	SED09-01-101909	15/174	0.18 - 35	6.1	37,000 N[11]	No	BSL
1031-07-8	Endosulfan Sulfate	0.19 J	17 J	ug/kg	SED09-10-031610	8/174	0.31 - 35	17	37,000 N[11]	No	BSL
7421-93-4	Endrin Aldehyde	3.2	140	ug/kg	SED09-10-040609	3/173	0.26 - 23	140	1,800 N[12]	No	BSL

TABLE E-14

OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - SEDIMENT
SITE 09 - ALLEN HARBOR LANDFILL
FORMER NCBC DAVISVILLE, NORTH KINGSTOWN, RHODE ISLAND

CAS Number	Chemical	Minimum Concentration[1]	Maximum Concentration[1]	Units	Sample of Maximum Concentration	Frequency of Detection	Range of Nondetects[2]	Concentration Used for Screening[3]	Screening Toxicity Value[4]	COPC Flag	Rationale for Contaminant Deletion or Selection[5]
53494-70-5	Endrin Ketone	0.22 J	25 J	ug/kg	SED09-01-101111	10/174	0.21 - 35	25	1,800 N[12]	No	BSL
58-89-9	gamma-BHC (Lindane)	0.23 J	48	ug/kg	SED09-10-031610	9/174	0.14 - 18	48	520 C	No	BSL
5103-74-2	gamma-Chlordane	0.29 J	8.7 J	ug/kg	SED09-01-101909	18/174	0.12 - 18	8.7	1,600 C[9]	No	BSL
76-44-8	Heptachlor	0.42 J	0.42 J	ug/kg	SED09-08-101909	1/173	0.15 - 18	0.42	110 C	No	BSL
1024-57-3	Heptachlor Epoxide	2.1 J	2.8 J	ug/kg	SED09-09-101011	3/174	0.12 - 18	2.8	53 C	No	BSL
118-74-1	Hexachlorobenzene	0.24 J	0.24 J	ug/kg	SED09-12A-092110	1/107	0.14 - 66	0.24	300 C	No	BSL
72-43-5	Methoxychlor	0.39 J	78 J	ug/kg	SED09-10-101011	3/174	0.26 - 180	78	31,000 N	No	BSL
1336-36-3	**Total Aroclor**	7.3 J	790	ug/kg	SED09-01-101909	81/182	1.84 - 120	790	**220 C[13]**	**Yes**	ASL
Metals											
7429-90-5	**Aluminum**	1,590	15,700	mg/kg	SED09-09-101909	174/174	-	15,700	**7,700 N**	**Yes**	ASL
7440-36-0	Antimony	0.08 J	1.7 J	mg/kg	SED09-09-101909	21/174	0.1 - 6	1.7	3.1 N	No	BSL
7440-38-2	**Arsenic**	0.775 J	25	mg/kg	SED09-10-042208	142/174	0.91 - 8.1	25	**0.39 C**	**Yes**	ASL
7440-41-7	Beryllium	0.23 J	1.3	mg/kg	SED09-09-20051213	132/174	0.18 - 1	1.3	16 N	No	BSL
7440-47-3	Chromium	2.8	61.3	mg/kg	SED09-09-101909	174/174	-	61.3	12,000 N[14]	No	BSL
7440-50-8	Copper	4.4	90	mg/kg	SED09-09_Q106	174/174	-	90	310 N	No	BSL
7439-89-6	**Iron**	5,040	32,000	mg/kg	SED09-09-101909	174/174	-	32,000	**5,500 N**	**Yes**	ASL
7439-92-1	Lead	3.85 J	67.7	mg/kg	SED09-09_Q106	165/174	4.3 - 10.6	67.7	400	No	BSL
7439-96-5	**Manganese**	34.4	368	mg/kg	SED09-09-101909	174/174	-	368	**180 N**	**Yes**	ASL
7439-97-6	Mercury	0.01 J	0.39	mg/kg	SED09-09	128/174	0.0034 - 0.4	0.39	2.3 N	No	BSL
7440-02-0	Nickel	2.8 J	78.8 J	mg/kg	SED09-12-020508	173/174	6.7 - 6.7	78.8	150 N	No	BSL
7440-66-6	Zinc	12 J	305	mg/kg	SED09-01-032811	173/174	26.2 - 26.2	305	2,300 N	No	BSL

Footnotes:
1 - Sample and duplicate are considered as two separate samples when determining the minimum and maximum concentrations.
2 - Values presented are sample-specific quantitation limits.
3 - The maximum detected concentration is used for screening purposes.
4 - USEPA Regional Screening Level, November 2012. Carcinogenic values represent an incremental cancer risk of 1E-06. The noncarcinogenic values are the RSL divided by 10 to correspond to a Target Hazard Quotient of 0.1.
5 - The chemical is selected as a COPC if the maximum detected concentration exceeds the risk-based COPC screening level.
6 - Ten percent of noncarcinogenic screening level is less than the carcinogenic screening level, therefore the noncarcinogenic value is presented.
7 - Value is for acenaphthene.
8 - Value is for pyrene.
9 - Value is for chlordane.
10 - Value is for alpha-BHC.
11 - Value is for Endosulfan.
12 - Value is for Endrin.
13 - Value is for PCBs (high risk).
14 - Value is for trivalent chromium.
15 - Value is for mercuric chloride (and other mercury salts).
Shaded criterion indicates that the maximum detected concentration exceeded the screening criteria and was retained as a COPC.

Definitions:
C = Carcinogen
COPC = Chemical Of Potential Concern
J = Estimated value
N = Noncarcinogen
NA = Not Applicable/Not Available

Rationale Codes:
For selection as a COPC:
ASL = Above Screening Level.

For elimination as a COPC:
BSL = Below COPC Screening Level
NTX = No toxicity criteria

RECREATIONAL EXPOSURES TO SEDIMENT ALONG THE SHORELINE OF SITE 09

1.0 HUMAN HEALTH RISK EVALUATION

This section presents a focused, limited evaluation of the primary contaminants detected in the sediment samples collected as a result of the implementation of the LTMP for Site 09.

1.1 Methodology

The first stage of conducting the human health risk evaluation involved comparing the detected concentration of a chemical detected in sediment samples collected in 2005 to 2012 to the most recent USEPA Regional Screening Levels (RSLs) and other applicable criteria identified in this section. In general, if the detected concentration in sediment was greater than a risk screening level, the chemical was identified as a chemical of potential concern (COPC).

The following screening levels were used to select COPCs for sediment:

- The USEPA Regional Screening Levels (RSLs) for ***soils*** assuming a ***residential land use scenario***, and
- ***Recreational screening levels*** developed by a simple multiplication of the residential soil RSL by a factor of 10. A factor of 10 was applied to the RSLs to account for the fact that the frequency and duration of receptor exposure to the Site 09 shoreline sediments is anticipated to be significantly less than that experienced as a result of the daily exposure to soils assumed under a residential land use scenario. This factor is particularly relevant for the Site 09 sediments because, given the current physical characteristics of the shoreline, recreational activities are likely to be limited along the Site 09 shoreline.

If the detected concentration for a chemical exceeded the screening levels identified above at a sampling location then that chemical was considered to be a COPC. Subsequently, a more detailed human health risk evaluation was conducted with these COPCs. Because of the additive noncarcinogenic effects of some chemicals (i.e., some noncarcinogenic chemicals impact the same target organs or exhibit similar mechanisms of action), one tenth of the RSL for noncarcinogenic effects was used as the risk screening level to select COPCs.

Carcinogenic risks are expressed in the form of dimensionless probabilities, referred to as incremental lifetime cancer risks (ILCRs). The ILCR was derived by dividing the carcinogenic risk-based concentration (RBC) for a particular medium (e.g., sediment) into the detected concentration at each sampling location. The USEPA RSLs were used as the RBCs in this evaluation. COPCs potentially resulting in carcinogenic effects were evaluated using the following equation:

$$ILCR = \sum_{i=1}^{n} \left(\frac{C_i}{RBC_i} \times 10^{-6} \right)$$

where: ILCR = Incremental lifetime cancer risk.
C_i = Detected concentration (µg/kg) for compound i.
RBC = Risk-based concentration (µg/kg) for compound i.
10^{-6} = Risk assessment point of departure risk level.

Multiplying the C_i/RBC ratio by USEPA's point of departure risk level, $1x10^{-6}$ produces a cancer risk estimate for the detected COPC. The ratios are multiplied by $1x10^{-6}$ because the RBCs correspond to a $1x10^{-6}$ risk level. The ILCR values for all COPCs were summed to account for potential cumulative carcinogenic effects of multiple carcinogens detected in an environmental medium. USEPA defines the range of $1x10^{-4}$ to $1x10^{-6}$ as the ILCR target range for hazardous waste facilities addressed under the CERCLA and the Resource Conservation Recovery Act (RCRA). Individual or cumulative ILCRs greater than $1x10^{-4}$ are generally considered "unacceptable" by USEPA. Risk management decisions are necessary when the ILCR is within $1x10^{-4}$ to $1x10^{-6}$. USEPA typically does not require remediation when the cumulative ILCR is less than $1x10^{-6}$. Similarly, cumulative ILCRs greater than $1x10^{-5}$ are generally considered to be "unacceptable" by the State of Rhode Island; remediation may or may not be necessary when the cumulative ILCR exceeds $1x10^{-5}$.

Non-carcinogenic risk estimates are presented in the form of hazard quotients (HQs). The HQ was derived by dividing the non-carcinogenic RBC for a particular medium (e.g., sediment) into the detected concentration at each sampling location. Compounds potentially resulting in non-carcinogenic (systemic) effects will be evaluated using the following equations:

$$HQ_i = \frac{C_i}{RBC}$$

$$HI = \sum_{i=1}^{n} HQ_i$$

where: HQ_i = Hazard quotient for compound i.
C_i = Detected concentration (µg/kg) for compound i.
RBC = Risk-based concentration (µg/kg) for compound i.
HI = Hazard index.

The HQs for all COPCs at each sampling location were summed to account for potential non-carcinogenic effects associated with multiple chemical exposures. The total HI for each sampling location was then compared to the USEPA's target level of 1.0. "Acceptable" exposure levels are generally concentration levels that represent a HI less than or equal to 1.0. However, because all chemicals do not exhibit the same mechanism of action or impact the same target organ, the exceedance of this value does not necessarily constitute an "unacceptable" non-carcinogenic risk. If the estimated HI was greater than 1.0, non-carcinogenic effects were segregated according to the affected target organs and target organ HIs were calculated, which represent the sum of those chemicals that impact similar target organs or exhibit similar mechanisms of action. Generally, estimated HIs greater than 1.0 for the target organs are considered to be "unacceptable."

Some chemicals exhibit both carcinogenic and noncarcinogenic effects. The more restrictive USEPA RSL was used for screening but both carcinogenic and noncarcinogenic risks were estimated.

1.2 Risk Evaluation

A comparison of the detected sediment concentrations to screening levels is presented in Table E-14. The following chemicals were detected in sediment samples at concentrations exceeding the COPC screening levels and were retained as COPCs for sediment.

- VOCs [vinyl chloride]
- PAHs [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene]
- PCBs [Aroclor-1260 and total Aroclors]
- Inorganics [aluminum, arsenic, iron, and manganese]

ILCRs and HIs were estimated for residential and recreational exposures as shown on Tables E-15 and E-16, respectively. The ILCR of $6x10^{-4}$ for residential exposures exceeds USEPA's target risk range and RIDEM's cumulative cancer risk benchmark. The ILCR of $6x10^{-5}$ for recreational exposures is within USEPA's target risk range but exceed RIDEM's cumulative cancer risk benchmark. Carcinogenic PAHs at location SED09-10 were the major contributors to the cancer risks for residential and recreational exposures.

The cumulative HI of 2 for residential exposures exceeded the acceptable level of 1, although as shown on Table E-15 the HIs for the individual target organs are less than or equal to 1. The cumulative HI of 0.2 for recreational exposures was less than 1.

TABLE E-15

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - RESIDENTIAL EXPOSURES TO SEDIMENT
SITE 09 - ALLEN HARBOR LANDFILL
FORMER NCBC DAVISVILLE, NORTH KINGSTOWN, RHODE ISLAND

Chemical	Incremental Lifetime Carcinogenic Risk (ILCR)			Estimated Non-Carcinogenic Hazard Quotient (HQ)		
	Maximum Detected Concentration[1] (mg/kg)	Residential RSL[2] (mg/kg)	Estimated ILCR	Primary Target Organ	Residential RSL[2] (mg/kg)	Estimated HQ
Volatile Organic Compounds						
Vinyl Chloride	1.1	0.06	2E-05	Liver	74	0.01
Semivolatile Organic Compounds						
Benzo(a)anthracene	6.8	0.15	5E-05	Cancer	NA	NA
Benzo(a)pyrene	4.7	0.015	3E-04	Cancer	NA	NA
Benzo(b)fluoranthene	6.4	0.15	4E-05	Cancer	NA	NA
Benzo(k)fluoranthene	2	1.5	1E-06	Cancer	NA	NA
Dibenzo(a,h)anthracene	0.9	0.015	6E-05	Cancer	NA	NA
Indeno(1,2,3-cd)pyrene	2	0.15	1E-05	Cancer	NA	NA
PCBs						
Total Aroclor	0.79	0.22	4E-06	Cancer	NA	NA
Metals						
Aluminum	15,700	NA	NA	Central Nervous System	77,000	0.2
Arsenic	25	0.39	6E-05	Skin, Cardiovascular System	22	1
Iron	32,000	NA	NA	Gastrointestinal System	55,000	0.6
Manganese	368	NA	NA	Central Nervous System	1,800	0.2
		Total ILCR	6E-04		Total HI	2

1 - Maximum detected concentration in 2005 to 2012 sediment samples.

2 - USEPA Regional Screening Level Table (November 2012). Carcinogenic values correspond to a $1x10^{-6}$ cancer risk level. Noncarcinogenic values corresponds to a hazard index of 1.

NA - Not applicable. There are no cancer slope factors (CSF) or reference dose (RfD) available for this chemical.

Target Organ HIs

Liver =	0.01
Central Nervous System =	0.4
Cardiovascular System =	1
Skin =	1
Gastrointestinal System =	0.6

TABLE E-16

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs - RECREATIONAL EXPOSURES TO SEDIMENT
SITE 09 - ALLEN HARBOR LANDFILL
FORMER NCBC DAVISVILLE, NORTH KINGSTOWN, RHODE ISLAND

Chemical	Incremental Lifetime Carcinogenic Risk (ILCR)			Estimated Non-Carcinogenic Hazard Quotient (HQ)		
	Maximum Detected Concentration[1] (mg/kg)	10X Residential RSL[2] (mg/kg)	Estimated ILCR	Primary Target Organ	10X Residential RSL[2] (mg/kg)	Estimated HQ
Volatile Organic Compounds						
Vinyl Chloride	1.1	0.6	2E-06	Liver	740	0.001
Semivolatile Organic Compounds						
Benzo(a)anthracene	6.8	1.5	5E-06	Cancer	NA	NA
Benzo(a)pyrene	4.7	0.15	3E-05	Cancer	NA	NA
Benzo(b)fluoranthene	6.4	1.5	4E-06	Cancer	NA	NA
Benzo(k)fluoranthene	2	15	1E-07	Cancer	NA	NA
Dibenzo(a,h)anthracene	0.9	0.15	6E-06	Cancer	NA	NA
Indeno(1,2,3-cd)pyrene	2	1.5	1E-06	Cancer	NA	NA
PCBs						
Total Aroclor	0.79	2.2	4E-07	Cancer	NA	NA
Metals						
Aluminum	15,700	NA	NA	Central Nervous System	770,000	0.02
Arsenic	25	3.9	6E-06	Skin, Cardiovascular System	220	0.1
Iron	32,000	NA	NA	Gastrointestinal System	550,000	0.06
Manganese	368	NA	NA	Central Nervous System	18,000	0.02
		Total ILCR	6E-05		Total HI	0.2

1 - Maximum detected concentration in 2005 to 2012 sediment samples.

2 - USEPA Regional Screening Level Table (November 2012). Values are 10 times the residential RSLs.

NA - Not applicable. There are no cancer slope factors (CSF) or reference doses (RfD) available for this chemical.

BACKUP CALCULATIONS FOR ALLEN HARBOR LANDFILL RISKS

VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF CONSTRUCTION WORKERS TO SOIL
CALCULATION OF ADDITIONAL DERMAL RISKS
SITE 9 - ALLEN HARBOR LANDFILL
NCBC DAVISVILLE

Scenario Timeframe: Future
Medium: Soil
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	Intake Equation/ Model Name
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	Dermal CDI[1] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	Csoil x CF x SA x AF x ABS x EF x ED
	SA	Skin Surface Area	cm^2/day	3,300	BW x AT
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.3	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	
	EF	Exposure Frequency	days/year	150	
	ED	Exposure Duration	years	1	
	BW	Body Weight	kg	70	
	AT-C	Averaging Time (Cancer)	days	25,550	
	AT-N	Averaging Time (Non-Cancer)	days	365	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Dermal Intake - RME = 8.30E-08
Noncancer Dermal Intake - RME = 5.81E-06

CALCULATION OF ADDITIONAL DERMAL CANCER RISKS FOR THE CONSTRUCTION WORKER
SITE 9 - ALLEN HARBOR LANDFILL
NCBC DAVISVILLE

Scenario Timeframe: Future
Medium: Soil
Exposure Point: Entire Site
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	Benzo(a)pyrene Equivalent	1.01E+01	mg/kg	1.01E+01	mg/kg	M	1.1E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	7.9E-07
	Arsenic	3.70E+00	mg/kg	3.70E+00	mg/kg	M	9.2E-09	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.4E-08
	(total)										**8.1E-07**
										Additional Dermal Risks	**8.1E-07**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03

Total Soil Risk from 1996 RI	**2E-06**
Additional Dermal Risks	**8E-07**
Total Risk	**3E-06**

VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF RECREATIONAL USERS TO SEDIMENT
CALCULATION OF ADDITIONAL DERMAL RISKS
SITE 9 - ALLEN HARBOR LANDFILL
NCBC DAVISVILLE

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	Intake Equation/ Model Name
Dermal	Csed	Chemical Concentration in Sediment	mg/kg	95% UCL or Max	Dermal CDI[(1)] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	Csoil x CF x SA x AF x ABS x EF x ED
	SA	Skin Surface Area	cm^2/day	463	BW x AT
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.5	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	
	EF	Exposure Frequency	days/year	144	
	ED	Exposure Duration	years	16	
	BW	Body Weight	kg	36	
	AT-C	Averaging Time (Cancer)	days	25,550	
	AT-N	Averaging Time (Non-Cancer)	days	5,840	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Dermal Intake - RME = 5.80E-07
Noncancer Dermal Intake - RME = 2.54E-06

CALCULATION OF ADDITIONAL DERMAL CANCER RISKS FOR THE RECREATIONAL USER - SEDIMENT
SITE 9 - ALLEN HARBOR LANDFILL
NCBC DAVISVILLE

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	Benzo(a)pyrene Equivalent	6.96E+00	mg/kg	6.96E+00	mg/kg	M	5.2E-07	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	3.8E-06
	Arsenic	3.25E+01	mg/kg	3.25E+01	mg/kg	M	5.7E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	8.5E-07
											5.E-06
										Additional Dermal Risks	**5.E-06**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03

Total Recreational Sediment Risk from 1996 RI	**1E-05**
Additional Dermal Risks	**5E-06**
Total Risk	**2E-05**

VALUES OF DAILY INTAKE CALCULATIONS FOR EXPOSURE OF RECREATIONAL USERS TO SOIL
CALCULATION OF ADDITIONAL DERMAL RISKS
SITE 9 - ALLEN HARBOR LANDFILL
NCBC DAVISVILLE

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	Intake Equation/ Model Name
Dermal	Csoil	Chemical Concentration in Soil	mg/kg	95% UCL or Max	Dermal CDI[(1)] (mg/kg/day) =
	CF	Conversion Factor	kg/mg	1.0E-06	Csoil x CF x SA x AF x ABS x EF x ED / BW x AT
	SA	Skin Surface Area	cm^2/day	925	
	AF	Soil to Skin Adherence Factor	mg/cm^2	0.5	U.S. EPA, December 1989
	ABS	Dermal Absorption Factor (Solid)	unitless	chemical specific	
	EF	Exposure Frequency	days/year	144	
	ED	Exposure Duration	years	16	
	BW	Body Weight	kg	36	
	AT-C	Averaging Time (Cancer)	days	25,550	
	AT-N	Averaging Time (Non-Cancer)	days	5,840	

1 CDI = Chronic Daily Intake

Daily Intake Calculations

Ingestion Intake = (IR x Fi x EF x ED x CF) / (BW x AT)
Dermal Intake = (CF x SA x AF x ABS x EF x ED) / (BW x AT)

Cancer Dermal Intake - RME = 1.16E-06
Noncancer Dermal Intake - RME = 5.07E-06

CALCULATION OF ADDITIONAL DERMAL CANCER RISKS FOR THE RECREATIONAL USER - SOIL
SITE 9 - ALLEN HARBOR LANDFILL
NCBC DAVISVILLE

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Point: Entire Site
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	Benzo(a)pyrene Equivalent	1.01E+01	mg/kg	1.01E+01	mg/kg	M	1.5E-06	mg/kg-day	7.3E+00	$(mg/kg\text{-}day)^{-1}$	1.1E-05
	Arsenic	3.70E+00	mg/kg	3.70E+00	mg/kg	M	1.3E-07	mg/kg-day	1.5E+00	$(mg/kg\text{-}day)^{-1}$	1.9E-07
											1.E-05
										Additional Dermal Risks	**1.E-05**

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

Dermal Absorption Fraction from Soil(ABS) (USEPA, July 2004):

PAHs - 0.13 Arsenic - 0.03

Total Recreational Soil Risk from 1996 RI	**4E-05**
Additional Dermal Risks	**1E-05**
Total Risk	**5E-05**