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U S NAVY RESPONSE TO THE U S EPA REGION I AND THE RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT COMMENTS REGARDING THE DRAFT FEASIBILITY STUDY REPORT FOR SITE 7, TANK FARM 1, OPERABLE UNIT 13 (OU 13) NS NEWPORT RI
12/23/2014
DEPARTMENT OF THE NAVY

Navy Responses to Regulatory Agency Comments
EPA Comments, October 28, 2014
RIDEM Comments, November 17, 2014

Draft Feasibility Study Report for Site 7 – Tank Farm 1, OU 13
NAVSTA Newport, RI

December 23, 2014

EPA General Comments:

EPA General Comment 1*: Although the FS focuses on the two area where soil risks were identified, explain whether the entire OU was investigated to determine if there were any exceedances of both CERCLA risk standards and any applicable ARARs standards in surface and subsurface soils. Explain how the remainder of Tank Farm 1 will be addressed under CERCLA.*

Response: The first paragraph of the Executive Summary has been revised to read, "This Feasibility Study (FS) report was prepared to address two exposure units based on discrete releases of Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) contaminants within Tank Farm 1 (Site 7, Operable Unit [OU] 13) at the Naval Station (NAVSTA) Newport, in Portsmouth, Rhode Island. This document was completed by Resolution Consultants (Resolution) for the U.S. Department of the Navy (Navy) and the Naval Facilities Engineering Command Mid-Atlantic (NAVFAC MIDLANT). The specific exposure units included in this FS consist of the Ethyl Blending Plant (EBP) (includes the EBP and associated previously designated Area of Concerns [AOCs] TF1-004, TF1-005, and TF1-018) and the Transformer Vaults (includes Transformer Vault 2 [TV2] and Transformer Vault 3 [TV3]). There are other areas within Tank Farm 1 with either completed or ongoing petroleum-related response actions. These include 10 former tanks (Tanks 9 through 18), fuel distribution piping and equipment, and other petroleum-related AOCs. As part of the CERCLA process, a Data Gaps Assessment (DGA) was completed for the EBP and the Transformer Vaults, which are the only areas within Tank Farm 1 that contain known or potential CERCLA releases and require assessment under the CERCLA process (Tetra Tech, 2014). During the DGA, no unacceptable risk to groundwater was identified. The DGA Report also concluded that no surface water bodies are close enough to the EBP or the Transformer Vaults to be impacted. Accordingly, this FS focuses exclusively on the chemicals of concern (COCs) in soil, identified in the DGA as requiring the consideration of a CERCLA response action, at the EBP and the Transformer Vaults.

After completing the FS process, the Navy intends to prepare a Proposed Plan and Record of Decision (ROD) for Tank Farm 1 (OU 13) that references the supporting information provided by the DGA report and this FS document."

Similarly, the first paragraph of Section 1.0 has been revised to read, "This Feasibility Study (FS) report presents the development and evaluation of remedial alternatives for two exposure units within Tank Farm 1 (Site 7, Operable Unit 13 [OU13]) (the Site), located within the Naval Station (NAVSTA) Newport, in Portsmouth, Rhode Island. The specific exposure units included in this FS consist of the Ethyl Blending Plant (EBP) (includes the EBP and associated previously designated Area of Concerns [AOCs] TF1-004, TF1-005, and TF1-018) and the Transformer Vaults (includes Transformer Vault 2 [TV2] and Transformer Vault 3 [TV3]). There are other

areas within Tank Farm 1 with either completed or ongoing petroleum-related response actions. These include 10 former tanks (Tanks 9 through 18), fuel distribution piping and equipment, and other petroleum-related AOCs. As part of the CERCLA process, a Data Gaps Assessment (DGA) was completed for the EBP and the Transformer Vaults, which are the only areas within Tank Farm 1 that contain known or potential CERCLA releases and require assessment under the CERCLA process (Tetra Tech, 2014). During the DGA, no unacceptable risk to groundwater was identified. The DGA Report also concluded that no surface water bodies are close enough to the EBP or the Transformer Vaults to be impacted. Accordingly, this FS focuses exclusively on the chemicals of concern (COCs) in soil, identified in the DGA as requiring the consideration of a CERCLA response action, at the EBP and the Transformer Vaults.

After completing the FS process, the Navy intends to prepare a Proposed Plan and Record of Decision (ROD) for Tank Farm 1 (OU 13) that references the supporting information provided by the DGA report and this FS document."

EPA General Comment 2: *The NCP criteria are intended to evaluate alternatives relative to one another. It is inappropriate to evaluate the alternatives individually against the criteria (Tables 3-2 to 3-6 and 4-1 to 4-4).*

Response: The evaluations conducted in Tables 3-2 to 3-6 and 4-1 to 4-4 are consistent with EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (Interim Final, October 1988) (See specifically Section 4.3.2 and Chapter 5.0). Note that a comparative analysis was also conducted as provided in Section 5.0 and Table ES-1.

EPA General Comment 3*: Details regarding the volumes of soil to be excavated for S-2 and S-4 should be specified in Chapter 4. It is currently unclear what soils will be left behind under S-2. Likewise, details regarding the costs of each alternative should be incorporated into the text of Chapter 4. Currently, it is challenging to evaluate the alternatives relative to one another because you have to refer to several other chapters, figures, and tables to glean relevant information. Also, some tables are mixed in with the figures, so the FS should be reviewed by a competent editor.*

Response: Due to the numerous components of this comment, Resolution Consultants has broken this comment into three sub-comments as follows:

a. *Details regarding the volumes of soil to be excavated for S-2 and S-4 should be specified in Chapter 4. It is currently unclear what soils will be left behind under S-2.*

The estimated area and volume of soil removal were added to the Detailed Description of Alternatives for Alternatives S-2, S-3, and S-4.

To address Alternative S-2, the second, third, and fourth paragraphs of Section 4.2.1 have been revised to read: "At the EBP, seven soil boring locations (TF1-EBP-SB1004, TF1-EBP-SB1012, TF1-EBP-SB1016, TF1-EBP-SB1017, TF1-EBP-SB1018, TF1-EBP-SB1020, and TF1-EBP-SB1036) exceed the Industrial PRGs. For the purpose of evaluating remedial alternatives, impacted areas totaling approximately 1,800 square feet or 0.04 acres are estimated, based on the data collected in the DGA report. The impacted volume of soil is estimated to be approximately 130 cubic yards based on a 2 foot depth of impact. Soil would remain onsite at concentrations greater than the Residential PRGs at the EBP; therefore, LUCs would be established to prevent

residential and unrestricted recreational use of the property, and thus prevent the exposure of such receptors to COCs in surface soil.

Two soil sample locations exceed the selected PRG for PCBs at the Transformer Vaults. At TV2, one soil location (TF1-EV2-E) exceeds the selected PRG for PCBs. At TV3, one soil location (TV3-SB1026) exceeds the selected PRG for PCBs. For the purpose of evaluating remedial alternatives, the extent of each exceedance is assumed to be limited to an area of 100 square feet (10 by 10 foot square). Assuming an impacted depth of 2 feet, the volume of soil is estimated to be approximately 10 cubic yards per area or 20 cubic yards in total. As part of the excavation at the Transformer Vaults, all PCB concentrations exceeding the PRG will be removed. Therefore, LUCs are not required at the Transformer Vaults. Details of each component of Alternative S-2 are as follows.

Soil Removal and Disposal – The goal of the removal is to address Industrial PRG exceedances at seven former sample locations at the EBP and the PRG exceedance for two former sample locations at the Transformer Vaults as described in the following paragraphs. The areas currently targeted for excavation are presented on Figures 8, 9, and 10 and estimated areas and volumes are provided below.

Exposure Unit	Area of Proposed Soil Removal (sq. feet)	Volume of Proposed Soil Removal (cubic yards)
EBP	1,800	130
TV2 and TV3	200	20

To address Alternative S-3, the second paragraph of Section 4.3.1 has been revised to read:
Soil Removal and Disposal – The goal of the removal is to address all surface soils that exceed the PRGs for the EBP and Transformer Vaults. The areas currently targeted for excavation are presented on Figures 8, 9, and 10 and estimated areas and volumes are provided below.

Exposure Unit	Area of Proposed Soil Removal (sq. feet)	Volume of Proposed Soil Removal (cubic yards)
EBP	5,200	400
TV2 and TV3	200	20

To address Alternative S-4, the second paragraph of Section 4.4.1 has been revised to read:
Soil Removal and Disposal – Prior to installation of the cover, soil removal will be performed to address RIDEM GA Leachability Criteria exceedances of naphthalene at two former sample locations at the EBP. In addition, soil removal will be performed to address the PRG for the Transformer Vaults at one sample location at TV2 and one sample location at TV3. The areas currently targeted for excavation are presented on Figures 8, 9, and 10 and estimated areas and volumes are provided below.

Exposure Unit	Area of Proposed Soil Removal (sq. feet)	Volume of Proposed Soil Removal (cubic yards)
EBP	800	60
TV2 and TV3	200	20

a. *Likewise, details regarding the costs of each alternative should be incorporated into the text of Chapter 4. Currently, it is challenging to evaluate the alternatives relative to one another because you have to refer to several other chapters, figures, and tables to glean relevant information.*

Additional cost details were added to the Section 4 text for Alternatives S-2, S-3, and S-4.

To address Alternative S-2, the last paragraph of Section 4.2.2 has been revised to read:

"Cost: As part of this alternative, costs are associated with the excavation, environmental sampling, implementation of LUCs, and five-year reviews. The cost associated with this alternative is summarized below. Note that costs associated with potential assessment/remediation of the soil beneath the EBP structure are not included since the details, including whether remediation will be needed, are not known. Additional details on the price breakdown are presented in Appendix C.

Cost Component	Present Value (PV) Cost
Capital Cost	
Land Use Control Remedial Design	$10,000
Delineation Soil Sampling	$38,460
Site Preparation and Management	$9,600
Excavation	$14,750
Soil Disposal	$17,705
Post-Construction	$17,500
Subtotal (including Contingency and Project Management)	$162,887
O&M Costs	
Annual LUC Site Inspections	$48,040
Periodic Annual Costs	
Five Year Reviews	$21,518
Total PV Cost of Alternative[1]	$232,000

[1] Rounded to the nearest $1,000"

To address Alternative S-3, the last paragraph of Section 4.3.2 has been revised as follows:

"Cost: The estimated cost associated with this alternative is presented below. Note that costs associated with potential assessment/remediation of the soil beneath the EBP structure are not included since the details, including whether remediation will be needed, are not known. Additional details on the price breakdown are presented in Appendix C.

Cost Component	PV Cost
Capital Cost	
Delineation Soil Sampling	$38,460
Site Preparation and Management	$22,240
Excavation	$41,200
Soil Disposal	$40,950
Post-Construction	$25,000
Subtotal (including Contingency and Project Management)	$253,118
O&M Costs	$0
Periodic Annual Costs	$0
Total PV Cost of Alternative[1]	$253,000

[1] Rounded to the nearest $1,000"

To address Alternative S-4, the last paragraph of Section 4.4.2 has been revised as follows:

"Cost: As part of this alternative, costs are associated with the excavation, containment, environmental sampling, implementation of LUCs, and five-year reviews. The cost associated with this alternative is presented below. Note that costs associated with potential assessment/remediation of the soil beneath the EBP structure are not included since the details, including whether remediation will be needed, are not known. Additional details on the price breakdown are presented in Appendix C.

Cost Component	Present Value (PV) Cost
Capital Cost	
Land Use Control Remedial Design	$10,000
Delineation Soil Sampling	$38,460
Site Preparation and Management	$27,240
Excavate and Construct Soil Cover	$54,460
Soil Disposal	$9,830
Post-Construction	$17,500
Subtotal (including Contingency and Project Management)	$241,590

Cost Component	Present Value (PV) Cost
O&M Costs	
Annual LUC Site Inspections and Cover Maintenance	$77,604
Periodic Annual Costs	
Five Year Reviews	$21,518
Total PV Cost of Alternative[1]	$341,000

[1] Rounded to the nearest $1,000"

a. *Also, some tables are mixed in with the figures, so the FS should be reviewed by a competent editor.*

A thorough QC of documents will be performed prior to subsequent versions.

EPA General Comment 4*: Include a tag map that depicts where PRGs are exceeded.*

Response: Analytes and corresponding concentrations for soil samples that exceeded PRGs have been added to Figures 6, 7, 9, and 10. The revised figures are attached.

EPA General Comment 5*: Consistent with the NCP at 40 CFR §300.430(e)(2)(i), remedial action objectives must include remediation goals. Remediation goals shall establish acceptable exposure levels that are protective of human health and the environment. According to RIDEM regulations, if recreational use is present (or may be present in the future) the human health RGs need to be based on residential risk standards. Please replace the RAOs accordingly.*

Response: The RAOs in Section 2.2 have been revised to read:

"The soil RAOs for the protection of human health at the EBP are:

- Prevent exposure by industrial and restricted recreational users to soil containing site contaminants that exceed industrial use scenario Preliminary Remediation Goals (PRGs).
- Prevent exposure by future residents and other unrestricted users to soil containing site contaminants that exceed residential use scenario PRGs.
- Prevent future migration of soil contaminants to groundwater (soil COCs above Rhode Island Department of Environmental Management [RIDEM] GA Leachability Criteria).

The soil RAOs for the protection of human health and the environment at the Transformer Vaults are:

- Prevent exposure by industrial users, restricted recreational users to soil containing site contaminants that exceed RIDEM Industrial/Commercial Direct Exposure Criteria (I/C DEC).
- Prevent exposure by future residents and other unrestricted users to soil containing site contaminants that exceed RIDEM Residential Direct Exposure Criteria (RDEC).

- Prevent future migration of soil contaminants to groundwater (soil COCs above RIDEM GA Leachability Criteria).
- Prevent exposure by insectivorous mammals and birds to soil containing COCs that exceed ecological PRGs."

EPA General Comment 6*: The Navy's proposed PRG of 10 mg/kg for PCBs does not adequately account for uncertainties in the magnitude and extent of PCB contamination and the risk calculation parameters and therefore is not acceptable. EPA calculated a central tendency preliminary remedial goal (PRG) for ecological risk from polychlorinated biphenyls (PCBs) as 3.4 milligrams per kilogram (mg/kg) based on an HQ of 1, an exposure area of 10% of the nominal home range, and a geometric mean of the NOAEL and LOAEL. Revise the ecological PRG for PCBs to 3.4 mg/kg and revise the scope of the FS accordingly.*

EPA's proposed PCB PRG recognizes the following uncertainties:

- *The home range of a receptor, such as a bird or mammal, is not an absolute. Reliable sources for home range values, including EPA's Exposure Factors Handbook, provide a range of values that vary by the habitat where the various studies were performed. For example, a shrew might have a small home range in a high-quality habitat where food is readily available. Conversely, the home range might be larger in a poor habitat that forces the animal to forage over a larger area. For Tank Farm 1, EPA proposes the use of 10% of the home range used in the initial assessment to address this uncertainty. The Navy changed the home range used in the initial SLERA and the Step 3A in the DGA report. EPA prefers to keep the home range consistent between SLERA and Step 3A. When two equally valid values are found in the literature, the mean of the two values could be used in a Step 3A refinement if such a change is explicitly described and justified. Changes to other exposure factors such as body weight should also be explicitly described and justified.*
- *The sampling does not justify assigning a contaminant concentration value to the nearest square foot. This is another reason to apply an uncertainty factor in developing a PRG. If the Navy cannot assure that future use will remain the same, it is possible that contaminants could be redistributed (e.g., re-grading of the site as part of removing structures). EPA's proposed PRG provides a degree of protectiveness for changes in future use.*
- *If the risk calculation, after application of Step 3A, determines that risk is possible, then the contaminants should be retained for consideration in the FS unless additional information or sampling supports another course of action.*

Response: The PRG calculation has been updated to reflect the use of an AUF of 10% and the geometric mean of the NOAEL and LOAEL. The FS has been revised to address a PRG of 3.4 mg/kg at the Transformer Vaults as indicated in other comment responses. The updated tables from the PRG development appendix (now Appendix A) are attached. The portion of Section 2.3 that addresses the Transformer Vaults has been revised to read:

"Based on the conclusion in the DGA to further assess Aroclor 1260 at TV2 and TV3, ecological PRGs have been developed for the site to prevent exposure to soils with site-related contaminant concentrations that may present risks to ecological receptors (see Table 2-3). Risk-

based PRGs were developed for insectivorous receptors exposed to PCBs in soil associated with the Transformer Vaults. Because the Transformer Vaults are the same size and because the PRG calculation is not based on site-specific uptake factors or toxicity values, the calculated PRGs are the same for both exposure areas.

Ecological risk-based PRGs were developed using the food web equations presented in the DGA report (Tetra Tech, 2014). The ecological risk-based PRGs developed in Appendix A correspond to a HQ of 1. PRGs were developed for two insectivorous receptors, the short-tailed shrew and the American robin based on the exposure assumptions (e.g., body weight, ingestion rate, bioaccumulation factor) used in the Tier 2, Step 3A food web model in the DGA report (Tetra Tech, 2014). PRGs were developed using the geometric mean of the toxicity reference values (TRVs) based on both no observed adverse effects levels (NOAELs) and lowest observed adverse effects levels (LOAELs). Due to the small size of the Transformer Vaults, it is assumed that the shrew and robin obtain only a portion of their diets from within the exposure area. Because the uptake factors and TRVs are the same for both Aroclor 1254 and Aroclor 1260, the PRGs are applicable to the Total PCB concentration in soil.

As indicated in Appendix A, PRGs are calculated for each receptor based on the geometric mean of the NOAEL- and the LOAEL-based TRVs and an area use factor (AUF) of 0.1 (assumes each receptor obtains 10% of their diet from the Transformer Vaults). Typically, risk managers consider the range of PRGs derived for multiple receptors and different levels of protection. Based on the small size of the Transformer Vaults, the low quality habitat available, and the conservative nature of the food web (i.e., use of NOAELs, exclusive invertebrate diet assumed), a PRG based on a NOAEL-based TRV would be overly protective. Therefore, the geometric mean of the NOAEL- and LOAEL-based TRVs was determined to be appropriate for the derivation of the PRGs. The lower of the PRGs derived for the short-tailed shrew and the American robin is recommended as the ecological PRG for PCBs. This corresponds to a value of 3.4 mg/kg which is the PRG derived based on the short-tailed shrew.

Although the human health risk assessment did not identify unacceptable risks for the Transformer Vaults, Table 11 of Appendix A and Table 2-3 also identifies a human health-based PRG based on applicability of ARARs. For PCBs, the RIDEM DEC (both residential and industrial/commercial) and GA Leachability Criteria are the same. As such, the PRG for PCBs was based on both criteria and is equal to 10 mg/kg. The lower of the human health and ecological PRGs for PCBs is selected as the applicable PCB PRG for the Transformer Vaults. The ecological PRG of 3.4 mg/kg based on the short-tailed shrew is lower than the human health-based PRGs. "

EPA Specific Comments:

Attachment A

EPA Specific Comment 1*: p. ES-i, ¶1 - If correct, at the end of the first paragraph add: "Outside of these two areas within the OU, no soil contamination above CERCLA risk or applicable or relevant and appropriate statutory/regulatory levels was identified. In addition, no groundwater risks were identified for the unrestricted use of groundwater." Also note whether there were any risks from exposure to any sediments or surface water within the OU.*

Response: Based on the comments presented in EPA General Comment 1 and Specific Comment 1, the first paragraph of the Executive Summary has been revised to read, "This Feasibility Study (FS) report presents the development and evaluation of remedial alternatives for two exposure units within Tank Farm 1 (Site 7, Operable Unit 13 [OU13]) (the Site), located within the Naval Station (NAVSTA) Newport, in Portsmouth, Rhode Island. The specific exposure units included in this FS consist of the Ethyl Blending Plant (EBP) (includes the EBP and associated previously designated Area of Concerns [AOCs] TF1-004, TF1-005, and TF1-018) and the Transformer Vaults (includes Transformer Vault 2 [TV2] and Transformer Vault 3 [TV3]). There are other areas within Tank Farm 1 with either completed or ongoing petroleum-related response actions. These include 10 former tanks (Tanks 9 through 18), fuel distribution piping and equipment, and other petroleum-related AOCs. As part of the CERCLA process, a Data Gaps Assessment (DGA) was completed for the EBP and the Transformer Vaults, which are the only areas within Tank Farm 1 that contain known or potential CERCLA releases and require assessment under the CERCLA process (Tetra Tech, 2014). During the DGA, no unacceptable risk to groundwater was identified. The DGA Report also concluded that no surface water bodies are close enough to the EBP or the Transformer Vaults to be impacted. Accordingly, this FS focuses exclusively on the chemicals of concern (COCs) in soil, identified in the DGA as requiring the consideration of a CERCLA response action, at the EBP and the Transformer Vaults."

EPA Specific Comment 2*: p. ES-i, ¶2 - Identify how DLA Energy used the site. Were either the ethyl blending plant or the transformer vaults used by DLA Energy (see also §1.3)?*

Response: The last sentence has been revised to read, "DLA Energy continued to use the site as a fuel storage area and distribution facility until operations were terminated in 1998."

EPA Specific Comment 3*: p. ES-ii - Regarding the RAO bullets, is there any subsurface soil exceeding unrestricted use standards below 2 feet? The RI Remediation Standards for residential exposure and the leachability standards apply throughout the vadose zone. RAOs should be for all soils, not just surface soils.*

Response: Based on additional comments received by the EPA and RIDEM, the RAO text has been revised. Please refer to the response to EPA General Comment 5 for the revised text which accounts for application of RIDEM criteria throughout the vadose zone. Note also that no PRGs were selected for subsurface soil and that the selected surface soil PRGs were not exceeded in any subsurface soil samples.

EPA Specific Comment 4*: p. ES-ii, bullet 1 - Replace "ARARs" with "Applicable or Relevant and Appropriate Requirements (ARARs)."*

Response: Based on additional comments received by the EPA and RIDEM, the RAO text has been revised. Please refer to the response to EPA General Comment 5 for the revised text.

EPA Specific Comment 5*: p. ES-ii, ¶2 - Replace "Applicable or Relevant and Appropriate Requirements (ARARs)" with "ARARs."*

Response: Based on additional comments received by the EPA and RIDEM, the RAO text has been revised. Please refer to the response to EPA General Comment 5 for the revised text.

EPA Specific Comment 6*: p. ES-iii, Table - Identify whether subsurface soil exceeds industrial and residential direct contact standards. Leachability standards apply to all soil down to the groundwater.*

Response: The text has been revised to read, "At the EBP, soil concentrations were compared to the industrial and residential PRGs. No residential or industrial PRGs were developed for subsurface soil based on comparison of maximum subsurface soil concentrations to ARARs and background concentrations. The following text discusses the impacted area for each land use scenario (industrial and residential)."

EPA Specific Comment 7*: p. ES-iv, Table - The TSCA risk-based standard for unrestricted use is generally 1 ppm.*

Response: As noted in the Action-Specific ARARs tables for each alternative, 40 CFR 761.61(c) of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, USEPA Region 1. It is not necessary to default to 1 ppm. As an example of a Superfund site in Rhode Island where this approach is being used, refer to the recent Proposed Plan for the Peterson Puritan Superfund Site. For the Peterson Puritan site, a PCB cleanup level for soil of 10 ppm was determined to not pose an unreasonable risk to human health or the environment based on the results of human health and ecological risk assessment.

For the Transformer Vaults at Tank Farm 1, the human health risk assessment concluded that there was no unacceptable risk associated with surface soil. An ecological risk-based goal was developed in the draft FS and has been further modified based on EPA's request for changes in certain exposure assumptions. The ecological risk-based goal is the basis for the selected PRG for PCBs in surface soil at the Transformer Vaults. Based on the results of the human health and ecological risk assessments and taking into account the more conservative exposure assumptions requested by EPA, the selected PRG will not result in an unreasonable risk of injury to human health or the environment.

EPA Specific Comment 8*: p. ES-iv - In the description of the remedial alternatives, clarify whether all soil (surface and subsurface) exceeding leachability standards will be removed. If not, explain how remaining leachability exceedances will be addressed (e.g., an impermeable cap/cover with LUCs and long-term monitoring).*

For Alternative S-2, clarify whether two feet of clean cover material will be used to backfill in the excavation and serve as a cover over any subsurface soils that exceed industrial or residential PRGs. Add LUCs and long-term monitoring to ensure the protectiveness of the cover.

For Alternative S-2, would the LUC component of the remedy also include "…Short-term LUCs would likely be required until the ethyl blending plant structure is demolished and the soil beneath the building can be assessed and remediated, if necessary…" (as included in Alternative S-3)? Will the ethyl blending plant structure be removed separately from the CERCLA process or as part of Alternative S-3?

Response: Due to the numerous components of this comment, Resolution Consultants has broken this comment into three sub-comments as follows:

a. *p. ES-iv - In the description of the remedial alternatives, clarify whether all soil (surface and subsurface) exceeding leachability standards will be removed. If not, explain how remaining leachability exceedances will be addressed (e.g., an impermeable cap/cover with LUCs and long-term monitoring).*

All naphthalene concentrations in subsurface soil were well below the RIDEM GA Leachability Standards (maximum concentration of 6 µg/kg J). Alternatives S-2, S-3, and S-4 all include excavation and off-site disposal of soil exceeding RIDEM GA Leachability Criteria. For additional clarification, the phrase "(includes removal of all soils exceeding RIDEM GA Leachability Criteria)" has been added to the end of each bullet that addresses soil excavation.

a. *For Alternative S-2, clarify whether two feet of clean cover material will be used to backfill in the excavation and serve as a cover over any subsurface soils that exceed industrial or residential PRGs. Add LUCs and long-term monitoring to ensure the protectiveness of the cover.*

The first paragraph of the Remedial Alternatives text has been revised to read, "Per the stepwise CERCLA process for the development of remedial alternatives, four alternatives were defined, retained, and evaluated in detail in the FS. Since human health or ecological PRGs were not developed for subsurface soil based on comparison of maximum subsurface soil concentrations to ARARs and background, there are no remedial actions required for subsurface soil."

As such, a cover is not required. No changes were made to the Alternative S-2.

a. *For Alternative S-2, would the LUC component of the remedy also include "…Short-term LUCs would likely be required until the ethyl blending plant structure is demolished and the soil beneath the building can be assessed and remediated, if necessary…" (as included in Alternative S-3)? Will the ethyl blending plant structure be removed separately from the CERCLA process or as part of Alternative S-3?*

Alternatives S-2 and S-4 were revised to include the following text, "Short-term LUCs, to include maintenance of the EBP structure foundation, would also be required until the EBP structure is demolished and the soil beneath the building can be assessed and remediated, if necessary. Demolition of this building is not considered part of the remedy." Other sections of the text were revised as appropriate to include short-term LUCs as part of Alternative S-2 and S-4.

EPA Specific Comment 9*: p. ES-iv, ¶1 - The Navy's proposed PRG of 10 mg/kg for PCBs does not adequately account for uncertainties in the magnitude and extent of PCB contamination and the risk calculation parameters and therefore is not acceptable. Part of the uncertainty concerns potential future site uses that could result in contaminants redistributed over an area that could comprise a larger proportion of a receptors home range. EPA calculated a central tendency preliminary remedial goal (PRG) for ecological risk from polychlorinated biphenyls (PCBs) as 3.4 milligrams per kilogram (mg/kg) based on an HQ of 1, an exposure area of 10% of the nominal home range, and a geometric mean of the NOAEL and LOAEL. Revise the ecological PRG for PCBs to 3.4 mg/kg and revise the scope of the FS accordingly.*

Response: The PRG calculation has been updated to reflect the use of an AUF of 10% and the geometric mean of the NOAEL and LOAEL. The FS has been updated accordingly to reflect the new PRG of 3.4 mg/kg based on the short-tailed shrew as described in other comment responses. The Executive Summary text has been updated as follows:

"Transformer Vaults

Two soil sample locations exceed the selected PRG for PCBs at the Transformer Vaults. At TV2, one surface soil sample (TF1-EV2-E) has a PCB concentration greater than the PRG. The sample is located directly east of the door. At TV3, one soil location (TV3-SB1026) exceeds the selected PRG for PCBs. This sample location is also located directly east of the door. PCBs were not detected in subsurface soil samples. For the purpose of evaluating remedial alternatives, the extent of each exceedance is assumed to be limited and an area of 100 square feet (10 by 10 foot square) is estimated per area. Assuming an impacted depth of 2 feet, the volume of soil is estimated to be approximately 10 cubic yards per area or 20 cubic yards.

Preliminary Remedial Goal for the Transformer Vaults

Soil Parameter	PRG (mg/kg)	Regulatory Basis
PCBs	3.4	Ecological Risk-Based Goal

Notes:
mg/kg – Milligrams per kilogram"

EPA Specific Comment 10*: p. ES-iv, last bullet - As previously discussed, for Alternative S-3, all surface and subsurface soil that exceeds both residential/industrial and leachability standards will need to be removed (otherwise the alternative needs to maintain a cover over the soils [impermeable cover over any subsurface soil exceeding leachability standards to be left in place] and LUCs and long-term monitoring to prevent disturbance of the cover and underlying contaminated subsurface soils). If subsurface soils exceeding leachability standards are to be left in place then long-term monitoring will be required to confirm the alternative is protective in preventing contaminant migration to the groundwater.*

Response: The first paragraph of the Remedial Alternatives text has been revised to read, "Per the stepwise CERCLA process for the development of remedial alternatives, four alternatives were defined, retained, and evaluated in detail in the FS. Since human health or ecological PRGs were not developed for subsurface soil based on comparison of maximum subsurface soil concentrations to ARARs and background, there are no remedial actions required for subsurface soil."

As such, LUCs and long-term monitoring are not required for Alternative S-3. No changes were made to the text.

EPA Specific Comment 11*: p. ES-v, bullet 1 - All surface soil that exceeds the TSCA 1 ppm standard needs to be removed (otherwise the alternative needs to maintain a protective cover over any PCB contaminated soil left in place and LUCs need to be maintained).*

If the demolition of the ethyl blending plant structure is a required component of this alternative, include a bullet to describe what will be done.

Response: With regards to the TSCA PCB standards, please refer to the response to EPA Specific Comment 7.

The demolition of the EBP structure is not a required component of any alternative. The following text has been added to the bullets for Alternatives S-2, S-3, and S-4: "Demolition of this building is not considered part of the remedy." The text in Sections 3 and 4 has also been revised to clarify.

EPA Specific Comment 12*: p. ES-v, bullet 6 - For the Alternative S-4 LUC description, explain whether maintenance of the ethyl blending plant structure will be part of the cover and therefore included in the LUC requirements. Add long-term monitoring for the cover.*

Response: The bullet for Alternative S-4 has been revised as follows, "LUCs at the EBP to prevent disturbance of the soil cover and access to underlying contaminated soils and long-term maintenance of the cover. Short-term LUCs, to include maintenance of the EBP structure foundation, would also be required until the EBP structure is demolished and the soil beneath the building can be assessed and remediated, if necessary. Demolition of this building is not considered part of the remedy." With respect to long-term monitoring for the cover, there will be no source material below the cover which is above leachability criteria, thereby negating the need for groundwater monitoring. However, long-term maintenance of the cover will be performed to maintain protectiveness. Costs for this have been included in the alternative.

EPA Specific Comment 13: *p. ES-vi, Table -*

a. *Incorporate previous comments into the Table.*

b. *Alternative S-1 is not protective because it does not address leachability exceedances in the soil.*

c. *Based on the current description of Alternative S-2, it is unclear whether it is protective (see previous questions concerning whether subsurface soils will be addressed by this alternative). It is therefore unclear whether Alternative S-2 complies with ARARs.*

d. *Alternative S-3 will be protective only if all surface and subsurface soil exceeding industrial/residential and leachability standards is removed, along with all soil that exceeds 1 ppm of PCBs in the transformer vault area. Therefore, it is unclear whether Alternative S-3 complies with ARARs.*

e. *Based on the current description of Alternative S-4 it is unclear whether any subsurface soil that exceed leachability standards will remain. An impermeable cover will be needed to address the leachability exceedance, with LUCs and long-term groundwater monitoring. Therefore, it is unclear whether Alternative S-4 complies with ARARs.*

Response:

Table ES-1 has been revised based on the comments received from the EPA and RIDEM and is attached.

a. The Overall Protection of Human Health and the Environment text has been revised to read, "Alternative S-1 would not be protective of human health because contact with contaminated soil would not be prevented. Additionally, Alternative S-1 would not be protective of groundwater because it does not address RIDEM GA Leachability Criteria exceedances in soil."

b. The Overall Protection of Human Health and the Environment text has been revised to read, "Alternative S-2 removes all soil that exceeds the Industrial PRGs at the EBP and the PRGs at the Transformer Vaults (includes removal of all soils exceeding RIDEM GA Leachability Criteria). Alternative S-2 requires implementation of LUCs, which add protection to human health. Alternative S-2 is slightly more protective than Alternative S-4."

c. The Overall Protection of Human Health and the Environment text has been revised to read, "Alternative S-3 removes all soil that exceeds the Residential and Industrial PRGs at the EBP as well as the PRGs at the Transformer Vaults (includes removal of all soils exceeding RIDEM GA Leachability Criteria). Alternative S-3 is considered the most effective at protecting human health and the environment. Under Alternative S-3, all contaminated soil is removed from the site; thereby, allowing unrestricted use at the site."

   With regards to the TSCA PCB standards, please refer to the response to EPA Specific Comment 7.

d. The Overall Protection of Human Health and the Environment text has been revised to read, "Alternative S-4 removes all soil that exceeds the RIDEM GA Leachability Criteria. Alternative S-4 is slightly less protective than Alternative S-2 since soil exceeding the Industrial PRGs remains in place. Although contaminated soil remains in place, the soil cover would prevent direct contact, erosion, and transport of remaining surface soil exceeding residential PRGs."

EPA Specific Comment 14*: p. 1, §1.1 - Discuss any risk assessments that show whether there is risk from drinking the groundwater within the OU. Explain whether the entire OU was evaluated to determine that there were no exceedances of risk or ARARs bases soil standards in the surface and subsurface soils, except in the ethyl blending plant and transformer vault areas. Also, describe whether there were any risks identified from exposure to any sediments or surface water within the OU.*

Response: The first paragraph of Section 1.0 has been revised to read, "This Feasibility Study (FS) report presents the development and evaluation of remedial alternatives for two exposure units within Tank Farm 1 (Site 7, Operable Unit 13 [OU13]) (the Site), located within the Naval Station (NAVSTA) Newport, in Portsmouth, Rhode Island. The specific exposure units included in this FS consist of the Ethyl Blending Plant (EBP) (includes the EBP and associated previously designated Area of Concerns [AOCs] TF1-004, TF1-005, and TF1-018) and the Transformer Vaults (includes Transformer Vault 2 [TV2] and Transformer Vault 3 [TV3]). There are other areas within Tank Farm 1 with either completed or ongoing petroleum-related response actions. These include 10 former tanks (Tanks 9 through 18), fuel distribution piping and equipment, and other petroleum-related AOCs. As part of the CERCLA process, a Data Gaps Assessment (DGA) was completed for the EBP and the Transformer Vaults, which are the only areas within

Tank Farm 1 that contain known or potential CERCLA releases and require assessment under the CERCLA process (Tetra Tech, 2014). During the DGA, no unacceptable risk to groundwater was identified. The DGA Report also concluded that no surface water bodies are close enough to the EBP or the Transformer Vaults to be impacted. Accordingly, this FS focuses exclusively on the chemicals of concern (COCs) in soil, identified in the DGA as requiring the consideration of a CERCLA response action, at the EBP and the Transformer Vaults."

EPA Specific Comment 15*: p. 4, §1.3.3 - Describe the investigations conducted throughout the OU to show there were no other areas within the OU with CERCLA exceedances.*

Response: The first paragraph of Section 1.3.3 has been revised to read, "As discussed in Section 1.0, the EBP and the Transformer Vaults are the only areas within Tank Farm 1 that contain known or potential CERCLA releases. As such, this FS focuses exclusively on the EBP and Transformer Vaults and the chemicals of concern (COCs) in soil requiring the consideration of a CERCLA response action. Previous investigations as they relate specifically to the EBP and Transformer Vaults at Tank Farm 1 include the 2010 Site Investigation and Remedial Action Report (Shaw, 2010) and 2012-2013 Data Gaps Assessment (DGA; Tetra Tech, 2014)."

EPA Specific Comment 16*: p. 5, ¶¶4&5 - Discuss the results of the subsurface soil sampling.*

Response: Based on RIDEM Specific Comment 21, the details of the DGA findings have been removed from the Section 1.3.3. The results of the previous investigations, which include the subsurface soil sampling, are presented and discussed, as requested, in Section 1.3.5, Nature and Extent of Contamination. Refer to the response to EPA Specific Comment 19 for the revised Section 1.3.5 text.

EPA Specific Comment 17*: p. 6, ¶4 - At the end of the paragraph, add: "The groundwater is classified as a drinking water source based on federal criteria."*

Response: The requested sentence has been added.

EPA Specific Comment 18*: p. 6, ¶5 - Discuss whether there are any wetlands (federal or state jurisdictional) or floodplain within the OU.*

Response: The last sentence of the fifth paragraph of Section 1.3.4 has been revised as follows, "No federal or state jurisdictional wetlands are present within the Tank Farm 1 boundary. Additionally, the Tank Farm 1 site is not located within the 100-year flood zone."

EPA Specific Comment 19*: p. 7, ¶¶2-3 - Identify whether the contaminants identified in the surface and subsurface soil were above risk-based criteria or ARARs.*

Response: The summary of nature and extent of contamination in Section 1.3.5 is a summary of the nature and extent discussion presented in the DGA Report, as indicated at the beginning of the section. It is premature to discuss ARARs in this section, since they are not presented until Section 2.0 of the report. Section 1.3.5 has been revised to discuss the nature and extent of contamination in relation to the DGA screening criteria. The text has been revised to read:

"A summary of the nature and extent of contamination at the EBP and TV2 and TV3 is presented below. As part of the DGA (Tetra Tech, 2014), soil sample results were initially

compared to background concentrations and RSLs. Groundwater sample results were compared to RSLs and Maximum Contaminant Levels (MCLs). The following text discusses the nature and extent of contamination in relation to the DGA screening criteria.

EBP

The locations of soil borings and monitoring wells in the vicinity of the EBP are shown on Figure 3. Analytical data tables containing the surface soil, subsurface soil, and groundwater analytical data are presented in the DGA Report (Tetra Tech, 2014). A total of 32 surface soil samples and 24 subsurface samples were taken from 29 soil borings in the vicinity of the EBP, including the areas referred to in the DGA Report as AOCs TF1-004, TF1-005, and TF1-018.

Chemicals detected in one or more surface soil sample included 5 VOCs, 22 SVOCs (primarily PAHs), 23 metals, TPH, and GRO.

- All VOC concentrations were below the EPA RSLs. Of the VOCs detected, carbon disulfide and 1,2,3-trichlorobenzene were detected in just one sample each at trace concentrations, while acetone (a common laboratory contaminant) was detected in all 32 surface soil samples. Methyl acetate and 2-butanone were detected at relatively low concentrations in roughly two-thirds of the surface soil samples collected.
- Of the SVOCs detected, the PAH compounds were detected at the highest concentrations and in the greatest number of samples (roughly two-thirds to all of the surface soil samples). Six PAHs, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthrancene, and indeno(1,2,3-cd)pyrene, were detected at concentrations greater than their respective RSLs in surface soil.
- Metals were detected in all surface soil samples. As part of the DGA Report, EBP soil data were compared to background concentrations identified from the NAVSTA Newport Basewide Background Study (Tetra Tech, 2008) for inorganics in different soil types. The background comparison indicated the surface soil background concentrations for antimony, silver, sodium, and thallium were all non-detect. Therefore, statistical comparison of site surface soil data to background data for these metals was not conducted. The background comparison concluded that EBP surface soil concentrations of arsenic, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, vanadium, and zinc were found to be statistically greater than background concentrations. Of those analytes, arsenic, chromium, cobalt, iron, manganese, and thallium were detected at concentrations above their respective RSLs.
- TPH were detected in nearly all surface soil samples, while GRO were detected in just 4 surface soil samples at low concentrations. TPH, which is not regulated under CERCLA, was compared to the RIDEM Residential Direct Exposure Criteria of 500 mg/kg and there were no exceedances.

The chemicals detected in subsurface soil were similar to those detected in surface soil, however, the concentrations and frequency of detection of individual PAHs and TPH were lower.

- Three PAHs, benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene, were detected at concentrations greater than their respective RSLs in subsurface soil.

- Metals were detected in all subsurface soil samples. The subsurface soil background concentrations for antimony, silver, sodium, and thallium were non-detect and cadmium concentrations were only detected in two background samples. Therefore, statistical comparison of site data to background data for these metals was not conducted. The background comparison concluded that subsurface soil concentrations of aluminum, arsenic, beryllium, calcium, chromium, cobalt, copper, lead, mercury, nickel, vanadium, and zinc were found to be greater than background concentrations. Of these metals, aluminum, arsenic, chromium, cobalt, and thallium were detected above their respective RSLs.
- Analytical results indicated VOCs, GRO, and TPH were detected in subsurface soil at concentrations below comparison criteria.

The distribution of selected PAHs and metals in surface and subsurface soil were plotted on figures in the DGA Report. As shown on these plots, the PAH concentrations tend to decrease with increasing distance from the EBP and also decrease with increasing sample depth. Because of this pattern, the DGA Report (Tetra Tech, 2014) concluded that the PAH contamination is most likely attributable to activities that occurred during former operations at the EBP. The presence of PAHs could be a result of engine idling, operation of the heating system at the plant, use of lubricants, etc. Note that elevated PAH concentrations were detected in the surface soil samples from location EBP-MW-GT-124R, which is located adjacent to an asphalt roadway and relatively far from the EBP. These concentrations are thought to be the result of the boring's close proximity to the asphalt roadway and not the result of releases associated with the EBP. The DGA report concluded that the data does not indicate discharges or spills of TEL or ethyl fluid, since the primary components of that fluid (TEL, EDB, and EDC) were not found in quantity. Metals detections were widespread across the sample locations, did not show a pattern of increased concentration with proximity to the EBP, and appeared to be equally dispersed throughout the area. The DGA Report concluded that metals were not likely the result of any localized spill or any other types of releases that might have occurred during former operations at the EBP. Therefore, the metals are not considered to be attributable to site conditions (Tetra Tech, 2014). Note also that chromium speciation was not evaluated (only total chromium was analyzed); however, hexavalent chromium is not expected to be present based on the site history.

Four monitoring wells were installed around the EBP, with a single well upgradient (MW1001) and three wells down gradient (MW1000, MW-GZ-101R, and MW-GT-124R). Groundwater samples were collected in August 2012 and analyzed for VOCs, EDB/DBCP, SVOCs, PAHs, and metals. In groundwater samples from the downgradient monitoring wells, 4 VOCs were detected in one well (MW1000) at trace concentrations, 3 SVOCs were detected in one to two wells each, and 17 metals were detected in filtered and unfiltered groundwater samples. At the downgradient wells, benzene, benzo(b)fluoranthene, cobalt, iron, and manganese concentrations were detected above EPA RSLs. However, concentrations of cobalt, iron, and manganese were less than upgradient groundwater concentrations. None of the detected concentrations exceeded the federal MCLs.

Transformer Vaults

The locations of soil borings in the vicinity of the TV2 and TV3 are shown on Figures 4 and 5, respectively. Analytical data tables containing the surface soil and subsurface soil analytical data presented in the DGA Report (Tetra Tech, 2014).

During the 2010 sampling event, one surface soil sample (0 to 0.5 ft bgs) was collected from each transformer vault and analyzed for PCBs. During the initial DGA sampling event, soil samples were collected from the surface interval (0 to 1 feet bgs) and the subsurface (2 to 4 feet bgs). Samples were analyzed for GRO, PCBs, and TPH. During the supplemental sampling in October 2013, soil samples were collected from the surface interval (0 to 1 feet bgs) and were analyzed for PCBs only.

At TV2, Aroclor 1260, GRO, and TPH were detected in surface soil. GRO was detected in 2 of 6 surface soil samples at concentrations below the RIDEM Residential Direct Exposure Criteria (RDEC). TPH was detected in all of the 6 surface soil samples analyzed, but at concentrations below the RIDEM RDEC. Aroclor 1260 was detected in the 2010 surface soil sample (see 2010 Site Investigation and Remedial Action Report discussion above) and in 5 of the 11 surface soil samples collected during the DGA. The Aroclor 1260 detections were located east and north of TV2. Aroclor 1260 was detected at concentrations exceeding the RSL of 220 µg/kg. Sample concentrations ranged from 180 µg/kg to 24,000 µg/kg. The concentrations of Aroclor 1260 are higher near the eastern part of the building, with the highest concentration located just outside the door. PCBs were not detected in subsurface soil at TV2.

At TV3, Aroclor 1260, Aroclor 1254, GRO, and TPH were detected in surface soil. GRO was detected in 1 of the 6 surface soil samples at concentrations below the RIDEM RDEC. TPH was detected in 5 of the 6 surface soil samples analyzed, but at concentrations below the RIDEM RDEC. Aroclor 1260 was detected in 8 of the 9 surface soil samples collected during the 2010 sampling event (see 2010 Site Investigation and Remedial Action Report discussion above) and the DGA. Aroclor 1260 was detected at concentrations exceeding the RSL of 220 µg/kg. Aroclor 1260 was detected at a maximum concentration of 4300 µg/kg at SB1026. In addition, Aroclor 1254 was detected in one surface soil sample. The concentrations of Aroclor 1260 are higher near the eastern part of the building, with the highest concentration located just outside the door. PCBs were not detected in subsurface soil at TV3."

EPA Specific Comment 20*: p. 8, ¶1 - If the metals are the result of Navy operations, they need to be addressed if they exceed risk-based criteria or ARARs.*

Response: Although the DGA Report concludes that the detected metals in soil are not considered attributable to site conditions, metals were still addressed during the development of PRGs for soil. No change has been made based on this comment.

EPA Specific Comment 21*: p. 8, §1.3.5, ¶2 - Please identify what metals exceeded the background concentrations instead of listing only those metals that did not exceed background.*

Response: The text has been revised to list the metals that exceeded background. Please refer to the response to EPA Specific Comment 19 for the revised text.

EPA Specific Comment 22*: p. 8, ¶3 - State whether any of the groundwater contaminants exceeded MCLGs, federal risk-based standards (i.e., for manganese), or more stringent State GA standards.*

Response: Section 1.3.5 has been revised to discuss the nature and extent of contamination in relation to the DGA screening criteria. Comparison to the MCLG and RIDEM GA Groundwater Objectives was not performed since this was not considered screening criteria in the DGA Report. Please refer to the response to EPA Specific Comment 19 for the revised text.

EPA Specific Comment 23*: p. 9, ¶4 - If the metals are from any Navy operations - either directly or indirectly - they should be discussed in more detail here.*

Response: Based on RIDEM Specific Comment 28 and EPA Specific Comment 23, the paragraph has been revised to read: "Detections of metals in the surface soils, subsurface soil, and groundwater exhibit no apparent association with specific areas. The nature of metals exceedances across the Site lend evidence to the fact that high metals concentrations are not likely the result of any localized spill or any other types of localized releases that might have occurred during former operations at the EBP. Therefore, these metals are not considered to be attributable to site conditions. All soil samples were compared to the RIDEM GA Leachability Criteria. The RIDEM GA Leachability Criteria demonstrates that soil concentrations below the leachability criterion are protective of the actual and potential uses of groundwater. With the exception of naphthalene, all soil sample concentrations were below the RIDEM GA Leachability Criteria. Two VOCs were detected in the groundwater but were not present in any of the soil samples. The VOC concentrations and the nickel concentrations further support that there is minimal leaching between the surface soils and groundwater."

EPA Specific Comment 24*: p. 10, ¶1 - Discuss the exceedances of leachability standards and how they relate to groundwater within the OU.*

Response: Please refer to the response to EPA Specific Comment 23 for the revised text.

EPA Specific Comment 25*: p. 10, §1.3.7 - Discuss any human health risk-assessments conducted throughout the OU. Discuss the basis for determining there were no CERCLA risks within the OU outside of the ethyl blending plant and transformer vault areas. Discuss any risk exceedances in the subsurface soil.*

Response: Section 1.0 discusses the rationale for not including other areas within the OU as well as the justification for only addressing surface soil. The first paragraph of Section 1.0 has been revised to read, "This Feasibility Study (FS) report presents the development and evaluation of remedial alternatives for two exposure units within Tank Farm 1 (Site 7, Operable Unit 13 [OU13]) (the Site), located within the Naval Station (NAVSTA) Newport, in Portsmouth, Rhode Island. The specific exposure units included in this FS consist of the Ethyl Blending Plant (EBP) (includes the EBP and associated previously designated Area of Concerns [AOCs] TF1-004, TF1-005, and TF1-018) and the Transformer Vaults (includes Transformer Vault 2 [TV2] and Transformer Vault 3 [TV3]). There are other areas within Tank Farm 1 with either completed or ongoing petroleum-related response actions. These include 10 former tanks (Tanks 9 through 18), fuel distribution piping and equipment, and other petroleum-related AOCs. As part of the CERCLA process, a Data Gaps Assessment (DGA) was completed for the EBP and the Transformer Vaults, which are the areas within Tank Farm 1 that contain the only

known or potential CERCLA releases, and require assessment under the CERCLA process (Tetra Tech, 2014). Accordingly, this FS focuses exclusively on the EBP and the Transformer Vaults and the chemicals of concern (COCs) in surface soil identified in the DGA as requiring the consideration of a CERCLA response action. No unacceptable risk to other environmental media (i.e., subsurface soil, groundwater, etc.) was identified during the DGA. Additionally, outside of these two areas within the OU, no soil contamination above CERCLA risk or applicable or relevant and appropriate statutory/regulatory levels was identified."

No changes have been made to Section 1.3.7.

EPA Specific Comment 26*: p. 11, §1.3.8 - Discuss any ecological risk-assessments conducted throughout the OU. Discuss the basis for determining there were no CERCLA ecological risks within the OU outside of the ethyl blending plant and transformer vault areas.*

Response: See response to EPA Specific Comment 25. No changes were made to Section 1.3.8 based on this comment.

EPA Specific Comment 27*: p. 12, ¶2 - Explain why no ecological COPCs were retained for further evaluation.*

Response: Based on the several comments received, the Transformer Vaults text has been revised to read:

"Based on the initial screening of the chemical data (Tier 1 screening), one PCB and two petroleum hydrocarbons were initially selected as COPCs at TV2. Two PCBs and two petroleum hydrocarbons were initially selected as COPCS at TV3.

PCBs (specifically Aroclor 1260) were detected in 6 of 12 samples from TV2 with a large difference between the maximum concentration (24,000 µg/kg at TF1-EV2-E) and the next highest concentration (1,000 µg/kg at TF1-TV2-SB1028). Detected concentrations of Aroclor 1260 in other samples from TV2 were ≤ 260 µg/kg, and are considered to generally bound the extent of PCBs in soil at TV2 (Tetra Tech, 2014). PCBs (specifically Aroclor 1260) were also detected in 8 of 9 samples from TV3. Aroclor 1260 concentrations ranged from 26 µg/kg (TF1-TV3-SB1031) to 4,300 µg/kg (TF1-TV3-SB1026).

These chemicals were then further evaluated (Tier 2, Step 3A screening) to refine the list of COPCs, and to better characterize risks to ecological receptors. At the Transformer Vaults, no chemicals were retained as COPCs for further evaluation for terrestrial plants, soil invertebrates, and herbivorous wildlife. However, the DGA report concluded that considering (1) the disparity between the maximum Aroclor 1260 concentrations and the rest of the data; and (2) the uncertainty associated with determining population-level risks in an area that comprises a small percent of the home range, the localized areas associated with the maximum Aroclor-1260 concentrations should be addressed to protect insectivorous receptors in the future if the soil is spread over a larger area because of site activities. Therefore the recommended SMDP is to further evaluate these localized areas associated with TV2 and TV3 for the insectivorous wildlife endpoints in a FS."

EPA Specific Comment 28*: p. 12, §1.3.8, ¶4 - Please discuss the PCB results for transformer vault 3, as was done for transformer vault 2 and make the same change to Section 1.3.9.*

Response: The text has been revised accordingly. Please refer to the response to EPA Specific Comment 27 for the revised text.

EPA Specific Comment 29*: p. 12, §1.3.8, ¶5 - EPA has not accepted the DGA report conclusion that PCBs do not pose a significant risk to ecological receptors. This paragraph must be rewritten to address EPA's requirement to establish a more conservative risk-based ecological PRG for PCBs that supersedes the RIDEM direct exposure criterion. Transformer vaults 2 and 3 should both be discussed in this context. Make the same change to Section 1.3.9.*

Response: Please refer to the response to EPA Specific Comment 27 for the revised text in Section 1.3.8. The Summary of Risks discussion in Section 1.3.9 has been revised to read:

"Summary of Risks: Aroclor 1260 was detected in 6 of 12 samples from TV2 with a large difference between the maximum concentration (24,000 µg/kg at TF1-EV2-E) and the next highest concentration (1,000 µg/kg at TF1-TV2-SB1028). Detected concentrations of Aroclor 1260 in other samples from TV2 were ≤ 260 µg/kg, and are considered to generally bound the extent of PCBs in soil at TV2. PCBs (specifically Aroclor 1260) were also detected in 8 of 9 samples from TV3. Aroclor 1260 concentrations ranged from 26 µg/kg (TF1-TV3-SB1031) to 4,300 µg/kg (TF1-TV3-SB1026) (Tetra Tech, 2014). Current and potential future exposures to surface and subsurface soil and groundwater at the Transformer Vaults did not result in an unacceptable human health risk.

As discussed in Section 1.3.8, the DGA report concluded that the localized areas associated with the maximum Aroclor 1260 concentrations at TV2 and TV3 should be further addressed to protect insectivorous receptors in the future if soil is spread over a larger area because of site activities."

EPA Specific Comment 30*: p. 13, ¶1 - If the metals are the result, either directly or indirectly, from any Navy operations they should be discussed in more detail here.*

Response: The current text regarding metals is consistent with the Final DGA Report. No change is proposed. Although the DGA Report concludes that the detected metals in soil are not considered attributable to site conditions, metals were still addressed during the development of PRGs for soil later in the report.

EPA Specific Comment 31*: p. 13, §1.3.9, ¶1 - Please supplement the last sentence with: "… samples; however, the concentrations did not result in any excess risk."*

Response: The requested edit has been made.

EPA Specific Comment 32*: p. 13, §1.3.9, ¶4 - Please clarify that surface soil contamination at the ethyl blending plant also exceeded the RIDEM industrial/commercial direct exposure criteria (I/C DEC).*

Response: The intent of this paragraph was to provide a brief summary of the overall conclusions of the risk assessment conducted in the DGA report for the EBP. ARARs are not introduced until Section 2.0 of the report. See also the response to EPA Specific Comment 19. No change has been made based on this comment.

EPA Specific Comment 33*: p. 13, ¶4 - Specify whether contaminants in subsurface soil (throughout the vadose zone) posed any risks.*

Response: The following sentence has been added: "Current and potential future exposures to subsurface soil and groundwater at the EBP did not result in an unacceptable human health risk."

EPA Specific Comment 34*: p. 13, ¶7 - Why were hunters considered potential receptors for the transformer vault area, but not the ethyl blending plant area?*

Response: The receptors should have been consistent between the Transformer Vaults and EBP. To correct this error, the summaries of receptors for the EBP and Transformer Vaults have both been modified to read as follows:

"Receptors: Potential current/future receptors include: residents, construction workers, commercial and industrial workers, trespassers, limited recreational users (hunters), and biota."

EPA Specific Comment 35*: p. 13, §1.3.9, ¶8 - Please state that no excess human health risk was calculated for the contamination at transformer vault 2 but that one surface soil sample at transformer vault 2 exceeded both the RIDEM industrial/commercial direct exposure criteria (I/C DEC) and the ecological PRG.*

Response: ARARs and ecological PRGs are not introduced until Section 2.0. See also the response to EPA Specific Comment 32. The paragraph has been modified as follows to summarize the conclusions of the HHRA and ERA as presented in the Final DGA Report, which is now available, and to also include Transformer Vault 3:

"Summary of Risks: Aroclor 1260 was detected in 6 of 12 samples from TV2 with a large difference between the maximum concentration (24,000 µg/kg at TF1-EV2-E) and the next highest concentration (1,000 µg/kg at TF1-TV2-SB1028). Detected concentrations of Aroclor 1260 in other samples from TV2 were ≤ 260 µg/kg, and are considered to generally bound the extent of PCBs in soil at TV2. PCBs (specifically Aroclor 1260) were also detected in 8 of 9 samples from TV3. Aroclor 1260 concentrations ranged from 26 µg/kg (TF1-TV3-SB1031) to 4,300 µg/kg (TF1-TV3-SB1026) (Tetra Tech, 2014). Current and potential future exposures to subsurface soil and groundwater at the Transformer Vaults did not result in an unacceptable human health risk.

As discussed in Section 1.3.8, the DGA report concluded that the localized areas associated with the maximum Aroclor 1260 concentrations at TV2 and TV3 should be further addressed to protect insectivorous receptors in the future if soil is spread over a larger area because of site activities."

EPA Specific Comment 36*: p. 14, §1.3.9 - Revise this section to state that the DGA concluded that a risk to ecological receptors exists at transformer vault 2 from PCBs and that a Feasibility Study was recommended to address the location with the greatest concentration of PCBs.*

Include a summary of transformer vault 3 similar to the last paragraph on page 13 and add a paragraph similar to the one described in the first part of this comment that recommends

additional sampling at transformer vault 3 to verify that the magnitude of the PCB contamination is not significantly greater than the available data indicate.

Response: Revised text is provided in the response to EPA Specific Comment 35. Note that the DGA Report was not specific regarding future sampling needs at Transformer Vault 3; however, the remedial alternatives developed later in the FS report do include additional soil sampling.

EPA Specific Comment 37*: p. 18, §2.2 - Regarding the RAO bullets, is there any subsurface soil exceeding unrestricted use standards below two feet? RI Remediation Standards for residential exposure and leachability standards apply throughout the vadose zone. RAOs should be for all soils, not solely surface soils.*

Response: Based on additional comments received by the EPA and RIDEM, the RAO text has been revised as follows:

"The soil RAOs for the protection of human health at the EBP are:

- Prevent exposure by industrial and restricted recreational users to soil containing site contaminants that exceed industrial use scenario PRGs.
- Prevent exposure by future residents and other unrestricted users to soil containing site contaminants that exceed residential use scenario PRGs.
- Prevent future migration of soil contaminants to groundwater (soil COCs above RIDEM GA Leachability Criteria).

The soil RAOs for the protection of human health and the environment at The Transformer Vaults are:

- Prevent exposure by industrial and restricted recreational users to soil containing site contaminants that exceed RIDEM Industrial/Commercial Direct Exposure Criteria (I/C DEC).
- Prevent exposure by future residents and other unrestricted users to soil containing site contaminants that exceed RIDEM RDEC.
- Prevent future migration of soil contaminants to groundwater (soil COCs above RIDEM GA Leachability Criteria).
- Prevent exposure by insectivorous mammals and birds to surface soil containing COCs that exceed ecological PRGs."

Note also that no PRGs were selected for subsurface soil and that the selected surface soil PRGs were not exceeded in any subsurface soil samples. See responses to comments on Section 2.3.

EPA Specific Comment 38*: p. 18, §2.2, ¶1 - Add an RAO to address the results of the ecological risk screening that determined that there is risk to ecological receptors and edit this paragraph accordingly.*

Response: Please refer to EPA Specific Comment 37 for the revised RAOs. The referenced paragraph was also edited to include mention that the RAOs were also based on results of the ERA.

EPA Specific Comment 39*: p. 19, §2.3 - Discuss any risk-based PRGs required for subsurface soil or change the discussion about surface soil PRGs to apply to all soils.*

Response: The following paragraphs have been added to the EBP portion of Section 2.3:

"Table 5 of Appendix A also presents a comparison of maximum detected subsurface soil concentrations to the RIDEM RDEC and site-specific background concentrations. There were no resulting residential scenario PRGs selected for subsurface soil, based on the selection method described above."

"Similar to the residential scenario, Table 7 of Appendix A also presents a comparison of maximum detected subsurface soil concentrations to the RIDEM I/C DEC and site-specific background concentrations. There were no I/C scenario PRGs selected for subsurface soil, based on the selection method described above."

The following sentence has been added to the last paragraph of the Transformer Vault portion of Section 2.3:

"No PCBs were detected in subsurface soil at the Transformer Vaults and therefore, the selected PRG is only applicable to surface soil."

EPA Specific Comment 40*: p. 20, §2.3, ¶2 - Clarify the first sentence as follows: "… naphthalene, which is based on the RIDEM Leachability Criterion assuming protection of GA classified groundwater, and arsenic and chromium, which …."*

Response: The requested edit has been made.

EPA Specific Comment 41*: p. 22, §2.3, ¶1 - EPA calculated a PRG of 3.4 mg/kg for PCBs based on the shrew. This calculated value accounts for uncertainties regarding potential future re-distribution of contaminants over a larger area, as well as uncertainty on the size of the receptors' home range for a given habitat type. This value is protective of current and possible future site use by ecological receptors. Please edit the FS to use this value as the ecological PRG for PCBs.*

Response: The PRG calculation has been updated to reflect the use of an AUF of 10% and the geometric mean of the NOAEL and LOAEL. The FS has been updated accordingly to reflect the new PRG of 3.4 mg/kg based on the short-tailed shrew. The updated tables from the PRG development appendix (now Appendix A) are attached. Refer to the response to EPA General Comment 6 for the revised Section 2.3 text for the Transformer Vaults.

EPA Specific Comment 42*: p. 22, ¶3 - The TSCA risk-based standard for unrestricted use is generally 1 ppm.*

Response: With regards to the TSCA PCB standards, please refer to the response to EPA Specific Comment 7.

EPA Specific Comment 43*: p. 22, §2.4 - This section also needs to address contaminated subsurface soil, if contaminant levels exceed either risk-based criteria or ARARs.*

Response: The following paragraphs have been added to Section 2.4:

"Table 2-5 provides a comparison of subsurface soil data to PRGs for surface soil and no PRGs were exceeded. As described in Section 2.3, PRGs were not developed for subsurface soil based on comparison of maximum subsurface soil concentrations to ARARs and background values. As such, impacted subsurface soil was not identified at the EBP."

"Table 2-7 provides a comparison of subsurface soil data to PRGs. PCB concentrations were not detected in subsurface soil samples and therefore, the selected PRG applies only to surface soil."

EPA Specific Comment 44*: p. 23, §2.4, ¶4 - Please clarify whether the volume discussed in the first bullet also includes RIDEM GA leachability criteria exceedances. If it does not, then correct the assumptions in Table 5-1.*

Response: The volume does include the RIDEM GA leachability criteria. For additional clarity for following text has been added to the end of the bullet: "(including the RIDEM GA Leachability Criterion for naphthalene)".

EPA Specific Comment 45*: p. 24, ¶1 - What depth were the exceedances of leachability standards identified?*

Response: The surface soil samples were from the 0 to 1 foot depth. For additional clarity, the first sentence of this paragraph was modified as follows to include the sample depths:

"There are two surface soil sample locations (EBP-SB1020 and EBP-SB1012; 0 to 1 foot depth) that exceed the RIDEM GA Leachability Criteria for naphthalene. "

EPA Specific Comment 46*: p. 24, §2.4, ¶2 - Please delete the second sentence that refers to transformer vault 3.*

Add another figure depicting the sample locations for transformer vault 3 and the one exceedance of the PRG. Add text for transformer vault 3 similar to that for transformer vault 2, but recommend additional sampling at transformer vault 3 rather than excavation.

Response: The second sentence has been deleted as requested. The Transformer Vaults text has been revised to read, "Table 2-6 provides a comparison of the Transformer Vaults surface soil data to the proposed PRG. Figures 9 and 10 show the surface soil sample locations with PRG exceedances at TV2 and TV 3, respectively. As shown on Figure 9, one surface soil sample (TF1-EV2-E) has a PCB concentration greater than the PRG at TV2. The sample is located directly east of the door. At TV3, one surface soil sample (TV2-SB1026) has a PCB concentration that exceeds the PRG (Figure 10). For the purpose of evaluating remedial alternatives, the extent of each exceedance is assumed to be limited and an area of 100 square feet (10 by 10 foot square) is estimated per area. Assuming an impacted depth of 2 feet, the volume of soil is estimated to be approximately 10 cubic yards per area or 20 cubic yards total."

Figure 10 has been created to show the PRG exceedance at TV3 and is attached.

EPA Specific Comment 47*: p. 26, §3.1.2 - See previous comments concerning Alternative S-2. In the description of Alternative S-2, explain whether all soil (surface and subsurface) exceeding leachability standards will be removed and if not, explain how any remaining leachability exceedances will be addressed.*

For Alternative S-2, clarify if two feet of clean cover material will be used to backfill in the excavation and serve as a cover over any subsurface soils that exceed industrial or residential PRGs. Add LUCs and long-term monitoring to ensure the protectiveness of the cover.

Response: The first paragraph of Section 3.0 has been revised to address subsurface soil as follows: "Remedial alternatives for soil at the EBP and Transformer Vaults are developed in the following sections. As discussed in Section 2.4, PRGs were not developed for subsurface soil based on a comparison of maximum subsurface soil concentrations to ARARs and background values. Additionally, surface soil PRGs were not exceeded in subsurface soil. Hence, there are no remedial actions required for subsurface soil. Remedial technologies not screened from further consideration in Section 2.6 have been used as the basis for developing potential site-specific remedial alternatives listed in this section. Feasible remedial technologies and process options have been combined into comprehensive site remedial alternatives that address the RAOs detailed in Section 2.2.

Based on other comments received, the following text has been added to the end of the Limited Excavation discussion: "Stormwater runoff controls will be required during excavation. Once the excavation is complete, stormwater runoff controls (such as an impermeable cover material) will not need to be implemented because the remaining contaminant concentrations do not exceed the RIDEM GA Leachability Criteria. Once all contaminated soil is removed, the area would be seeded. Due to the shallow depth of the excavation, it is assumed that no backfill would be needed."

EPA Specific Comment 48*: p. 26, ¶5 - Discuss how the excavated soil will be characterized and managed on-site before disposal.*

Response: The paragraph has been revised to read, "All excavated soil will be stockpiled at an approved location. Details regarding stockpile management (e.g., stormwater controls and temporary covers) will be developed during the remedial design phase. Prior to disposal, waste characterization samples will be collected from the stockpiled soil."

EPA Specific Comment 49*: p. 27, ¶4 - In the LUC description, include the standard language used in other Newport decision documents concerning how LUCs will be maintained at the property if it were transferred from Navy control.*

Discuss the need for short-term LUCs under the building foundation here.

Response: The last paragraph of Section 3.1.2 has been revised to read, "As long as the Navy retains the property, NAVSTA Newport enforces any LUC necessary. The LUC RD is tracked by the Navy through a centralized system to assure each LUC is maintained appropriately. If the land is sold and released from Navy jurisdiction, the land use restriction is written into the deed for the new property and recorded against the property title. The format of the land use

restriction would meet local or Rhode Island recording standards and is termed an Environmental Land Use Restriction (ELUR). In cases where LUCs are placed to address contamination at a site, the Navy must submit an annual report to the regulatory agencies documenting that all of the restrictions are being met. The Navy is also required to take immediate action to correct any violations identified. This report must be submitted every year until such time as LUCs are no longer needed."

To address short-term LUCs, the first paragraph of the Land Use Controls text has been revised to read, "At the Transformer Vaults, all PCB concentrations exceeding PRGs would be removed. As such, LUCs would not be required at the Transformer Vaults. However, soil would remain on-site at concentrations greater than PRGs at the EBP; therefore, LUCs would be established to prevent residential and other unrestricted use and thus prevent the exposure of such receptors to COCs in surface soil at the EBP. Additionally, short-term LUCs would also be required until the EBP structure is demolished and the soil beneath the building can be assessed. Short-term LUCs would prevent disturbance of the building foundation without approval of the Navy and regulatory agencies. Short-term LUCs would also include maintenance of the EBP structure foundation. The demolition of the EBP structure is not considered part of this alternative. However, once the building is demolished and the foundation is removed, the underlying soil would be assessed and remediated if needed to meet PRGs."

EPA Specific Comment 50*: p. 27, §3.1.3 –*

a. *See previous comments concerning Alternative S-3. For Alternative S-3, all surface and subsurface soil that exceeds both residential/industrial and leachability standards will need to be removed (otherwise the alternative needs to maintain an impermeable cover over any subsurface soil exceeding leachability standards to be left in place and LUCs and long-term monitoring to prevent disturbance of the cover and underlying contaminated subsurface soils). If subsurface soils exceeding leachability standards are left in place, long-term monitoring will be required to confirm the alternative is protective in preventing contaminant migration to the groundwater.*

b. *Also, all surface soil that exceeds the TSCA 1 ppm standard either needs to be removed or needs a protective cover over any PCB contaminated soil left in place and LUCs need to be maintained.*

c. *Discuss how the excavated soil will be characterized and managed on-site before disposal.*

Response:

a. The first paragraph of Section 3.0 has been revised to address subsurface soil as follows: "Remedial alternatives for soil at the EBP and Transformer Vaults are developed in the following sections. As discussed in Section 2.4, PRGs were not developed for subsurface soil based on a comparison of maximum subsurface soil concentrations to ARARs and background values. Additionally, surface soil PRGs were not exceeded in subsurface soil. Hence, there are no remedial actions required for subsurface soil. Remedial technologies not screened from further consideration in Section 2.6 have been used as the basis for developing potential site-specific remedial alternatives listed in this

section. Feasible remedial technologies and process options have been combined into comprehensive site remedial alternatives that address the RAOs detailed in Section 2.2."

b. Please refer to the response to EPA Specific Comment 7.

c. The paragraph of Section 3.1.3 has been revised to read, "All excavated soil will be stockpiled at an approved location. Details regarding stockpile management (e.g., stormwater controls and temporary covers) will be developed during the remedial design phase. Prior to disposal, waste characterization samples will be collected from the stockpiled soil."

EPA Specific Comment 51*: p. 28, §3.1.3, ¶1 - Further sampling at transformer vault 3 will be required before remedial action. Further pre-remedial sampling at transformer vault 2 is not required if the Navy extends the excavations to the locations of samples with PCB concentrations less than the ecological PRG of 3.4 mg/kg.*

Response: The text has been revised to read, "Further sampling will be needed to delineate the extent of surface soils that exceed PRGs at the EBP, TV2, and TV3. Further sampling would also include analysis for hexavalent chromium at a few locations in the EBP. Chromium is currently identified as a potential COC based on an assumption that the detections in surface soil around the EBP are hexavalent chromium; however, if hexavalent chromium is determined not to be present, then chromium would no longer be a COC. "

EPA Specific Comment 52*: p. 28, §3.14 –*

a. See previous comments concerning Alternative S-4. Based on the current description of Alternative S-4, it is unclear whether any subsurface soils that exceed leachability standards will remain. If so, an impermeable cover is necessary to address the leachability exceedance, with LUCs and long-term groundwater monitoring.

b. All surface soil that exceeds the TSCA 1 ppm standard will need to be removed (otherwise the alternative needs to maintain a protective cover over any PCB contaminated soil remaining and LUCs need to be maintained).

c. Discuss how the excavated soil from the transformer vault area will be characterized and managed on-site before disposal.

d. In the LUC description, include the standard language used in other Newport decision documents concerning how LUCs will be maintained at the property if it were to be transferred from Navy control.

e. Discuss the need for short-term LUCs under the building foundation (until the building is demolished). If the building will be maintained, describe how the LUCs will include maintenance of the building foundation as part of the cover.

Response:

a. The first paragraph of Section 3.0 has been revised to address subsurface soil as follows: "Remedial alternatives for soil at the EBP and Transformer Vaults are developed

in the following sections. As discussed in Section 2.4, PRGs were not developed for subsurface soil based on a comparison of maximum subsurface soil concentrations to ARARs and background values. Additionally, surface soil PRGs were not exceeded in subsurface soil. Hence, there are no remedial actions required for subsurface soil. Remedial technologies not screened from further consideration in Section 2.6 have been used as the basis for developing potential site-specific remedial alternatives listed in this section. Feasible remedial technologies and process options have been combined into comprehensive site remedial alternatives that address the RAOs detailed in Section 2.2."

b. Please refer to the response to EPA Specific Comment 7.

c. The text has been revised as follows, "Refer to Section 2.4 for estimated areas and volumes of surface soil exceeding RIDEM GA Leachability Criteria. All excavated soil will be stockpiled at an approved location. Details regarding stockpile management (e.g., stormwater controls and temporary covers) will be developed during the remedial design phase. Prior to disposal, waste characterization samples will be collected from the stockpiled soil."

d. The following paragraphs have been added to Sections 3.1.4 and 3.1.5, "For this remedial alternative, the LUC RD would limit development of the site for residential use. In accordance with the ROD, LUCs would be monitored and enforced as long as contaminants are present above levels that allow for unrestricted use and unlimited exposure, as determined by the five-year review process.

As long as the Navy retains the property, NAVSTA Newport enforces any LUC necessary. The LUC RD is tracked by the Navy through a centralized system to assure each LUC is maintained appropriately. If the land is sold and released from Navy jurisdiction, the land use restriction is written into the deed for the new property and recorded against the property title. The format of the land use restriction would meet local or Rhode Island recording standards and is termed an ELUR. In cases where LUCs are placed to address contamination at a site, the Navy must submit an annual report to the regulatory agencies documenting that all of the restrictions are being met. The Navy is also required to take immediate action to correct any violations identified. This report must be submitted every year until such time as LUCs are no longer needed."

e. The following text has been added to Sections 3.1.2, 3.1.4, and 3.1.5, "Additionally, short-term LUCs would also be required until the EBP structure is demolished and the soil beneath the building can be assessed. Short-term LUCs would prevent disturbance of the building foundation without approval of the Navy and regulatory agencies. Short-term LUCs would also include maintenance of the EBP structure foundation. The demolition of the EBP structure is not considered part of this alternative. However, once the building is demolished and the foundation is removed, the underlying soil would be assessed and remediated if needed to meet PRGs."

EPA Specific Comment 53*: p. 28, ¶5 - Stormwater controls will be required during installation of the cover and until the site is stabilized to prevent erosion of the cover material to less than the required protective depth.*

Response: The sentence was revised to read, "Stormwater runoff controls will be required during installation of the soil cover and until the site is stabilized. Once the site is stabilized, stormwater runoff controls (such as an impermeable cover material) will not need to be implemented because the contaminant concentrations in the covered soil do not exceed the RIDEM GA Leachability Criteria."

EPA Specific Comment 54*: p. 29, §3.1.5 - Many of the comments that pertain to Alternatives S2 through S4 also pertain to this alternative. Describe where the consolidated soil would be put on the site and what standards would apply. If the subsurface soil is contaminated above risk and ARAR standards, then this alternative does not address the newly exposed contaminated subsurface soil that now is at the surface.*

Response: As discussed in previous comments, the first paragraph of Section 3.0 has been revised to state that subsurface soil PRGs did not need to be developed, all subsurface soil concentrations were detected below surface soil PRGs, and remedial actions are not warranted for subsurface soil. Alternative S-5 has been revised to reflect applicable comments received on Alternatives S-2 through S-4.

The location of consolidated soil would be determined during the Remedial Design. As such, the text has not been revised to address the location of consolidated soil.

EPA Specific Comment 55*: p. 29, §3.1.5, ¶1 - Please supplement the text for Alternative S-5 to indicate that the soil that exceeds the RIDEM GA Leachability Criteria will be segregated for off-site disposal as indicated in Table 3-1.*

Please edit the last sentence to read: "… implemented because the contaminant concentrations in the consolidated soil do not exceed the RIDEM GA Leachability Criteria."

Response: The following sentence has been added after the first sentence in this paragraph: "Prior to on-site consolidation, limited soil that exceeded RIDEM GA Leachability Criteria would be segregated for off-site disposal."

As requested, the last sentence of the first paragraph has been revised to read, "Once the site is stabilized, stormwater runoff controls (such as an impermeable cover material) will not need to be implemented because the contaminant concentrations in the consolidated soil do not exceed the RIDEM GA Leachability Criteria."

EPA Specific Comment 56*: p. 31, ¶4 - Since soil PCB levels are above 1 ppm, the Alternative does not address TSCA risk-based standards for protecting human health.*

Response: Please refer to the response to EPA Specific Comment 7.

EPA Specific Comment 57*: p. 32, §4.2.1 - See all previous questions/comments about Alternative S-2, in particular, if the excavations are not to be backfilled, then if the subsurface soil still contains contamination above risk and ARAR based standards the alternative is not protective.*

Response: The first paragraph of Section 4.2.1 has been revised to read, **"**Under this alternative, limited soil excavation and off-site disposal would be performed to remove soils

exceeding the Industrial PRGs (including RIDEM GA Leachability Criteria) at the EBP and to remove soils exceeding the selected PRG for the Transformer Vaults at TV2 and TV3. As discussed in Section 3.0, no remedial actions are required for subsurface soil and subsurface soil concentrations do not exceed surface soil PRGs."

EPA Specific Comment 58*: p. 32, §4.2.1, ¶1 - Please reference transformer vault 3 or state that supplemental sampling will be performed at transformer vault 3 to assess the magnitude of PCB contamination.*

Response: See response to Comment 57 above. As shown, a reference to TV3 has been added.

EPA Specific Comment 59*: p. 32, §4.2.1, ¶3 - Move the third sentence, which discusses the ethyl blending plant, to the second paragraph. Edit the third paragraph to discuss transformer vault 3.*

Response: The second and third paragraphs of Section 4.2.1 have been revised to read, "At the EBP, seven soil boring locations (TF1-EBP-SB1004, TF1-EBP-SB1012, TF1-EBP-SB1016, TF1-EBP-SB1017, TF1-EBP-SB1018, TF1-EBP-SB1020, and TF1-EBP-SB1036) exceed the Industrial PRGs. For the purpose of evaluating remedial alternatives, impacted areas totaling approximately 1,800 square feet or 0.04 acres are estimated, based on the data collected in the DGA report. The impacted volume of soil is estimated to be approximately 130 cubic yards based on a 2 foot depth of impact. Soil would remain onsite at concentrations greater than the Residential PRGs at the EBP; therefore, LUCs would be established to prevent residential and unrestricted recreational use of the property, and thus prevent the exposure of such receptors to COCs in surface soil.

Two soil sample locations exceed the selected PRG for PCBs at the Transformer Vaults. At TV2, one soil location (TF1-EV2-E) exceeds the selected PRG for PCBs. At TV3, one soil location (TV3-SB1026) exceeds the selected PRG for PCBs. For the purpose of evaluating remedial alternatives, the extent of each exceedance is assumed to be limited to an area of 100 square feet (10 by 10 foot square). Assuming an impacted depth of 2 feet, the volume of soil is estimated to be approximately 10 cubic yards per area or 20 cubic yards in total. As part of the excavation at the Transformer Vaults, all PCB concentrations exceeding the PRG will be removed. Therefore, LUCs are not required at the Transformer Vaults. Details of each component of Alternative S-2 are as follows."

EPA Specific Comment 60*: p. 34, ¶¶ 4 to 6 - As previously discussed, this alternative may not be protective if the excavation exposes deeper contaminated subsurface soil above industrial risk, direct contact, or leachability standards. The alternative also would not meet ARAR standards, particularly State remediation standards that require a clean cover over subsurface soils above industrial direct contact standards. Also leachability standards apply to all soils down to groundwater, so if there are leachability exceedances below two feet, this alternative would not meet ARAR requirements.*

Response: Subsurface soil concentrations do not exceed industrial risk, direct contact, or leachability standards. The first paragraph of Section 4.2.1 has been revised to address subsurface soil. Please refer to the response to EPA Specific Comment 57.

EPA Specific Comment 61*: p. 35, ¶1 - If the circumstances described above are present, Alternative S-2 would not meet this criterion.*

Response: Subsurface soil concentrations do not exceed industrial risk, direct contact, or leachability standards. The first paragraph of Section 4.2.1 has been revised to address subsurface soil. Please refer to the response to EPA Specific Comment 57.

EPA Specific Comment 62*: p. 36, §4.3.1 - See all previous comments about Alternative S-3. In particular, if the excavations are not backfilled and the subsurface soil still contains contamination above risk and ARAR based standards, the alternative is not protective.*

Response: The first paragraph of Section 4.3.1 has been revised to read, "This alternative involves excavation of all surface soils that exceed industrial and residential PRGs in the proximity of the EBP and the selected PRG for the Transformer Vaults at TV2 and TV3. As discussed in Section 3.0, PRGs were not developed for subsurface soil based on a comparison of maximum subsurface soil concentrations to ARARs and background values. Additionally, surface soil PRGs were not exceeded in subsurface soil. Therefore, there are no remedial actions required for subsurface soil. Excavated soil will be transported off-site for disposal, reuse, or recycling. At the Transformer Vaults, all PCB concentrations exceeding the PRG would be removed. As such, LUCs would not be required at the Transformer Vaults. Since no sampling has been performed underneath the EBP structure, short-term LUCs would likely be required until the EBP structure is demolished and the soil beneath the building can be assessed. Once the building is demolished and the foundation is removed, the underlying soil would be assessed and remediated if needed to meet Residential PRGs. Short-term LUCs would prevent disturbance of the building foundation without approval of the Navy and regulatory agencies. Details of each component of Alternative S-3 are discussed below."

EPA Specific Comment 63*: p. 36, §4.3.1, ¶1 - Edit the first sentence to reference transformer vault 3 or state that supplemental sampling will be performed at transformer vault 3 to assess the magnitude of PCB contamination.*

Response: The first paragraph has been revised to include TV3. Please refer to the response to EPA Specific Comment 62.

EPA Specific Comment 64*: p. 37, ¶5 - As previously discussed, this alternative may not be protective if the excavation exposes deeper contaminated subsurface soil above industrial risk, direct contact, or leachability standards.*

Response: Subsurface soil concentrations do not exceed residential risk, direct contact, or leachability standards. The first paragraph of Section 4.2.1 has been revised to address subsurface soil. Please refer to the response to EPA Specific Comment 62. No changes have been made to the Criteria Analysis.

EPA Specific Comment 65*: p. 38, ¶1 - If contaminated subsurface soils are present, the alternative would not meet ARAR standards, particularly State remediation standards that require a clean cover over subsurface soils above industrial direct contact standards and LUC to prevent contact with subsurface soils that exceed residential standards. Also leachability standards apply to all soils down to groundwater, so if there are leachability exceedances below two feet this alternative would not meet ARAR requirements.*

Response: Subsurface soil concentrations do not exceed residential risk, direct contact, or leachability standards. The first paragraph of Section 4.2.1 has been revised to address subsurface soil. Please refer to the response to EPA Specific Comment 62. No changes have been made to the Criteria Analysis.

EPA Specific Comment 66*: p. 38, ¶2 - If the circumstances described above are present, Alternative S-3 would not meet this criterion.*

Response: Subsurface soil concentrations do not exceed residential risk, direct contact, or leachability standards. The first paragraph of Section 4.2.1 has been revised to address subsurface soil. Please refer to the response to EPA Specific Comment 62. No changes have been made to the Criteria Analysis.

EPA Specific Comment 67*: p. 38, ¶3 - Change the text to: "This alternative does not involve/include treatment."*

Response: The requested change has been made.

EPA Specific Comment 68*: p. 39, §4.4.1 - See all previous comments about Alternative S-4. In particular, if leachability standards are exceeded in the subsurface soil, then an impermeable cover is required.*

Response: The first paragraph of Section 4.4.1 has been revised to read, "As discussed in Section 3.0, PRGs were not developed for subsurface soil based on a comparison of maximum subsurface soil concentrations to ARARs and background values. Additionally, surface soil PRGs were not exceeded in subsurface soil. Therefore, there are no remedial actions required for subsurface soil. This alternative would use clean soil cover to isolate the contaminated surface soils at the EBP. Containment will reduce exposure risks at the site by preventing direct contact with the contaminated soil. Additionally, limited soil excavation and off-site disposal would be conducted to remove soils exceeding the RIDEM GA Leachability Criteria for naphthalene around two soil boring locations at the EBP (TF1-EBP-SB1012 and TF1-EBP-SB1020). At the Transformer Vaults, the excavation would remove soils exceeding the selected PRG for TV2 and TV3. Since the excavation will remove all PCB concentrations exceeding the PRG for the Transformer Vaults, containment and LUCs would not be required at TV2 and TV3. Maintenance of the cover would be required over time including mowing, shrub removal, and integrity inspections. LUCs will be established for the EBP, and five-year reviews would be performed to evaluate the success of the remedial actions. Details of each component of Alternative S-4 are discussed below."

EPA Specific Comment 69*: p. 41, ¶¶ 4 to 6 - If there are leachability exceedances in the subsurface soil that are not addressed by the soil removal, this alternative would not be protective, would not meet ARAR requirements, and would not meet the long-term effectiveness and permanence criterion unless an impermeable cover is installed and long-term groundwater monitoring included.*

Response: Subsurface soil concentrations do not exceed residential risk, direct contact, or leachability standards. The first paragraph of Section 4.4.1 has been revised to address subsurface soil. Please refer to the response to EPA Specific Comment 68. No changes have been made to the Criteria Analysis.

EPA Specific Comment 70*: p. 43, §5.0 - See all previous comments about all of the alternatives. It is not possible to evaluate the comparative analysis until it is determined which, if any, of the proposed alternatives meets the Protectiveness and ARARs compliance criteria.*

Response: Based on the incorporation of previous comments, there is no change to the previous conclusions regarding the Protectiveness and ARARs compliance criteria as discussed in Section 4.0.

EPA Specific Comment 71*: p. 45, §5.1.3 - It appears that S-2 would be more effective than S-4 based on current and projected future industrial/commercial use because soil exceeding the remedial goals for industrial exposure would be removed by S-2, but not S-4. Neither would be effective in the long-term under a future residential scenario. Please revise the text accordingly.*

Response: The paragraph has been revised to read, "In terms of mitigating risks remaining at the site after RAOs have been met, and for risks from management of residuals, Alternative S-3 has the highest long-term effectiveness since it removes all contaminated soil from the EBP and Transformer Vaults that exceeds PRGs. Alternatives S-2 and S-4 are less effective since contaminated soil remains at the EBP under those alternatives. However, these alternatives utilize controls to prevent exposure to contaminated soil over the long-term to provide the desired long-term effectiveness. Under the future industrial land use scenario, Alternative S-2 is slightly more effective than Alternative S-4 since it removes all contaminated soil exceeding the Industrial PRGs. A future residential land use scenario would be prevented under Alternatives S-2 and S-4; however, controls and inspections would be relied upon to provide permanent protection from contaminants and are therefore less effective. Alternative S-1 is not effective and doesn't provide permanent protection from contaminants."

EPA Specific Comment 72*: p. 46, §5.1.5, ¶1 - Both S-3 and S-4 would result in the greatest short-term harm to the surrounding environment because of the larger area that would be impacted by each alternative - one by excavation and the other by a soil cover. Please edit the discussion accordingly.*

Response: The paragraph has been revised to read, "Environmental Impacts: The remedial alternatives evaluated differ in the magnitude of potential impacts to natural habitats. Since no construction activities or remedial actions are proposed under Alternative S-1, there are no additional short-term impacts to natural habitats. Under Alternative S-2, limited excavation and environmental sampling are proposed and short-term impacts to the natural habitat will be minimal. Alternatives S-3 and S-4 have the greatest short-term impact to natural habitats since they have the longest construction period and impact the same construction footprint, which is larger than Alternative S-2."

EPA Specific Comment 73*: p. 47, §5.1.6, ¶4 - There is a difference among the alternatives regarding additional remedial actions. S-3 would have removed contamination exceeding the remedial goals while both S-2 and S-4 leave contamination in place. Therefore, additional effort would be required for S-2 and S-4 to remove contamination if additional remedial actions are necessary. This effort could be onerous for S-4 because the soil cover would have to be removed to conduct additional remedial action. Please edit the discussion accordingly.*

Response: The paragraph has been revised to read, "The ease of undertaking additional remedial actions, if warranted by future site conditions or requirements, is proportional to the

degree or intensity of each remedy. Since Alternative S-3 would remove all contamination exceeding industrial and residential PRGs, additional remedial actions can be performed with relative ease. Additional remedial actions would be more difficult to implement for Alternatives S-2 and S-4, since contamination remains in place. Additional actions associated with Alternative S-4 would be more difficult to implement than Alternative S-3 since the soil cover may need to be removed to conduct additional remedial actions."

EPA Specific Comment 74*: p. 47, §5.1.6, ¶7 - Text is missing from the beginning of this paragraph. Please correct.*

Response: The second sentence has been moved to be the first sentence to address this comment.

EPA Specific Comment 75*: p. 49, §5.2, ¶2 - Table 5-1 indicates that the baseline cost for S-3 is not greater than the upper-end cost for S-2. Please correct.*

Response: Table 5-1 has been revised based on the Cost comments received from the EPA and RIDEM and is attached. However, the Baseline Cost for S-3 remains lower than the Upper-End Cost for S-2. This is due to the O&M and Five Year Review costs required under Alternative S-2.

EPA Specific Comment 76*: Table 2-1 - The Table should include the groundwater ARARs (MCLs, MCLGs, State GA standards) and TBCs (EPA Health Advisories) that were used to determine that there were no groundwater exposure/consumption risks within the OU.*

Response: As discussed in Section 1.0 of the report, there was no unacceptable risk associated with groundwater. Therefore, groundwater is not addressed in the feasibility study and ARARs do not need to be identified for that medium. No change has been made based on this comment.

EPA Specific Comment 77*: Table 2-3 - Cite the TSCA risk-based standard for unrestricted exposure of 1 ppm.*

Include tables for subsurface soil data.

The Navy's proposed PRG of 10 mg/kg for PCBs does not adequately account for uncertainties in the magnitude and extent of PCB contamination and the risk calculation parameters and therefore is not acceptable. EPA calculated a central tendency preliminary remedial goal (PRG) for ecological risk from PCBs as 3.4 mg/kg based on an HQ of 1, an exposure area of 10% of the nominal home range, and a geometric mean of the NOAEL and LOAEL. Please revise the ecological PRG for PCBs to 3.4 mg/kg and revise the scope of the FS accordingly.

Response: Please refer to the response to EPA Specific Comment 7 with regards to the TSCA risk-based standard. Table 2-3 has been revised to reflect the PRG of 3.4 mg/kg and is attached.

The subsurface soil data for the EBP and Transformer Vaults has been added to the FS as Tables 2-5 and 2-7, which are attached.

EPA Specific Comment 78*: Table 2-5 - Change the PRG to 3.4 mg/kg.*

Response: The table has been revised as requested. Table 2-5 has been changed to Table 2-6 and is attached.

EPA Specific Comment 79*: Table 2-6, p. 1 - The screening comment for fencing is not appropriate because remediation is required to address exposures based on exceedances of the RIDEM industrial/commercial direct exposure criteria (I/C DECs), not just residential risk. In addition, a fence currently prevents access to Tank Farm 1 without authorization. Please revise the rationale for fencing.*

The screening comment related to excavation and on-site disposal is not consistent with the text on page 30, Section 3.1.a that states that this alternative was not retained because it is not cost effective. Please correct the table accordingly.

Response: Table 2-6 has been changed to Table 2-8. The Fencing & Security Measures Screening text has been revised to read, "A fence currently prevents access to the Site. Not appropriate since RIDEM RDEC and I/C DEC exceedances are present in surface soil and potential receptors include residents and commercial and industrial worker."

The Excavation & On-Site Disposal Screening text has been revised to read, "'Effective in preventing exposure to contaminated soils. Would allow for UU/UE of excavated areas."

EPA Specific Comment 80*: Table 2-6, p. 3 - Please revise the screening comment for land treatment because fuel spills are the primary release mechanism for contamination at the ethyl blending plant.*

Response: Table 2-6 has been changed to Table 2-8. The Land Treatment Screening text has been revised to read, "Not effective in removing the primary site COCs (PAHs and metals)".

EPA Specific Comment 81*: Table 2-6, p. 5 - Revise the screening comments for all the biological processes because fuel spills are the primary release mechanism for the contamination at the ethyl blending plant.*

Response: Table 2-6 has been changed to Table 2-8. The Screening Text for all Biological Processes has been revised to read, "Not effective in removing the primary site COCs (PAHs and metals)".

EPA Specific Comment 82*: Table 2-6 - This table should apply to all soils.*

Response: The title of Table 2-6 has been revised to "Technology & Process Option Screening for Soil".

EPA Specific Comment 83*: Table 3-1 - See all previous comments about the descriptions of the Alternatives and incorporate any text changes made into this Table. The Table should apply to all soils, not just surface soil.*

Response: Table 3-1 has been revised to include all previous comments and is attached. Subsurface soil was not added to Table 3-1 since no remedial actions are required for

subsurface soil. The Section 3.0 text has been revised to explain why subsurface soil does not require remedial action.

EPA Specific Comment 84*: Table 3-1 - The scope of the S-4 and S-5 remedies are inconsistent. S-5 requires groundwater monitoring to evaluate leaching of the contamination left in place. S-4 does not include groundwater monitoring even though the same contamination will be left in place. Please correct the discrepancy here and in Tables 3-5 and 3-6.*

Response: Since Alternatives S-4 and S-5 remove soil concentrations above the RIDEM GA Leachability Criteria, groundwater sampling is not warranted. The Section 3 tables were revised to remove groundwater monitoring.

EPA Specific Comment 85*: Table 3-2 - Please edit the description and the effectiveness disadvantage to include "… , ecological receptors, or address exceedances of the RIDEM I/C DECs or GA Leachability Criteria."*

Response: The Effectiveness text from Table 3-2 has been revised to read, "Does not mitigate on-site risk to residential receptors and ecological receptors, or address exceedances of the RIDEM I/C DECs or GA Leachability Criteria".

EPA Specific Comment 86*: Table 3-3 - Please edit the description and the effectiveness advantage to include "… , the RIDEM I/C DECs, and the ecological PRG."*

See all previous comments about the descriptions of this Alternative and incorporate any text changes made here. In particular, the Alternative may neither be protective nor meet ARAR requirements.

Response: Table 3-3 Effectiveness text has been revised to read:

- Removes soil exceeding the Industrial PRGs (including RIDEM GA Leachability Criteria) at the EBP
- Removes soil exceeding the PRG (including RIDEM GA Leachability) at the Transformer Vaults
- Limits use of property for residential uses

The updated Table 3-3 is attached.

EPA Specific Comment 87*: Table 3-4 - See all previous comments about the descriptions of this Alternative and incorporate any text changes made into this Table. In particular, the Alternative potentially may neither be protective nor meet ARAR requirements.*

Please edit the description of the effectiveness disadvantage to read: "… potential for current and future liability."

Response: Table 3-4 has been revised to include all previous comments and is attached.

The effectiveness disadvantage text from Table 3-4 has been revised to read, "Transportation to off-site facilities increases the potential for current and future liability".

EPA Specific Comment 88*: Table 3-5 - Please edit the description to include removal of ecological PRG exceedances and the effectiveness disadvantage to read: "Does not remove all contaminants."*

See all previous comments about the descriptions of this Alternative and incorporate any text changes made into this Table. In particular, the Alternative potentially may neither be protective nor meet ARAR requirements.

Response: The second sentence of the Table 3-5 description has been revised to read, Prior to containment, limited soil excavation and off-site disposal would be conducted to remove soils exceeding the RIDEM GA Leachability Criteria at the EBP and remove soils exceeding the PRG at the Transformer Vaults." Additionally, the effectiveness disadvantage text from Table 3-5 has been revised to read, "Does not remove all contaminants at the EBP".

Table 3-5 has been revised to include all previous comments and is attached.

EPA Specific Comment 89*: Table 3-6 - Please edit the description of the effectiveness disadvantage to read: "Does not remove all contaminants."*

See all previous comments about the descriptions of this Alternative and incorporate any text changes made into this Table. In particular, the Alternative may neither be protective nor meet ARAR requirements.

Response: The effectiveness disadvantage text from Table 3-6 has been revised to read, "Does not remove all contaminants".

Table 3-6 has been revised to include all previous comments and is attached.

EPA Specific Comment 90*: Table 4-1 - Revise this Table. Since soil PCB levels are above 1 ppm, the Alternative does not address TSCA risk-based standards for protecting human health.*

Response: Please refer to the response to EPA Specific Comment 7. No changes were made to Table 4-1.

EPA Specific Comment 91*: Table 4-2 - See all previous comments about this Alternative and incorporate any text changes made. In particular, the Alternative may neither be protective nor meet ARAR requirements.*

Ecological protection should also include removal of soil at transformer vault 3 or supplemental sampling to verify the magnitude of PCB concentrations.

Under Adequacy and Reliability, please change "determined" to "confirmed."

Response: All previous comments have been incorporated into Table 4-2, which is attached. Alternative S-2 is considered protective and meets ARAR requirements.

Table 4-2 has been revised to include excavation at TV3.

The Adequacy and Reliability of Controls text in Table 4-2 has been revised to read, "Adequacy of this alternative will be confirmed during the five-year reviews. LUCs are reliable if properly enforced."

EPA Specific Comment 92*: Table 4-3 - Ecological protection should also include removal of soil at transformer vault 3 or supplemental sampling to verify the magnitude of PCB concentrations.*

See all previous comments about this Alternative and incorporate any text changes made. In particular, the Alternative potentially may neither be protective nor meet ARAR requirements.

Response: Table 4-3 has been revised to include excavation at TV3.

All previous comments have been incorporated into Table 4-3, which is attached. Alternative S-3 is considered protective and meets ARAR requirements.

EPA Specific Comment 93*: Table 4-4 - See all previous comments about this Alternative and incorporate any text changes made. In particular, the Alternative potentially may neither be protective nor meet ARAR requirements.*

Ecological protection should also include removal of soil at transformer vault 3 or supplemental sampling to verify the magnitude of PCB concentrations.

Under Adequacy and Reliability, please change "determined" to "confirmed."

Regarding Ease of Undertaking Additional Remedial Actions, please edit the text as follows: "… to occur following removal of the soil cover."

Response: All previous comments have been incorporated into Table 4-4, which is attached. Alternative S-4 is considered protective and meets ARAR requirements.

Table 4-4 has been revised to include excavation at TV3.

The Adequacy and Reliability of Controls text in Table 4-4 has been revised to read, "Adequacy of this alternative will be confirmed during the five-year reviews. LUCs are reliable if properly enforced."

The Ease of undertaking Additional Remedial Actions, if needed text in Table 4-4 has been revised to read, "If further action is deemed necessary in the future, this alternative would allow for additional remedial actions to occur following removal of the soil cover, as necessary."

EPA Specific Comment 94*: Table 5-1 - Please verify the upper-end cost for S-3 that is essentially equal to the upper-end cost for S-2. The relative changes in the sensitivity assumptions do not appear appropriate.*

Review the assumptions for S-3 that require three waste characterization samples even though only 450 cubic yards will be excavated.

Please explain why the analysis assumes a doubling of the excavation volume for S-2, a tripling for S-4, but only a 10% increase in the excavation volume for S-3. These assumptions are not appropriate.

Response: Table 5-1 has been revised based on the Cost comments received from the EPA and RIDEM and is attached. Based on comments received, the upper-end cost projection for Alternative S-3 is roughly $80,000 more than the upper-end cost projection for Alternative S-2.

As discussed below, the Alternative S-3 upper-end cost projection assumes 840 cubic yards of soil would be excavated. Based on this revision, 4 waste characterization samples are required. The table has been revised to reflect the revision.

For Alternatives S-2, S-3, and S-4, the upper-end cost projection reflects a 100% increase in excavation volume. The volume assumptions for the Cost Sensitivity Analysis have been revised as follows:

- Alternative S-2: Increase area and volume of limited excavation to from 150 cubic yards to 300 cubic yards (based on 4,000 sf x 2 ft)

Alternative S-3: Increase area and volume of excavation at the EBP from 400 cubic yards to 800 cubic yards (based on 10,400 sf) and increase area and volume of excavation at the Transformer Vaults from 20 cubic yards to 40 cubic yards Alternative S-4: Increase area and volume of limited excavation from 60 cubic yards to 120 cubic yards at the EBP and from 20 cubic yards to 40 cubic yards at the Transformer Vaults; increase area of cap to 10,400 sf;

EPA Specific Comment 95*: Figure 5 - Please add the Shaw sample to this figure.*

Response: The figure has been revised as requested and is attached.

EPA Specific Comment 96*: Figure 7 - Provide the missing text associated with the asterisk.*

Response: The figure has been revised as requested and is attached.

EPA Specific Comment 97*: Figure 8 - The sample locations between this figure and Figure 2-1 in the Draft Final Data Gaps Assessment Report of April 2014 differ significantly. Please correct the sample locations in Figure 8, all of which are erroneously offset.*

Revise the red and green color scheme to be consistent with Figures 6 and 8.

Response: The sample location coordinates presented on Figure 8 are correct. The appearance of the offset is due to the angle at which the aerial photograph was captured. During the remedial design, the location of the samples in relationship to the EBP structure will be field verified.

Figure 8 is attached and has been revised so the color scheme is consistent with Figure 6.

EPA Specific Comment 98*: Figure 9 - The sample locations in this figure differ from Figure 2-2 in the Draft Final Data Gaps Assessment Report from April 2014. Please correct the sample locations in Figure 9, all of which are erroneously offset.*

Response: The sample location coordinates presented on Figure 9 are correct. The appearance of the offset is due to the angle at which the aerial photograph was captured. During the remedial design, the location of the samples in relationship to the EBP structure will be field verified.

EPA Specific Comment 99*: Appendix A - Table 4-6A: Please highlight the exceedances.*

Response: The tables shown in Appendix A were taken directly from the DGA Report. In order to avoid confusion, Appendix A was removed from the Report. Resolution Consultants has replaced references to Appendix A with references to the DGA Report. Additionally, all relevant surface and subsurface soil results at the EBP and Transformer Vaults are presented in Tables 2-4 through 2-7. Tables 2-5 and 2-7 have been added to show the subsurface soil data for the EBP and Transformer Vaults and are attached.

EPA Specific Comment 100*: Appendix A - The appendix tables show exceedances in subsurface soils and groundwater. This needs to be incorporated into the text. In particular, the protectiveness and ARARs compliance of the proposed soil alternatives relies on whether the alternatives also address the subsoil exceedances (further complicated by the requirement to sample subsoil throughout the vadose zone).*

Response: Based on the findings of the DGA Report, the FS does not address groundwater. In order to avoid confusion, Appendix A was removed from the Report. All relevant surface and subsurface soil results at the EBP and Transformer Vaults are presented in Tables 2-4 through 2-7. Tables 2-5 and 2-7 have been added to show the subsurface soil data for the EBP and Transformer Vaults and are attached.

EPA Specific Comment 101*: Table C-2a - See all previous ARARs comments about this Alternative and incorporate any text changes made. In particular, the Table needs to identify if there are any ARARs that the alternative does not meet (e.g., RI Remediation standards for direct contact and leachability).*

Response: As discussed in previous comment responses, this alternative will meet the RI Remediation standards for direct contact and leachability. No table revisions are necessary.

EPA Specific Comment 102*: Table C-2b - For the alternative to meet TSCA risk-based standards, the PCB PRG needs to be 1 ppm for unrestricted use.*

Response: Please refer to the response to EPA Specific Comment 7.

EPA Specific Comment 103*: Table C-3a - See all previous ARARs comments about this Alternative and incorporate any text changes made. In particular, the Table needs to identify if there are any ARARs that the alternative does not meet (in particular the RI Remediation standards for direct contact and leachability).*

Response: As discussed in previous comment responses, this alternative will meet the RI Remediation standards for direct contact and leachability. No table revisions are necessary.

EPA Specific Comment 104*: Table C-3b - For the alternative to meet TSCA risk-based standards, the PCB PRG needs to be 1 ppm for unrestricted use.*

Response: Please refer to the response to EPA Specific Comment 7.

EPA Specific Comment 105*: Table C-2a - See all previous ARARs comments about this Alternative and incorporate any text changes made. In particular, the Table needs to identify all ARARs that the alternative does not meet (e.g., the RI Remediation standards for leachability).*

Response: It appears that this comment was meant to refer to Table C-4a. As discussed in previous comment responses, this alternative will meet the RI Remediation standards for direct contact and leachability. No table revisions are necessary.

EPA Specific Comment 106*: Table C-2b - Note that for the alternative to meet TSCA risk-based standards, the PCB PRG needs to be 1 ppm for unrestricted use.*

Remove the citation to "Expedited Policy for Remediation of Environmental Simple Sites" as it refers to a state administrative process that does not apply to CERCLA sites.

Response: It appears that this comment was meant to refer to Table C-4b. With respect to the TSCA risk-based standards, please refer to the response to EPA Specific Comment 7. The citation has been removed, as requested.

EPA Specific Comment 107*: Appendix C - Table C-4b: Several Rhode Island Solid Waste requirements incorporated into the Tank Farm 5 Record of Decision have not been identified in this table for Alternative S-4. Please correct as appropriate.*

Response: Please refer to the response to RIDEM Specific Comment 57 for a discussion of the Rhode Island Solid Waste requirements which were in the Tank Farm 5 ROD.

EPA Specific Comment 108:

a. *Appendix D - Alternative S-2: Please edit the description to refer to meeting GA leachability criteria (even though these exceedances are currently co-located with I/C DEC exceedances). Add supplemental sampling at transformer vault 3.*

b. *Alternative S-3: Following excavation, some regrading is expected and the area cleared and grubbed is expected to be seeded. Please modify the costs accordingly.*

c. *Alternative S-3: Confirmation sampling is expected for this alternative, as indicated in Section 4.3.1. PDI sampling is not required. The confirmation sampling will include all parameters with a PRG. Please edit the costs accordingly.*

d. *Alternative S-3: Based on Table 5-1 that indicated one waste characterization sample per 250 cubic yards, two waste characterization samples are required for S-3. Please correct.*

e. *Alternative S-3: Add supplemental sampling at transformer vault 3.*

f. *Alternative S-4: Capital costs indicate clearing and grubbing of 5300 square feet, but only seeding 460 square feet. Please correct. Add supplemental sampling at transformer vault 3.*

Response: Appendix D has been changed to Appendix C and is attached.

a. Alternative S-2 has been revised to include excavation at TV3. Additionally, the Alternative S-2 Description text has been revised to read, "This alternative consists of excavating the full extent of surface soil at TV2 and TV3 that exceeds the selected PRG (including GA Leachability Criteria). Additionally, this alternative includes limited surface soil excavation at the Ethyl Blending Plant to meet Industrial PRGs (including GA Leachability Criteria), land use controls and annual site inspections, and five-year reviews."

b. Alternative S-3 has been revised to include re-grading and seeding. Additionally, Alternative S-2 was also revised to include re-grading and seeding

c. Based on the DGA data, it appears that some of the boundaries are not fully delineated. As such, further sampling will be performed for Alternative S-3. The cost estimate has been revised to address the revised sampling quantities and assumptions. The details of the sampling will be determined during the Remedial Design.

d. Table 5-1: For the Alternative S-3 Upper-end cost projection, 4 waste characterization samples are required. The table has been revised to reflect the revision.

e. All Alternatives have been revised to include excavation at TV3.

f. The clearing and grubbing and seeding costs have been revised accordingly. The Alternative S-4 Description has been revised to read, "This alternative consists of excavating the full extent of surface soil at TV2 and TV3 that exceeds the selected PRG (including the GA Leachability Criteria). Additionally, this alternative consists of limited surface soil excavation around 2 historic sample locations to address leachability criteria exceedances for naphthalene, installation of a cover system, land use controls, annual site inspections, and five-year reviews."

RIDEM General Comments:

RIDEM General Comment 1*: This Feasibility Study (FS) only focuses on two small areas of Tank Farm 1. Please discuss in this report how the remainder of the tank farm will be addressed under CERCLA. Please indicate if the entire tank farm was thoroughly investigated under CERCLA and if so, if there were any exceedances of CERCLA risk standards or ARARs identified in surface or subsurface soil, groundwater, surface water or sediment.*

Response: To address this comment, the first paragraph of the Executive Summary has been revised to read, "This Feasibility Study (FS) report was prepared to address two exposure units based on discrete releases of Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) contaminants within Tank Farm 1 (Site 7, Operable Unit [OU] 13) at the Naval Station (NAVSTA) Newport, in Portsmouth, Rhode Island. This document was completed by Resolution Consultants (Resolution) for the U.S. Department of the Navy (Navy) and the Naval Facilities Engineering Command Mid-Atlantic (NAVFAC MIDLANT). The specific exposure units included in this FS consist of the Ethyl Blending Plant (EBP) (includes the EBP and associated previously designated Area of Concerns [AOCs] TF1-004, TF1-005 and TF1-018)

and the Transformer Vaults (includes Transformer Vault 2 [TV2] and Transformer Vault 3 [TV3]). There are other areas within Tank Farm 1 with either completed or ongoing petroleum-related response actions. These include 10 former tanks (Tanks 9 through 18), fuel distribution piping and equipment, and other petroleum-related AOCs. As part of the CERCLA process, a Data Gaps Assessment (DGA) was completed for the EBP and the Transformer Vaults, which are the areas within Tank Farm 1 that contain the only known or potential CERCLA releases, and require assessment under the CERCLA process (Tetra Tech, 2014). No unacceptable risk to groundwater was identified during the DGA. The DGA Report also concluded that no surface water bodies are close enough to the EBP or the Transformer Vaults to be impacted. Accordingly, this FS focuses exclusively on the EBP and the Transformer Vaults and the chemicals of concern (COCs) in soil identified in the DGA as requiring the consideration of a CERCLA response action."

Similar revisions were made throughout the text.

RIDEM General Comment 2*: This FS discusses surface soil only at the Ethyl Blending Plant (EBP) and the Transformer Vaults. It states that no exceedances were detected in the subsurface soil at the transformer vaults; however, there is no mention of the exceedances of criteria in the subsurface soil at the EBP. Many of the specific comments below discuss the need to address subsurface soil at the EBP throughout the report. Please include the subsurface soil data for the EBP and the Transformer Vaults in the "Tables" section of this report.*

Response: The subsurface soil data at the EBP and Transformer Vaults has been included as new Tables 2-5 and 2-7, which are attached. Additionally, the text has been revised to reflect that subsurface soil was evaluated and no PRGs were selected for subsurface soil at the EBP or Transformer Vaults. Additionally, the selected surface soil PRGs were not exceeded in any subsurface soil samples.

RIDEM General Comment 3*: Please conduct a thorough review of the report for typographical errors and cross-references, including reference to: 1) "The Transformer Vaults" versus "the Transformer Vaults" versus "the transformer vaults"; and 2) "AOC-004, AOC-005, AOC-018" versus "TF1-004, TF1-005, TF1-018".*

Response: A thorough QC of documents has been performed.

1) All references have been revised to "the Transformer Vaults"

2) The correct names of the Areas of Concern (AOCs) are TF1-004, TF1-005, and TF1-018. All text references have been revised accordingly.

RIDEM General Comment 4*: Sample results from all previous investigations, including the 2010 investigation, should be presented consistently throughout the text, tables, and figures of the report, or justification for not doing so should be provided for completeness. For example, RIDEM notes that samples collected in 2010 from sample locations TV2 and TV3 are discussed in the report text and the results are provided in tables included in Appendix A; however, only the sample collected in 2010 from TV2 is presented on the associated Figure 4, and the sample collected in 2010 from TV3 is not presented in the associated Figure 5. In addition, the results of the 2010 sampling at the EBP are only discussed in text.*

Response: Figure 5 has been revised to include the 2010 sample location and is attached. The 2010 sample locations collected at the EBP were not added to the figures or tables since the samples were only analyzed for TPH and GRO, which are not COCs in this FS. Note that Appendix A has been removed as described in the responses to EPA Specific Comments 99 and 100. Surface soil sample data collected at the Transformer Vaults during the 2010 sampling event is included on Table 2-6 (former Table 2-5).

The Section 1.3.3 text has been revised to read, "As part of the 2010 Site Investigation, field data was collected by DLA Energy per RIDEM regulations. The investigations were performed under RIDEM regulations to address the former storage tanks, distribution piping network, and releases of stored fuels. Soil samples were collected around the EBP via test pits and the samples were field screened for petroleum with laboratory analysis for total petroleum hydrocarbons (TPH) and gasoline-related constituents.

EBP: In May 2010, test pits were excavated down to 5 feet below ground surface (bgs) at 11 locations in the vicinity of the EBP. In May-June 2010, 23 soil samples were collected in the vicinity of the EBP. Sample analyses for soil samples collected in 2010 were limited to field screening for petroleum with laboratory analysis for total petroleum hydrocarbon (TPH) and gasoline-related constituents. Based on field screening results, eight soil samples were submitted to the laboratory for TPH and gasoline-related analysis. TPH results ranged from 31 mg/kg to the west of the EBP [TF1- JB-W OF EBP-W (2.5')] to 160 mg/kg to the north [TF1-EBP-N1 (2.5')] and east [TF1-EBP-E2 (3.5')] of the EBP. Gasoline-related constituents were identified in one sample [TF1-18 C1 (2.5')] west of the EBP at a concentration of 3.7 mg/kg. Analytical results did not detect concentrations of TPH above RIDEM industrial/commercial or residential criteria at the EBP.

Transformer Vaults: In 2010, surface soil samples were collected in the vicinity of the transformer vaults. One surface soil sample was collected at TV2, at a location outside the door on the east side of the building. One surface soil sample was collected at TV3, at a location near the northeastern corner of the building near a rectifier. The soil sample at TV2 contained 24 mg/kg of the PCB congener Aroclor 1260. The sample at TV3 contained 0.51 mg/kg of Aroclor 1260. No remedial actions were completed at these areas (Shaw, 2010)."

RIDEM General Comment 5*: There are several mentions of chromium being retained as a contaminant of concern until speciation data are available to disprove exceedance of the hexavalent chromium preliminary remediation goal (PRG); however, remedies as presented in the Draft FS do not account for the absence of this data and do not address chromium. For example, on page 23, it is stated in the 4th paragraph that "Figure 8 summarizes all surface soil sample locations that have PRG exceedances for PAHs and/or metals and shows an estimated extent of surface soil impacts for the purpose of evaluating remedial alternatives," yet samples with concentrations exceeding the PRG for chromium IV are not highlighted. Furthermore, it is unclear when these data would be available (i.e., if analysis for hexavalent chromium is being conducted with the DGA, or if it will be performed as a pre-design activity).*

Response: As discussed in Section 1.3.5, only total chromium was analyzed at the site. Additionally, hexavalent chromium is not expected to be present at the site. As such, Figure 8 does not show chromium exceedances, but instead a note is included on the figure to clearly explain why. Sampling for hexavalent chromium was not performed as part of the DGA, which is now final.

The following text has been added to the Alternative S-2, S-3, and S-4 discussions in Sections 3 and 4:

"Further sampling will be needed to delineate the extent of surface soils that exceed PRGs at the EBP, TV2, and TV3. Further sampling would also include analysis for hexavalent chromium at a few locations in the EBP. Chromium is currently identified as a potential COC based on an assumption that the detections in surface soil around the EBP are hexavalent chromium; however, if hexavalent chromium is determined not to be present, then chromium would no longer be a COC."

RIDEM Specific Comments:

RIDEM Specific Comment 1*: p. ii, Table of Contents, Tables. - Please add: 1) "Table ES-1, Summary of Comparative Analysis" (referenced on p. ES-v), and; 2) change the title of Table 2-1 to "Chemical Specific ARARs and TBCs", consistent with the table.*

Response: The Table of Contents has been revised as requested.

RIDEM Specific Comment 2*: p. ES-i, Executive Summary, Regulatory Context; 1st sentence. - Please change, "Comprehensive Response" to "Comprehensive Environmental Response".*

Response: The referenced sentence has been changed to refer to CERCLA. The first sentence of the Executive Summary has been revised to read, "This Feasibility Study (FS) report was prepared to address two exposure units based on discrete releases of Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) contaminants…"

RIDEM Specific Comment 3*: p. ES-ii, Executive Summary, Remedial Action Objectives, Preliminary Remediation Goals, and Estimation of Areas and Volumes; bullets - The Remedial Action Objectives (RAOs) should reference PRGs or cleanup goals rather than ARARs/RIDEM's criteria. The PRGs/cleanup goals should be based on the most stringent criteria (including ARARs/RIDEM's criteria).*

Response: Based on other comments received by the EPA and RIDEM, the RAO text has been revised. Please refer to the response to EPA General Comment 5 for the revised text.

RIDEM Specific Comment 4*: p. ES-ii, Executive Summary, Remedial Action Objectives, Preliminary Remediation Goals, and Estimation of Areas and Volumes; 2nd and 5th bullets - Please change these bullets to "Prevent exposure by future residents and other unrestricted users to surface and subsurface soil containing site contaminants that pose unacceptable risk and/or exceed cleanup goals (or PRGs)."*

Response: Based on other comments received by the EPA and RIDEM, the RAO text has been revised. Please refer to the response to EPA General Comment 5 for the revised text.

RIDEM Specific Comment 5*: p. ES-iii, Executive Summary, EBP; bullet - Please indicate if there are exceedances below 2 feet at the EBP. Residential PRGs and leachability criteria apply down to the water table. Please recalculate the impacted area including subsurface soil.*

Response: The text has been revised to read, "At the EBP, soil concentrations were compared to the industrial and residential PRGs. No residential or industrial PRGs were developed for subsurface soil based on comparison of maximum subsurface soil concentrations to ARARs and background concentrations. The following text discusses the impacted area for each land use scenario (industrial and residential)."

RIDEM Specific Comment 6*: p. ES-iii, Executive Summary, EBP; table - Please see comment above. PRGs based on leachability exceedances would not apply to surface soil only. Please include PRGs for subsurface soil as well.*

Response: Please refer to the response to RIDEM Specific Comment 5.

RIDEM Specific Comment 7*: p. ES-iv, Executive Summary, Remedial Alternatives.*

> *Alternative 2, 1st bullet – Add "and Leachability Criteria" or include an impermeable cap as part of this alternative.*
>
> *Alternative 3, 1st bullet - Are there exceedances of residential criteria in subsurface soil? Excavation of subsurface soil will be required to address subsurface soil exceedances if they exist.*
>
> *Alternative 3, 3rd bullet - Please indicate when the Navy proposes to demolish the EBP structure. Will this be part of the remedy?*

Response: The first bullet of Alternative S-2 has been revised to read, "Limited soil excavation and off-site disposal at the EBP to meet Industrial PRGs (includes removal of all soils exceeding RIDEM GA Leachability Criteria)".

The first paragraph of the Remedial Alternatives text has been revised to read, "Per the stepwise CERCLA process for the development of remedial alternatives, four alternatives were defined, retained, and evaluated in detail in the FS. Since human health or ecological PRGs were not developed for subsurface soil based on comparison of maximum subsurface soil concentrations to ARARs and background, there are no remedial actions required for subsurface soil."

> The third bullet of Alternative S-3 has been revised to read, "Short-term LUCs, to include maintenance of the EBP structure foundation, would likely be required until the EBP structure is demolished and the soil beneath the building can be assessed and remediated, if necessary. Demolition of this building is not considered part of the remedy."

RIDEM Specific Comment 8*: p. ES-vi, Table ES-1, Summary of Comparative Analysis - Please revise this table based on previous comments and the comments on Sections 3, 4 and 5.*

Response: Table ES-1 been revised based on the comments received from the EPA and RIDEM and is attached.

RIDEM Specific Comment 9*: p. 2, Section 1.3, Tank Farm 1 Background Information; 1st paragraph, penultimate sentence - Please correct to state "The site was used by the Navy as a fuel storage area …"*

Response: The sentence has been revised to read, "The site was used by the Navy as a fuel storage area and distribution facility from 1940 until it was leased to the DLA Energy in 1974."

RIDEM Specific Comment 10*: p. 3, Section 1.3.1, Site Description - Several references are made to surrounding properties and features. Please identify these properties/features, including, but not limited to: the former Fuel Loading Area, Melville Pond, the Melville Public Fishing and Camping Area, the Navy Fire Department and electrical substation, and vacant Pump House 49, on a figure in this document.*

Response: Figure 2 has been revised to include these surrounding properties and features and is attached. All references to the Navy Fire Department have been removed from the text and figure since it is not within proximity to Tank Farm 1.

RIDEM Specific Comment 11*: p. 4, Section 1.3.2, Site History; 1st paragraph, 2nd sentence - Please correct "1,2-dibromomethane" to "1,2-dibromoethane".*

Response: The typo was corrected as requested.

RIDEM Specific Comment 12*: p. 4, Section 1.3.3, Previous Investigations; 1st paragraph - Please change to "2012-2013 Data Gaps Assessment (DGA; Tetra Tech, 2014)."*

Response: The edit has been made as requested.

RIDEM Specific Comment 13*: p. 4, Section 1.3.3, Previous Investigations; last paragraph, 1st sentence - Please change to "….As part of the 2012-2013 DGA…"*

Response: The edit has been made as requested.

RIDEM Specific Comment 14*: p. 5, Section 1.3.3, Previous Investigations, EBP Findings; 1st paragraph - The 2nd sentence states, "bedrock was encountered at a depth of 1.5 to 4 feet in each of the soil borings". Please review and correct this statement as the subsurface soil samples listed in Appendix A indicate soil boring samples were collected at depths greater than 4 feet at certain locations.*

Response: The text has been revised to read, "In the vicinity of the EBP, a total of 29 soil borings were advanced as part of the DGA (see Figure 3). Of these soil borings, four borings were completed for the purpose of installing bedrock groundwater monitoring wells. Bedrock was encountered at depths ranging from 1.3 feet (at SB-1002) to 9 feet (at SB-1003)."

RIDEM Specific Comment 15*: p. 5, Section 1.3.3, Previous Investigations, EBP Findings; 1st paragraph, 3rd sentence - Please change "…soil samples were collected at the surface (0 to 1 feet below ground surface " to "…soil samples were collected at the surface (0 to 0.5 feet, 0 to 1 feet, 0 to 2 feet, or 1 to 2 feet below ground surface".*

Response: The paragraph has been revised to read, "In the vicinity of the EBP, a total of 29 soil borings were advanced as part of the DGA (see Figure 3). Of these soil borings, four

borings were completed for the purpose of installing bedrock groundwater monitoring wells. Bedrock was encountered at depths ranging from 1.3 feet (at SB-1002) to 9 feet (at SB-1003).

Three soil samples were proposed at each boring location. At each soil boring, an initial surface soil sample was collected. At monitoring well locations, the initial surface soil sample was collected from 0 to 0.5 feet or 0 to 2 feet below ground surface (bgs). At the remaining soil boring locations, the initial surface soil sample was collected from 0 to 1 feet bgs. Subsurface soil samples were proposed at the interval immediately above the bedrock. Additionally, a third soil sample was proposed between the initial surface soil sample and the sample collected above bedrock. Due to the presence of shallow bedrock at the site, only one or two soil samples were collected from most of the soil boring locations at the EBP.

The soil samples collected from the soil borings and the well installation borings were analyzed for volatile organic compounds (VOCs), EDB, 1,2-dibromo-3-chloropropane (DBCP), semi-volatile organic compounds/ polycyclic aromatic hydrocarbons (SVOC/PAHs), total metals, gasoline-range organics (GRO), and total petroleum hydrocarbons (TPH) (Tetra Tech, 2014). The analytical results are summarized in Section 1.3.5, Nature and Extent of Contamination."

RIDEM Specific Comment 16*: p. 5, Section 1.3.3, Previous Investigations, EBP Findings; 1st paragraph, penultimate sentence - Please add "EDB and 1,2-dibromo-3-chloropropane" and change "extractable total petroleum hydrocarbons (EPH)" to "extractable total petroleum hydrocarbons (TPH)" for consistency with the associated tables in Appendix A. Use TPH, rather than EPH throughout the document.*

Response: The text has been revised as requested. See response to RIDEM Specific Comment 15.

RIDEM Specific Comment 17*: p. 5, Section 1.3.3, Previous Investigations, EBP Findings, 2nd and 3rd paragraphs - In the last sentence of both paragraphs, please change "The analytical results are summarized below" to "The analytical results are summarized in Section 1.3.5, Nature and Extent of Contamination".*

Response: The text has been revised as requested.

RIDEM Specific Comment 18*: p. 5, Section 1.3.3, Previous Investigations, Transformer Vaults Findings - Please include references to Figures 4 and 5 in this subsection, consistent with the previous subsection "EBP Findings" that references Figure 3.*

Response: References to Figures 4 and 5 were added. The text has been revised to read, "At TV2, 11 surface soil and 6 subsurface soil samples were collected during the DGA (Figure 4)." "At TV3, 9 surface soil and 6 subsurface soil samples were collected during the DGA (Figure 5)."

RIDEM Specific Comment 19*: p. 5, Section 1.3.3, Previous Investigations, Transformer Vaults Findings, 1st paragraph - In the 2nd sentence, please change, "During the initial sampling event" to "During the 2012 sampling event".*

Response: The text has been revised as requested.

RIDEM Specific Comment 20*: p. 5, Section 1.3.3, Previous Investigations, Transformer Vaults Findings; 1st paragraph - Please correct the typo in the 3rd sentence ("….seven additional locations were sampled").*

Response: The text has been revised as requested.

RIDEM Specific Comment 21*: p. 5, Section 1.3.3, Previous Investigations, Transformer Vaults Findings - In the 2nd and 3rd paragraphs, please remove reference to the results of sampling as they are incomplete and inconsistent with the previous EBP Findings subsection. Rather, include a sentence stating, "The analytical results are summarized in Section 1.3.5 Nature and Extent of Contamination".*

Response: The text has been revised to read, "At TV2, 11 surface soil and 6 subsurface soil samples were collected during the DGA (Figure 4). Samples were analyzed for PCBs, GRO, and TPH (Tetra Tech, 2014). The analytical results are summarized in Section 1.3.5, Nature and Extent of Contamination.

At TV3, 9 surface soil and 6 subsurface soil samples were collected during the DGA (Figure 5). Samples were analyzed for PCBs, GRO, and TPH (Tetra Tech, 2014). The analytical results are summarized in Section 1.3.5, Nature and Extent of Contamination."

RIDEM Specific Comment 22*: p. 6, Section 1.3.4, Physical Characteristics; 1st paragraph, 2nd sentence - Please remove the reference to "(Tetra Tech, 2014)" due to redundancy with the 1st sentence.*

Response: The edit has been made as requested.

RIDEM Specific Comment 23*: p. 7, Section 1.3.5, Nature and Extent of Contamination, EBP; 4th paragraph, 7th sentence - Please change "…(TEL, ethylene EDB, and EDC)…" to "…(TEL, EDB, and EDC)…".*

Response: The text has been as requested.

RIDEM Specific Comment 24*: p. 8, Section 1.3.5, Nature and Extent of Contamination, EBP; last paragraph - In the 2nd sentence, please define DBCP (or include this acronym earlier in the text). Also, add this to the list of acronyms on p. iv.*

Response: As shown in the response to RIDEM Specific Comment 16, Section 1.3.3 has been revised to include the definition of DBCP. Additionally, the acronym was added to the list of acronyms.

RIDEM Specific Comment 25*: p. 9, Section 1.3.5, Nature and Extent of Contamination, Transformer Vaults - In the 2nd sentences of the 1st and 2nd paragraphs, please remove ", though". Also, in the 1st paragraph, penultimate sentence, please change "the closer to" to "near".*

Response: The requested edits have been made.

RIDEM Specific Comment 26*: p. 9, Section 1.3.5, Nature and Extent of Contamination, Transformer Vaults; 1st paragraph - In the 4th sentence, please change to "Aroclor 1260 was*

detected in the 2010 surface soil sample (see 2010 Site Investigation and Remedial Action Report discussion above) and in 5 of the 11 samples collected during the DGA."

Response: The text has been revised as requested

RIDEM Specific Comment 27*: p. 9, Section 1.3.6, Fate and Transport; 1st paragraph; 5th sentence - Please change to: "Additionally, the single PAH exceedance that was detected in MW-GZ-101R was not detected in the duplicate sample, although the reporting limits for this sample and for other samples are elevated above the standard. Certain other PAHs are reported with similarly elevated reporting limits that are above applicable criteria."*

Response: The text has been revised as requested.

RIDEM Specific Comment 28*: p. 9, Section 1.3.6, Fate and Transport; 2nd paragraph, 1st sentence - Please change "are uniformly spread around" to "exhibit no apparent association with specific areas or historical operations at…".*

Response: Based on RIDEM Specific Comment 28 and EPA Specific Comment 23, the paragraph has been revised to read, "Detections of metals in the surface soils, subsurface soil, and groundwater exhibit no apparent association with specific areas. The nature of metals exceedances across the Site lend evidence to the fact that high metals concentrations are not likely the result of any localized spill or any other types of localized releases that might have occurred during former operations at the EBP. Therefore, these metals are not considered to be attributable to site conditions. All soil samples were compared to the RIDEM GA Leachability Criteria. The RIDEM GA Leachability Criteria demonstrates that soil concentrations below the leachability criterion are protective of the actual and potential uses of groundwater. With the exception of naphthalene, all soil sample concentrations were below the RIDEM GA Leachability Criteria. Two VOCs were detected in the groundwater but were not present in any of the soil samples. The VOC concentrations and the nickel concentrations further support that there is minimal leaching between the surface soils and groundwater."

RIDEM Specific Comment 29*: p. 13, Section 1.3.9, Conceptual Site Model Summary, EBP; 1st paragraph, 4th sentence - Please change "be equally dispersed throughout the area" to "exhibit no apparent spatial trends."*

Response: The text has been revised as requested.

RIDEM Specific Comment 30*: p. 14, Section 1.3.9, Conceptual Site Model Summary, Transformer Vaults - In the 1st sentence, please remove "However," and "also."*

Response: The text has been revised to read, "As discussed in Section 1.3.8, the DGA report concluded that the localized areas associated with the maximum Aroclor 1260 concentrations at TV2 and TV3 should be further addressed to protect insectivorous receptors in the future if soil is spread over a larger area because of site activities."

RIDEM Specific Comment 31*: p. 18, Section 2.2, Development of Remedial Action Objectives - This section discusses surface soil only. The RAOs should apply to all soil. Are there exceedances of residential or leachability criteria below 2 feet? These will need to be addressed*

by the RAOs. Please remove the term "surface" where applicable in this section, and revise the RAOs (2nd bullet for both the EBP and Transformer Vaults) to address all soils.

Response: Please refer to the response to EPA Specific Comment 37 for the revised RAOs and discussion of subsurface soil.

RIDEM Specific Comment 32*: p. 19, Section 2.3, Development of Preliminary Remediation Goals - This section discusses the development of PRGs for surface soil only. Are there exceedances of residential or leachability criteria below 2 feet? If so, please develop PRGs for subsurface soil including an evaluation of subsurface background levels for metals.*

Response: The following paragraphs have been added to the EBP portion of Section 2.3:

"Table 5 of Appendix A also presents a comparison of maximum detected subsurface soil concentrations to the RIDEM RDEC and site-specific background concentrations. There were no resulting residential scenario PRGs selected for subsurface soil, based on the selection method described above."

"Similar to the residential scenario, Table 7 of Appendix A also presents a comparison of maximum detected subsurface soil concentrations to the RIDEM I/C DEC and site-specific background concentrations. There were no resulting I/C scenario PRGs selected for subsurface soil, based on the selection method described above."

The following sentence has been added to the last paragraph of the Transformer Vault portion of Section 2.3:

"No PCBs were detected in subsurface soil at the Transformer Vaults and therefore, the selected PRG is only applicable to surface soil."

The following paragraphs were added to Section 2.4:

"Table 2-5 provides a comparison of subsurface soil data to PRGs for surface soil and no PRGs were exceeded. As described in Section 2.3, PRGs were not developed for subsurface soil based on comparison of maximum subsurface soil concentrations to ARARs and background values. As such, impacted subsurface soil was not identified at the EBP."

"Table 2-7 provides a comparison of subsurface soil data to PRGs. PCB concentrations were not detected in subsurface soil samples and therefore, the selected PRG applies only to surface soil."

RIDEM Specific Comment 33*: p. 19-20, Section 2.3, Development of Preliminary Remediation Goals - It is not transparent in this section, or in Appendix B, how final human health PRGs are selected from among the various values considered. Additionally, the text states that PRGs are developed based on three separate cancer risk levels (10-6, 10-5 and 10-4) but does not explain why (when PRGs are typically based on 10-6 for individual contaminants - see RAGS Part B and RIDEM Remediation Regulations Section 8), or how the three risk levels are used. Please provide further clarification regarding the development and selection of the final PRGs. A flow chart describing the PRG selection process would be a helpful visual aid.*

Response: The text has been revised to include further clarification regarding the PRG selection process, including use of 1 x 10^{-6} as a cancer risk point-of-departure during the evaluation. The following text has been added to Section 2.3:

"For the contaminants listed above which were considered risk-drivers, selected PRGs were identified as follows:

1) The lower of the risk-based goals (point-of-departure: cancer risk = 1 x 10^{-6} or HQ = 1) or ARAR (if available) was initially selected;

2) The PRGs selected in Step 1 were compared to site-specific background values (if available and applicable) and the greater of the two values was selected as the interim PRG, as PRGs are typically not set at concentrations below naturally-occurring background concentrations;

3) The interim PRGs selected in Step 2 were evaluated against available site data to estimate the potential extent of remediation. Other potential PRGs (e.g., cancer risk = 1 x 10^{-5} and ARARs) were evaluated similarly against site data, including a review of the corresponding residual risk associated with the potential PRGs. In addition, as part of the evaluation, residual risks were calculated for soils remaining following removal of samples with exceedances of PRGs for the specific scenario. All of this information was considered to select the site-specific PRGs."

A second paragraph later in the section was added to provide further details:

"The PAHs which were considered risk-drivers in surface soil (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) were evaluated following the procedure noted above, beginning with the lower risk-based PRGs at a point-of-departure cancer risk equal to 1 x 10^{-6}. Assuming that soils exceeding RIDEM RDEC were removed, additional evaluation of calculated potential exposure point concentrations (95% upper confidence limits [UCLs]) for remaining soils showed the contribution to residual risk from these PAHs as 1 x 10^{-5}."

RIDEM Specific Comment 34*: p. 22, Section 2.4, Estimation of Areas and Volumes - Please recalculate the estimated areas and volumes in this section to include any exceedances of residential or leachability criteria below 2 feet, if applicable.*

Response: Please refer to the response to RIDEM Specific Comment 32.

RIDEM Specific Comment 35*: p. 26, Section 3.0, Development and Screening of Soil Alternatives - Please remove the term "surface" from the 1st and 2nd paragraphs on this page and refer to just "soil" throughout this section.*

Response: The first paragraph of Section 3.0 has been revised to address subsurface soil as follows: "Remedial alternatives for soil at the EBP and Transformer Vaults are developed in the following sections. As discussed in Section 2.4, PRGs were not developed for subsurface soil based on a comparison of maximum subsurface soil concentrations to ARARs and background values. Additionally, surface soil PRGs were not exceeded in subsurface soil. Hence, there are no remedial actions required for subsurface soil. Remedial technologies not screened from

further consideration in Section 2.6 have been used as the basis for developing potential site-specific remedial alternatives listed in this section. Feasible remedial technologies and process options have been combined into comprehensive site remedial alternatives that address the RAOs detailed in Section 2.2."

RIDEM Specific Comment 36*: p. 26, Section 3.1.2, Alternative S-2 – Limited Action - Please discuss in this section the proposed demolition of the EBP structure and short-term LUCs, similar to the discussion in Section 3.1.3, unless this is only a component of Alternative S-3.*

Response: The following paragraph has been revised to read, "At the Transformer Vaults, all PCB concentrations exceeding PRGs would be removed. As such, LUCs would not be required at the Transformer Vaults. However, soil would remain on-site at concentrations greater than PRGs at the EBP; therefore, LUCs would be established to prevent residential and other unrestricted use and thus prevent the exposure of such receptors to COCs in surface soil at the EBP. Additionally, short-term LUCs would also be required until the EBP structure is demolished and the soil beneath the building can be assessed. Short-term LUCs would prevent disturbance of the building foundation without approval of the Navy and regulatory agencies. The demolition of the EBP structure is not considered part of this alternative. Once the building is demolished and the foundation is removed, the underlying soil would be assessed and remediated if needed to meet PRGs.

Five-year reviews would also be required since contaminants will remain in excess of levels that allow for unrestricted use and unlimited exposure. Five-year reviews of Tank Farm 1 would be conducted as part of the facility-wide five-year review process."

RIDEM Specific Comment 37*: p. 26, Section 3.1.2, Alternative S-2 – Limited Action; 2nd sentence - After "….PRGs at the EBP", add ", and removal of soils exceeding the RIDEM GA Leachability Criteria for naphthalene."*

Response: The text has been revised to read, "Limited soil excavation and off-site disposal would also remove surface soils exceeding Industrial PRGs (including RIDEM GA Leachability Criteria) at the EBP."

RIDEM Specific Comment 38*: p. 26, Section 3.1.2, Alternative S-2 – Limited Action, Limited Excavation; 1st paragraph - Add "and two boring locations (TF1-EBP-SB1012 and TF1-EBP-SB1020) exceed the GA Leachability Criteria" at the end of the 1st sentence.*

Response: As discussed in Section 2.3 and shown in Table 2-2, the RIDEM GA Leachability Criteria was used in the development of the Industrial PRGs. The text has been revised to read, "At the EBP, seven soil boring locations (TF1-EBP-SB1004, TF1-EBP-SB1012, TF1-EBP-SB1016, TF1-EBP-SB1017, TF1-EBP-SB1018, TF1-EBP-SB1020, and TF1-EBP-SB1036) exceed the Industrial PRGs. The RIDEM GA Leachability Criteria served as the basis of the Industrial PRG for naphthalene due to the exceedances at soil boring locations TF1-EBP-SB1012 and TF1-EBP-SB1020."

RIDEM Specific Comment 39*: p. 27, Section 3.1.3, Alternative S-3 – Excavation and Off-Site Disposal; 5th sentence - Please revise to "all soil in excess of both Residential and Industrial PRGs would be removed" and add ", including removal of soils exceeding the RIDEM GA*

Leachability Criteria for naphthalene (around soil boring locations TF1-EBP-SB1012 and TF1-EBP-SB1020)."

Response: As discussed in Section 2.3 and shown in Tables 2-2, the RIDEM GA Leachability Criteria was used in the development of the Residential and Industrial PRGs. The text has been revised to read," At the EBP, all surface soil in excess of both the Residential and Industrial PRGs would be removed. The RIDEM GA Leachability Criteria served as the basis of the Residential and Industrial PRGs for naphthalene due to the exceedances at soil boring locations TF1-EBP-SB1012 and TF1-EBP-SB1020."

RIDEM Specific Comment 40*: p. 27, Section 3.1.3, Alternative S-3 – Excavation and Off-Site Disposal; 1st paragraph - Please indicate when the Navy proposes to demolish the EBP structure. Is this part of Alternative S-3? Will a pre-design investigation be conducted?*

Response: Demolition of the EBP structure is not considered part of the remedy. The date of building demolition is unknown. The text has been revised to read, "Since no sampling has been performed underneath the EBP structure, short-term LUCs would likely be required until the EBP structure is demolished and the soil beneath the building can be assessed. Short –term LUCs would also include maintenance of the EBP structure foundation. The demolition of the EBP structure is not considered part of this alternative. However, once the building is demolished and the foundation is removed, the underlying soil would be assessed and remediated if needed to meet Residential and Industrial PRGs. Short-term LUCs would prevent disturbance of the building foundation without approval of the Navy and regulatory agencies."

RIDEM Specific Comment 41*: p. 28, Section 3.1.4, Alternative S-4 – Containment - Please discuss in this section the proposed demolition of the EBP structure and short-term LUCs, similar to the discussion in Section 3.1.3, unless this is only a component of Alternative S-3.*

Response: The following text has been added to the end of Section 3.1.4, "Additionally, short-term LUCs would also be required until the EBP structure is demolished and the soil beneath the building can be assessed. Short-term LUCs would prevent disturbance of the building foundation without approval of the Navy and regulatory agencies. Short –term LUCs would also include maintenance of the EBP structure foundation. The demolition of the EBP structure is not considered part of this alternative. However, once the building is demolished and the foundation is removed, the underlying soil would be assessed and remediated if needed to meet PRGs."

RIDEM Specific Comment 42*: p. 28, Section 3.1.4, Alternative S-4 – Containment; last paragraph, 6th sentence - Please consider changing "stormwater runoff controls will not need to be implemented" to "low permeability cap options are not necessary."*

Response: The text has been revised to read, "Stormwater runoff controls will be required during installation of the cover and until the site is stabilized. Once the site is stabilized, stormwater runoff controls (such as an impermeable cover material) will not need to be implemented because the contaminant concentrations in the consolidated soil do not exceed the RIDEM GA Leachability Criteria."

RIDEM Specific Comment 43*: p. 29, Section 3.1.5, Alternative S-5- On-Site Consolidation and Containment; 1st paragraph - Please note that a soil cover (2 feet of clean fill) is only*

acceptable if the excavated soil placed under the cover is below the applicable leachability criteria. Otherwise, an impermeable cap will be necessary. Does this alternative include removal and off-site disposal of all soil exceeding the GA Leachability Criteria?

Response: The following sentence has been added: "Prior to on-site consolidation, limited soil that exceeded RIDEM GA Leachability Criteria would be segregated for off-site disposal." Additionally, the text has been revised to read, "Stormwater runoff controls will be required during installation of the cover and until the site is stabilized. Once the site is stabilized, stormwater runoff controls (such as an impermeable cover material) will not need to be implemented because the contaminant concentrations in the consolidated soil do not exceed the RIDEM GA Leachability Criteria."

RIDEM Specific Comment 44*: p. 29, Section 3.1.5, Alternative S-5 – On-Site Consolidation/Containment; 1st paragraph, last sentence - If all excavated soil is below the applicable leachability criteria (see comment above), then please consider changing "stormwater runoff controls will not need to be implemented" to "low permeability cap options are not necessary."*

Response: See response to RIDEM Specific Comment 43.

RIDEM Specific Comment 45*: p. 29, Section 3.1.5, Alternative S-5 – On-Site Consolidation and Containment; 2nd paragraph - Please note that in addition to the area consisting of the soil cover, LUCs will be required wherever contaminants exceed RIDEM's residential criteria in surface and subsurface soil (down to the water table).*

Response: The text has been revised to read, "LUCs would only be required for the area consisting of the soil cover since all contaminated soil will be underneath the cover."

RIDEM Specific Comment 46*: p. 29, Section 3.1.5, Alternative S-5 – On-Site Consolidation and Containment - Please discuss in this section the proposed demolition of the EBP structure and short-term LUCs, similar to the discussion in Section 3.1.3, unless this is only a component of Alternative S-3.*

Response: The following text has been added to the end of Section 3.1.5, "Additionally, short-term LUCs would also be required until the EBP structure is demolished and the soil beneath the building can be assessed. Short-term LUCs would prevent disturbance of the building foundation without approval of the Navy and regulatory agencies. Short –term LUCs would also include maintenance of the EBP structure foundation. The demolition of the EBP structure is not considered part of this alternative. However, once the building is demolished and the foundation is removed, the underlying soil would be assessed and remediated if needed to meet PRGs."

RIDEM Specific Comment 47*: p. 32, Section 4.2, Alternative S-2 – Limited Action - This alternative will need to require removal of the exceedances of GA Leachability Criteria in soil at the EBP, or installation of an impermeable cap in order to be protective. Please revise this section as necessary.*

Response: The RIDEM GA Leachability Criteria was used in the development of the PRGs. The first sentence of Section 4.2.1 has been revised to read, "Under this alternative, limited soil

excavation and off-site disposal would be performed to remove soils exceeding the Industrial PRGs (including RIDEM GA Leachability Criteria) at the EBP and to remove soils exceeding the selected PRG for the Transformer Vaults at TV2 and TV3."

RIDEM Specific Comment 48*: p. 35, Section 4.3, Alternative S-3 – Excavation and Off-Site Disposal - Please revise this section to address all soils, not just surface soil. For residential or unrestricted recreational use, all exceedances of residential and GA Leachability Criteria in subsurface soil must be addressed.*

Response: The following text has been added to the 1st paragraph of Section 4.3.1: "As discussed in Section 3.0, PRGs were not developed for subsurface soil based on a comparison of maximum subsurface soil concentrations to ARARs and background values. Additionally, surface soil PRGs were not exceeded in subsurface soil. Therefore, there are no remedial actions required for subsurface soil."

RIDEM Specific Comment 49*: p. 35, Section 4.3, Alternative S-3 – Excavation and Off-Site Disposal - RIDEM notes that the demolition of the EBP structure is only discussed for Alternative S-3 throughout the report. Is it part of the Alternative S-3 remedy only or should this also be discussed for all alternatives?*

Response: The demolition of the EBP structure is not considered part of Alternative S-3. The following text has been added to the end of the Short-Term LUCs and Inspections text in Section 4.3.1, "The demolition of the EBP structure is not considered part of this alternative. However, once the building is demolished and the foundation is removed, the underlying soil would be assessed and remediated if needed to meet PRGs."

Short-term LUCs are required for Alternatives S-2 and S-4 as well. For Alternatives S-2 and S-4, the following text has been added to the detailed description, **"**Additionally, short-term LUCs would also be required until the EBP structure is demolished and the soil beneath the building can be assessed. Short-term LUCs would prevent disturbance of the building foundation without approval of the Navy and regulatory agencies. Short –term LUCs would also include maintenance of the EBP structure foundation. The demolition of the EBP structure is not considered part of this alternative. However, once the building is demolished and the foundation is removed, the underlying soil would be assessed and remediated if needed to meet PRGs."

RIDEM Specific Comment 50*: p. 35, Section 4.3.1, Soil Removal and Disposal; 3rd paragraph - Please indicate if there a basis for the estimated 20 post-excavation samples (e.g., linear feet of sidewall and square feet of excavation bottom).*

Response: Based on comments received from the Navy, the sampling proposed for each Alternative has been revised slightly. The text has been revised to read, "Further sampling will be needed to delineate the extent of surface soils that exceed PRGs at the EBP, TV2, and TV3. The details of the sampling assumptions are presented in Appendix C. Further sampling would also include analysis for hexavalent chromium at a few locations in the EBP. Chromium is currently identified as a potential COC based on an assumption that the detections in surface soil around the EBP are hexavalent chromium; however, if hexavalent chromium is determined not to be present, then chromium would no longer be a COC."

RIDEM Specific Comment 51*: p. 44-45, Section 5.1.1 & 5.1.3 - These sections indicate that Alternative 4 is more protective, effective and permanent than Alternative 2. However, the contaminated soil would remain on site (capped) in Alternative 4 whereas it would be excavated off-site in Alternative 2. However, it is unclear whether leachability exceedances will be addressed by Alternative 2 and whether subsurface soil exceedances will be addressed by any of the alternatives.*

Response: Section 5.1.1 has been revised to read, "Alternative S-3 is considered the most effective at protecting human health and the environment. Under Alternative S-3, contaminated soil is removed from the EBP and the Transformer Vaults. Once the soil underneath the EBP structure is assessed and remediated, all contaminants will be removed from the EBP; thereby, allowing unrestricted use at the site and eliminating the possibility of future exposures that exist under other alternatives. Both Alternatives S-2 and S-4 require the implementation of LUCs at the EBP, which add protection for human health. Alternative S-4 removes soil that exceeds the RIDEM GA Leachability Criteria and includes a physical barrier that would isolate the contaminated soil remaining at the EBP. Alternative S-2 removes soil that exceeds the Industrial PRGs (including the RIDEM GA Leachability Criteria). As such, Alternative S-2 provides a slightly greater level of protection. Alternative S-1 would not be protective of human health because contact with contaminated soil would not be prevented."

Section 5.1.3 has been revised to read, "In terms of mitigating risks remaining at the site after RAOs have been met, and for risks from management of residuals, Alternative S-3 has the highest long-term effectiveness since it removes all contaminated soil from the EBP and Transformer Vaults that exceeds PRGs. Alternatives S-2 and S-4 are less effective since contaminated soil remains at the EBP under those alternatives. However, these alternatives utilize controls to prevent exposure to contaminated soil over the long-term to provide the desired long-term effectiveness. Under the future industrial land use scenario, Alternative S-2 is slightly more effective than Alternative S-4 since it removes all contaminated soil exceeding the Industrial PRGs. A future residential land use scenario would be prevented under Alternatives S-2 and S-4; however, controls and inspections would be relied upon to provide permanent protection from contaminants and are therefore less effective. Alternative S-1 is not effective and doesn't provide permanent protection from contaminants."

Regarding subsurface soil, see responses to previous EPA and RIDEM comments. No changes were made to Sections 5.1.1 and 5.1.3.

RIDEM Specific Comment 52*: p. 45, Section 5.1.5, Short-Term Effectiveness; 2nd paragraph, last sentence - Please add "and management (i.e., engineering controls and contingency measures)" after "handling."*

Response: The last sentence of the second paragraph has been revised as requested.

RIDEM Specific Comment 53*: p. 46, Section 5.1.5, Short-Term Effectiveness; 1st sentence (continued from previous page) - Please add "and handling and management of impacted soils" after "excavation activities."*

Response: Based on EPA Specific Comment 72, the last sentence of the third paragraph has been revised to read: "Alternatives S-3 and S-4 have the greatest short-term impact to natural

habitats since they have the longest construction period and impact the same construction footprint which is larger than Alternative S-2."

RIDEM Specific Comment 54*: p. 47, Section 5.1.6, Implementability; 5th paragraph, 1st sentence - Please remove "surface". Unrestricted use is only possible if all soil exceeding PRGs (including subsurface) is addressed.*

Response: As indicated in other comment responses, PRGs were not developed for subsurface soil based on a comparison of maximum subsurface soil concentrations to ARARs and background values. Additionally, surface soil PRGs were not exceeded in subsurface soil. Therefore, there are no remedial actions required for subsurface soil. No changes were made to Section 5.1.6.

RIDEM Specific Comment 55*: p. 47, Section 5.1.6, Implementability; last paragraph - In the 1st sentence, please change "The remaining alternatives" to "Alternatives S-2 through S-4." Additionally, in the last sentence of this same paragraph, please change, "Finally, special technologies…" to "Finally, special technologies (i.e., proprietary technologies or technologies with more variables affecting ultimate effectiveness), are not proposed…"*

Response: The paragraph has been revised to read, "Alternative S-1 would not require specialized equipment or personnel. Alternatives S-2 through S-4 would require off-site disposal of soil, with Alternative S-3 requiring disposing the largest amount of soil. All services and materials required for the remaining alternatives would be relatively easy to obtain. Finally, special technologies (i.e., proprietary technologies or technologies with more variables affecting ultimate effectiveness) are not proposed for any of the alternatives discussed in this FS."

RIDEM Specific Comment 56*: p. 49, Section 5.2, Cost Sensitivity Analysis; 1st sentence on page - Please change, "…the following two factors…" to "the following three factors…".*

Response: The text has been revised as requested.

RIDEM Specific Comment 57*: Table 2-1, Chemical-Specific ARARs and TBCs - Only chemical-specific ARARs and TBCs are included in this table. Are there any location or action-specific ARARs or TBCs? There appears to be a number of ARARs missing. Please review recent feasibility studies or RODs for NSN (i.e., Tank Farms 4 and 5) to ensure that all applicable ARARs are included in this report. For example, several requirements from RIDEM's Solid Waste Regulations are applicable to Alternative 4.*

Response: There are no location-specific ARARs/TBCs associated with this Site. There are no nearby wetlands, the Site is not in a floodplain, there are no known endangered species in the area, and there are no known historically significant features. Since Action-specific ARARs/TBCs can vary between remedial alternatives, the action-specific ARARs/TBC are provided for each alternative in Appendix B. With respect to action-specific ARARs/TBCs, recent RODs for Tank Farms 4 and 5 were reviewed during development of the ARARs associated with each alternative. It should be noted that Tank Farm 5 included waste/debris in the area which justified use of Rhode Island Solid Waste regulations. Remedial actions at the Tank Farm 1 EBP are limited to contaminated soil. The following is a list of additional RIDEM ARARs found in those RODs, along with reasoning for not including them in the Tank Farm 1 EBP FS:

- Rhode Island Solid Waste Regulations – Dust Control – Covered by the Air Pollution Control ARAR
- Rhode Island Solid Waste Regulations – Sedimentation and Erosion Control – Included in the containment alternative (Alternative S-4). Also covered by the Soil Erosion and Sediment Control Handbook TBC
- Rhode Island Solid Waste Regulations – Vegetated Top Cover; Cover Permeability; Surface Water Drainage – The containment alternative (Alternative S-4) utilizes two feet of cover soil, similar to the remedy applied in Tank Farm 4. These regulations are not included in the Tank Farm 4 ROD and similarly, are not included for Tank Farm 1.
- Rhode Island Solid Waste Regulations – Siting in and Adjacent to Wetlands and Floodplains; Closure in "Unstable Areas" – As noted above, the EBP Site is not adjacent to wetlands, nor in a floodplain.
- Rhode Island Solid Waste Regulations – Long-term Monitoring; Compliance Boundaries; Monitoring Wells – The alternatives remove soils above leachability criteria and there are no waste deposits at the Site which would be considered a source of groundwater contamination.

RIDEM Specific Comment 58*: Table 2-2, PRGs for Soil at the Ethyl Blending Plant - Please review previous comments and incorporate PRGs for subsurface soil if necessary. Review background data for subsurface soil as it applies to metals.*

Response: Refer to the responses to EPA Specific Comment 39 and RIDEM Specific Comment 32. See also the updated Appendix A showing the PRG development, which is attached.

RIDEM Specific Comment 59*: Table 2-4, Analytical Results – Surface Soil at the Ethyl Blending Plant - Please include another table after this table with all <u>sub</u>surface soil data from the EBP. Please highlight any exceedances of residential, industrial or leachability criteria or develop residential and industrial PRGs for subsurface soil and highlight PRG exceedances similar to Table 2-4.*

Response: A new Table 2-5 has been added to include the subsurface soil data at the EBP and is attached. The table shows that no surface soil PRGs are exceeded in subsurface soil.

RIDEM Specific Comment 60*: Table 2-5, Analytical Results – TV2 and TV3 - Please include all subsurface soil data from TV2 and TV3 in this table.*

Response: A new Table 2-7 has been added to include the subsurface soil data at the Transformer Vaults and is attached.

RIDEM Specific Comment 61*: Table 2-6, Technology Process Option Screening for Surface Soils, page 1 - Regarding elimination of fencing, under screening, please replace "is only to" with "includes".*

Response: Table 2-6 has been renamed Table 2-8. Based on EPA Specific Comment 79, the screening text has been revised to read, "A fence currently prevents access to the Site. Not appropriate since RIDEM RDEC and I/C DEC exceedances are present in surface soil and potential receptors include residents and commercial and industrial worker."

RIDEM Specific Comment 62*: Table 2-6, Technology Process Option Screening for Surface Soil, page 1 - For the Excavation and On-Site Disposal remedial technology, please add "Native Soil or" before "Single" under Process Options.*

Response: Table 2-6 has been renamed Table 2-8. The table has been revised to read, "Native Soil Single or Double Barrier Cap".

RIDEM Specific Comment 63*: Table 3-1, Components of Surface Soil Remedial Alternatives - Please revise this table based on previous comments. Also, for Alternative S-2, please add "future sampling to define the extent of soil requiring excavation and LUCs" under "Key Components."*

Response: Table 3-1 has been revised based on previous comments and is attached. Additionally, "Further sampling to delineate all soil exceeding Industrial PRGs at the EBP and PRGs at the Transformer Vaults" was added under Key Components for Alternative S-2.

RIDEM Specific Comment 64*: Table 3-3, Screening of Remedial Alternative S-2: Limited Action - Under "Effectiveness/Advantages," please add "and other Industrial PRGs."*

Response: Table 3-3 Effectiveness text has been revised to read:

- Removes soil exceeding the Industrial PRGs (including RIDEM GA Leachability Criteria) at the EBP
- Removes soil exceeding the PRG (including RIDEM GA Leachability) at the Transformer Vaults
- Limits use of property for residential uses

The updated Table 3-3 is attached.

RIDEM Specific Comment 65*: Table 3-6, Screening of Remedial Alternative S-5: On-Site Consolidation and Containment - Please see previous comments. Land use controls will be required wherever exceedances of residential or leachability criteria exist in the soil above the water table.*

Response: Alternative S-5 consolidates all soil above the Residential and Industrial PRGs, except for soil which exceeds RIDEM GA Leachability Criteria, which will be disposed off-site. No changes were made to the table. The current Table 3-6 is attached.

RIDEM Specific Comment 66*: Tables 4-1 to 4-4, Detailed Evaluations - Please revise these tables based on previous comments.*

Response: The Section 4 tables have been revised based on all comments received from RIDEM and EPA. Tables 4-2 through 4-4 are attached.

RIDEM Specific Comment 67: *Table 5-1, Cost Sensitivity Analysis Summary - This table compares costs associated with the baseline estimate with the following upper-end projections:*

- *Alternative S-2: doubling of excavated soil volume (140 to 280 CY) and confirmation samples increasing from 25 to 30.*
- *Alternative S-3: excavated soil volume increasing from 400 CY to 450 CY and confirmation samples increasing from 20 to 40 (and increasing pre-excavation delineation samples to 20 from an unknown number).*
- *Alternative S-4: excavated soil volume increasing from 70 CY (60 CY for naphthalene and 10 CY for TV2) to 200 CY and confirmation samples increasing from 15 to 20 (and increasing pre-excavation delineation samples to 20 from an unknown number).*

It appears that the upper-end projection for Alternative S-4 does not allow for any increase in the area of impacted soils to be capped. Please summarize the baseline volume and sampling assumptions in the notes to facilitate comparison of baseline and upper-end projections. Given that delineation has not been completed the north, east, and south in the EBP area, the upper-end projections presented may grossly underestimate the "upper end."

Response: Based on comments received, the excavation volumes and sample quantities have been revised. The notes presented in Table 5-1 have been revised to read:

- Alternative S-2: Increase area and volume of limited excavation to from 150 cubic yards to 300 cubic yards (based on 4,000 sf x 2 ft); increase number of delineation samples by 20%; increase number of waste characterization samples to 2 samples (1 sample per 250 cubic yards); increase data validation hours to 40; increase cost of annual LUC site inspection by 20%
- Alternative S-3: Increase area and volume of excavation at the EBP from 400 cubic yards to 800 cubic yards (based on 10,400 sf) and increase area and volume of excavation at the Transformer Vaults from 20 cubic yards to 40 cubic yards; increase number of delineation samples by 20%; increase number of waste characterization samples to 4 samples (1 sample per 250 cubic yards); increase data validation hours to 40
- Alternative S-4: Increase area and volume of limited excavation from 60 cubic yards to 120 cubic yards at the EBP and from 20 cubic yards to 40 cubic yards at the Transformer Vaults; increase area of cap to 10,400 sf; increase number of delineation samples by 20%; increase number of clean fill samples to 4 samples (1 sample per 250 cubic yards per fill type); increase cost of O&M and Five-Year Reviews by 20%

RIDEM Specific Comment 68*: Figure 5, Transformer Vault 3 Sample Location Map - Please add the location of TF1-EV2-N.*

Response: The figure has been revised to include the location of TF1-EV3-N and is attached.

RIDEM Specific Comment 69*: Appendix B, Table 1 - Please note the misspelling of "Human". Additionally, the note at the bottom of the table indicates that the risks are based on EPA Regional Screening Levels dated November 2013 (although PRGs are calculated based on more recent RSLs). Please indicate whether use of the current RSLs would change the outcome of the HHSRE.*

Response: The misspelling has been corrected. A note has been added at the bottom of the table which states "Use of the most current RSLs would not have changed the outcome of the screening results shown above."

RIDEM Specific Comment 70*: Appendix B, Attachment 1 - Please remove the reference to exposure parameters (such as fish consumption) that are not relevant to the PRG development for Tank Farm 1.*

Response: The attachment table is taken directly from an EPA directive and, as noted in the comment, includes some exposure parameters which are not relevant to the PRG development for Tank Farm 1. A note stating this has been added to the cover page of the table, as well as to Section 2.3 in the FS report text.

RIDEM Specific Comment 71*: Appendix B, Table 5 - PRGs are presented based on a cancer risk of 10-6, 10-5 and 10-4. It is unclear how these three sets of values are used in establishing PRGs. Regardless, risk-based PRGs should be based on 10-6 cancer risk for individual contaminants (e.g., see RAGS Part B and RIDEM Remediation Regulations Section 8). Furthermore, there are multiple instances where the final PRG is based on the RDEC, which is a value higher than the risk-based PRG (based on 10-6 risk; for example, dibenzo(a,h)anthracene). Please explain. (This comment also applies to Section 2.3 of the main report.)*

Response: See response to RIDEM Specific Comment 33.

RIDEM Specific Comment 72*: Appendix B, Table 6 - Please provide a footnote explaining the derivation of residual risk estimates.*

Response: A footnote has been added to state that the residual risk at the PRG was determined by utilizing a proportion of the Regional Screening Level (RSL), either at a cancer risk of 1×10^{-6} or a non-cancer hazard index of 1, to the selected PRG.

Table ES-1
Summary of Comparative Analysis

Alternative	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long Term Effectiveness and Permanence	Reduction of TMV through Treatment	Short-Term Effectiveness	Implementability	Cost
S-1: No Action	Alternative S-1 would not be protective of human health because contact with contaminated soil would not be prevented. Additionally, Alternative S-1 would not be protective of groundwater because it does not address RIDEM GA Leachability Criteria exceedances in soil.	Does not comply with ARARs	Alternative S-1 is not effective and doesn't provide permanent protection from contaminants.	This alternative does not include/involve treatment.	Since no construction activities or remedial actions are proposed under Alternative S-1, there are no additional short-term risks to the community, workers, and environment.	Alternative S-1 is considered the most implementable since no construction activities or remedial actions are proposed.	Total Cost: $0
S-2: Limited Action	Alternative S-2 removes all soil that exceeds the Industrial PRGs at the EBP and the PRGs at the Transformer Vaults (includes removal of all soils exceeding RIDEM GA Leachability Criteria). Alternatives S-2 requires implementation of LUCs, which add protection to human health. Alternative S-2 is slightly more protective than Alternative S-4.	Meets ARARs	Alternative S-2 is less effective than Alternative S-3 since contaminated soil remains in place. However, it is considered more effective than Alternative S-4 since all soil exceeding the Industrial PRGs is removed. This alternative utilizes controls to prevent exposure to contaminated soil over the long-term to provide the desired long-term effectiveness.	This alternative does not include/involve treatment.	Under Alternative S-2, limited excavation is proposed and short-term risks to the workers, surrounding community, and environment will be minimal.	Alternative S-2 is more difficult to implement because of the administrative burden and future inspections over the long-term. LUCs and excavation are proven technologies.	Capital Cost: $162,887 O&M: $48,040 Five-Year Reviews: $21,518 Total Cost: $159,000
S-3: Excavation and Off-Site Disposal	Alternative S-3 removes all soil that exceeds the Residential and Industrial PRGs at the EBP as well as the PRGs at the Transformer Vaults (includes removal of all soils exceeding RIDEM GA Leachability Criteria). Alternative S-3 is considered the most effective at protecting human health and the environment. Under Alternative S-3, all contaminated soil is removed from the site; thereby, allowing unrestricted use at the site.	Meets ARARs	Alternative S-3 has the highest long-term effectiveness since it removes all contaminated soil from the site and allows for unrestricted use.	This alternative does not include/involve treatment.	Alternatives S-3 and S-4 have the greatest short-term impact to natural habitats since they have the longest construction period and impact the same construction footprint.	Alternative S-3 is relatively easy to implement. Excavation is a proven technology and there are no long-term components.	Capital Cost: $253,118 O&M: $0 Five-Year Reviews: $0 Total Cost: $253,000
S-4: Containment	Alternative S-4 removes all soil that exceeds the RIDEM GA Leachability Criteria. Alternative S-4 is slightly less protective than Alternative S-2 since soil exceeding the Industrial PRGs remains in place. Although contaminated soil remains in place, the soil cover would prevent direct contact, erosion, and transport of remaining surface soil exceeding residential PRGs.	Meets ARARs	Alternative S-4 is less effective than Alternative S-2 since contaminated soil exceeding the Industrial PRGs remains in place. However, this alternative utilizes controls to prevent exposure to contaminated soil over the long-term to provide the desired long-term effectiveness. Additionally, the alternative installs a physical barrier over contaminated soil.	This alternative does not include/involve treatment.	Alternatives S-3 and S-4 have the greatest short-term impact to natural habitats since they have the longest construction period and impact the same construction footprint.	Alternative S-4 is the most difficult to implement because of the administrative burden of future inspections and maintenance over the long-term. LUCs and excavation are proven technologies. Alternative S-4 is slightly more difficult to implement than Alternative S-2.	Capital Cost: $241,590 O&M: $77,604 Five-Year Reviews: $21,518 Total Cost: $341,000

Notes:
LUCs – Land use controls
ARAR – Applicable or relevant and appropriate requirement
O&M – Operation and maintenance

Table 2-2
Preliminary Remediation Goals (PRGs) for Surface Soil at the Ethyl Blending Plant

Analyte	Selected PRG (mg/kg)	Basis[1]
Residential Use Scenario		
Benzo(a)anthracene	0.9	RDEC
Benzo(a)pyrene	0.4	RDEC
Benzo(b)fluoranthene	0.9	RDEC
Benzo(g,h,i)perylene	0.8	RDEC
Benzo(k)fluoranthene	0.9	RDEC
Chrysene	0.4	RDEC
Dibenz(a,h)anthracene	0.4	RDEC
Fluoranthene	20	RDEC
Indeno(1,2,3-cd)pyrene	0.9	RDEC
Naphthalene	0.8	Leachability
Pyrene	13	RDEC
Arsenic	14	Background
Chromium VI	18	Background
Manganese	390	RDEC
Industrial Use Scenario		
Benzo(a)anthracene	7.8	I/C DEC
Benzo(a)pyrene	0.8	I/C DEC
Benzo(b)fluoranthene	7.8	I/C DEC
Dibenz(a,h)anthracene	0.8	I/C DEC
Naphthalene	0.8	Leachability
Arsenic	14	Background

Notes

1. See Appendix A for PRG development and basis:
RDEC and I/C DEC - RIDEM Remediation Regulations, DEM-DSR-01-93, November 2011, Table 1 (Residential and Industrial/Commercial Direct Exposure Criteria [DEC])
Leachability - RIDEM Remediation Regulations, DEM-DSR-01-93, November 2011, Table 2 (GA Leachability Criteria)
Background - If RIDEM criteria or risk-based PRGs were below background concentrations for the site, the backgrounc concentration was selected.

Table 2-3
Preliminary Remediation Goals (PRGs) for Surface Soil at the Transformer Vaults

Analyte	Selected PRG (mg/kg)	Basis[1]
PCBs	3.4	Ecological-Based PRG

Notes

1. See Appendix A for PRG development and basis:
   Note that the selected PRG represents the lower of the ecological based PRG for insectivores and the applicable RIDEM Remediation Regulation criteria.

Table 2-5
Analytical Results - Subsurface Soil at the Ethyl Blending Plant

SAMPLE ID			TF1-EBP-SB1000-0203	TF1-EBP-SB1001-0708	TF1-EBP-SB1001-0810	TF1-EBP-SB1003-0203	TF1-EBP-SB1003-0405	TF1-EBP-SB1004-0203	TF1-EBP-SB1005-0204	TF1-EBP-SB1006-0204	TF1-EBP-SB1008-0203	TF1-EBP-SB1009-0204	TF1-EBP-SB1010-0204	TF1-EBP-SB1010-0405	TF1-EBP-SB1011-0405	TF1-EBP-SB1012-0204	TF1-EBP-SB1013-0204
LOCATION ID			TF1-EBP-SB1000	TF1-EBP-SB1001	TF1-EBP-SB1001	TF1-EBP-SB1003	TF1-EBP-SB1003	TF1-EBP-SB1004	TF1-EBP-SB1005	TF1-EBP-SB1006	TF1-EBP-SB1008	TF1-EBP-SB1009	TF1-EBP-SB1010	TF1-EBP-SB1010	TF1-EBP-SB1011	TF1-EBP-SB1012	TF1-EBP-SB1013
SAMPLE DATE			08/07/12	08/08/12	08/08/12	08/08/12	08/08/12	08/07/12	08/07/12	08/08/12	08/08/12	08/08/12	08/06/12	08/06/12	08/06/12	08/06/12	08/08/12
DEPTH INTERVAL (FT)	Residential	Industrial	2 - 3	7 - 8	8 - 10	2 - 3	4 - 5	2 - 3	2 - 4	2 - 4	2 - 3	2 - 4	2 - 4	4 - 5	4 - 5	2 - 4	2 - 4
SACODE	PRG	PRG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)																	
BENZO(A)ANTHRACENE	900	7800	10 U	21 J	17 J	13 J	11 U	6.8 U	11 U	8.9 J	2.6 J	12 U	20 J	13 U	30	130	10 U
BENZO(A)PYRENE	400	800	10 UJ	15 J	12 J	8.2 J	5.3 J	4.3 J	8.3 J	6.2 J	11 UJ	12 UJ	23 J	10 J	22 J	84 J	10 UJ
BENZO(B)FLUORANTHENE	900	7800	2.9 U	38	28	22 J	10 J	8 U	17 U	14 J	4.6 J	3.6 J	46	18 U	45	160	10 U
BENZO(G,H,I)PERYLENE	800		10 U	10 J	8.1 J	6.6 J	3.1 J	3.4 J	12 J	4.2 J	11 U	12 U	20 J	11 J	12 J	43	10 U
BENZO(K)FLUORANTHENE	900		10 U	9.4 J	5.6 J	5.1 J	11 U	11 U	11 U	12 U	11 U	12 U	8.1 J	13 U	16 J	55	10 U
CHRYSENE	400		10 UJ	20 J	16 J	9.5 J	11 U	11 UJ	7.4 J	3.4 J	11 UJ	12 UJ	18 J	8.2 J	34 J	130	10 U
DIBENZO(A,H)ANTHRACENE	400	800	10 U	4.5 J	2.2 J	3.1 J	11 U	2.1 J	3 J	12 U	11 U	12 U	4.2 J	3 J	3.6 J	16 J	10 U
FLUORANTHENE	20000		2 U	43	36	31	12 U	9.2 U	19 J	17 J	4.3 J	2.5 J	30	34 U	89	280	10 U
INDENO(1,2,3-CD)PYRENE	900		10 U	13 J	8.5 J	8.4 J	4 J	3.6 J	7.1 J	5.2 J	11 U	12 U	34 J	13 J	27 J	91 J	10 U
NAPHTHALENE	800	800	10 U	11 U	9.7 U	11 U	11 U	11 U	11 U	12 U	11 U	12 U	11 U	13 U	6 J	12 U	10 U
PYRENE	13000		10 U	26	25	18 J	11 U	8.9 U	16 U	11 J	2.9 J	12 U	22 U	25 U	64	200	10 U
METALS (MG/KG)																	
ALUMINUM			15200	13900	9590	13500	10800	13300	14700	13000	12700	12100	9000	9740	10100	15700	10800
ANTIMONY			0.05 J	0.14 J	0.09 J	0.11 J	0.11 J	0.07 J	0.08 J	0.08 J	0.07 J	0.06 J	0.05 J	0.08 J	0.08 J	0.12 J	0.08 J
ARSENIC	14	14	7.2	11.9 J	11 J	9.9 J	9.6 J	5.5	7.4	6.8 J	5.6 J	4 J	3.3	4.7	5.4	10.9	5.6 J
BARIUM			24.7	24.9	11.3	21.2	17.5	19.2	18	20.5	15.1	15.4	15.7	18.8	15	36	14.6
BERYLLIUM			0.4	0.61	0.42	0.49	0.47	0.36	0.38	0.43	0.37	0.33	0.31	0.36	0.31	0.51	0.34
CADMIUM			0.04 J	0.08 J	0.16	0.11	0.11	0.06 J	0.12	0.11	0.09 J	0.12	0.06 J	0.1 J	0.06 J	0.16 J	0.09
CALCIUM			543 J	518 J	799	457 J	490 J	570 J	459 J	592 J	477 J	499 J	626 J	1060 J	560 J	796 J	544 J
CHROMIUM	18		17.5	16.2	13.9	14.7	13.9	15.2	17	14.4	14.3	14	10.7	11.8	11.6	17.3	13
COBALT			8.5	12.4	20.3	8.2	14.5	7.9	7.6	9	6.7	6.5	8.7	6.7	9.3	9.6	8.6
COPPER			10.7	14.7	14.3	10.5	10.7	12.1	10.4	13.4	9.4	6.8	9.4	10.8	18.8	14.6	13.7
IRON			21200	23200	25400	23400	22400	19400	24300	19800	17700	17100	13100	16200	24900	23200	20400
LEAD			8.9	14.9	8.7	11.9	8.5	8.3	11.2	10.8	8.9	7.4	6.1 J	8.1 J	22.6 J	13.5 J	7.4
MAGNESIUM			2740	2540	2410	2330	2160	2770	3020	2770	2590	2430	2040	2430	2780	3030	2980
MANGANESE	390		232	280	345	208	242	211	186	231	206	184	266	255	211	299	321
MERCURY			0.03 J	0.12	0.03 J	0.03 J	0.04	0.03 J	0.06	0.1	0.04	0.04	0.02 J	0.02 J	0.008 J	0.23 J	0.02 J
NICKEL			17.1	19.1	23.5	16.4	18.7	14.8	20.8	15.4	13.7	14.4	10.1	11.2	18	19.7	18.3
POTASSIUM			571	406 J	230	276 J	287 J	418	279	430 J	395 J	383 J	428	493	404	371	384 J
SELENIUM			0.54	0.63	0.27 U	0.48	0.38 J	0.49	0.39 J	0.34 U	0.34 J	0.39 U	0.31 J	0.32 J	0.23 J	0.59	0.33 U
SILVER			0.05 J	0.06 J	0.03 J	0.05 J	0.04 J	0.04 J	0.04 J	0.04 J	0.04 J	0.03 J	0.02 J	0.01 J	0.02 J	0.05 J	0.02 J
SODIUM			36.9 J	37.3 J	32 U	27.1 J	28.3 J	30.7 J	24.8 J	33.4 J	30.7 J	31.5 J	39 U	47.5 U	26.9 U	37.2 U	24.1 J
THALLIUM			0.09	0.1	0.02 J	0.07	0.05 J	0.08 J	0.07 J	0.08 J	0.08 J	0.07 J	0.06 J	0.06 J	0.04 J	0.1	0.05 J
VANADIUM			22.1	22.5	16.8	20.1	18.2	19.4	18.3	18.6	19.2	17.7	17	18	13	20.7	13.9
ZINC			32.8	42.7	50.8	40.2	41.5	30	41.7	32.8	30.9	29.8	21 J	23.5 J	41.8 J	43.4 J	34
MISCELLANEOUS PARAMETERS (%)																	

Table 2-5
Analytical Results - Subsurface Soil at the Ethyl Blending Plant

SAMPLE ID			TF1-EBP-SB1000-0203	TF1-EBP-SB1001-0708	TF1-EBP-SB1001-0810	TF1-EBP-SB1003-0203	TF1-EBP-SB1003-0405	TF1-EBP-SB1004-0203	TF1-EBP-SB1005-0204	TF1-EBP-SB1006-0204	TF1-EBP-SB1008-0203	TF1-EBP-SB1009-0204	TF1-EBP-SB1010-0204	TF1-EBP-SB1010-0405	TF1-EBP-SB1011-0405	TF1-EBP-SB1012-0204	TF1-EBP-SB1013-0204
LOCATION ID			TF1-EBP-SB1000	TF1-EBP-SB1001	TF1-EBP-SB1001	TF1-EBP-SB1003	TF1-EBP-SB1003	TF1-EBP-SB1004	TF1-EBP-SB1005	TF1-EBP-SB1006	TF1-EBP-SB1008	TF1-EBP-SB1009	TF1-EBP-SB1010	TF1-EBP-SB1010	TF1-EBP-SB1011	TF1-EBP-SB1012	TF1-EBP-SB1013
SAMPLE DATE			08/07/12	08/08/12	08/08/12	08/08/12	08/08/12	08/07/12	08/07/12	08/08/12	08/08/12	08/08/12	08/06/12	08/06/12	08/06/12	08/06/12	08/08/12
DEPTH INTERVAL (FT)	Residential	Industrial	2 - 3	7 - 8	8 - 10	2 - 3	4 - 5	2 - 3	2 - 4	2 - 4	2 - 3	2 - 4	2 - 4	4 - 5	4 - 5	2 - 4	2 - 4
SACODE	PRG	PRG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOTAL SOLIDS			95	87	96	93	92	85	81	81	85	82	88	72	93	83	90
MISCELLANEOUS VOLATILES (UG/KG)																	
1,2-DIBROMO-3-CHLOROPROPANE			3.2 UJ	2.8 UJ	3 UJ	3.5 UJ	2.4 UJ	2.4 UJ	3 U	2.5 UJ	2.8 U	2.5 UJ	3 UJ	3 UJ	2.4 UJ	2.4 UJ	2.5 UJ
1,2-DIBROMOETHANE			3.2 UJ	2.8 UJ	3 UJ	3.5 UJ	2.4 UJ	2.4 UJ	3 U	2.5 UJ	2.8 U	2.5 UJ	3 UJ	3 U	2.4 UJ	2.4 UJ	2.5 U
PETROLEUM HYDROCARBONS (MG/KG)																	
GASOLINE RANGE ORGANICS			3 J	2.3 U	2.1 U	3.3 UJ	2.4 UJ	2.6 UJ	3.1 UJ	3 UJ	2.7 UJ	3.6 U	2.7 J	3.3 UJ	2.2 UJ	2.9 U	2.8 UJ
TPH (C09-C36)			12 U	28	13 U	21 U	13 U	9.6 U	14 U	8.3 U	8.3 U	12 U	8.9 U	9 U	12 U	37	4.6 U

Table 2-5
Analytical Results - Subsurface Soil at the Ethyl Blending Plant

SAMPLE ID			TF1-EBP-SB1014-0203	TF1-EBP-SB1015-0204	TF1-EBP-SB1016-0506	TF1-EBP-SB1017-0204	TF1-EBP-SB1018-0304	TF1-EBP-SB1020-0203	TF1-EBP-SB1021-0204	TF1-EBP-SB1022-0203	TF1-EBP-SB1035-0304
LOCATION ID			TF1-EBP-SB1014	TF1-EBP-SB1015	TF1-EBP-SB1016	TF1-EBP-SB1017	TF1-EBP-SB1018	TF1-EBP-SB1020	TF1-EBP-SB1021	TF1-EBP-SB1022	TF1-EBP-SB1035
SAMPLE DATE			08/06/12	08/08/12	08/06/12	08/08/12	08/06/12	08/06/12	08/06/12	08/06/12	08/06/12
DEPTH INTERVAL (FT)	Residential	Industrial	2 - 3	2 - 4	5 - 6	2 - 4	3 - 4	2 - 3	2 - 4	2 - 3	3 - 4
SACODE	PRG	PRG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
POLYCYCLIC AROMATIC HYDROCARBONS (UG/KG)											
BENZO(A)ANTHRACENE	900	7800	3.4 U	6.7 J	59	7.4 J	3.3 U	21 J	8.3 U	9 U	2.9 U
BENZO(A)PYRENE	400	800	12 UJ	5.1 J	44 J	5.2 J	12 UJ	16 J	6.7 J	7.6 J	11 UJ
BENZO(B)FLUORANTHENE	900	7800	5.9 U	11 J	90	14 J	5.2 U	36	14 U	17 U	5.3 U
BENZO(G,H,I)PERYLENE	800		12 U	8.7 J	26	4 J	12 U	12 J	4 J	6.2 J	11 U
BENZO(K)FLUORANTHENE	900		12 U	12 U	34	11 U	12 U	11 J	9.6 U	12 U	11 U
CHRYSENE	400		12 UJ	12 U	70	2.5 J	12 UJ	21 J	3.6 J	5.4 J	11 UJ
DIBENZO(A,H)ANTHRACENE	400	800	12 U	2.8 J	9.8 J	11 U	12 U	4.8 J	2.4 J	3 J	11 U
FLUORANTHENE	20000		6.3 U	14 J	150	14 J	5.3 U	43	14 U	19 U	5.2 U
INDENO(1,2,3-CD)PYRENE	900		3.5 J	5 J	55 J	4.9 J	12 U	23 J	8.8 J	13 J	4 J
NAPHTHALENE	800	800	12 U	12 U	4.6 J	11 U	12 U	11 U	9.6 U	12 U	11 U
PYRENE	13000		5 U	8.7 J	120	10 J	4.2 U	36	13 U	16 U	4 U
METALS (MG/KG)											
ALUMINUM			12800	15900	10800	12400	14700	15200	15200	14400	11600
ANTIMONY			0.07 J	0.11 J	0.14 J	0.11 J	0.08 J	0.13 J	0.18 J	0.44 J	0.07 J
ARSENIC	14	14	5.2	8.6 J	7.5	6.1 J	5	11.1	10.9	10.5	4.9
BARIUM			19.2	33.4	28.4	21	30.6	33.6	35.2	34.5	16.9
BERYLLIUM			0.42	0.51	0.37	0.36	0.46	0.48	0.54	0.44	0.31
CADMIUM			0.07 J	0.23	0.15	0.13	0.06 J	0.19 J	0.09 J	0.07 J	0.06
CALCIUM			500 J	513 J	1590 J	966 J	693 J	458 J	864 J	1710 J	435 J
CHROMIUM	18		14.5	15.4	12.2	13.8	14.6	16.5	14	24.2	13
COBALT			9.1	10	8.5	7.3	6.3	6.9	6.4	7.6	6.5
COPPER			11.5	10.2	12.7	10.6	9.4	10.9	11.8	43.3	10.6
IRON			19500	20500	18600	16600	18300	19400	18600	38200	15800
LEAD			8.4 J	10.5	12.8 J	8.7	8.8 J	14.3 J	13.6 J	10 J	7.6 J
MAGNESIUM			2900	2630	2260	2420	2340	2470	2040	2520	2410
MANGANESE	390		213	315	235	200	222	236	252	336	193
MERCURY			0.03 J	0.03 J	0.2 J	0.06	0.05 J	0.11 J	0.04 J	0.04 J	0.02 J
NICKEL			16.3	17.9	15	14.8	17	17.2	13.6	27	13
POTASSIUM			404	355 J	563	434 J	336	322	330	334	328
SELENIUM			0.51	0.67	0.47 J	0.46 J	0.55 J	0.57 J	0.72	0.59	0.45 J
SILVER			0.04 J	0.08 J	0.06 J	0.05 J	0.06 J	0.07	0.07	0.06 J	0.02 J
SODIUM			37 U	35.3 J	63.7 U	50 J	45 U	29.5 U	38.2 U	39.6 U	31.7 U
THALLIUM			0.07 J	0.1	0.09 J	0.08 J	0.09 J	0.11	0.13	0.11	0.06
VANADIUM			18.8	20.2	15.7	18.6	20.3	19	19.7	22	18.2
ZINC			30.6 J	39.1	31.9 J	31.8	61.6 J	40.2 J	31.9 J	37.9 J	25.8 J
MISCELLANEOUS PARAMETERS (%)											

Table 2-5
Analytical Results - Subsurface Soil at the Ethyl Blending Plant

SAMPLE ID			TF1-EBP-SB1014-0203	TF1-EBP-SB1015-0204	TF1-EBP-SB1016-0506	TF1-EBP-SB1017-0204	TF1-EBP-SB1018-0304	TF1-EBP-SB1020-0203	TF1-EBP-SB1021-0204	TF1-EBP-SB1022-0203	TF1-EBP-SB1035-0304
LOCATION ID			TF1-EBP-SB1014	TF1-EBP-SB1015	TF1-EBP-SB1016	TF1-EBP-SB1017	TF1-EBP-SB1018	TF1-EBP-SB1020	TF1-EBP-SB1021	TF1-EBP-SB1022	TF1-EBP-SB1035
SAMPLE DATE			08/06/12	08/08/12	08/06/12	08/08/12	08/06/12	08/06/12	08/06/12	08/06/12	08/06/12
DEPTH INTERVAL (FT)	Residential	Industrial	2 - 3	2 - 4	5 - 6	2 - 4	3 - 4	2 - 3	2 - 4	2 - 3	3 - 4
SACODE	PRG	PRG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
TOTAL SOLIDS			84	84	85	87	80	85	94	79	86
~~MISCELLANEOUS VOLATILES (UG/KG)~~											
1,2-DIBROMO-3-CHLOROPROPANE			2.5 UJ	3.2 UJ	2.8 UJ	2.8 UJ	3 UJ	2.8 UJ	3 UJ	2.4 UJ	3.5 UJ
1,2-DIBROMOETHANE			2.5 UJ	3.2 UJ	2.8 UJ	2.8 UJ	3 UJ	2.8 UJ	3 UJ	2.4 UJ	3.5 U
PETROLEUM HYDROCARBONS (MG/KG)											
GASOLINE RANGE ORGANICS			2.5 UJ	3.3 UJ	3.9 UJ	2.4 UJ	2.7 U	3.1 U	2.4 UJ	3.4 UJ	3.4 UJ
TPH (C09-C36)			8.6 U	20 U	26	11 U	18 U	34	47	18 U	12 U

Table 2-6
Analytical Results - Surface Soil at TV2 and TV3

EXPOSURE UNIT		Transformer Vault 2											
SAMPLE ID		TF1-EV2-E	TF1-TV2-SS-1020-0001	TF1-TV2-SS-1021-0001	TF1-TV2-SS-1022-0001	TF1-TV2-SS-1023-0001	TF1-TV2-SS-1024-0001	TF1-TV2-SS-1025-0001	TF1-TV2-SS1026-0001	TF1-TV2-SS1027-000.9	TF1-TV2-SS1028-000.8	TF1-TV2-SS1029-000.8	TF1-TV2-SS1030-0001
LOCATION ID		TF1-EV2-E	TF1-TV2-SB1020	TF1-TV2-SB1021	TF1-TV2-SB1022	TF1-TV2-SB1023	TF1-TV2-SB1024	TF1-TV2-SB1025	TF1-TV2-SB1026	TF1-TV2-SB1027	TF1-TV2-SB1028	TF1-TV2-SB1029	TF1-TV2-SB1030
SAMPLE DATE	Surface	May-June 2010	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	10/22/13	10/22/13	10/22/13	10/22/13	10/22/13
DEPTH INTERVAL (FT)	Soil	0-0.5	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0-1	0-0.9	0-0.8	0-0.8	0-1
SACODE	PRG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
PCBS (UG/KG)													
AROCLOR-1016		3800 U	8.3 U	8 U	8.9 U	9.2 U	9.5 U	8.7 U	9.4 U	8.6 U	11 U	9.1 U	9 U
AROCLOR-1221		3800 U	8.3 U	8 U	8.9 U	9.2 U	9.5 U	8.7 U	9.4 U	8.6 U	11 U	9.1 U	9 U
AROCLOR-1232		3800 U	9.8 U	9.4 U	10 U	11 U	11 U	10 U	11 U	10 U	13 U	11 U	11 U
AROCLOR-1242		3800 U	8.3 U	8 U	8.9 U	9.2 U	9.5 U	8.7 U	9.4 U	8.6 U	11 U	9.1 U	9 U
AROCLOR-1248		3800 U	8.3 U	8 U	8.9 U	9.2 U	9.5 U	8.7 U	9.4 U	8.6 U	11 U	9.1 U	9 U
AROCLOR-1254		3800 U	8.3 U	8 U	8.9 U	9.2 U	9.5 U	8.7 U	9.4 U	8.6 U	11 U	9.1 U	9 U
AROCLOR-1260	3,400	**24000**	8.3 U	260	8.9 U	9.2 U	9.5 U	8.7 U	180 J	180 J	1000 J	250 J	9 U
TOTAL AROCLOR	3,400	**24000**	8.51 U	260	9.06 U	9.46 U	9.71 U	8.89 U	180	180	1000	250	0 U
MISCELLANEOUS PARAMETERS (%)													
TOTAL SOLIDS			95	89	89	89	86	93	84	94	74	88	92
PETROLEUM HYDROCARBONS (MG/KG)													
GASOLINE RANGE ORGANICS			0.96 J	1.3 J	1.2 U	1.8 U	1.4 U	1.1 U					
TPH (C09-C36)			220	150	290	320	330	51					

Table 2-6
Analytical Results - Surface Soil at TV2 and TV3

EXPOSURE UNIT		Transformer Vault 3									
SAMPLE ID		TF1-EV3-N	TF1-TV3-SS-1026-0001	TF1-TV3-SS-1027-0001	TF1-TV3-SS-1028-0001	TF1-TV3-SS-1029-0001	TF1-TV3-SS-1030-0001	TF1-TV3-SS-1031-0001	TF1-TV3-SS1032-0001	TF1-TV3-SS1032-0001-	TF1-TV3-SS1033-000.9
LOCATION ID		TF1-EV3-N	TF1-TV3-SB1026	TF1-TV3-SB1027	TF1-TV3-SB1028	TF1-TV3-SB1029	TF1-TV3-SB1030	TF1-TV3-SB1031	TF1-TV3-SB1032		TF1-TV3-SB1033
SAMPLE DATE	Surface	May-June 2010	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	10/22/13	10/22/13	10/22/13
DEPTH INTERVAL (FT)	Soil	0-0.5	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0-1	0-1	0-0.9
SACODE	PRG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DUP	NORMAL
PCBS (UG/KG)											
AROCLOR-1016		38 U	91 U	8.7 U	8.9 U	8.4 U	9.2 U	8.9 U	7.8 U	8.7 U	8.3 U
AROCLOR-1221		38 U	91 U	8.7 U	8.9 U	8.4 U	9.2 U	8.9 U	7.8 U	8.7 U	8.3 U
AROCLOR-1232		38 U	110 U	10 U	10 U	9.8 U	11 U	10 U	9.1 U	10 U	9.8 U
AROCLOR-1242		38 U	91 U	8.7 U	8.9 U	8.4 U	9.2 U	8.9 U	7.8 U	8.7 U	8.3 U
AROCLOR-1248		38 U	91 U	8.7 U	8.9 U	8.4 U	9.2 U	8.9 U	7.8 U	8.7 U	8.3 U
AROCLOR-1254		38 U	91 U	8.7 U	8.9 U	8.4 U	9.2 U	8.9 U	7.8 U	8.7 U	380 J
AROCLOR-1260	3,400	510	**4300**	1600 J	110	180 J	9.2 U	26	970 J	1100 J	560 J
TOTAL AROCLOR	3,400	510	**4300**	1600 J	110	180 J	9.46 U	26	970	1100	940
MISCELLANEOUS PARAMETERS (%)											
TOTAL SOLIDS			84	86	86	92	92	91	92	93	95
PETROLEUM HYDROCARBONS (MG/KG)											
GASOLINE RANGE ORGANICS			2.7 U	2.5 UJ	2.3 J	2.1 UJ	1 UJ	2 UJ			
TPH (C09-C36)			350	400	250	240	340	17 U			

Table 2-7
Analytical Results - Subsurface Soil at TV2 and TV3

EXPOSURE UNIT		Transformer Vault 2								Transformer Vault 3					
SAMPLE ID		TF1-TV2-SB-1020-0204	TF1-TV2-SB-1021-0204	TF1-TV2-SB-1022-0204	TF1-TV2-SB-1022-0204-D	TF1-TV2-SB-1022-0204-AVG	TF1-TV2-SB-1023-0204	TF1-TV2-SB-1024-0204	TF1-TV2-SB-1025-0204	TF1-TV3-SB-1026-0204	TF1-TV3-SB-1027-0204	TF1-TV3-SB-1028-0204	TF1-TV3-SB-1029-0204	TF1-TV3-SB-1030-0204	TF1-TV3-SB-1031-0204
LOCATION ID		TF1-TV2-SB1020	TF1-TV2-SB1021	TF1-TV2-SB1022	TF1-TV2-SB1022	TF1-TV2-SB1022	TF1-TV2-SB1023	TF1-TV2-SB1024	TF1-TV2-SB1025	TF1-TV3-SB1026	TF1-TV3-SB1027	TF1-TV3-SB1028	TF1-TV3-SB1029	TF1-TV3-SB1030	TF1-TV3-SB1031
SAMPLE DATE	Surface	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12	08/03/12
DEPTH INTERVAL (FT)	Soil	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4
SACODE	PRG	NORMAL	NORMAL	ORIG	DUP	AVG	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
PCBS (UG/KG)															
AROCLOR-1016		9.1 U	8.8 U	8.7 U	8.1 U	8.4 U	8.7 U	9.9 U	9 U	8.3 U	8.9 U	9.9 U	9 U	8.4 U	8.6 U
AROCLOR-1221		9.1 U	8.8 U	8.7 U	8.1 U	8.4 U	8.7 U	9.9 U	9 U	8.3 U	8.9 U	9.9 U	9 U	8.4 U	8.6 U
AROCLOR-1232		11 U	10 U	10 U	9.5 U	9.75 U	10 U	12 U	10 U	9.7 U	10 U	12 U	10 U	9.9 U	10 U
AROCLOR-1242		9.1 U	8.8 U	8.7 U	8.1 U	8.4 U	8.7 U	9.9 U	9 U	8.3 U	8.9 U	9.9 U	9 U	8.4 U	8.6 U
AROCLOR-1248		9.1 U	8.8 U	8.7 U	8.1 U	8.4 U	8.7 U	9.9 U	9 U	8.3 U	8.9 U	9.9 U	9 U	8.4 U	8.6 U
AROCLOR-1254		9.1 U	8.8 U	8.7 U	8.1 U	8.4 U	8.7 U	9.9 U	9 U	8.3 U	8.9 U	9.9 U	9 U	8.4 U	8.6 U
AROCLOR-1260	3,400	9.1 U	8.8 U	8.7 U	8.1 U	8.4 U	8.7 U	9.9 U	9 U	8.3 U	8.9 U	9.9 U	9 U	8.4 U	8.6 U
TOTAL AROCLOR	3,400	9.37 U	8.97 U	8.3 U	8.89 U	8.6 U	8.89 U	10.2 U	9.14 U	8.5 U	9.06 U	10.2 U	9.29 U	8.61 U	8.8 U
MISCELLANEOUS PARAMETERS (%)															
TOTAL SOLIDS		91	92	86	86	86	88	86	89	88	87	83	90	92	89
PETROLEUM HYDROCARBONS (MG/KG)															
GASOLINE RANGE ORGANICS		1.2 J	1.2 U	1.3 U	1.4 UJ	1.35 UJ	1.4 U	1.4 U	1.3 U	2.4 UJ	2.9 UJ	3 UJ	2.3 UJ	1.3 UJ	1.3 UJ
TPH (C09-C36)		11 U	10 U	7.8 U	9.4 U	8.6 U	5.4 U	7.2 U	6.9 U	8.4 U	14 U	8.6 U	13 U	6.2 U	6.3 U

Table 3-1
Components of Surface Soil Remedial Alternatives

Alternative	Key Components
S-1: No Action	• No remedial action • For comparison only
S-2: Limited Action	• Install erosion controls • Surface soil excavation with confirmation sampling at TV2 and TV3 to remove all soil exceeding the PRG for the Transformer Vaults • Limited surface soil excavation at the EBP to address Industrial PRG exceedances • Further sampling to delineate all soil exceeding Industrial PRGs at the EBP and PRGs at the Transformer Vaults • Off-site disposal of excavated soils from both exposure units • Implement LUCs restricting residential use at the EBP and perform associated inspections and reporting • Implementation of short-term LUCs prohibiting disturbance of the EBP building foundation without approval of the Navy and regulatory agencies until the underlying soil can be assessed • Five-year reviews to evaluate remedy
S-3: Excavation and Off-Site Disposal	• Future sampling to delineate the extent of surface soil exceedances • Site preparation for excavation; create soil staging pad • Install erosion controls • Excavate contaminated soil to an anticipated depth of 2 ft bgs at both the EBP and Transformer Vaults to remove all surface soil exceeding the PRGs for the respective exposure units • Off-site disposal of excavated soils from both exposure units • Backfill excavation with clean fill • Site Restoration • Implementation of short-term LUCs prohibiting disturbance of the EBP building foundation without approval of the Navy and regulatory agencies until the underlying soil can be assessed
S-4: Containment	• Future sampling to delineate the extent of surface soil exceedances • Surface soil excavation at TV2 and TV3 to remove all soil exceeding the PRG for the Transformer Vaults • Limited surface soil excavation and disposal off-site to address RIDEM GA Leachability Criteria exceedances at the EBP • Off-site disposal of excavated soils from both exposure units • Site preparation for containment at the EBP • Install a 2-foot soil cover at the EBP, consisting of 2 feet of clean fill, over the contaminated soil, with topsoil and grass seed.

Alternative	Key Components
	• Periodic maintenance of the cover including mowing, shrub removal, and integrity inspections. • Implement LUCs for the EBP, which restrict residential use and digging on the cover, and perform associated inspections/reports • Implementation of short-term LUCs prohibiting disturbance of the EBP building foundation without approval of the Navy and regulatory agencies until the underlying soil can be assessed • Five-year reviews to evaluate remedy
S-5: On-Site Consolidation and Containment (Screened Out)	• Future sampling to delineate the extent of surface soil exceedances • Site preparation including erosion controls installation • Limited surface soil excavation to address RIDEM GA Leachability Criteria exceedances at the EBP and TV2. • Off-site disposal of excavated soils • Excavate remaining contaminated soil at the EBP and TV3 to an anticipated depth of 2 ft bgs and consolidate excavated soil in one location • Backfill excavation • Install soil cover, consisting of geotextile layer covered with 2 feet of clean fill, over stockpiled soil. • Complete cover with topsoil and grass seed. • Maintenance of the cover would be required over time including mowing, shrub removal, and integrity inspections. • Implement LUCs, which restrict residential use and digging on the cover, and perform associated inspections/reports • Implementation of short-term LUCs prohibiting disturbance of the EBP building foundation without approval of the Navy and regulatory agencies until the underlying soil can be assessed • Five-year reviews to evaluate remedy

Table 3-2
Screening of Remedial Alternative S-1: No Action

Description: No remedial activities are included under this alternative.

	Effectiveness	Implementability	Cost
Advantages:	• None	• No action makes this the easiest alternative to implement	• No capital costs • No O&M costs
Disadvantages:	• Does not mitigate on-site risk to residential receptors and ecological receptors, or address exceedances of the RIDEM I/C DECs or GA Leachability Criteria	• Additional remedial actions may be required in the future	• Costs of additional remedial actions (if required)

Conclusion: The No Action alternative is not protective of the environment. However, it is used as a baseline in comparison with other alternatives. **This alternative will be retained for detailed analysis.**

Table 3-3
Screening of Remedial Alternative S-2: Limited Action

Description: Under this alternative, soil excavation and off-site disposal of soil at the Transformer Vaults would be conducted to meet the selected PRG for PCBs. Additionally, limited soil excavation and off-site disposal would be done at the EBP to remove soils exceeding the Industrial PRGs for the EBP. LUCs would be established at the EBP and inspections would be conducted to prevent residential and other unrestricted use of the EBP area. Short-term LUCs would also be implemented until the soil underneath the EBP structure could be assessed and remediated if needed.

	Effectiveness	**Implementability**	**Cost**
Advantages:	• Removes soil exceeding the Industrial PRGs (including RIDEM GA Leachability Criteria) at the EBP • Removes soil exceeding the PRG (including RIDEM GA Leachability) at the Transformer Vaults • Limits use of property for residential uses	• LUCs and soil excavations are proven technologies and easy to implement.	• Low capital costs • Low O&M costs
Disadvantages:	• Does not remove all contaminants	• Long-term actions are required	• Five-year Review costs

Conclusion: The Limited Action alternative is protective of human health and the environment. This alternative is less difficult to implement than other alternatives. **This alternative will be retained for detailed analysis.**

Table 3-4
Screening of Remedial Alternative S-3: Excavation and Off-Site Disposal

Description: Under this alternative, contaminated surface soil from the EBP and Transformer Vaults will be excavated and disposed off-site. Short-term LUCs would be implemented until the soil underneath the EBP structure could be assessed and remediated if needed. This alternative would address all surface soils exceeding selected PRGs and therefore, would allow for unrestricted use and unlimited exposure upon completion of the remedial action.

	Effectiveness	**Implementability**	**Cost**
Advantages:	• Removes contaminated soil	• Excavation is a proven technology	• No or limited O&M costs
Disadvantages:	• Transportation to off-site facilities increases the potential for current and future liability	• Moderate amount of logistical considerations required during excavation	• Moderate capital cost

Conclusion: The Excavation and Off-Site Disposal alternative is protective of human health and the environment and allows for unrestricted use. This alternative is moderately difficult to implement. **This alternative will be retained for detailed analysis.**

Table 3-5
Screening of Remedial Alternative S-4: Containment

Description: This alternative would use a soil cover to provide a barrier to the contaminated surface soils at the EBP. Prior to containment, limited soil excavation and off-site disposal would be conducted to remove soils exceeding the RIDEM GA Leachability Criteria at the EBP and remove soils exceeding the PRG at the Transformer Vaults. LUCs will be established for the EBP, and five-year reviews would be performed to evaluate the success of the remedial actions. Short-term LUCs would also be implemented until the soil underneath the EBP structure could be assessed and remediated if needed.

	Effectiveness	Implementability	Cost
Advantages:	• Eliminates exposure to contaminated soils	• A soil cover is a proven technology	• Low capital costs
Disadvantages:	• Does not remove all contaminants at the EBP	• Maintenance will be required	• Moderate O&M cost • Five-year Review costs

Conclusion: The Containment alternative is protective of human health and the environment. However, maintenance of the soil cover will be required since contaminants remain in place. **This alternative will be retained for detailed analysis.**

Table 3-6
Screening of Remedial Alternative S-5: On-Site Consolidation and Containment

Description: This alternative is similar to Alternative S-4 but would include excavation and consolidation of contaminated material. After the contaminated material is consolidated, the material would be covered with a soil cover. Land use controls will be established for the consolidation area, and five-year reviews would be performed to evaluate the success of the remedial actions. Short-term LUCs would also be implemented until the soil underneath the EBP structure could be assessed and remediated if needed.

	Effectiveness	Implementability	Cost
Advantages:	• Eliminates exposure to contaminated soils	• Excavation and a soil cover are proven technologies	• None
Disadvantages:	• Does not remove all contaminants	• Moderate amount of logistical considerations required during excavation • Maintenance will be required	• High capital cost • Five-year Review costs

Conclusion: The On-Site Consolidation and Containment alternative is protective of human health and the environment. This remedial alternative has the highest cost and only a relatively small area that would be made available for unlimited use/unrestricted exposure as result. **This alternative will not be retained for detailed analysis.**

Table 4-1
Detailed Evaluation of S-1: No Action

Evaluation Criteria	Detailed Analysis
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	
Human Health Protection	This alternative would not provide any protection of human health from risks identified at the EBP in the DGA Report.
Ecological Protection	This alternative would not provide any protection of the environment from risks assumed at the Transformer Vaults in the DGA Report.
COMPLIANCE WITH ARARs	
Chemical-, Location-, and Action-Specific	Under current conditions, chemical-specific ARARs have not been met. Therefore, this alternative would not meet ARARs. Refer to Table B-1 in Appendix B for a list and evaluation of ARARs associated with this alternative.
LONG-TERM EFFECTIVENESS AND PERMANENCE	
Magnitude of Residual Risk	Since this alternative includes no controls to reduce potential direct contact with contaminated soil, the residual risk would be the same as that identified in the DGA Report.
Adequacy and Reliability of Controls	This alternative does not include any controls to reduce potential future exposures to surface soil.
REDUCTION OF TMV THROUGH TREATMENT	
Treatment Process Used and Materials Treated	No treatment would be performed under this alternative.
Amount Destroyed or Treated	No treatment would be performed under this alternative.
Degree of Expected Reductions of TMV through treatment	No treatment would be performed under this alternative.
Degree to which Treatment is Irreversible	No treatment would be performed under this alternative.
Type and Quantity of Residuals Remaining after Treatment	No treatment would be performed under this alternative.
SHORT-TERM EFFECTIVENESS	
Protection of Community during Remedial Actions	Since this alternative involves no construction or monitoring measures, there would be no additional short-term risks to the community from the remedy.
Protection of Workers during Remedial Actions	Since this alternative involves no construction or monitoring measures, there would be no additional short-term risks to workers from the remedy.
Environmental Impacts	Since this alternative involves no construction or monitoring measures, there would be no additional short-term environmental impacts associated with the remedy.

Evaluation Criteria	Detailed Analysis
Time to Achieve Remedial Action Objectives	This alternative does not meet RAOs
IMPLEMENTABILITY	
Ability to Construct and Operate	No construction of operation would be performed under this alternative.
Reliability of the Technology	No technologies would be implemented under this alternative.
Ease of undertaking Additional Remedial Actions, if needed	If further action is deemed necessary in the future, this alternative would allow for additional remedial actions to occur.
Ability to Monitor Effectiveness	No monitoring would be conducted under this alternative. Therefore, the effectiveness would not be evaluated.
Ability to Obtain Approvals and Coordinate with Other Agencies	No approvals would likely be needed for this alternative.
Availability of Off-Site Treatment, Storage, and Disposal Services and Capacity	No off-site treatment, storage, or disposal services would be needed under this alternative.
Availability of Necessary Equipment and Specialists	No equipment or specialists would be needed under this alternative.
Availability of Technology	No technologies would be needed for this alternative.
COSTS	
Total Cost	$0

Table 4-2
Detailed Evaluation of S-2: Limited Action

Evaluation Criteria	Detailed Analysis
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	
Human Health Protection	This alternative removes soil concentrations exceeding the Industrial PRGs (including RIDEM GA Leachability Criteria) at the EBP; thereby, reducing the risk to industrial workers. Surface soil exceeding the PRGs (including the RIDEM GA Leachability Criteria) would also be fully removed at the Transformer Vaults. By implementing LUCs at the EBP, contact with COCs at concentrations that would cause an unacceptable risk to residential and unrestricted human receptors is prevented.
Ecological Protection	This alternative would address ecological protection through the removal of soil at TV2 and TV3 that exceeds the PRG for the Transformer Vaults.
COMPLIANCE WITH ARARs	
Chemical-, Location-, and Action-Specific	Under this alternative, chemical-specific and action-specific ARARs will be met. Therefore this alternative would meet ARARs. Refer to Tables B-2a and B-2b in Appendix B for a list and evaluation of ARARs associated with this alternative.
LONG-TERM EFFECTIVENESS AND PERMANENCE	
Magnitude of Residual Risk	The type and quantity of contaminants remaining at the site following implementation of this limited action remedy is similar to current conditions at the EBP, except for the removal of soil concentrations exceeding the Industrial PRGs. As part of this alternative, all soil concentrations that exceed the PRG at the Transformer Vaults will be removed. However, soil contamination will remain present at the EBP. LUCs would be implemented to restrict potential residential receptors from coming into contact with soil that could pose unacceptable exposure.
Adequacy and Reliability of Controls	Adequacy of this alternative will be confirmed during the five-year reviews. LUCs are reliable if properly enforced.
REDUCTION OF TMV THROUGH TREATMENT	
Treatment Process Used and Materials Treated	No treatment would be performed under this alternative.
Amount Destroyed or Treated	No treatment would be performed under this alternative.
Degree of Expected Reductions of TMV through treatment	No treatment would be performed under this alternative.

Evaluation Criteria	Detailed Analysis
Degree to which Treatment is Irreversible	No treatment would be performed under this alternative.
Type and Quantity of Residuals Remaining after Treatment	No treatment would be performed under this alternative.
SHORT-TERM EFFECTIVENESS	
Protection of Community during Remedial Actions	Short-term community risks associated with off-site disposal of contaminated soil would be minor.
Protection of Workers during Remedial Actions	Short-term worker risks associated with environmental sampling and excavation would be mitigated through the use of proper PPE.
Environmental Impacts	Short-term, minor impacts to ecological habitat due to excavation and environmental sampling would occur.
Time to Achieve Remedial Action Objectives	RAOs would be achieved once the limited excavation is performed and LUCs are implemented. It is assumed implementation of this alternative will take approximately 1 year.
IMPLEMENTABILITY	
Ability to Construct and Operate	LUCs and excavation are common and easy to implement.
Reliability of the Technology	Excavation and LUCs are known to be reliable.
Ease of undertaking Additional Remedial Actions, if needed	If further action is deemed necessary in the future, this alternative would allow for additional remedial actions to occur.
Ability to Monitor Effectiveness	Samples around the excavation would be conducted to evaluate the effectiveness of the remedy. Five-year reviews will also be conducted to monitor effectiveness.
Ability to Obtain Approvals and Coordinate with Other Agencies	Approval for disposal of contaminated soils would require coordination with other agencies.
Availability of Off-Site Treatment, Storage, and Disposal Services and Capacity	Multiple facilities would be able to accept the excavated materials for final disposition.
Availability of Necessary Equipment and Specialists	There are many contractors available to provide the equipment and services required by this alternative.
Availability of Technology	This alternative contains commonly-used technologies.
COSTS	
Capital Costs	$89,243
O&M	$48,040
Five-Year Reviews	$21,518
Total Cost	$159,000

Table 4-3
Detailed Evaluation of S-3: Excavation and Off-Site Disposal

Evaluation Criteria	Detailed Analysis
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	
Human Health Protection	This alternative removes soil concentrations exceeding the PRGs for both the EBP and Transformer Vaults. Short-term LUCs would be implemented until the soil underneath the EBP structure could be assessed and remediated. Once that is done, unrestricted use and unlimited exposure would be achieved.
Ecological Protection	This alternative would address ecological protection through the removal of soil at TV2 and TV3 that exceeds the PRG for the Transformer Vaults.
COMPLIANCE WITH ARARs	
Chemical-, Location-, and Action-Specific	Under this alternative, chemical-specific and action-specific ARARs will be met. Therefore this alternative would meet ARARs. Refer to Tables B-3a and B-3b in Appendix B for a list and evaluation of ARARs associated with this alternative.
LONG-TERM EFFECTIVENESS AND PERMANENCE	
Magnitude of Residual Risk	Upon completion of the excavation, all contaminants will be removed from the site.
Adequacy and Reliability of Controls	Excavation is an adequate and reliable means for removing contaminated material.
REDUCTION OF TMV THROUGH TREATMENT	
Treatment Process Used and Materials Treated	No treatment would be performed under this alternative.
Amount Destroyed or Treated	No treatment would be performed under this alternative.
Degree of Expected Reductions of TMV through treatment	No treatment would be performed under this alternative.
Degree to which Treatment is Irreversible	No treatment would be performed under this alternative.
Type and Quantity of Residuals Remaining after Treatment	No treatment would be performed under this alternative.
SHORT-TERM EFFECTIVENESS	
Protection of Community during Remedial Actions	Short-term community risks associated with off-site disposal of contaminated soil would be minor.
Protection of Workers during Remedial Actions	Short-term worker risks associated with environmental sampling and excavation would be mitigated through the use of proper PPE.
Environmental Impacts	Short-term, minor impacts to ecological habitat due to excavation and environmental sampling would occur.

Time to Achieve Remedial Action Objectives	RAOs would be achieved once the excavation is performed. It is assumed implementation of this alternative will take approximately 1 year.
IMPLEMENTABILITY	
Ability to Construct and Operate	Excavation is common and easy to implement.
Reliability of the Technology	Excavation is known to be reliable.
Ease of undertaking Additional Remedial Actions, if needed	If further action is deemed necessary in the future, this alternative would allow for additional remedial actions to occur.
Ability to Monitor Effectiveness	Samples around the excavation would be conducted to evaluate the effectiveness of the remedy.
Ability to Obtain Approvals and Coordinate with Other Agencies	Approval for disposal of contaminated soils would require coordination with other agencies.
Availability of Off-Site Treatment, Storage, and Disposal Services and Capacity	Multiple facilities would be able to accept the excavated materials for final disposition.
Availability of Necessary Equipment and Specialists	There are many contractors available to provide the equipment and services required by this alternative.
Availability of Technology	This alternative contains commonly-used technologies.
COSTS	
Capital Costs	$190,377
O&M	N/A
Five-Year Reviews	N/A
Total Cost	$191,000

Table 4-4
Detailed Evaluation of S-4: Containment

Evaluation Criteria	Detailed Analysis
OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT	
Human Health Protection	This alternative removes soil concentrations exceeding the RIDEM GA Leachability Criteria at the EBP; thereby, reducing the potential for naphthalene concentrations to migrate to groundwater. Surface soil exceeding the PRGs (including the RIDEM GA Leachability Criteria) would also be fully removed at the Transformer Vaults. This alternative prevents direct contact, erosion, and transport of surface soil exceeding the PRGs at the EBP through installation of a soil cover. LUCs would be implemented so that the soil cover remains intact and an unacceptable risk to human receptors is prevented for the life of the remedy.
Ecological Protection	This alternative would address ecological protection through the removal of soil at TV2 and TV3 that exceeds the PRG for the Transformer Vaults.
COMPLIANCE WITH ARARs	
Chemical-, Location-, and Action-Specific	Under this alternative, chemical-specific and action-specific ARARs will be met. Therefore this alternative would meet ARARs. Refer to Tables B-4a and B-4b in Appendix B for a list and evaluation of ARARs associated with this alternative.
LONG-TERM EFFECTIVENESS AND PERMANENCE	
Magnitude of Residual Risk	The type and quantity of contaminants remaining at the site following implementation of this remedy is similar to current conditions, except for the removal of soil concentrations exceeding the RIDEM GA Leachability Criteria, which would also fully address exceedances of the PRG for the Transformer Vaults. Exposure to the COCs at the EBP would be prevented by the soil cover. Additionally, LUCs would be implemented to ensure the integrity of the cover at the EBP.
Adequacy and Reliability of Controls	Adequacy of this alternative will be confirmed during the five-year reviews. LUCs are reliable if properly enforced.
REDUCTION OF TMV THROUGH TREATMENT	
Treatment Process Used and Materials Treated	No treatment would be performed under this alternative.
Amount Destroyed or Treated	No treatment would be performed under this alternative.
Degree of Expected Reductions of TMV through treatment	No treatment would be performed under this alternative.
Degree to which Treatment is Irreversible	No treatment would be performed under this alternative.

Evaluation Criteria	Detailed Analysis
Type and Quantity of Residuals Remaining after Treatment	No treatment would be performed under this alternative.
SHORT-TERM EFFECTIVENESS	
Protection of Community during Remedial Actions	Short-term community risks associated with off-site disposal of contaminated soil would be minor.
Protection of Workers during Remedial Actions	Short-term worker risks associated with environmental sampling, excavation, and containment would be mitigated through the use of proper PPE.
Environmental Impacts	Short-term, minor impacts to ecological habitat due to excavation, containment, and environmental sampling would occur.
Time to Achieve Remedial Action Objectives	RAOs would be achieved once the limited excavation is performed, containment is complete, and LUCs are implemented. It is assumed implementation of this alternative will take approximately 1 year.
IMPLEMENTABILITY	
Ability to Construct and Operate	LUCs, excavation, and containment are common technologies. With the proper planning and design, the alternative would be relatively easy to implement.
Reliability of the Technology	Excavation, containment, and LUCs are known to be reliable.
Ease of undertaking Additional Remedial Actions, if needed	If further action is deemed necessary in the future, this alternative would allow for additional remedial actions to occur following removal of the soil cover, as necessary.
Ability to Monitor Effectiveness	Samples around the excavation would be conducted to evaluate the effectiveness of the remedy. Five-year reviews will also be conducted to monitor effectiveness.
Ability to Obtain Approvals and Coordinate with Other Agencies	Approval for disposal of contaminated soils would require coordination with other agencies.
Availability of Off-Site Treatment, Storage, and Disposal Services and Capacity	Multiple facilities would be able to accept the excavated materials for final disposition.
Availability of Necessary Equipment and Specialists	There are many contractors available to provide the equipment and services required by this alternative.
Availability of Technology	This alternative contains commonly-used technologies.
COSTS	
Capital Costs	$189,656
O&M	$77,604
Five-Year Reviews	$21,518
Total Cost	$289,000

Table 5-1
Cost Sensitivity Analysis Summary

Cost Estimate Scenarios	Alternative S-2 Limited Action	Alternative S-3 Excavation and Off-site Disposal	Alternative S-4 Containment
Lower-end cost projection[(1)]	$177,000	$195,000	$260,000
Baseline cost estimate[(2)]	$232,000	$253,000	$341,000
Upper-end cost projection[(3)]	$304,000	$388,000	$467,000

Notes:

(1) Cost rounded to nearest $1,000. Eliminate contingency costs; apply a 25% reduction to O&M and Five-Year Review costs

(2) Cost rounded to nearest $1,000. Cost estimate as provided in the baseline alternative (Appendix C)

(3) Cost rounded to nearest $1,000. Cost estimates expanded as follows:

Alternative S-2: Increase area and volume of limited excavation to from 150 cubic yards to 300 cubic yards (based on 4,000 sf x 2 ft); increase number of delineation samples by 20%; increase number of waste characterization samples to 2 samples (1 sample per 250 cubic yards); increase data validation hours to 40; increase cost of annual LUC site inspection by 20%

Alternative S-3: Increase area and volume of excavation at the EBP from 400 cubic yards to 800 cubic yards (based on 10,400 sf) and increase area and volume of excavation at the Transformer Vaults from 20 cubic yards to 40 cubic yards; increase number of delineation samples by 20%; increase number of waste characterization samples to 4 samples (1 sample per 250 cubic yards); increase data validation hours to 40

Alternative S-4: Increase area and volume of limited excavation from 60 cubic yards to 120 cubic yards at the EBP and from 20 cubic yards to 40 cubic yards at the Transformer Vaults; increase area of cap to 10,400 sf; increase number of delineation samples by 20%; increase number of clean fill samples to 4 samples (1 sample per 250 cubic yards per fill type); increase cost of O&M and Five-Year Reviews by 20%

NARRAGANSETT BAY

THAYER DR

THAYER CT

CROMWELL DR

CROMWELL DR

MELVILLE POND

LAGOON RD

FORMER FUEL LOADING AREA

T14

T15

T13

T16

LAGOON RD

TRANSFORMER VAULT NO. 3

TRANSFORMER VAULT NO. 2

T11

T17

T18

T12

TF1-004

EBP-MW-GZ-101R

ETHYL BLENDING PLANT

EBP-MW1000

EBP-MW-GT-124R

T10

EBP-MW1001

TF1-005

TF1-018

T9

VACANT PUMP HOUSE 49

MELVILLE PUBLIC FISHING AND CAMPING AREA

BRADFORD AVE

STRINGHAM RD

ELECTRICAL SUBSTATION

MARITIME DR

STRINGHAM RD

Monitoring Well

AOCs investigated during Data Gaps Assessment

Tank Farm 1 (Site 7) Boundary

Sitewide_Contours

RESOLUTION CONSULTANTS

Drawn:	HM	12/16/2014
Approved:	MK	12/16/2014
Project #:	60266436	

N

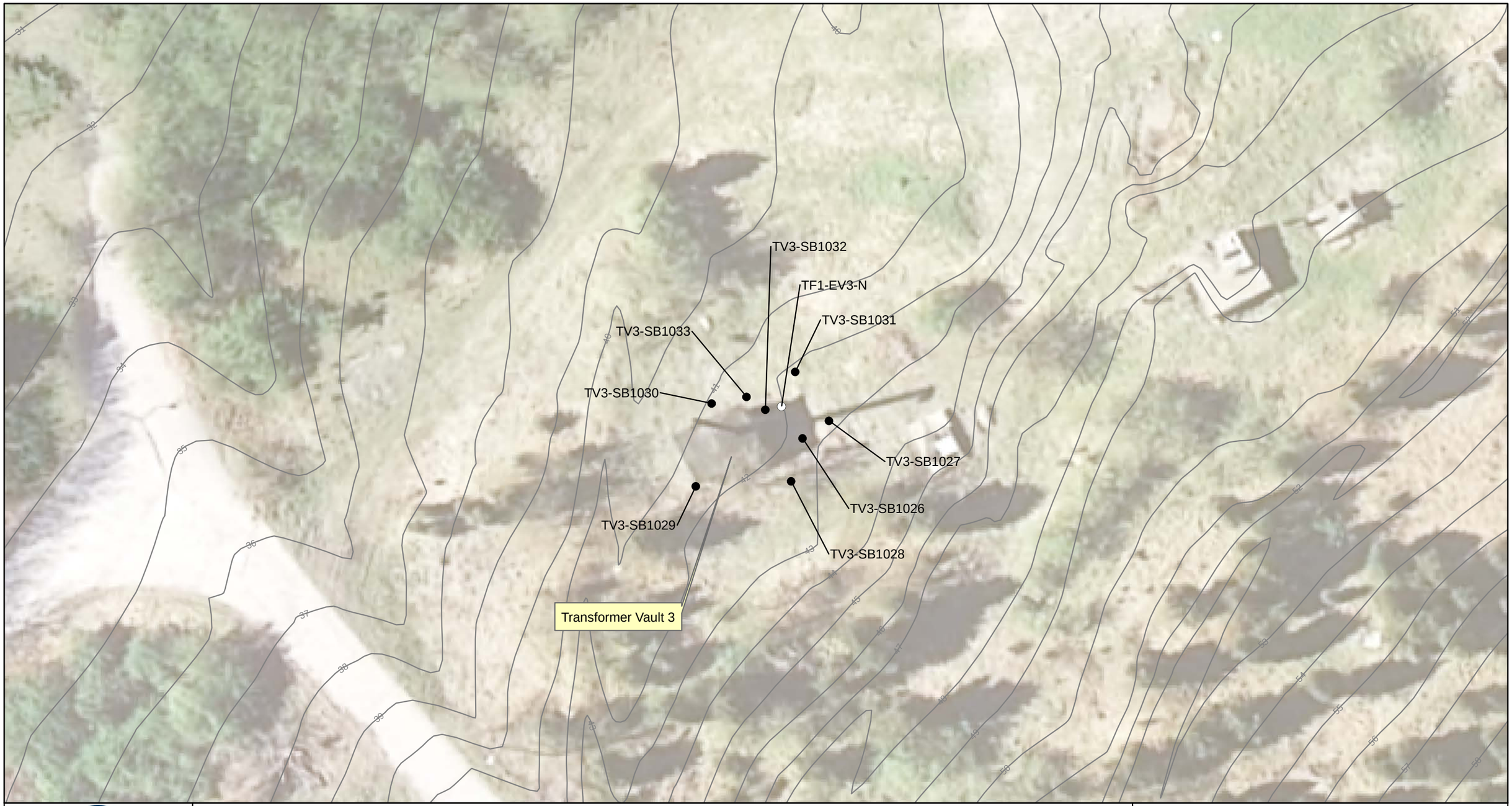
0 125 250

Scale in Feet

FIGURE 2
TANK FARM 1 LAYOUT

TANK FARM 1 (SITE 7)
NAVSTA NEWPORT, RHODE ISLAND

Path: W:\Govt\Projects\Navy CLEAN AECOM-EnSafe JV\Newport\GIS\Projects\Tank_Farm_1\MXD\Feasibilty_Study\Figure_2_AOCs.mxd



RESOLUTION CONSULTANTS

Drawn:	HM	12/19/2014
Approved:	NO	12/19/2014
Project #:	60266436	

- ● 2012-2013 Soil Boring
- ○ 2010 Site Investigation Soil Sample

N

0 10 20

Scale in Feet

FIGURE 5
TRANSFORMER VAULT 3
SAMPLE LOCATION MAP

TANK FARM 1 (SITE 7)
NAVSTA NEWPORT, RHODE ISLAND

ELEVATED PAHS ARE LIKELY DUE TO ASPHALT FROM NEARBY ROAD.

TF1-EBP-MW-SB-124R (ug/kg)	
BENZO(A)ANTHRACENE	8000
BENZO(A)PYRENE	6000
BENZO(B)FLUORANTHENE	8800
BENZO(G,H,I)PERYLENE	2800
BENZO(K)FLUORANTHENE	3900
CHRYSENE	9100
DIBENZO(A,H)ANTHRACENE	650 J
INDENO(1,2,3-CD)PYRENE	4800
PYRENE	14000

EBP-MW-GZ-101R

TF1-EBP-SB1018 (ug/kg)	
BENZO(A)ANTHRACENE	1400
BENZO(A)PYRENE	940
BENZO(B)FLUORANTHENE	1500
CHRYSENE	1500

TF1-EBP-SB1017 (ug/kg)	
BENZO(A)ANTHRACENE	1300
BENZO(A)PYRENE	980
BENZO(B)FLUORANTHENE	1400
CHRYSENE	1400

EBP-MW1000

TF1-EBP-SB1014 (ug/kg)	
BENZO(A)PYRENE	480
CHRYSENE	640

EBP-SB1008
EBP-SB1007
EBP-SB1005
EBP-SB1006
EBP-SB1003
EBP-SB1004
EBP-SB1000
EBP-SB1002
EBP-SB1001

TF1-EBP-SB1020 (ug/kg)	
BENZO(A)ANTHRACENE	2800
BENZO(A)PYRENE	2100
BENZO(B)FLUORANTHENE	3000
BENZO(G,H,I)PERYLENE	1300
BENZO(K)FLUORANTHENE	1500
CHRYSENE	3000
DIBENZO(A,H)ANTHRACENE	420
INDENO(1,2,3-CD)PYRENE	1900
NAPHTHALENE	810

TF1-EBP-SB1015 (ug/kg)	
BENZO(A)PYRENE	600
CHRYSENE	820

TF1-EBP-SB1022 (ug/kg)	
CHRYSENE	590

TF1-EBP-SB1036 (ug/kg)	
BENZO(A)ANTHRACENE	2700
BENZO(A)PYRENE	2000
BENZO(B)FLUORANTHENE	2800
BENZO(G,H,I)PERYLENE	1200
BENZO(K)FLUORANTHENE	1300
CHRYSENE	3000
INDENO(1,2,3-CD)PYRENE	1800

EBP-SB1021

EBP-SB1019

ETHYL BLENDING PLANT

TF1-EBP-SB1016 (ug/kg)	
BENZO(A)ANTHRACENE	2200
BENZO(A)PYRENE	1900
BENZO(B)FLUORANTHENE	3000
BENZO(G,H,I)PERYLENE	1100
BENZO(K)FLUORANTHENE	1200
CHRYSENE	2600
INDENO(1,2,3-CD)PYRENE	1800

TF1-EBP-SB1035 (ug/kg)	
BENZO(A)PYRENE	520
CHRYSENE	730

EBP-SB1010
EBP-SB1011

TF1-EBP-SB1013 (ug/kg)	
CHRYSENE	550

TF1-EBP-SB1009 (ug/kg)	
CHRYSENE	500

EBP-MW1001

TF1-EBP-SB1012 (ug/kg)	
BENZO(A)ANTHRACENE	8100
BENZO(A)PYRENE	5300
BENZO(B)FLUORANTHENE	7500
BENZO(G,H,I)PERYLENE	2400 J
BENZO(K)FLUORANTHENE	3200 J
CHRYSENE	9100
DIBENZO(A,H)ANTHRACENE	960 J
FLUORANTHENE	23000
INDENO(1,2,3-CD)PYRENE	3900 J
NAPHTHALENE	2000 J

RESOLUTION CONSULTANTS

Drawn:	HM	12/18/2014
Approved:	NO	12/18/2014
Project #:	60266436	

MW
SB

RIDEM RDEC Exceedance
RIDEM I/C DEC Exceedance
RIDEM GA LC Exceedance

PRG = Preliminary Remediation Goal
RIDEM = Rhode Island Dept. of Environmental Management

RDEC = Residential Direct Exposure Criteria
I/C DEC = Industrial/Commercial Direct Exposure Criteria

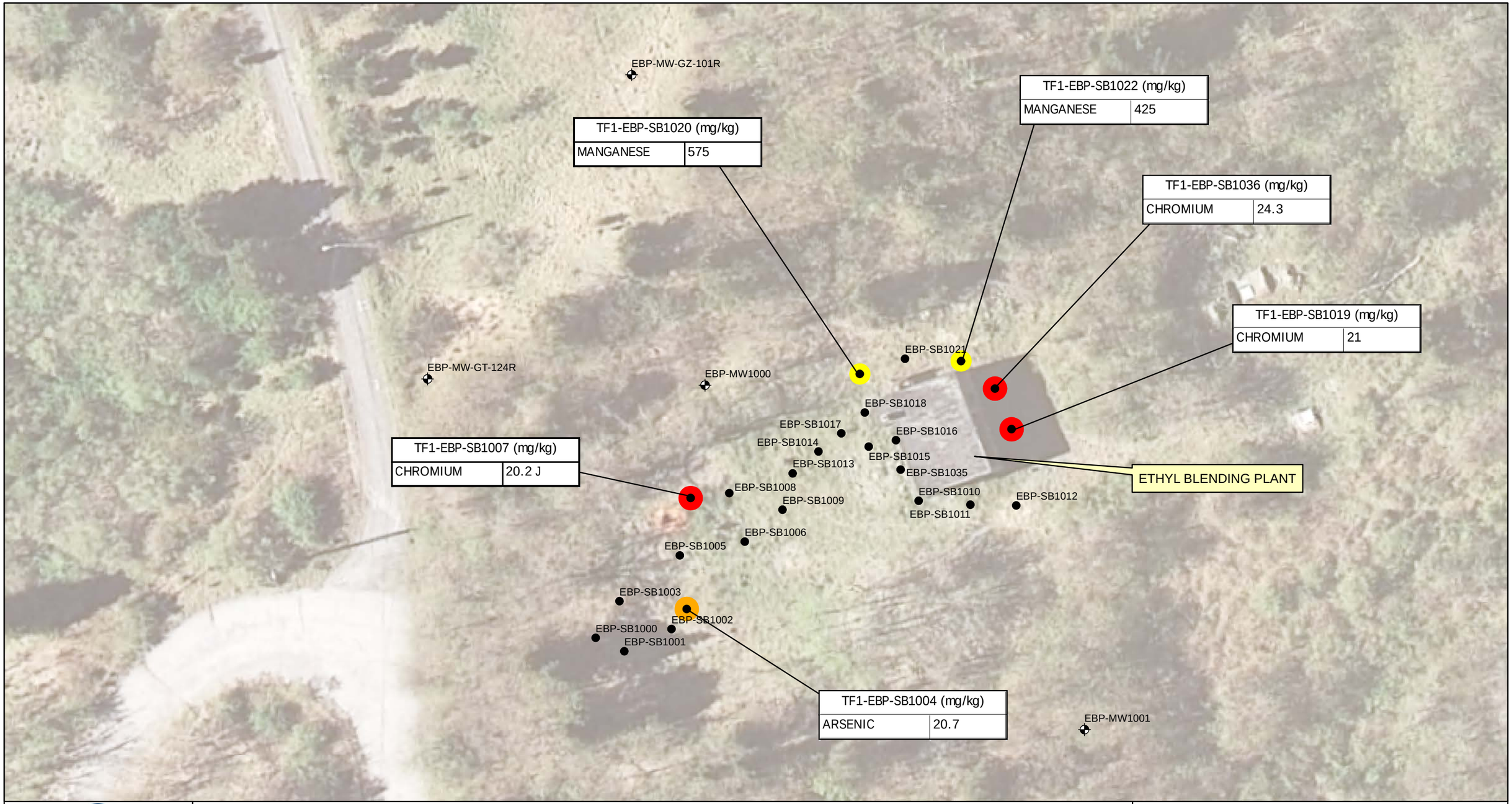
N

0 15 30

Scale in Feet

FIGURE 6
SURFACE SOILS EXCEEDING PRGs FOR PAHs
ETHYL BLENDING PLANT

TANK FARM 1 (SITE 7)
NAVSTA NEWPORT, RHODE ISLAND



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Drawn:	HM	12/18/2014
Approved:	NO	12/18/2014
Project #:	60266436	

MW

SB

PRG Exceedance for Arsenic (based on background)

PRG Exceedance for Manganese (based on RIDEM RDEC)

PRG Exceedance for Chromium (based on background)*

PRG = Preliminary Remediation Goal
RIDEM = Rhode Island Dept. of Environmental Management
RDEC = Residential Direct Exposure Criteria

I/C DEC = Industrial/Commercial Direct Exposure Criteria
COC = Contaminant of Concern
*Note: Chromium is a potential COC based on an assumption that detections are hexavalent chromium.

N

0 15 30

Scale in Feet

FIGURE 7
SURFACE SOILS EXCEEDING PRGs
FOR METALS
ETHYL BLENDING PLANT

TANK FARM 1 (SITE 7)
NAVSTA NEWPORT, RHODE ISLAND

EBP-MW-GZ-101R

EBP-MW-GT-124R

EBP-MW1000

AREA TO BE ENCOMPASSED BY A LAND USE CONTROL UNDER ALTERNATIVES #2 AND #4, EXCAVATED UNDER ALTERNATIVE #3, AND CAPPED UNDER ALTERNATIVE #4

EBP-SB1021
EBP-SB1022
EBP-SB1020
EBP-SB1036
EBP-SB1018
EBP-SB1019
EBP-SB1017
EBP-SB1016
EBP-SB1014
EBP-SB1015
EBP-SB1013
EBP-SB1035
EBP-SB1008
EBP-SB1010
EBP-SB1012
EBP-SB1009
EBP-SB1007
EBP-SB1011
EBP-SB1006
EBP-SB1005
EBP-SB1003
EBP-SB1004
EBP-SB1002
EBP-SB1000
EBP-SB1001

ETHYL BLENDING PLANT

EBP-MW1001

Notes:
1.PRG exceedances for chromium are not reflected on this figure. Hexavalent chromium has been identified as a potential COC, based on an assumption that the detected chromium is hexavalent chromium. There is no evidence that hexavalent chromium is actually present and further sampling/analysis would be expected to show that most of the chromium detected is trivalent chromium.
2.The PRG exceedances for PAHs at location EBP-MW-GT-124R are not reflected on the figure since these detections were likely due to the presence of asphalt from the nearby road and not associated with the Ethyl Blending Plant.

RESOLUTION CONSULTANTS

Drawn:	JB	12/4/2014
Approved:	NO	12/4/2014
Project #:	60266436	

Monitoring Well
Soil Boring

Exceeds Residential and Industrial PRGs (including GA LC)
Exceeds Residential PRGs
Exceeds Residential and Industrial PRGs

Estimated Extent of Excavation under Alternative 4 (exceeds GA LC)
Overall Estimated Extent of Surface Soil Impacts (Res and Ind PRG Exceedances)
Estimated Extent of Excavation under Alternative 2 (based on Ind PRG Exceedances)

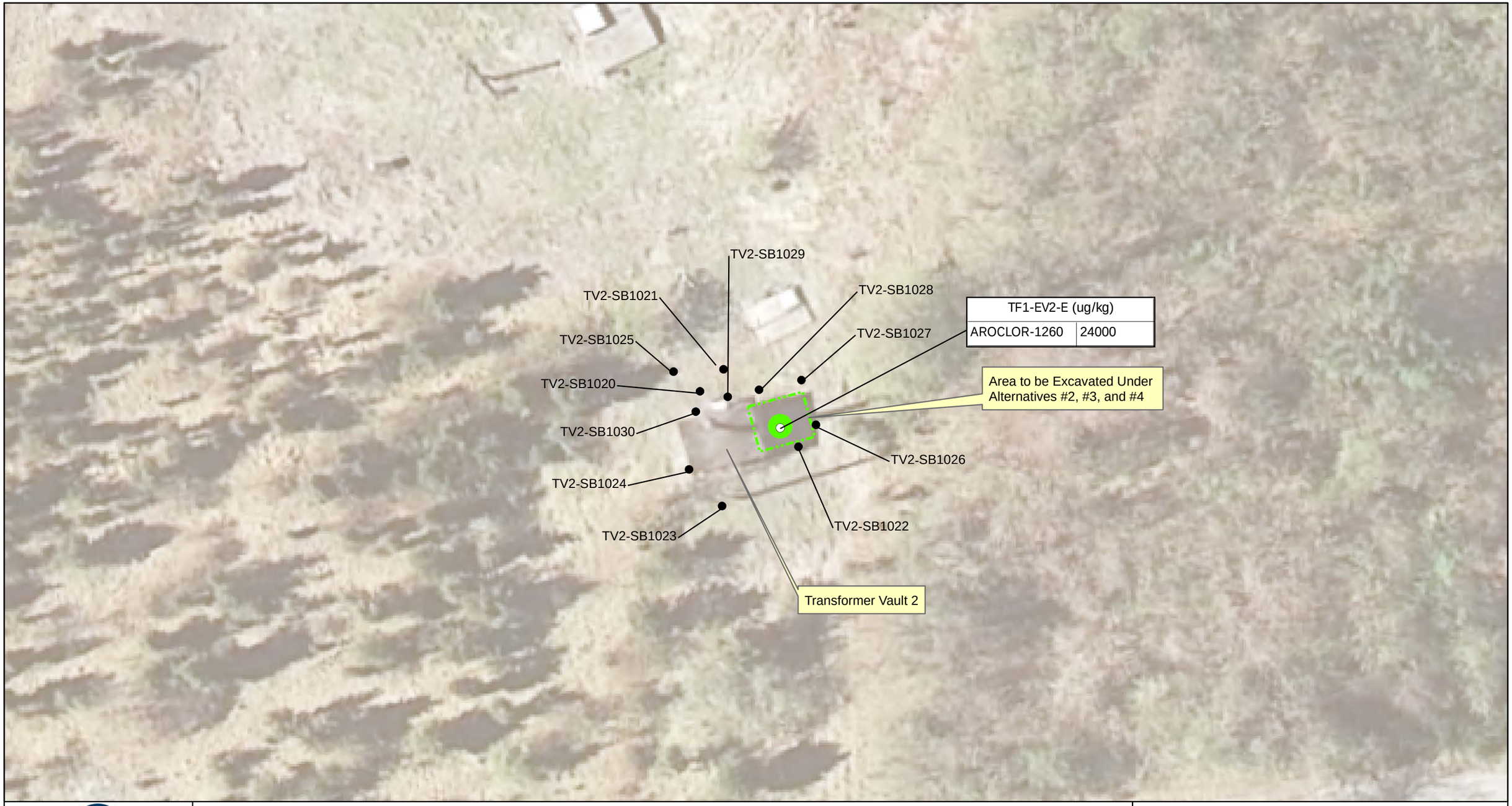
PRG = Preliminary Remediation Goal
GA LC = GA Leachability Criteria

N

0 15 30
Scale in Feet

FIGURE 8
SUMMARY OF SURFACE SOILS EXCEEDING PRGs
ETHYL BLENDING PLANT

TANK FARM 1 (SITE 7)
NAVSTA NEWPORT, RHODE ISLAND



RESOLUTION CONSULTANTS

Drawn:	HM	12/18/2014
Approved:	NO	12/18/2014
Project #:	60266436	

○ 2010 Site Investigation Soil Sample

● 2012-2013 Soil Boring

PRG Exceedance

Estimated Extent of Surface Soil Impacts for Remedial Alternatives Analysis

PRG = Preliminary Remediation Goal

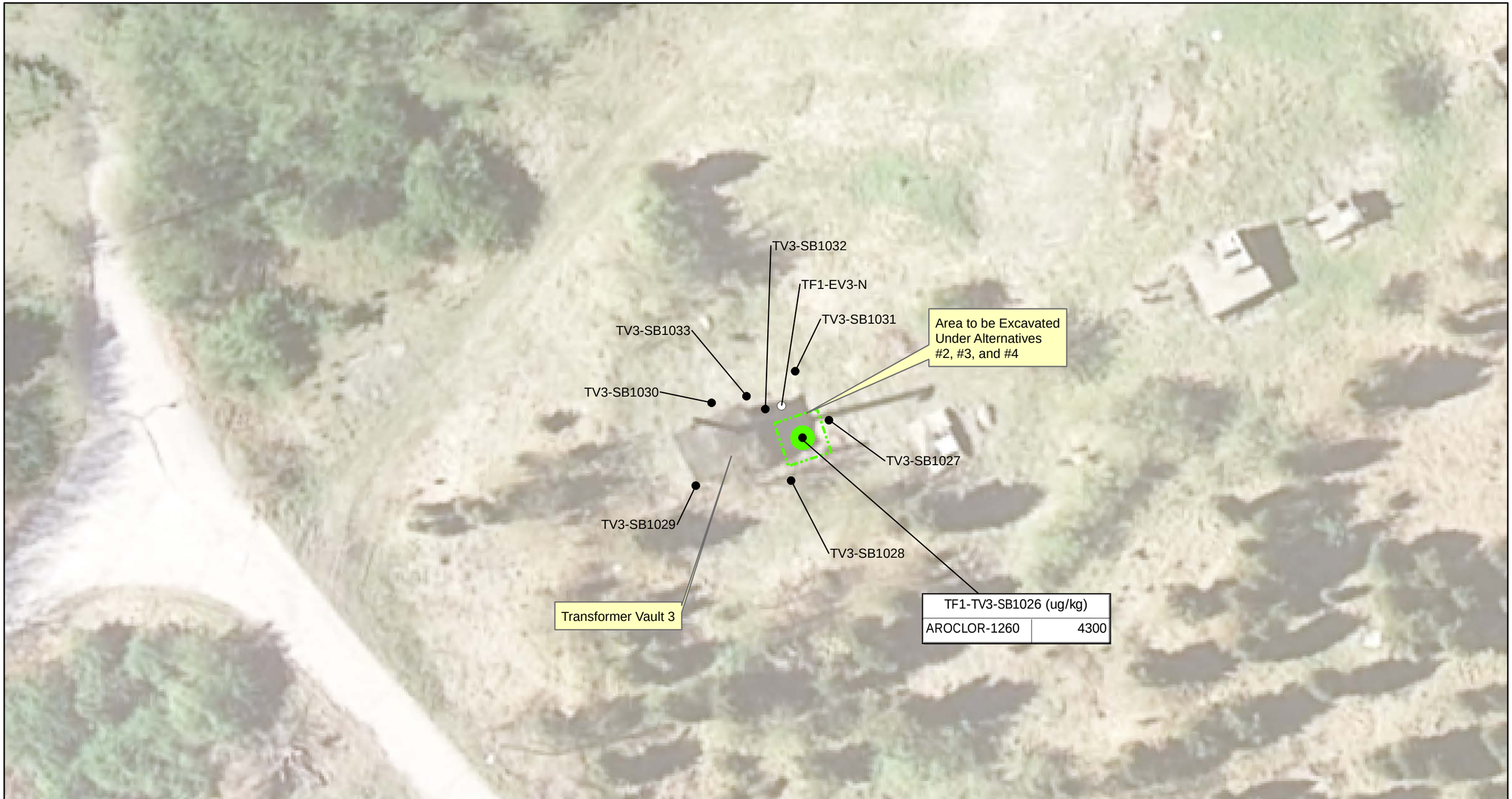
N

0 10 20

Scale in Feet

FIGURE 9
SURFACE SOILS EXCEEDING PRGs
TRANSFORMER VAULT 2

TANK FARM 1 (SITE 7)
NAVSTA NEWPORT, RHODE ISLAND



RESOLUTION CONSULTANTS

Drawn:	HM	12/18/2014
Approved:	NO	12/18/2014
Project #:	60266436	

○ 2010 Site Investigation Soil Sample

● 2012-2013 Soil Boring

PRG Exccedance

Estimated Extent of Surface Soil Impacts for Remedial Alternatives Analysis

PRG = Preliminary Remediation Goal

N

0 10 20

Scale in Feet

FIGURE 10
SURFACE SOILS EXCEEDING PRGs
TRANSFORMER VAULT 3

TANK FARM 1 (SITE 7)
NAVSTA NEWPORT, RHODE ISLAND

Appendix A

Calculation of Preliminary Remediation Goals for the Ethyl Blending Plant and the Transformer Vaults

TABLE 1 - SUMMARY OF HUMAN HEALTH RISK FROM DATA GAPS ASSESSMENT

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS -
RESIDENTIAL EXPOSURES TO SURFACE SOIL - ETHYL BLENDING PLANT
TANK FARM 1 - CATEGORY 1 AOCS - DATA GAPS ASSESSMENT
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Chemical	Incremental Lifetime Carcinogenic Risk (ILCR)			Estimated Non-Carcinogenic Hazard Quotient (HQ)		
	Exposure Point Concentration (mg/kg)[1]	Residential RSL[2] (mg/kg)	Estimated ILCR	Primary Target Organ	Residential RSL[2] (mg/kg)	Estimated HQ
Semivolatile Organic Compounds						
Benzo(a)anthracene	4.5	0.15	3E-05	Cancer	NA	NA
Benzo(a)pyrene	1.3	0.015	9E-05	Cancer	NA	NA
Benzo(b)fluoranthene	2.6	0.15	2E-05	Cancer	NA	NA
Benzo(k)fluoranthene	1.2	1.5	8E-07	Cancer	NA	NA
Dibenzo(a,h)anthracene	0.48	0.015	3E-05	Cancer	NA	NA
Indeno(1,2,3-cd)pyrene	2.55	1.5	2E-06	Cancer	NA	NA
Metals						
Arsenic	9.7	0.61	2E-05	Skin, Cardiovascular System	34	0.3
Chromium[2]	15.3	0.29	5E-05	None Specified	230	0.1
Cobalt	8.3	370	2E-08	Thyroid	23	0.4
Iron	22,210	NA	NA	Gastrointestinal System	55000	0.4
Manganese	264	NA	NA	Central Nervous System	1,800	0.1
Thallium	0.09	NA	NA	Skin	0.78	0.1
		Total ILCR	2E-04		Total HI	1

1 - Exposure point concentration is the 95% upper confidence calculated by ProUCL Version 5.0.
2 - USEPA Regional Screening Level Table (November 2013). Carcinogenic values correspond to a $1x10^{-6}$ cancer risk level. Noncarcinogenic values corresponds to a hazard index of 1.
3 - RSLs are for hexavalent chromium.
NA - Not applicable. There are no cancer slope factors (CSF) or reference dose (RfD) available for this chemical.

Note: The Residential Regional Screening Levels (RSLs) shown above are those that were available at the time the risk assessment was completed as part of the Data Gaps Assessment (Tetra Tech, 2014). The current RSLs were used to develop the preliminary remediation goals. Use of the most current RSLs would not have changed the outcome of the screening results shown above.

TABLE 2 - HUMAN HEALTH PRG DEVELOPMENT EQUATIONS

Resident Soil

Noncarcinogenic-child

- Ingestion

$$SL_{res\text{-}soil\text{-}nc\text{-}ing\text{-}c}\left(mg/kg\right)=\frac{THQ\times AT_r\left(\frac{365\ days}{year}\times ED_c\left(6\ years\right)\right)\times BW_c\left(15\ Kg\right)}{EF_r\left(\frac{350\ days}{year}\right)\times ED_c\left(6\ year\right)\times\frac{1}{RfD_o\left(\frac{mg}{Kg\text{-}day}\right)}\times IRS_c\left(\frac{200\ mg}{day}\right)\times\frac{10^{-6}Kg}{1mg}}$$

- Dermal

$$SL_{res\text{-}soil\text{-}nc\text{-}der\text{-}c}\left(mg/kg\right)=\frac{THQ\times AT_r\left(\frac{365\ days}{year}\times ED_c\left(6\ years\right)\right)\times BW_c\left(15\ Kg\right)}{EF_r\left(\frac{350\ days}{year}\right)\times ED_c\left(6\ year\right)\times\frac{1}{\left(RfD_o\left(\frac{mg}{Kg\text{-}day}\right)\times GIABS\right)}\times SA_c\left(\frac{2690\ cm^2}{day}\right)\times AF_c\left(\frac{0.2\ mg}{cm^2}\right)\times ABS_d\times\frac{10^{-6}Kg}{1mg}}$$

- Inhalation

$$SL_{res\text{-}soil\text{-}nc\text{-}inh\text{-}c}\left(mg/kg\right)=\frac{THQ\times AT_r\left(\frac{365\ days}{year}\times ED_c\left(6\ years\right)\right)}{EF_r\left(\frac{350\ days}{year}\right)\times ED_c\left(6\ year\right)\times ET_{rs}\left(\frac{24\ hours}{day}\right)\times\left(\frac{1\ day}{24\ hours}\right)\times\frac{1}{RfC\left(\frac{mg}{m^3}\right)}\times\left(\frac{1}{VF_s\left(\frac{m^3}{Kg}\right)}+\frac{1}{PEF_w\left(\frac{m^3}{Kg}\right)}\right)}$$

- Total

$$SL_{res\text{-}soil\text{-}nc\text{-}tot\text{-}c}\left(mg/kg\right)=\frac{1}{\frac{1}{SL_{res\text{-}soil\text{-}nc\text{-}ing\text{-}c}}+\frac{1}{SL_{res\text{-}soil\text{-}nc\text{-}der\text{-}c}}+\frac{1}{SL_{res\text{-}soil\text{-}nc\text{-}inh\text{-}c}}}$$

Noncarcinogenic-adult

- Ingestion

$$SL_{res\text{-}soil\text{-}nc\text{-}ing\text{-}a}\left(mg/kg\right)=\frac{THQ\times AT_r\left(\frac{365\ days}{year}\times ED_r\left(26\ years\right)\right)\times BW_a\left(80\ Kg\right)}{EF_r\left(\frac{350\ days}{year}\right)\times ED_r\left(26\ year\right)\times\frac{1}{RfD_o\left(\frac{mg}{Kg\text{-}day}\right)}\times IRS_a\left(\frac{100\ mg}{day}\right)\times\frac{10^{-6}Kg}{1mg}}$$

- Dermal

$$SL_{res\text{-}soil\text{-}nc\text{-}der\text{-}a}\left(mg/kg\right)=\frac{THQ\times AT_r\left(\frac{365\ days}{year}\times ED_r\left(26\ years\right)\right)\times BW_a\left(80\ Kg\right)}{EF_r\left(\frac{350\ days}{year}\right)\times ED_r\left(26\ year\right)\times\frac{1}{\left(RfD_o\left(\frac{mg}{Kg\text{-}day}\right)\times GIABS\right)}\times SA_a\left(\frac{6032\ cm^2}{day}\right)\times AF_a\left(\frac{0.07\ mg}{cm^2}\right)\times ABS_d\times\frac{10^{-6}Kg}{1mg}}$$

- Inhalation

$$SL_{res\text{-}soil\text{-}nc\text{-}inh\text{-}a}\left(mg/kg\right)=\frac{THQ\times AT_r\left(\frac{365\ days}{year}\times ED_r\left(26\ years\right)\right)}{EF_r\left(\frac{350\ days}{year}\right)\times ED_r\left(26\ year\right)\times ET_{rs}\left(\frac{24\ hours}{day}\right)\times\left(\frac{1\ day}{24\ hours}\right)\times\frac{1}{RfC\left(\frac{mg}{m^3}\right)}\times\left(\frac{1}{VF_s\left(\frac{m^3}{Kg}\right)}+\frac{1}{PEF_w\left(\frac{m^3}{Kg}\right)}\right)}$$

- Total

$$SL_{res\text{-}soil\text{-}nc\text{-}tot\text{-}a}\left(mg/kg\right)=\frac{1}{\frac{1}{SL_{res\text{-}soil\text{-}nc\text{-}ing\text{-}a}}+\frac{1}{SL_{res\text{-}soil\text{-}nc\text{-}der\text{-}a}}+\frac{1}{SL_{res\text{-}soil\text{-}nc\text{-}inh\text{-}a}}}$$

Carcinogenic

- Ingestion

$$SL_{res\text{-}soil\text{-}ca\text{-}ing}\left(mg/kg\right)=\frac{TR\times AT_r\left(\frac{365\ days}{year}\times LT\left(70\ years\right)\right)}{CSF_o\left(\frac{mg}{Kg\text{-}day}\right)^{-1}\times IFS_{adj}\left(\frac{36750\ mg}{Kg}\right)\times\left(\frac{10^{-6}Kg}{mg}\right)}$$

where:

$$IFS_{adj}\left(\frac{36750\ mg}{Kg}\right)=\frac{EF_{ressc}\left(\frac{350\ days}{year}\right)\times ED_c\left(6\ years\right)\times IRS_c\left(\frac{200\ mg}{day}\right)}{BW_c\left(15\ Kg\right)}+\frac{EF_{ressa}\left(\frac{350\ days}{year}\right)\times ED_r\text{-}ED_c\left(20\ years\right)\times IRS_a\left(\frac{100\ mg}{day}\right)}{BW_a\left(80\ Kg\right)}$$

- Dermal

$$SL_{res\text{-}soil\text{-}ca\text{-}der}\left(mg/kg\right)=\frac{TR\times AT_r\left(\frac{365\ days}{year}\times LT\left(70\ years\right)\right)}{\left(\frac{CSF_o\left(\frac{mg}{Kg\text{-}day}\right)^{-1}}{GIABS}\right)\times DFS_{adj}\left(\frac{112266\ mg}{Kg}\right)\times ABS_d\times\left(\frac{10^{-6}Kg}{mg}\right)}$$

where:

$$DFS_{adj}\left(\frac{112266\ mg}{Kg}\right)=\frac{EF_{ressc}\left(\frac{350\ days}{year}\right)\times ED_c\ (6\ years)\times SA_c\left(\frac{2690\ cm^2}{day}\right)\times AF_c\left(\frac{0.2\ mg}{cm^2}\right)}{BW_c\ (15\ Kg)}+\frac{EF_{ressa}\left(\frac{350\ days}{year}\right)\times ED_r\text{-}ED_c\ (20\ years)\times SA_a\left(\frac{6032\ cm^2}{day}\right)\times AF_a\left(\frac{0.07\ mg}{cm^2}\right)}{BW_a\ (80\ Kg)}$$

- Inhalation

$$SL_{res\text{-}soil\text{-}ca\text{-}inh}\ (mg/kg)=\frac{TR\times AT_r\left(\frac{365\ days}{year}\times LT\ (70\ years)\right)}{IUR\left(\frac{\mu g}{m^3}\right)^{-1}\times\left(\frac{1000\ \mu g}{mg}\right)\times EF_r\left(\frac{350\ days}{year}\right)\times\left(\frac{1}{VF_s\left(\frac{m^3}{Kg}\right)}+\frac{1}{PEF_w\left(\frac{m^3}{Kg}\right)}\right)\times ED_r\ (26\ years)\times ET_{rs}\left(\frac{24\ hours}{day}\right)\times\left(\frac{1\ day}{24\ hours}\right)}$$

- Total

$$SL_{res\text{-}soil\text{-}ca\text{-}tot}\ (mg/kg)=\frac{1}{\frac{1}{SL_{res\text{-}soil\text{-}ca\text{-}ing}}+\frac{1}{SL_{res\text{-}soil\text{-}ca\text{-}der}}+\frac{1}{SL_{res\text{-}soil\text{-}ca\text{-}inh}}}$$

Mutagenic

- Ingestion

$$SL_{res\text{-}soil\text{-}mu\text{-}ing}\ (mg/kg)=\frac{TR\times AT_r\left(\frac{365\ days}{year}\times LT\ (70\ years)\right)}{CSF_o\left(\frac{mg}{Kg\text{-}day}\right)^{-1}\times IFSM_{adj}\left(\frac{166833.33\ mg}{Kg}\right)\times\left(\frac{10^{-6}Kg}{mg}\right)}$$

where:

$$IFSM_{adj}\left(\frac{166833.33\ mg}{Kg}\right)=\frac{EF_{ressc\ 0\text{-}2}\left(\frac{350\ days}{year}\right)\times ED_{0\text{-}2}\ (yr)\times IRS_c\left(\frac{200\ mg}{day}\right)\times 10}{BW_c\ (15\ Kg)}+\frac{EF_{ressc\ 2\text{-}6}\left(\frac{350\ days}{year}\right)\times ED_{2\text{-}6}\ (yr)\times IRS_c\left(\frac{200\ mg}{day}\right)\times 3}{BW_c\ (15\ Kg)}+$$
$$\frac{EF_{ressa\ 6\text{-}16}\left(\frac{350\ days}{year}\right)\times ED_{6\text{-}16}\ (yr)\times IRS_a\left(\frac{100\ mg}{day}\right)\times 3}{BW_a\ (80\ Kg)}+\frac{EF_{ressa\ 16\text{-}26}\left(\frac{350\ days}{year}\right)\times ED_{16\text{-}26}\ (yr)\times IRS_a\left(\frac{100\ mg}{day}\right)\times 1}{BW_a\ (80\ Kg)}$$

- Dermal

$$SL_{res\text{-}soil\text{-}mu\text{-}der}\ (mg/kg)=\frac{TR\times AT_r\left(\frac{365\ days}{year}\times LT\ (70\ years)\right)}{\left(\frac{CSF_o\left(\frac{mg}{Kg\text{-}day}\right)^{-1}}{GIABS}\right)\times DFSM_{adj}\left(\frac{475598.67\ mg}{Kg}\right)\times ABS_d\times\left(\frac{10^{-6}Kg}{mg}\right)}$$

where:

$$EF_{ressc\ 0\text{-}2}\left(\frac{350\ days}{year}\right)\times ED_{0\text{-}2}\ (yr)\times AF_c\left(\frac{0.2\ mg}{2}\right)\times SA_c\left(\frac{2690\ cm^2}{day}\right)\times 10\quad EF_{ressc\ 2\text{-}6}\left(\frac{350\ days}{year}\right)\times ED_{2\text{-}6}\ (yr)\times AF_c\left(\frac{0.2\ mg}{2}\right)\times SA_c\left(\frac{2690\ cm^2}{day}\right)\times 3$$

$$DFSM_{adj}\left(\frac{475598.67\ mg}{Kg}\right)=\frac{\left(\frac{1}{\text{year}}\right)\times\left(\frac{0.07\ mg}{cm^2}\right)\times\left(\frac{6032\ cm^2}{\text{day}}\right)\times\left(\frac{350\ \text{days}}{\text{year}}\right)\times ED_{0\text{-}2}\,(\text{yr})\times AF_a\left(\frac{0.07\ mg}{cm^2}\right)\times SA_a\left(\frac{6032\ cm^2}{\text{day}}\right)\times 3}{BW_c\,(15\ Kg)}+\frac{\left(\frac{1}{\text{year}}\right)\times\left(\frac{0.07\ mg}{cm^2}\right)\times\left(\frac{6032\ cm^2}{\text{day}}\right)\times\left(\frac{350\ \text{days}}{\text{year}}\right)\times ED_{2\text{-}6}\,(\text{yr})\times AF_a\left(\frac{0.07\ mg}{cm^2}\right)\times SA_a\left(\frac{6032\ cm^2}{\text{day}}\right)\times 3}{BW_c\,(15\ Kg)}+$$

$$\frac{EF_{ressa\ 6\text{-}16}\left(\frac{350\ \text{days}}{\text{year}}\right)\times ED_{6\text{-}16}\,(\text{yr})\times AF_a\left(\frac{0.07\ mg}{cm^2}\right)\times SA_a\left(\frac{6032\ cm^2}{\text{day}}\right)\times 3}{BW_a\,(80\ Kg)}+\frac{EF_{ressa\ 16\text{-}26}\left(\frac{350\ \text{days}}{\text{year}}\right)\times ED_{16\text{-}26}\,(\text{yr})\times AF_a\left(\frac{0.07\ mg}{cm^2}\right)\times SA_a\left(\frac{6032\ cm^2}{\text{day}}\right)\times 1}{BW_a\,(80\ Kg)}$$

- Inhalation

$$SL_{res\text{-}soil\text{-}mu\text{-}inh}\,(mg/kg)=\frac{TR\times AT_r\left(\frac{365\ \text{days}}{\text{year}}\times LT\,(70\ \text{years})\right)}{ET_{rs}\left(\frac{24\ \text{hours}}{\text{day}}\right)\times\left(\frac{1\ \text{day}}{24\ \text{hours}}\right)\times\left(\frac{1000\ \mu g}{mg}\right)\times\left(\begin{array}{l}\left(EF_{0\text{-}2}\left(\frac{350\ \text{days}}{\text{year}}\right)\times ED_{0\text{-}2}\,(\text{yrs})\times IUR\left(\frac{\mu g}{m^3}\right)^{-1}\times 10\right)+\\ \left(EF_{2\text{-}6}\left(\frac{350\ \text{days}}{\text{year}}\right)\times ED_{2\text{-}6}\,(\text{yrs})\times IUR\left(\frac{\mu g}{m^3}\right)^{-1}\times 3\right)+\\ \left(EF_{6\text{-}16}\left(\frac{350\ \text{days}}{\text{year}}\right)\times ED_{6\text{-}16}\,(\text{yrs})\times IUR\left(\frac{\mu g}{m^3}\right)^{-1}\times 3\right)+\\ \left(EF_{16\text{-}26}\left(\frac{350\ \text{days}}{\text{year}}\right)\times ED_{16\text{-}26}\,(\text{yrs})\times IUR\left(\frac{\mu g}{m^3}\right)^{-1}\times 1\right)\end{array}\right)\times\left(\frac{1}{VF_s\left(\frac{m^3}{Kg}\right)}+\frac{1}{PEF_w\left(\frac{m^3}{Kg}\right)}\right)}$$

- Total

$$SL_{res\text{-}soil\text{-}mu\text{-}tot}\,(mg/kg)=\frac{1}{\frac{1}{SL_{res\text{-}soil\text{-}mu\text{-}ing}}+\frac{1}{SL_{res\text{-}soil\text{-}mu\text{-}der}}+\frac{1}{SL_{res\text{-}soil\text{-}mu\text{-}inh}}}$$

Supporting Equations

- Child

$$ED_c\,(6\ \text{years})=ED_{0\text{-}2}\,(2\ \text{years})+ED_{2\text{-}6}\,(4\ \text{years})$$

$$BW_c\,(15\ kg)=\frac{BW_{0\text{-}2}\,(15\ kg)\times ED_{0\text{-}2}\,(2\ \text{years})+BW_{2\text{-}6}\,(15\ kg)\times ED_{2\text{-}6}\,(4\ \text{years})}{ED_{0\text{-}2}\,(2\ \text{years})+ED_{2\text{-}6}\,(4\ \text{years})}$$

$$EF_c\left(\frac{350\ \text{days}}{\text{year}}\right)=\frac{EF_{0\text{-}2}\left(\frac{350\ \text{days}}{\text{year}}\right)\times ED_{0\text{-}2}\,(2\ \text{years})+EF_{2\text{-}6}\left(\frac{350\ \text{days}}{\text{year}}\right)\times ED_{2\text{-}6}\,(4\ \text{years})}{ED_{0\text{-}2}\,(2\ \text{years})+ED_{2\text{-}6}\,(4\ \text{years})}$$

$$AF_c\left(\frac{0.2\ mg}{cm^2}\right)=\frac{AF_{0\text{-}2}\left(\frac{0.2\ mg}{cm^2}\right)\times ED_{0\text{-}2}\,(2\ \text{years})+AF_{2\text{-}6}\left(\frac{0.2\ mg}{cm^2}\right)\times ED_{2\text{-}6}\,(4\ \text{years})}{ED_{0\text{-}2}\,(2\ \text{years})+ED_{2\text{-}6}\,(4\ \text{years})}$$

$$SA_c\left(\frac{2690\ cm^2}{day}\right)=\frac{SA_{0\text{-}2}\left(\frac{2690\ cm^2}{day}\right)\times ED_{0\text{-}2}\left(2\ years\right)+SA_{2\text{-}6}\left(\frac{2690\ cm^2}{day}\right)\times ED_{2\text{-}6}\left(4\ years\right)}{ED_{0\text{-}2}\left(2\ years\right)+ED_{2\text{-}6}\left(4\ years\right)}$$

$$IRS_c\left(\frac{200\ mg}{day}\right)=\frac{IRS_{0\text{-}2}\left(\frac{200\ mg}{day}\right)\times ED_{0\text{-}2}\left(2\ years\right)+IRS_{2\text{-}6}\left(\frac{200\ mg}{day}\right)\times ED_{2\text{-}6}\left(4\ years\right)}{ED_{0\text{-}2}\left(2\ years\right)+ED_{2\text{-}6}\left(4\ years\right)}$$

- **Adult**

$$ED_a\left(20\ years\right)=ED_{6\text{-}16}\left(10\ years\right)+ED_{16\text{-}26}\left(10\ years\right)$$

$$BW_a\left(80\ kg\right)=\frac{BW_{6\text{-}16}\left(80\ kg\right)\times ED_{6\text{-}16}\left(10\ years\right)+BW_{16\text{-}26}\left(80\ kg\right)\times ED_{16\text{-}26}\left(10\ years\right)}{ED_{6\text{-}16}\left(10\ years\right)+ED_{16\text{-}26}\left(10\ years\right)}$$

$$EF_a\left(\frac{350\ days}{year}\right)=\frac{EF_{6\text{-}16}\left(\frac{350\ days}{year}\right)\times ED_{6\text{-}16}\left(10\ years\right)+EF_{16\text{-}26}\left(\frac{350\ days}{year}\right)\times ED_{16\text{-}26}\left(10\ years\right)}{ED_{6\text{-}16}\left(10\ years\right)+ED_{16\text{-}26}\left(10\ years\right)}$$

$$AF_a\left(\frac{0.07\ mg}{cm^2}\right)=\frac{AF_{6\text{-}16}\left(\frac{0.07\ mg}{cm^2}\right)\times ED_{6\text{-}16}\left(10\ years\right)+AF_{16\text{-}26}\left(\frac{0.07\ mg}{cm^2}\right)\times ED_{16\text{-}26}\left(10\ years\right)}{ED_{6\text{-}16}\left(10\ years\right)+ED_{16\text{-}26}\left(10\ years\right)}$$

$$SA_a\left(\frac{6032\ cm^2}{day}\right)=\frac{SA_{6\text{-}16}\left(\frac{6032\ cm^2}{day}\right)\times ED_{6\text{-}16}\left(10\ years\right)+SA_{16\text{-}26}\left(\frac{6032\ cm^2}{day}\right)\times ED_{16\text{-}26}\left(10\ years\right)}{ED_{6\text{-}16}\left(10\ years\right)+ED_{16\text{-}26}\left(10\ years\right)}$$

$$IRS_a\left(\frac{100\ mg}{day}\right)=\frac{IRS_{6\text{-}16}\left(\frac{100\ mg}{day}\right)\times ED_{6\text{-}16}\left(10\ years\right)+IRS_{16\text{-}26}\left(\frac{100\ mg}{day}\right)\times ED_{16\text{-}26}\left(10\ years\right)}{ED_{6\text{-}16}\left(10\ years\right)+ED_{16\text{-}26}\left(10\ years\right)}$$

- **Age-adjusted**

$$ED_r\left(26\ years\right)=ED_{0\text{-}2}\left(2\ years\right)+ED_{2\text{-}6}\left(4\ years\right)+ED_{6\text{-}16}\left(10\ years\right)+ED_{16\text{-}26}\left(10\ years\right)$$

$$EF_r\left(\frac{350\ days}{year}\right)=\frac{\begin{array}{c}EF_{0\text{-}2}\left(\frac{350\ days}{year}\right)\times ED_{0\text{-}2}\left(2\ years\right)+EF_{2\text{-}6}\left(\frac{350\ days}{year}\right)\times ED_{2\text{-}6}\left(4\ years\right)\\+EF_{6\text{-}16}\left(\frac{350\ days}{year}\right)\times ED_{6\text{-}16}\left(10\ years\right)+EF_{16\text{-}26}\left(\frac{350\ days}{year}\right)\times ED_{16\text{-}26}\left(10\ years\right)\end{array}}{ED_{0\text{-}2}\left(2\ years\right)+ED_{2\text{-}6}\left(4\ years\right)+ED_{6\text{-}16}\left(10\ years\right)+ED_{16\text{-}26}\left(10\ years\right)}$$

$$ET_{ress}\left(\frac{24\ hour}{day}\right)$$

TABLE 3 - HUMAN HEALTH EXPOSURE ASSUMPTIONS

Attached

Note that the attachment table is taken directly from an EPA directive (USEPA, 2014) and includes some exposure parameters which are not relevant to the PRG development for Tank Farm 1.

USEPA, 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. February 6, 2014.

Attachment 1. Recommended Default Exposure Factors (2014)

Symbol	Definition (units)	Previous Default Value	Currently Recommended Value	Source of current recommendation	Source of previous recommendation
Ingestion and Dermal Contact Rates					
IRW_c	Resident Drinking Water Ingestion Rate - Child (L/day)	1	0.78	U.S. EPA 2011a, Tables 3-15 and 3-33; weighted average of 90th percentile consumer-only ingestion of drinking water (birth to <6 years)	U.S. EPA 1989 (Exhibit 6-11)
IRW_a	Resident Drinking Water Ingestion Rate - Adult (L/day)	2	2.5	U.S. EPA 2011a, Table 3-33; 90th percentile of consumer-only ingestion of drinking water (≥ 21 years)	U.S. EPA 1989 (Exhibit 6-11)
IRS_c	Resident Soil Ingestion Rate - Child (mg/day)	200	200	U.S. EPA 2011a (Table 5-1); "upper-bound values" accounting for both soil and dust ingestion	U.S. EPA 1991a (pg. 15)
IRS_a	Resident Soil Ingestion Rate - Adult (mg/day)	100	100	U.S. EPA 1991a (pp. 6 and 15); EFH 2011 only provides a central tendency value	U.S. EPA 1991a (pg. 15)
IR_{iw}	Indoor Worker Soil Ingestion Rate (mg/day)	50	50	U.S. EPA 1991a (pp. 9-10, 15); EFH 2011 values not provided	U.S. EPA 1991a (pg. 15)
IR_{ow}	Outdoor Worker Soil Ingestion Rate (mg/day)	100	100	U.S. EPA 1991a (pg. 15), same as adult resident; EFH 2011 value not provided	U.S. EPA 1991a (pg. 15)
SA_c	Resident skin surface area - child (cm^2)	2,800	2,690	U.S. EPA 2011a, Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years)(forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere (per EPA 2011b))	U.S. EPA 2002 (Exhibit 1-2)
SA_a	Resident skin surface area - adult (cm^2)	5,700	6,032	U.S. EPA 2011a, Tables 7-2 and 7-12; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, 21+ years)(forearm and lower leg-specific data used for males and female lower leg; ratio of male forearm to arm applied to female arm data.	U.S. EPA 2002 (Exhibit 1-2)
SA_{ow}	Worker skin surface area - adult (cm^2)	3,300	3,470	US EPA 2011a, Table 7-2; weighted avergae of mean values for head, hands, and forearms (male and femalem, 21+years) (similar assumptions for forearms as used in EPA 2011b)	U.S. EPA 2002 (Exhibit 1-2)
SA_c	Resident Water Surface area - child (cm^2)	6,600	6,378	U.S. EPA 2011a, Table 7.10; weighted average of mean values for children <6 years.	U.S. EPA 2004 (Exhibit 3-2)
SA_a	Resident Water Surface area - adult (cm^2)	18,000	20,900	U.S. EPA 2011a, Table 7.10; weighted average of mean values for adults, male and female 21+.	U.S. EPA 2004 (Exhibit 3-2)
AF_c	Resident soil adherence factor - child (mg/cm^2)	0.2	0.2	U.S. EPA 2004 (Exhibit 3-5), RAGS Part E	U.S. EPA 2002 (Exhibit 1-2)
AF_a	Resident soil adherence factor - adult (mg/cm^2)	0.07	0.07	U.S. EPA 2004 (Exhibit 3-5), RAGS Part E	U.S. EPA 2002 (Exhibit 1-2)
AF_{ow}	Worker soil adherence factor - adult (mg/cm^2)	0.2	0.12	U.S. EPA 2011a, Table 7-20 and Section 7.2.2; arithmetic mean of weighted average of body part-specific (hands, forearms, and face) mean adherence factors for adult commercial/industrial activities	U.S. EPA 2002 (Exhibit 1-2)
BW_c	Resident Body Weight - child (kg)	15	15	U.S. EPA 2011a, Table 8-1; weighted average of mean body weights (birth to <6 years)	U.S. EPA 1991a (pg. 15)

Attachment 1. Recommended Default Exposure Factors (2014)

Symbol	Definition (units)	Previous Default Value	Currently Recommended Value	Source of current recommendation	Source of previous recommendation
BW_a	Resident Body Weight - adult (kg)	70	80	U.S. EPA 2011a, Table 8-3; weighted mean values for adults 21 – 78	U.S. EPA 1991a (pg. 15)
Bw_w	Worker Body Weight (kg)	70	80	U.S. EPA 2011a, Table 8-3; weighted mean values for adults 21 – 78	U.S. EPA 1991a (pg. 15)
Exposure Frequency, Exposure Duration, and Exposure Time Variables					
EF_r	Resident Exposure Frequency (days/yr)	350	350	U.S. EPA 1991a (pg. 15); value not provided in EFH 2011	U.S. EPA 1991a (pg. 15)
EF_w	Worker Exposure Frequency (days/yr)	250	250	U.S. EPA 1991a (pg. 15); value not provided in EFH 2011	U.S. EPA 1991a (pg. 15)
EF_{iw}	Indoor Worker Exposure Frequency (days/yr)	250	250	U.S. EPA 1991a (pg. 15); value not provided in EFH 2011	U.S. EPA 1991a (pg. 15)
EF_{ow}	Outdoor Worker Exposure Frequency (days/yr)	225	225	U.S. EPA 1991a (pg. 15); value not provided in EFH 2011	U.S. EPA 1991a (pg. 15)
ED_r	Resident Exposure Duration (yr)	30	26	EPA 2011a, Table 16-108; 90th percentile for current residence time.	U.S. EPA 1991a (pg. 15)
ED_c	Resident Exposure Duration - child (yr)	6	6	U.S. EPA 1991a, Pages 6 and 15	U.S. EPA 1991a (pg. 15)
ED_a	Resident Exposure Duration - adult (yr)	24	20	EDr (26 years) - EDc (6 years)	U.S. EPA 1991a (pg. 15)
ED_w	Worker Exposure Duration - (yr)	25	25	U.S. EPA 1991a (pg. 15); EFH 2011 only provides a central tendency value	U.S. EPA 1991a (pg. 15)
ED_{iw}	Indoor Worker Exposure Duration - (yr)	25	25	U.S. EPA 1991a (pg. 15); EFH 2011 only provides a central tendency value	U.S. EPA 1991a (pg. 15)
ED_{ow}	Outdoor Worker Exposure Duration (yr)	25	25	U.S. EPA 1991a (pg. 15); EFH 2011 only provides a central tendency value	U.S. EPA 1991a (pg. 15)
ET_{ra}	Resident Air Exposure Time (hours/day)	24	24	The whole day	The whole day
ET_{rs}	Resident Soil Exposure Time (hours/day)	24	24	The whole day	The whole day
ET_w	Worker Air Exposure Time (hr/hr)	8	8	The work day	The work day
ET_{ws}	Worker Soil Exposure Time (hours/day)	8	8	The work day	The work day
ET_{rw}	Resident Water Exposure Time (hours/day)	24	24	The whole day	The whole day
ET_{rwc}	Resident Water Exposure Time - child (hours/event)	1	0.54	U.S. EPA 2011a, Table 16-28; weighted average of 90th percentile time spent bathing (birth to <6 years)	U.S. EPA 2004
ET_{rwa}	Resident Water Exposure Time - adult (hours/event)	0.58	0.71	U.S. EPA 2011a, Tables 16-30 and 16-31; weighted average of adult (21 to 78) 90th percentile of time spent bathing/ showering in a day, divided by mean number of baths/showers taken in a day.	U.S. EPA 2004
Miscellaneous Variables; values not provided in EFH 2011					

Attachment 1. Recommended Default Exposure Factors (2014)

Symbol	Definition (units)	Previous Default Value	Currently Recommended Value	Source of current recommendation	Source of previous recommendation
AT_r	Averaging time - resident (days/year)	365	365	U.S. EPA 1989 (pg. 6-23)	U.S. EPA 1989 (pg. 6-23)
AT_w	Averaging time - composite worker (days/year)	365	365	U.S. EPA 1989 (pg. 6-23)	U.S. EPA 1989 (pg. 6-23)
AT_{iw}	Averaging time - indoor worker (days/year)	365	365	U.S. EPA 1989 (pg. 6-23)	U.S. EPA 1989 (pg. 6-23)
AT_{ow}	Averaging time - outdoor worker (days/year)	365	365	U.S. EPA 1989 (pg. 6-23)	U.S. EPA 1989 (pg. 6-23)
LT	Lifetime (years)	70	70	U.S. EPA 1989 (pg. 6-22), pending additional input from NCEA	U.S. EPA 1989 (pg. 6-22)
IR_{fish}	Fish Ingestion Rate (mg/day)	5.4×10^4	**	Recommend using site-specific values	U.S. EPA 1991a (pg. 15)
$IR_{produce}$	Consumption of homegrown produce (g/day)	42 (fruit); 80 (veg)	**	Recommend using site-specific values	U.S. EPA 1990

References for Cited Sources:

U.S. EPA 1989. Risk assessment guidance for Superfund. Volume I: Human health evaluation manual (Part A). Interim Final. Office of Emergency and Remedial Response. EPA/540/1-89/002.

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U.S. EPA, 2005. Guidance on Selecting Age Groupsfor Monitoring and Assessing Childhood Exposures to Environmental Contaminants. EPA/630/P-03/003F, November, 2005.

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U.S. EPA 2011a. Exposure Factors Handbook: 2011 Edition. EPA/ 600/ R-090/052F, September 2011.

EPA. 2011b. "Regional Screening Levels (Formerly PRGs), User's Guide." November. On-Line Address: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm

Footnote: Users are directed to the *Exposure Factors Handbook* (2011) as a source for specific age-group exposure factors as described in EPA, 2005.

TABLE 4 - HUMAN HEALTH TOXICITY VALUES FOR RISK DRIVERS

Key: I = IRIS; P = PPRTV; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; J = New Jersey; O = EPA Office of Water; F = See FAQ; E = Environmental Criteria and Assessment Office; S = see user guide Section 5; L = see user guide on lead; M = mutagen; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; n = noncancer; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide); SSL values are based on DAF=1

Toxicity and Chemical-specific Information														Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer Child Hazard Index (HI) = 1			
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	voc	muta-gen	GIABS	ABS	C_{sat} (mg/kg)	PEF (m^3/kg)	VF (m^3/kg)	Analyte	CAS No.	Ingestion SL TR=1.0E-6 (mg/kg)	Dermal SL TR=1.0E-6 (mg/kg)	Inhalation SL TR=1.0E-6 (mg/kg)	Carcinogenic SL TR=1.0E-6 (mg/kg)	Ingestion SL Child HQ=1 (mg/kg)	Dermal SL Child HQ=1 (mg/kg)	Inhalation SL Child HQ=1 (mg/kg)	Noncarcinogenic SL Child HI=1 (mg/kg)
1.5E+00	I	4.3E-03	I	3.0E-04	I	1.5E-05	C			1	0.03		1.4E+09		Arsenic, Inorganic	7440-38-2	7.7E-01	5.1E+00	8.9E+02	6.7E-01	3.9E+01	2.9E+02	2.1E+04	3.4E+01
				1.5E+00	I					0.013			1.4E+09		Chromium(III), Insoluble Salts	16065-83-1					1.2E+05			1.2E+05
5.0E-01	J	8.4E-02	S	3.0E-03	I	1.0E-04	I		M	0.025			1.4E+09		Chromium(VI)	18540-29-9	3.1E-01		1.6E+01	3.0E-01	2.3E+02		1.4E+05	2.3E+02
										0.013			1.4E+09		Chromium, Total	7440-47-3								
															Polynuclear Aromatic Hydrocarbons (PAHs)									
7.3E-01	E	1.1E-04	C						M	1	0.13		1.4E+09		~Benz[a]anthracene	56-55-3	2.1E-01	5.7E-01	1.3E+04	1.5E-01				
7.3E+00	I	1.1E-03	C						M	1	0.13		1.4E+09		~Benzo[a]pyrene	50-32-8	2.1E-02	5.7E-02	1.3E+03	1.5E-02				
7.3E-01	E	1.1E-04	C						M	1	0.13		1.4E+09		~Benzo[b]fluoranthene	205-99-2	2.1E-01	5.7E-01	1.3E+04	1.5E-01				
7.3E+00	E	1.2E-03	C						M	1	0.13		1.4E+09		~Dibenz[a,h]anthracene	53-70-3	2.1E-02	5.7E-02	1.1E+03	1.5E-02				
7.3E-01	E	1.1E-04	C						M	1	0.13		1.4E+09		~Indeno[1,2,3-cd]pyrene	193-39-5	2.1E-01	5.7E-01	1.3E+04	1.5E-01				

TABLE 5. DEVELOPMENT OF HUMAN HEALTH RESIDENTIAL PRELIMINARY REMEDIATION GOALS (PRGs) FOR SOIL (RESIDENTIAL SCENARIO) AT THE ETHYL BLENDING PLANT

Analyte[1]	Maximum Detected Surface Soil Concentration	Maximum Detected Subsurface Soil Concentration	Units	Regulatory Criteria RIDEM Rem. Regs[2]			Residential Risk-Based Goals[3]				Additional Information		Selected Residential PRG for Surface Soil	Basis	Selected Residential PRG for Subsurface Soil	Basis
							ILCR				Site-specific	RI				
				RDEC	Leachability - GA	Leachability - GB	10^{-6}	10^{-5}	10^{-4}	HQ = 1	Background[4]	Background[5]				
Volatile Organic Compounds																
2-Butanone	0.058	0.018	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Acetone	0.77	0.4	mg/kg	7800	NA	NA	NA	NA	NA	NA			NA		NA	
Semivolatile Organic Compounds																
1,1-Biphenyl	0.18	NA	mg/kg	0.8	NA	NA	NA	NA	NA	NA			NA		NA	
2-Methylnaphthalene	0.71	NA	mg/kg	123	NA	NA	NA	NA	NA	NA			NA		NA	
Acenaphthene	2.2	0.022	mg/kg	43	NA	NA	NA	NA	NA	NA			NA		NA	
Acenaphthylene	0.2	0.0015	mg/kg	23	NA	NA	NA	NA	NA	NA			NA		NA	
Anthracene	3.3	0.038	mg/kg	35	NA	NA	NA	NA	NA	NA			NA		NA	
Benzo(a)anthracene	8.1	0.13	mg/kg	0.9	NA	NA	1.5E-01	1.5E+00	1.5E+01	NA			0.9	RDEC	NA	(7)
Benzo(a)pyrene	6	0.084	mg/kg	0.4	240	NA	1.5E-02	1.5E-01	1.5E+00	NA			0.4	RDEC	NA	(7)
Benzo(b)fluoranthene	8.8	0.16	mg/kg	0.9	NA	NA	1.5E-01	1.5E+00	1.5E+01	NA			0.9	RDEC	NA	(7)
Benzo(g,h,i)perylene	2.8	0.043	mg/kg	0.8	NA	NA	NA	NA	NA	NA			0.8	RDEC	NA	
Benzo(k)fluoranthene	3.9	0.055	mg/kg	0.9	NA	NA	NA	NA	NA	NA			0.9	RDEC	NA	
Bis(2-ethylhexyl)phthalate	1.9	0.5	mg/kg	46	NA	NA	NA	NA	NA	NA			NA		NA	
Chrysene	9.1	0.13	mg/kg	0.4	NA	NA	NA	NA	NA	NA			0.4	RDEC	NA	
Dibenzo(a,h)anthracene	0.96	0.016	mg/kg	0.4	NA	NA	1.5E-02	1.5E-01	1.5E+00	NA			0.4	RDEC	NA	(7)
Fluoranthene	23	0.28	mg/kg	20	NA	NA	NA	NA	NA	NA			20	RDEC	NA	
Fluorene	2.3	0.019	mg/kg	28	NA	NA	NA	NA	NA	NA			NA		NA	
Indeno(1,2,3-cd)pyrene	4.8	0.091	mg/kg	0.9	NA	NA	1.5E-01	1.5E+00	1.5E+01	NA			0.9	RDEC	NA	(7)
Naphthalene	2	0.006	mg/kg	54	0.8	NA	NA	NA	NA	NA			0.8	Leachability	NA	
Phenanthrene	21	0.19	mg/kg	40	NA	NA	NA	NA	NA	NA			NA		NA	
Pyrene	14	0.2	mg/kg	13	NA	NA	NA	NA	NA	NA			13	RDEC	NA	
Metals																
Antimony	0.32	0.044	mg/kg	10	NA	NA	NA	NA	NA	NA			NA		NA	
Arsenic	20.7	11.9	mg/kg	7	NA	NA	6.7E-01	6.7E+00	6.7E+01	3.4E+01	14	1.7	14	Background	NA	(8)
Barium	40.8	36	mg/kg	5500	NA	NA	NA	NA	NA	NA			NA		NA	
Beryllium	0.65	0.61	mg/kg	1.5	NA	NA	NA	NA	NA	NA			NA		NA	
Cadmium	0.42	0.23	mg/kg	39	NA	NA	NA	NA	NA	NA			NA		NA	
Chromium[6]	24.3	24.2	mg/kg	390	NA	NA	3.0E-01	3.0E+00	3.0E+01	2.3E+02	18		18	Background	NA	(7)
Copper	22.4	43.3	mg/kg	3100	NA	NA	NA	NA	NA	NA			NA		NA	
Lead	127	22.6	mg/kg	150	NA	NA	NA	NA	NA	NA			NA		NA	
Manganese	575	345	mg/kg	390	NA	NA	NA	NA	NA	NA	261		390	RDEC	NA	
Mercury	0.48	0.23	mg/kg	23	NA	NA	NA	NA	NA	NA			NA		NA	
Nickel	25.3	27	mg/kg	1000	NA	NA	NA	NA	NA	NA			NA		NA	
Selenium	0.73	0.72	mg/kg	390	NA	NA	NA	NA	NA	NA			NA		NA	
Silver	0.11	0.08	mg/kg	200	NA	NA	NA	NA	NA	NA			NA		NA	
Thallium	0.15	0.13	mg/kg	5.5	NA	NA	NA	NA	NA	NA			NA		NA	
Vanadium	27.7	22.5	mg/kg	550	NA	NA	NA	NA	NA	NA			NA		NA	
Zinc	82.2	61.6	mg/kg	6000	NA	NA	NA	NA	NA	NA			NA		NA	
Petroleum Hydrocarbons																
TPH (C09-C36)	300	47	mg/kg	500	500	2500	NA	NA	NA	NA			NA		NA	

Notes

ILCR - Incremental Lifetime Cancer Risk

HQ - Hazard Quotient

NA - Not carcinogenic, or a carcinogen was not evaluated for potential non-carcinogenic effects; not applicable

1. Only detected analytes which were considered risk drivers or have regulatory criteria have been presented.
2. RIDEM Rem. Regs. - RIDEM Remediation Regulations, DEM-DSR-01-93, November 2011, Table 1 (Residential Direct Exposure Criteria [DEC]) and Table 2 (Leachability Criteria); NA = no criterion available
3. Residential risk-based goals are developed based on risk results from the human health risk screening evaluation and consider the ingestion, dermal and inhalation routes of exposure, as applicable.
   Calculations are subject to change based on future changes to toxicity values and exposure parameters; NA = Not carcinogenic, or a carcinogen was not evaluated for potential non-carcinogenic effects; not applicable if not a risk driver
4. 95% UPL of background data set - ProUCL input and output can be found in this appendix; calculations only performed on metals which were either risk drivers or exceeded regulatory criteria.
5. Arsenic background based on Office Of Waste Management Policy Memo 00-01, Guidance for Arsenic in Soil, September 22, 2000
6. Chromium speciation has not been performed for this site. At this time, chromium has been assumed to be hexavalent chromium even though there is no current evidence that it would be this species. Future sampling/analysis is anticipated to show that most of the chromium detected is trivalent chromium. Upon confirmation of this assumption, chromium would no longer be a chemical of concern (COC) at this site.
7. No PRG selected for this COC because risk-based criteria do not apply to subsurface soil and regulatory criteria were not exceeded.
8. No PRG was selected because although regulatory criteria are exceeded for this COC, the maximum concentration is below the background value.

TABLE 6. RESIDUAL HUMAN HEALTH RISK ASSOCIATED WITH SELECTED RESIDENTIAL PRGs FOR THE ETHYL BLENDING PLANT

Analyte[1]	Maximum Detected Surface Soil Concentration	Units	Regulatory Criteria RIDEM Rem. Regs[2]			Residential Risk-Based Goals[3] ILCR				Additional Information		Selected		Residual Risk at PRG[6]	
										Site-specific	RI			Estimated	Estimated
			Res. DEC	Leachability - GA	Leachability - GB	10^{-6}	10^{-5}	10^{-4}	HQ = 1	Background[4]	Background[5]	PRG	Basis	ILCR	HQ
Volatile Organic Compounds															
2-Butanone	0.058	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA			
Acetone	0.77	mg/kg	7800	NA	NA	NA	NA	NA	NA			NA			
Semivolatile Organic Compounds															
1,1-Biphenyl	0.18	mg/kg	0.8	NA	NA	NA	NA	NA	NA			NA			
2-Methylnaphthalene	0.71	mg/kg	123	NA	NA	NA	NA	NA	NA			NA			
Acenaphthene	2.2	mg/kg	43	NA	NA	NA	NA	NA	NA			NA			
Acenaphthylene	0.2	mg/kg	23	NA	NA	NA	NA	NA	NA			NA			
Anthracene	3.3	mg/kg	35	NA	NA	NA	NA	NA	NA			NA			
Benzo(a)anthracene	8.1	mg/kg	0.9	NA	NA	1.5E-01	1.5E+00	1.5E+01	NA			0.9	RDEC	6.0E-06	NA
Benzo(a)pyrene	6	mg/kg	0.4	240	NA	1.5E-02	1.5E-01	1.5E+00	NA			0.4	RDEC	2.7E-05	NA
Benzo(b)fluoranthene	8.8	mg/kg	0.9	NA	NA	1.5E-01	1.5E+00	1.5E+01	NA			0.9	RDEC	6.0E-06	NA
Benzo(g,h,i)perylene	2.8	mg/kg	0.8	NA	NA	NA	NA	NA	NA			0.8	RDEC	NA	4.7E-04
Benzo(k)fluoranthene	3.9	mg/kg	0.9	NA	NA	NA	NA	NA	NA			0.9	RDEC	6.0E-07	NA
Bis(2-ethylhexyl)phthalate	1.9	mg/kg	46	NA	NA	NA	NA	NA	NA			NA			
Chrysene	9.1	mg/kg	0.4	NA	NA	NA	NA	NA	NA			0.4	RDEC	2.7E-08	NA
Dibenzo(a,h)anthracene	0.96	mg/kg	0.4	NA	NA	1.5E-02	1.5E-01	1.5E+00	NA			0.4	RDEC	2.7E-05	NA
Fluoranthene	23	mg/kg	20	NA	NA	NA	NA	NA	NA			20	RDEC	NA	8.7E-03
Fluorene	2.3	mg/kg	28	NA	NA	NA	NA	NA	NA			NA			
Indeno(1,2,3-cd)pyrene	4.8	mg/kg	0.9	NA	NA	1.5E-01	1.5E+00	1.5E+01	NA			0.9	RDEC	6.0E-06	NA
Naphthalene	2	mg/kg	54	0.8	NA	NA	NA	NA	NA			0.8	Leachability	2.1E-07	6.2E-03
Phenanthrene	21	mg/kg	40	NA	NA	NA	NA	NA	NA			NA			
Pyrene	14	mg/kg	13	NA	NA	NA	NA	NA	NA			13	Res. DEC	NA	7.6E-03
Metals															
Antimony	0.32	mg/kg	10	NA	NA	NA	NA	NA	NA			NA			
Arsenic	20.7	mg/kg	7	NA	NA	6.7E-01	6.7E+00	6.7E+01	3.4E+01	14	1.7	14	Background	2.1E-05	4.1E-01
Barium	40.8	mg/kg	5500	NA	NA	NA	NA	NA	NA			NA			
Beryllium	0.65	mg/kg	1.5	NA	NA	NA	NA	NA	NA			NA			
Cadmium	0.42	mg/kg	39	NA	NA	NA	NA	NA	NA			NA			
Chromium[6]	24.3	mg/kg	390	NA	NA	3.0E-01	3.0E+00	3.0E+01	2.3E+02	18		18	Background	6.0E-05	7.8E-02
Copper	22.4	mg/kg	3100	NA	NA	NA	NA	NA	NA			NA			
Lead	127	mg/kg	150	NA	NA	NA	NA	NA	NA			NA			
Manganese	575	mg/kg	390	NA	NA	NA	NA	NA	NA	190		390	Res. DEC	NA	2.2E-01
Mercury	0.48	mg/kg	23	NA	NA	NA	NA	NA	NA			NA			
Nickel	25.3	mg/kg	1000	NA	NA	NA	NA	NA	NA			NA			
Selenium	0.73	mg/kg	390	NA	NA	NA	NA	NA	NA			NA			
Silver	0.11	mg/kg	200	NA	NA	NA	NA	NA	NA			NA			
Thallium	0.15	mg/kg	5.5	NA	NA	NA	NA	NA	NA			NA			
Vanadium	27.7	mg/kg	550	NA	NA	NA	NA	NA	NA			NA			
Zinc	82.2	mg/kg	6000	NA	NA	NA	NA	NA	NA			NA			
Petroleum Hydrocarbons															
TPH (C09-C36)	300	mg/kg	500	500	2500	NA	NA	NA	NA			NA			
													Sum =	2E-04	
													Sum (without Chromium[7]) =	9E-05	

Notes

ILCR - Incremental Lifetime Cancer Risk

HQ - Hazard Quotient

NA - Not carcinogenic, or a carcinogen was not evaluated for potential non-carcinogenic effects; not applicable

1. Only detected analytes which were considered risk drivers or have regulatory criteria have been presented.
2. RIDEM Rem. Regs. - RIDEM Remediation Regulations, DEM-DSR-01-93, February 2004, Table 1 (Residential Direct Exposure Criteria [DEC]) and Table 2 (Leachability Criteria); NA = no criterion available
3. Risk-based goals are developed based on risk results from the human health risk screening evaluation and consider the ingestion, dermal and inhalation routes of exposure, as applicable.
Calculations are subject to change based on future changes to toxicity values and exposure parameters; NA = Not carcinogenic, or a carcinogen was not evaluated for potential non-carcinogenic effects; not applicable if not a risk driver
4. 95% UPL of background data set - ProUCL input and output can be found in this appendix; calculations only performed on metals which were either risk drivers or exceeded regulatory criteria.
5. Arsenic background based on Office Of Waste Management Policy Memo 00-01, Guidance for Arsenic in Soil, September 22, 2000
6. Residual Risk at PRG - determined by utilizing proportion of the Regional Screening Level (either at ILCR of $1x10^{-6}$ or HI of 1) to the selected PRG.
Regional Screening Levels (RSLs) - November 2014
7. Chromium speciation has not been performed for this site. At this time, chromium has been assumed to be hexavalent chromium even though there is no current evidence that it would be this species. Pre-design sampling/analysis is anticipated to show that most of the chromium detected is trivalent chromium. Upon confirmation of this assumption, chromium would no longer be a chemical of concern (COC) at this site.

TABLE 7. DEVELOPMENT OF HUMAN HEALTH INDUSTRIAL PRELIMINARY REMEDIATION GOALS (PRGs) FOR SOIL (INDUSTRIAL USE SCENARIO) AT THE ETHYL BLENDING PLANT

Analyte[1]	Maximum Detected Surface Soil Concentration	Maximum Detected Subsurface Soil Concentration	Units	Regulatory Criteria RIDEM Rem. Regs[2]			Risk-Based Goals[3]				Additional Information		Selected Industrial PRG for Surface Soil	Basis	Selected Industrial PRG for Subsurface Soil	Basis
							ILCR				Site-specific	RI				
				I/C DEC	Leachability - GA	Leachability - GB	10^{-6}	10^{-5}	10^{-4}	HQ = 1	Background[4]	Background[5]				
Volatile Organic Compounds																
2-Butanone	0.058	0.018	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Acetone	0.77	0.4	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Semivolatile Organic Compounds																
1,1-Biphenyl	0.18	NA	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
2-Methylnaphthalene	0.71	NA	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Acenaphthene	2.2	0.022	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Acenaphthylene	0.2	0.0015	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Anthracene	3.3	0.038	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Benzo(a)anthracene	8.1	0.13	mg/kg	7.8	NA	NA	NA	NA	NA	NA			7.8	I/C DEC	NA	
Benzo(a)pyrene	6	0.084	mg/kg	0.8	240	NA	NA	NA	NA	NA			0.8	I/C DEC	NA	
Benzo(b)fluoranthene	8.8	0.16	mg/kg	7.8	NA	NA	NA	NA	NA	NA			7.8	I/C DEC	NA	
Benzo(g,h,i)perylene	2.8	0.043	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Benzo(k)fluoranthene	3.9	0.055	mg/kg	78	NA	NA	NA	NA	NA	NA			NA		NA	
Bis(2-ethylhexyl)phthalate	1.9	0.5	mg/kg	410	NA	NA	NA	NA	NA	NA			NA		NA	
Chrysene	9.1	0.13	mg/kg	780	NA	NA	NA	NA	NA	NA			NA		NA	
Dibenzo(a,h)anthracene	0.96	0.016	mg/kg	0.8	NA	NA	NA	NA	NA	NA			0.8	I/C DEC	NA	
Fluoranthene	23	0.28	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Fluorene	2.3	0.019	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Indeno(1,2,3-cd)pyrene	4.8	0.091	mg/kg	7.8	NA	NA	NA	NA	NA	NA			NA		NA	
Naphthalene	2	0.006	mg/kg	10000	0.8	NA	NA	NA	NA	NA			0.8	Leachability	NA	
Phenanthrene	21	0.19	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Pyrene	14	0.2	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Metals																
Antimony	0.32	0.044	mg/kg	820	NA	NA	NA	NA	NA	NA			NA		NA	
Arsenic	20.7	11.9	mg/kg	7	NA	NA	NA	NA	NA	NA	14	1.7	14	Background	NA	(7)
Barium	40.8	36	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Beryllium	0.65	0.61	mg/kg	1.5	NA	NA	NA	NA	NA	NA			NA		NA	
Cadmium	0.42	0.23	mg/kg	1000	NA	NA	NA	NA	NA	NA			NA		NA	
Chromium	24.3	24.2	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Copper	22.4	43.3	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Lead	127	22.6	mg/kg	500	NA	NA	NA	NA	NA	NA			NA		NA	
Manganese	575	345	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Mercury	0.48	0.23	mg/kg	610	NA	NA	NA	NA	NA	NA			NA		NA	
Nickel	25.3	27	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Selenium	0.73	0.72	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Silver	0.11	0.08	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Thallium	0.15	0.13	mg/kg	140	NA	NA	NA	NA	NA	NA			NA		NA	
Vanadium	27.7	22.5	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Zinc	82.2	61.6	mg/kg	10000	NA	NA	NA	NA	NA	NA			NA		NA	
Petroleum Hydrocarbons																
TPH (C09-C36)	300	47	mg/kg	2500	500	2500	NA	NA	NA	NA			NA		NA	

Notes

ILCR - Incremental Lifetime Cancer Risk

HQ - Hazard Quotient

NA - Not carcinogenic, or a carcinogen was not evaluated for potential non-carcinogenic effects; not applicable

1. Only detected analytes which were considered risk drivers or have regulatory criteria have been presented.
2. RIDEM Rem. Regs. - RIDEM Remediation Regulations, DEM-DSR-01-93, November 2011, Table 1 (Industrial/Commercial Direct Exposure Criteria [DEC]) and Table 2 (Leachability Criteria); NA = no criterion available
3. Risk-based goals are not included because risks to a commercial/industrial works from exposure to soils at the Ethyl Blending Plant did not exceed USEPA's target risk range as presented in the human health risk screening evaluation. NA = Not applicable
4. 95% UPL of background data set - ProUCL input and output can be found in this appendix; calculations only performed on metals which were either risk drivers or exceeded regulatory criteria.
5. Arsenic background based on Office Of Waste Management Policy Memo 00-01, Guidance for Arsenic in Soil, September 22, 2000
6. Analyte exceeded the I/C DEC but did not exceed the higher background value.
7. No PRG was selected because although regulatory criteria are exceeded for this COC, the maximum concentration is below the background value.

TABLE 8. DERIVATION OF PRGs FOR THE SHORT-TAILED SHREW AT THE TRANSFORMER VAULT

Total Daily Dose (TDD) = $\frac{\Sigma([IR_f \times C_f] + [IR_s \times C_s] \times ED \times AUF}{\text{Body Weight}}$

Where:
IR_f = Ingestion rate of food (kg/day)
IR_s = Incidental ingestion rate of soil (kg/day)
C_f = Concentration of COC in food (mg/kg)
C_s= Concentration of COC in soil (mg/kg)
ED = Exposure duration (fraction of time receptor spends within exposure area)
AUF = Area use factor (ratio of the receptor's home range, etc,... relative to the size of exposure area)

ASSUMPTIONS FOR THE SHORT-TAILED SHREW	
Average Body Weight (kg)	0.0161
Exposure Duration (ED)	1.0
Area Use Factor (AUF)	0.10
Average Soil Consumption Rate (kg_{dw}/day)	0.0000129
Average Soil Invt.Consumption Rate (kg_{dw}/day)	0.001430

SUPPORTING CALCULATIONS

COC	Media Concentrations			Potential Total Daily Dose (mg/kg_{bw}/day)			Geometric Mean of LOAEL- and NOAEL-based TRVs (mg/kg_{bw}/day)	HQ
	Soil PRG (mg/kg_{dw})	Soil BAF	Soil Invertebrate (mg/kg_{dw})	Soil	Soil Invertebrate	Total		
POLYCHLORINATED BIPHENYLS - CALCULATION OF PRELIMINARY REMEDIAL GOALS								
Total PCBs	3.4	6.67	22.7	0.000272	0.201	0.201	0.215	1

Notes:
BAF - Bioaccumulation Factor.
dw - Dry Weight.
HQ - Hazard Quotient (TDD/TRV).
LOAEL - Lowest Observed Adverse Effects Level.
NOAEL - No Observed Adverse Effects Level.
PRG - Preliminary Remediation Goal. Soil concentration that results in a TDD equal to the TRV (i.e., HQ = 1).
TRV - Toxicity Reference Value.

Exposure assumptions reflect the average inputs used in the Step 3a evaulation in the Data Gaps Assessment (Tetra Tech, 2014; see Table I.1).
BAF represents the average soil-to-earthworm BAF used in the Step 3a evaulation in the Data Gaps Assessment (Tetra Tech, 2014; see Table I.3).
TRVs represent the values used in the Step 3a evaulation in the Data Gaps Assessment (Tetra Tech, 2014; see Table I.5).
NOAEL TRV = 0.068 mg/kg_{bw}/day
LOAEL TRV = 0.68 mg/kg_{bw}/day
Shrew AUF assumed to be 0.1 (10% of the home range of 0.97 acres).
BAF and TRVs are the same for Aroclor 1254 and 1260. Therefore, PRG applies to the Total PCB concentration.

TABLE 9. DERIVATION OF PRGs FOR THE AMERICAN ROBIN AT THE TRANSFORMER VAULT

Total Daily Dose (TDD) = $\frac{\Sigma([IR_f \times C_f] + [IR_s \times C_s] \times ED \times AUF}{\text{Average Body Weight}}$

Where:
IR_f = Ingestion rate of food (kg/day)
IR_s = Incidental ingestion rate of soil (kg/day)
C_f = Concentration of COC in food (mg/kg)
C_s= Concentration of COC in soil (mg/kg)
ED = Exposure duration (fraction of time receptor spends within exposure area)
AUF = Area use factor (ratio of the receptor's home range, etc,... relative to the size of exposure area)

ASSUMPTIONS FOR THE AMERICAN ROBIN	
Average Body Weight (kg)	0.0804
Exposure Duration	1.0
Area Use Factor	0.10
Average Soil Consumption Rate (kg_{dw}/day)	0.00076
Average Soil Invt.Consumption Rate (kg_{dw}/day)	0.0119

SUPPORTING CALCULATIONS

COC	Media Concentrations: Soil PRG (mg/kg_{dw})	Media Concentrations: Soil BAF	Media Concentrations: Soil Invertebrate (mg/kg_{dw})	Potential Total Daily Dose (mg/kg_{bw}/day): Soil	Potential Total Daily Dose (mg/kg_{bw}/day): Soil Invertebrate	Potential Total Daily Dose (mg/kg_{bw}/day): Total	Geometric Mean of LOAEL- and NOAEL-based TRVs (mg/kg_{bw}/day)	HQ
POLYCHLORINATED BIPHENYLS - CALCULATION OF PRELIMINARY REMEDIAL GOALS								
Total PCBs	5.7	6.67	38.1	0.0054	0.56	0.57	0.57	1

Notes:
BAF - Bioaccumulation Factor.
dw - Dry Weight.
HQ - Hazard Quotient (TDD/TRV).
LOAEL - Lowest Observed Adverse Effects Level.
NOAEL - No Observed Adverse Effects Level.
PRG - Preliminary Remediation Goal. Soil concentration that results in a TDD equal to the TRV (i.e., HQ = 1).
TRV - Toxicity Reference Value.

Exposure assumptions reflect the average inputs used in the Step 3a evaulation in the Data Gaps Assessment (Tetra Tech, 2014; see Table I.1).
BAF represents the average soil-to-earthworm BAF used in the Step 3a evaulation in the Data Gaps Assessment (Tetra Tech, 2014; see Table I.3).
TRVs represent the values used in the Step 3a evaulation in the Data Gaps Assessment (Tetra Tech, 2014; see Table I.5).
NOAEL TRV = 0.18 mg/kg_{bw}/day
LOAEL TRV = 1.8 mg/kg_{bw}/day
Robin AUF assumed to be 0.1 (10% of the home range of 0.97 acres).
BAF and TRVs are the same for Aroclor 1254 and 1260. Therefore, PRG applies to the Total PCB concentration.

TABLE 10. SUMMARY OF ECOLOGICAL PRGs AT THE TRANSFORMER VAULT

Analyte	Ecological PRG (mg/kg)	Basis	Recommended Ecological PRG (mg/kg)	Basis
Total PCBs	3.4	Short-tailed shrew PRG	3.4	Shrew PRG (lower of the shrew and robin PRGs)
	5.7	American robin PRG		

Notes:
LOAEL - Lowest Observed Adverse Effects Level.
NOAEL - No Observed Adverse Effects Level.
PRG - Preliminary Remediation Goal.

Ecological PRGs were derived using food web assumptions from Data Gaps Assessment (Tetra Tech, 2014).
PRGs assume shrew and robin obtain 10% of their diet from the transformer vault.

TABLE 11. DEVELOPMENT OF PRELIMINARY REMEDIATION GOALS (PRGs) FOR SOIL AT THE TRANSFORMER VAULTS

Analyte[1]	Maximum Detected Concentration	Units	Regulatory Criteria RIDEM Rem. Regs[2]				Insectivorous Ecological Receptor Exposure Scenario[3]	Selected PRG	Basis
			RDEC	I/C DEC	Leachability - GA	Leachability - GB			
Polychlorinated biphenyls (PCBs)									
PCBs	24	mg/kg	10	10	10	10	3.4	3.4	Ecological Risk

Notes

1. Only detected analytes which were considered risk drivers or have regulatory criteria have been presented.
2. RIDEM Rem. Regs. - RIDEM Remediation Regulations, DEM-DSR-01-93, November 2011, Table 1 (Residential and Industrial/Commercial Direct Exposure Criteria [DEC]) and Table 2 (Leachability Criteria); NA = no criterion available

3. The geometric mean of the no observed adverse effects level- (NOAEL) and lowest observed adverse effects level- (LOAEL) based TRVs and an area use factor (AUF) of 10% were used to derive PRGs for the American robin and the short-tailed shrew. The lower of the two values is recommended as the ecological PRG for insectivores.

Analytical Results
NS Newport
As BACKGROUND

Site	SITE 00002	SITE 00002	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
Location	BKG-SS03-NEB	BKG-SS09-NEB	BWBK-NE01	BWBK-NE02	BWBK-NE03	BWBK-NE04	BWBK-NE05
Depth	0 - 1.6 ft	0 - 1.8 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft
Date	1/1/1900 00:00	1/1/1900 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00
Matrix	SO	SO	SO	SO	SO	SO	SO
Type	N	N	N	N	N	N	N
Sample	BKG-SS03-NEB-0016	BKG-SS09-NEB-0018	BWBK-SS-NE01-0001	BWBK-SS-NE02-0001	BWBK-SS-NE03-0001	BWBK-SS-NE04-0001	BWBK-SS-NE05-0001
Analyte	**Units**							
Metals								
ARSENIC	mg/kg	**6.2 J**	**10.8 J**	**14.5**	**17.1**	**8.6**	**6.7**	**9.4**

Analytical Results
NS Newport
As BACKGROUND

Site	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
Location	BWBK-NE06	BWBK-NE07	BWBK-NE08	BWBK-NE09	BWBK-NE10	BWBK-NE101	BWBK-NE102
Depth	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft
Date	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	3/27/2007 00:00	3/27/2007 00:00
Matrix	SO	SO	SO	SO	SO	SO	SO
Type	N	N	N	N	N	N	N
Sample	BWBK-SS-NE06-0001	BWBK-SS-NE07-0001	BWBK-SS-NE08-0001	BWBK-SS-NE09-0001	BWBK-SS-NE10-0001	BWBK-SS-NE101-0001	BWBK-SS-NE102-0001
Analyte	**Units**							
Metals								
ARSENIC	mg/kg	**5.6**	**11.7**	**6.4**	**8.3**	**8.2**	**3.1**	**2.4**

Analytical Results
NS Newport
As BACKGROUND

	Site	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
	Location	BWBK-NE103	BWBK-NE104	BWBK-NE105	BWBK-NE106	BWBK-NE107	BWBK-NE108	BWBK-NE109
	Depth	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft
	Date	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00
	Matrix	SO	SO	SO	SO	SO	SO	SO
	Type	N	N	N	N	N	N	N
	Sample	BWBK-SS-NE103-0001	BWBK-SS-NE104-0001	BWBK-SS-NE105-0001	BWBK-SS-NE106-0001	BWBK-SS-NE107-0001	BWBK-SS-NE108-0001	BWBK-SS-NE109-0001
Analyte	**Units**							
Metals								
ARSENIC	mg/kg	**2.8**	**2.4**	**2.2**	**2.3**	**2.3**	**2.4**	**1.7**

Analytical Results
NS Newport
As BACKGROUND

	Site	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
	Location	BWBK-NE110	BWBK-NE01	BWBK-NE02	BWBK-NE03	BWBK-NE04	BWBK-NE05	BWBK-NE06
	Depth	0 - 1 ft	1 - 8 ft	1 - 9 ft	1 - 5 ft	1 - 10 ft	1 - 8 ft	1 - 9 ft
	Date	3/27/2007 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00
	Matrix	SO	SO	SO	SO	SO	SO	SO
	Type	N	N	N	N	N	N	N
	Sample	BWBK-SS-NE110-0001	BWBK-SB-NE01-0108	BWBK-SB-NE02-0109	BWBK-SB-NE03-0105	BWBK-SB-NE04-0110	BWBK-SB-NE05-0108	BWBK-SB-NE06-0109
Analyte	**Units**							
Metals								
ARSENIC	mg/kg	**3**	**5.2**	**5.8**	**5.5**	**4.6**	**5**	**4.9**

Analytical Results
NS Newport
As BACKGROUND

Site	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
Location	BWBK-NE07	BWBK-NE08	BWBK-NE09	BWBK-NE10	BWBK-NE101	BWBK-NE102	BWBK-NE103
Depth	1 - 7 ft	1 - 4 ft	1 - 10 ft	1 - 7 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft
Date	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00
Matrix	SO	SO	SO	SO	SO	SO	SO
Type	N	N	N	N	N	N	N
Sample	BWBK-SB-NE07-0107	BWBK-SB-NE08-0104	BWBK-SB-NE09-0110	BWBK-SB-NE10-0107	BWBK-SB-NE101-0110	BWBK-SB-NE102-0110	BWBK-SB-NE103-0110
Analyte	**Units**							
Metals								
ARSENIC	mg/kg	**5.2**	**4.4**	**4.3**	**3.8**	**3.2**	**2.6**	**2.4**

Analytical Results
NS Newport
As BACKGROUND

	Site	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
	Location	BWBK-NE104	BWBK-NE105	BWBK-NE106	BWBK-NE107	BWBK-NE108	BWBK-NE109	BWBK-NE110
	Depth	1 - 10 ft	1 - 10 ft	1 - 10 ft	5 - 10 ft	1 - 10 ft	1 - 10 ft	1 - 10 ft
	Date	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00
	Matrix	SO	SO	SO	SO	SO	SO	SO
	Type	N	N	N	N	N	N	N
	Sample	BWBK-SB-NE104-0110	BWBK-SB-NE105-0110	BWBK-SB-NE106-0110	BWBK-SB-NE107-0510	BWBK-SB-NE108-0110	BWBK-SB-NE109-0110	BWBK-SB-NE110-0110
Analyte	**Units**							
Metals								
ARSENIC	mg/kg	**2.1**	**3.7**	**2.6**	**1.9**	**2.2**	**2.2**	**2.6**

Analytical Results
NS Newport
Cr Mn BACKGROUND

Site		SITE 00002	SITE 00002	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
Location		BKG-SS03-NEB	BKG-SS09-NEB	BWBK-NE01	BWBK-NE02	BWBK-NE03	BWBK-NE04	BWBK-NE05
Depth		0 - 1.6 ft	0 - 1.8 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft
Date		1/1/1900 00:00	1/1/1900 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00
Matrix		SO	SO	SO	SO	SO	SO	SO
Type		N	N	N	N	N	N	N
Sample		BKG-SS03-NEB-0016	BKG-SS09-NEB-0018	BWBK-SS-NE01-0001	BWBK-SS-NE02-0001	BWBK-SS-NE03-0001	BWBK-SS-NE04-0001	BWBK-SS-NE05-0001
Analyte	**Units**							
Metals								
CHROMIUM, TOTAL	mg/kg	**12**	**11.4**	**17.1**	**17**	**14.5**	**15.7**	**16.7**
MANGANESE	mg/kg	**204**	**179**	**290**	**222**	**192**	**253**	**208**

Analytical Results
NS Newport
Cr Mn BACKGROUND

Site	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
Location	BWBK-NE06	BWBK-NE07	BWBK-NE08	BWBK-NE09	BWBK-NE10	BWBK-NE101	BWBK-NE102
Depth	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft
Date	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	9/13/2006 00:00	3/27/2007 00:00	3/27/2007 00:00
Matrix	SO	SO	SO	SO	SO	SO	SO
Type	N	N	N	N	N	N	N
Sample	BWBK-SS-NE06-0001	BWBK-SS-NE07-0001	BWBK-SS-NE08-0001	BWBK-SS-NE09-0001	BWBK-SS-NE10-0001	BWBK-SS-NE101-0001	BWBK-SS-NE102-0001
Analyte	**Units**							
Metals								
CHROMIUM, TOTAL	mg/kg	**15.2**	**14.4**	**14.2**	**13.9**	**12.8**	**10.3**	**7.9**
MANGANESE	mg/kg	**184**	**177**	**185**	**219**	**193**	**146**	**128**

Analytical Results
NS Newport
Cr Mn BACKGROUND

Site		BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND	BACKGROUND
Location		BWBK-NE103	BWBK-NE104	BWBK-NE105	BWBK-NE106	BWBK-NE107	BWBK-NE108	BWBK-NE109
Depth		0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft	0 - 1 ft
Date		3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00	3/27/2007 00:00
Matrix		SO	SO	SO	SO	SO	SO	SO
Type		N	N	N	N	N	N	N
Sample		BWBK-SS-NE103-0001	BWBK-SS-NE104-0001	BWBK-SS-NE105-0001	BWBK-SS-NE106-0001	BWBK-SS-NE107-0001	BWBK-SS-NE108-0001	BWBK-SS-NE109-0001
Analyte	**Units**							
Metals								
CHROMIUM, TOTAL	mg/kg	**8.3**	**7.9**	**6.6**	**7.1**	**6.6**	**7.1**	**6.3**
MANGANESE	mg/kg	**104**	**133**	**119**	**130**	**164**	**129**	**119**

Analytical Results
NS Newport
Cr Mn BACKGROUND

Site	BACKGROUND
Location	BWBK-NE110
Depth	0 - 1 ft
Date	3/27/2007 00:00
Matrix	SO
Type	N
Sample	BWBK-SS-NE110-0001

Analyte	Units	
Metals		
CHROMIUM, TOTAL	mg/kg	**6.6**
MANGANESE	mg/kg	**85.5**

Analytical Results
NS Newport
BACKGROUND

Location	ARSENIC	D_ARSENIC	CHROMIUM	D_CHROMIUM	MANGANESE	D_MANGANESE
BKG-SS03-NEB-0016	6.2	1	12	1	204	1
BKG-SS09-NEB-0018	10.8	1	11.4	1	179	1
BWBK-SS-NE01-0001	14.5	1	17.1	1	290	1
BWBK-SS-NE02-0001	17.1	1	17	1	222	1
BWBK-SS-NE03-0001	8.6	1	14.5	1	192	1
BWBK-SS-NE04-0001	6.7	1	15.7	1	253	1
BWBK-SS-NE05-0001	9.4	1	16.7	1	208	1
BWBK-SS-NE06-0001	5.6	1	15.2	1	184	1
BWBK-SS-NE07-0001	11.7	1	14.4	1	177	1
BWBK-SS-NE08-0001	6.4	1	14.2	1	185	1
BWBK-SS-NE09-0001	8.3	1	13.9	1	219	1
BWBK-SS-NE10-0001	8.2	1	12.8	1	193	1
BWBK-SS-NE101-0001	3.1	1	10.3	1	146	1
BWBK-SS-NE102-0001	2.4	1	7.9	1	128	1
BWBK-SS-NE103-0001	2.8	1	8.3	1	104	1
BWBK-SS-NE104-0001	2.4	1	7.9	1	133	1
BWBK-SS-NE105-0001	2.2	1	6.6	1	119	1
BWBK-SS-NE106-0001	2.3	1	7.1	1	130	1
BWBK-SS-NE107-0001	2.3	1	6.6	1	164	1
BWBK-SS-NE108-0001	2.4	1	7.1	1	129	1
BWBK-SS-NE109-0001	1.7	1	6.3	1	119	1
BWBK-SS-NE110-0001	3	1	6.6	1	85.5	1
BWBK-SB-NE01-0108	5.2	1				
BWBK-SB-NE02-0109	5.8	1				
BWBK-SB-NE03-0105	5.5	1				
BWBK-SB-NE04-0110	4.6	1				
BWBK-SB-NE05-0108	5	1				
BWBK-SB-NE06-0109	4.9	1				
BWBK-SB-NE07-0107	5.2	1				
BWBK-SB-NE08-0104	4.4	1				
BWBK-SB-NE09-0110	4.3	1				
BWBK-SB-NE10-0107	3.8	1				
BWBK-SB-NE101-0110	3.2	1				
BWBK-SB-NE102-0110	2.6	1				
BWBK-SB-NE103-0110	2.4	1				
BWBK-SB-NE104-0110	2.1	1				
BWBK-SB-NE105-0110	3.7	1				
BWBK-SB-NE106-0110	2.6	1				
BWBK-SB-NE107-0510	1.9	1				
BWBK-SB-NE108-0110	2.2	1				
BWBK-SB-NE109-0110	2.2	1				
BWBK-SB-NE110-0110	2.6	1				

1				**Background Statistics for Data Sets with Non-Detects**								
2		**User Selected Options**										
3		Date/Time of Computation		12/1/2014 9:05:36 AM								
4		From File		As Cr Mn background data set-ProUCL Input.xls								
5		Full Precision		OFF								
6		Confidence Coefficient		95%								
7		Coverage		95%								
8		rent or Future K Observations		1								
9		mber of Bootstrap Operations		2000								
10												
11	**ARSENIC**											
12												
13	**General Statistics**											
14				Total Number of Observations		42		Number of Distinct Observations		33		
15				Minimum		1.7		First Quartile		2.4		
16				Second Largest		14.5		Median		4.05		
17				Maximum		17.1		Third Quartile		6.1		
18				Mean		5.055		SD		3.518		
19				Coefficient of Variation		0.696		Skewness		1.712		
20				Mean of logged Data		1.43		SD of logged Data		0.601		
21												
22				**Critical Values for Background Threshold Values (BTVs)**								
23				Tolerance Factor K (For UTL)		2.104		d2max (for USL)		2.887		
24												
25				**Normal GOF Test**								
26				Shapiro Wilk Test Statistic		0.775		**Shapiro Wilk GOF Test**				
27				5% Shapiro Wilk Critical Value		0.942		Data Not Normal at 5% Significance Level				
28				Lilliefors Test Statistic		0.17		**Lilliefors GOF Test**				
29				5% Lilliefors Critical Value		0.137		Data Not Normal at 5% Significance Level				
30				**Data Not Normal at 5% Significance Level**								
31												
32				**Background Statistics Assuming Normal Distribution**								
33				95% UTL with 95% Coverage		12.45		90% Percentile (z)		9.563		
34				95% UPL (t)		11.04		95% Percentile (z)		10.84		
35				95% USL		15.21		99% Percentile (z)		13.24		
36												
37				**Gamma GOF Test**								
38				A-D Test Statistic		1.204		**Anderson-Darling Gamma GOF Test**				
39				5% A-D Critical Value		0.756		Data Not Gamma Distributed at 5% Significance Level				
40				K-S Test Statistic		0.144		**Kolmogrov-Smirnoff Gamma GOF Test**				
41				5% K-S Critical Value		0.138		Data Not Gamma Distributed at 5% Significance Level				
42				**Data Not Gamma Distributed at 5% Significance Level**								
43												
44				**Gamma Statistics**								
45				k hat (MLE)		2.788		k star (bias corrected MLE)		2.604		
46				Theta hat (MLE)		1.813		Theta star (bias corrected MLE)		1.941		
47				nu hat (MLE)		234.2		nu star (bias corrected)		218.8		
48				MLE Mean (bias corrected)		5.055		MLE Sd (bias corrected)		3.132		
49												
50				**Background Statistics Assuming Gamma Distribution**								
51				95% Wilson Hilferty (WH) Approx. Gamma UPL		11.15		90% Percentile		9.252		
52				95% Hawkins Wixley (HW) Approx. Gamma UPL		11.23		95% Percentile		11.06		
53				95% WH Approx. Gamma UTL with 95% Coverage		13.36		99% Percentile		15		
54				95% HW Approx. Gamma UTL with 95% Coverage		13.62						
55				95% WH USL		18.5		95% HW USL		19.38		
56												
57				**Lognormal GOF Test**								
58				Shapiro Wilk Test Statistic		0.882		**Shapiro Wilk Lognormal GOF Test**				
59				5% Shapiro Wilk Critical Value		0.942		Data Not Lognormal at 5% Significance Level				
60				Lilliefors Test Statistic		0.142		**Lilliefors Lognormal GOF Test**				
61				5% Lilliefors Critical Value		0.137		Data Not Lognormal at 5% Significance Level				
62				**Data Not Lognormal at 5% Significance Level**								
63												
64				**Background Statistics assuming Lognormal Distribution**								

65				95% UTL with 95% Coverage		14.8				90% Percentile (z)		9.029
66				95% UPL (t)		11.63				95% Percentile (z)		11.23
67				95% USL		23.7				99% Percentile (z)		16.92
68												
69	**Nonparametric Distribution Free Background Statistics**											
70	**Data do not follow a Discernible Distribution (0.05)**											
71												
72	**Nonparametric Upper Limits for Background Threshold Values**											
73				Order of Statistic, r		42				95% UTL with 95% Coverage		17.1
74				Approximate f		2.211				Confidence Coefficient (CC) achieved by UTL		0.884
75	95% Percentile Bootstrap UTL with 95% Coverage					16.97				95% BCA Bootstrap UTL with 95% Coverage		16.83
76				95% UPL		14.08				90% Percentile		9.32
77				90% Chebyshev UPL		15.73				95% Percentile		11.66
78				95% Chebyshev UPL		20.57				99% Percentile		16.03
79				95% USL		17.1						
80												
81	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
82	data set free of outliers and consists of observations collected from clean unimpacted locations.											
83	The use of USL tends to provide a balance between false positives and false negatives provided the data											
84	represents a background data set and when many onsite observations need to be compared with the BTV.											
85												
86	**CHROMIUM**											
87												
88	**General Statistics**											
89				Total Number of Observations		22				Number of Distinct Observations		18
90				Minimum		6.3				First Quartile		7.3
91				Second Largest		17				Median		11.7
92				Maximum		17.1				Third Quartile		14.48
93				Mean		11.35				SD		3.948
94				Coefficient of Variation		0.348				Skewness		0.0465
95				Mean of logged Data		2.366				SD of logged Data		0.368
96												
97	**Critical Values for Background Threshold Values (BTVs)**											
98				Tolerance Factor K (For UTL)		2.349				d2max (for USL)		2.603
99												
100	**Normal GOF Test**											
101				Shapiro Wilk Test Statistic		0.885	**Shapiro Wilk GOF Test**					
102				5% Shapiro Wilk Critical Value		0.911	Data Not Normal at 5% Significance Level					
103				Lilliefors Test Statistic		0.189	**Lilliefors GOF Test**					
104				5% Lilliefors Critical Value		0.189	Data appear Normal at 5% Significance Level					
105	**Data appear Approximate Normal at 5% Significance Level**											
106												
107	**Background Statistics Assuming Normal Distribution**											
108				95% UTL with 95% Coverage		20.62				90% Percentile (z)		16.4
109				95% UPL (t)		18.29				95% Percentile (z)		17.84
110				95% USL		21.62				99% Percentile (z)		20.53
111												
112	**Gamma GOF Test**											
113				A-D Test Statistic		1.04	**Anderson-Darling Gamma GOF Test**					
114				5% A-D Critical Value		0.745	Data Not Gamma Distributed at 5% Significance Level					
115				K-S Test Statistic		0.176	**Kolmogrov-Smirnoff Gamma GOF Test**					
116				5% K-S Critical Value		0.186	etected data appear Gamma Distributed at 5% Significance Lev					
117	**Detected data follow Appr. Gamma Distribution at 5% Significance Level**											
118												
119	**Gamma Statistics**											
120				k hat (MLE)		8.176				k star (bias corrected MLE)		7.091
121				Theta hat (MLE)		1.388				Theta star (bias corrected MLE)		1.6
122				nu hat (MLE)		359.7				nu star (bias corrected)		312
123				MLE Mean (bias corrected)		11.35				MLE Sd (bias corrected)		4.26
124												
125	**Background Statistics Assuming Gamma Distribution**											
126	95% Wilson Hilferty (WH) Approx. Gamma UPL					19.44				90% Percentile		17.03
127	95% Hawkins Wixley (HW) Approx. Gamma UPL					19.65				95% Percentile		19.14
128	95% WH Approx. Gamma UTL with 95% Coverage					23.08				99% Percentile		23.52

129	95% HW Approx. Gamma UTL with 95% Coverage					23.55						
130					95% WH USL	24.78					95% HW USL	25.4
131												
132	**Lognormal GOF Test**											
133					Shapiro Wilk Test Statistic	0.875	**Shapiro Wilk Lognormal GOF Test**					
134					5% Shapiro Wilk Critical Value	0.911	Data Not Lognormal at 5% Significance Level					
135					Lilliefors Test Statistic	0.174	**Lilliefors Lognormal GOF Test**					
136					5% Lilliefors Critical Value	0.189	Data appear Lognormal at 5% Significance Level					
137	**Data appear Approximate Lognormal at 5% Significance Level**											
138												
139	**Background Statistics assuming Lognormal Distribution**											
140				95% UTL with 95% Coverage		25.32					90% Percentile (z)	17.09
141					95% UPL (t)	20.38					95% Percentile (z)	19.53
142					95% USL	27.8					99% Percentile (z)	25.11
143												
144	**Nonparametric Distribution Free Background Statistics**											
145	**Data appear Approximate Normal at 5% Significance Level**											
146												
147	**Nonparametric Upper Limits for Background Threshold Values**											
148					Order of Statistic, r	22					95% UTL with 95% Coverage	17.1
149					Approximate f	1.158					Confidence Coefficient (CC) achieved by UTL	0.676
150	95% Percentile Bootstrap UTL with 95% Coverage					17.1					95% BCA Bootstrap UTL with 95% Coverage	17.1
151					95% UPL	17.09					90% Percentile	16.6
152					90% Chebyshev UPL	23.45					95% Percentile	16.99
153					95% Chebyshev UPL	28.94					99% Percentile	17.08
154					95% USL	17.1						
155												
156	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
157	data set free of outliers and consists of observations collected from clean unimpacted locations.											
158	The use of USL tends to provide a balance between false positives and false negatives provided the data											
159	represents a background data set and when many onsite observations need to be compared with the BTV.											
160												
161	**MANGANESE**											
162												
163	**General Statistics**											
164					Total Number of Observations	22					Number of Distinct Observations	21
165					Minimum	85.5					First Quartile	129.3
166					Second Largest	253					Median	178
167					Maximum	290					Third Quartile	201.3
168					Mean	171.1					SD	50.83
169					Coefficient of Variation	0.297					Skewness	0.431
170					Mean of logged Data	5.099					SD of logged Data	0.305
171												
172	**Critical Values for Background Threshold Values (BTVs)**											
173					Tolerance Factor K (For UTL)	2.349					d2max (for USL)	2.603
174												
175	**Normal GOF Test**											
176					Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk GOF Test**					
177					5% Shapiro Wilk Critical Value	0.911	Data appear Normal at 5% Significance Level					
178					Lilliefors Test Statistic	0.137	**Lilliefors GOF Test**					
179					5% Lilliefors Critical Value	0.189	Data appear Normal at 5% Significance Level					
180	**Data appear Normal at 5% Significance Level**											
181												
182	**Background Statistics Assuming Normal Distribution**											
183				95% UTL with 95% Coverage		290.5					90% Percentile (z)	236.2
184					95% UPL (t)	260.5					95% Percentile (z)	254.7
185					95% USL	303.4					99% Percentile (z)	289.3
186												
187	**Gamma GOF Test**											
188					A-D Test Statistic	0.298	**Anderson-Darling Gamma GOF Test**					
189					5% A-D Critical Value	0.743	etected data appear Gamma Distributed at 5% Significance Lev					
190					K-S Test Statistic	0.13	**Kolmogrov-Smirnoff Gamma GOF Test**					
191					5% K-S Critical Value	0.185	etected data appear Gamma Distributed at 5% Significance Lev					
192	**Detected data appear Gamma Distributed at 5% Significance Level**											

193												
194	**Gamma Statistics**											
195						k hat (MLE)	11.73			k star (bias corrected MLE)		10.16
196						Theta hat (MLE)	14.59			Theta star (bias corrected MLE)		16.84
197						nu hat (MLE)	516			nu star (bias corrected)		447
198						MLE Mean (bias corrected)	171.1			MLE Sd (bias corrected)		53.67
199												
200	**Background Statistics Assuming Gamma Distribution**											
201					95% Wilson Hilferty (WH) Approx. Gamma UPL		271.1			90% Percentile		242.4
202					95% Hawkins Wixley (HW) Approx. Gamma UPL		273			95% Percentile		267.8
203					95% WH Approx. Gamma UTL with	95% Coverage	314.2			99% Percentile		320
204					95% HW Approx. Gamma UTL with	95% Coverage	318.6					
205						95% WH USL	334.1			95% HW USL		339.9
206												
207	**Lognormal GOF Test**											
208						Shapiro Wilk Test Statistic	0.975			**Shapiro Wilk Lognormal GOF Test**		
209						5% Shapiro Wilk Critical Value	0.911			Data appear Lognormal at 5% Significance Level		
210						Lilliefors Test Statistic	0.146			**Lilliefors Lognormal GOF Test**		
211						5% Lilliefors Critical Value	0.189			Data appear Lognormal at 5% Significance Level		
212	**Data appear Lognormal at 5% Significance Level**											
213												
214	**Background Statistics assuming Lognormal Distribution**											
215						95% UTL with	95% Coverage	335.3		90% Percentile (z)		242.2
216						95% UPL (t)		280.2		95% Percentile (z)		270.5
217						95% USL		362.3		99% Percentile (z)		333
218												
219	**Nonparametric Distribution Free Background Statistics**											
220	**Data appear Normal at 5% Significance Level**											
221												
222	**Nonparametric Upper Limits for Background Threshold Values**											
223						Order of Statistic, r	22			95% UTL with	95% Coverage	290
224						Approximate f	1.158			Confidence Coefficient (CC) achieved by UTL		0.676
225					95% Percentile Bootstrap UTL with	95% Coverage	290			95% BCA Bootstrap UTL with	95% Coverage	290
226						95% UPL	284.5			90% Percentile		221.7
227						90% Chebyshev UPL	327			95% Percentile		251.5
228						95% Chebyshev UPL	397.6			99% Percentile		282.2
229						95% USL	290					
230												
231	Note: The use of USL to estimate a BTV is recommended only when the data set represents a background											
232	data set free of outliers and consists of observations collected from clean unimpacted locations.											
233	The use of USL tends to provide a balance between false positives and false negatives provided the data											
234	represents a background data set and when many onsite observations need to be compared with the BTV.											
235												

Appendix C

Cost Estimates

Planning Cost Estimate Summary

Alternative: S-1 No Action

Site:	Tank Farm 1, NAVSTA Newport	Description:	This alternative consists of no remedial action as a baseline comparison.
Location:	Portsmouth, Rhode Island		
Phase:	FS		
Date:	December 2014		

PERIODIC COSTS

Description	QTY	UNIT	UNIT COST	Total	Notes
No costs are estimated for this No Action alternative.					
SUBTOTAL				$0	
TOTAL PERIODIC ANNUAL COSTS				$0	

PRESENT VALUE ANALYSIS

	Total Cost per Year	Discount Factor	Present Value	Notes
Cost Type				
Capital Cost	0		$0	
O&M Cost	0		$0	
Periodic Cost	$0		$0	
Total Present Value of Alternative			$0	

Planning Cost Estimate Summary

Alternative:	S-2 Limited Action		
Site:	Tank Farm 1, NAVSTA Newport	Description:	This alternative consists of excavating the full extent of surface soil at TV2 and TV3 that exceeds the selected PRG (including GA Leachability Criteria). Additionally, this alternative includes limited surface soil excavation at the Ethyl Blending Plant to meet Industrial PRGs (including GA Leachability Criteria), land use controls and annual site inspections, and five-year reviews.
Location:	Portsmouth, Rhode Island		
Phase:	FS		
Date:	December 2014		

CAPITAL COSTS

Description		QTY	UNIT	UNIT COST	Total	Notes
Land Use Control Remedial Design (LUC RD)						
Prepare LUC RD (4 iterations)		1	LS	$10,000	$10,000	Estimated
					$10,000	
Delineation Soil Sampling						
HASP		1	LS	$2,500	$2,500	
Work Plan/UFP SAP		1	LS	$10,000	$10,000	
Direct push drill rig and operator		2	day	$2,000	$4,000	Assumes 24 0-2 foot depth soil borings
Labor to record and collect samples		4	person-days	$1,500	$6,000	Assume 12-hr field day
Laboratory analyses:						
	PAHs	18	EA	$120	$2,160	See Backup for sampling and analysis
	Arsenic	3	EA	$20	$60	assumptions. Quantities include field
	Manganese	7	EA	$20	$140	duplicates.
	Total Chromium	4	EA	$20	$80	
	Hexavalent Chromium	4	EA	$65	$260	
	pH, ORP, ferrous iron, react. Sulfide	4	EA	$90	$360	
	PCBs	10	EA	$60	$600	
Travel		4	person-days	$200	$800	
Field supplies and equipment		1	EA	$1,500	$1,500	Allowance
Data Validation		20	HR	$100	$2,000	Allowance
Surveying		1	LS	$2,000	$2,000	Sample locations, contours, surface features
Tech Memo (2 iterations)		60	HR	$100	$6,000	Allowance
					$38,460	
Site Preparation and Management						
RA Contractor Work Plan		1	LS	$2,500	$2,500	
HASP		1	LS	$1,500	$1,500	
Equipment mobilization		1	LS	$1,500	$1,500	
Temporary facilities		1	LS	$500	$500	
Erosion control measures		400	LF	$4	$1,600	
Clearing and grubbing		2000	SF	$1	$2,000	
					$9,600	
Excavation						
Excavate soil		150	CY	$15	$2,250	Based on 2 foot depth and areas shown on Figures 8 - 10
Dust control and air monitoring		1	LS	$500	$500	
Regrade excavation footprint		2000	SF	$1	$2,000	
Seeding		2000	SF	$5	$10,000	
					$14,750	
Soil Disposal						
Waste Characterization		1	EA	$830	$830	Estimate for VOCs, SVOCs, PCBs, pesticides, TPH, metals; 1 per 500 CY
T&D non-haz soil		225	Ton	$75	$16,875	
					$17,705	
Post-Construction						
Contractor Completion Report		75	HR	$100	$7,500	
Remedial Action Completion Report		100	HR	$100	$10,000	
(2 iterations)					$17,500	
SUBTOTAL					$108,015	
Contingency	30%				$32,405	Scope (15%)+ Bid(15%)
SUBTOTAL					$140,420	
Project Management	6%				$8,425.17	
Remedial Design	4%				$5,616.78	
Construction Management	6%				$8,425.17	
TOTAL CAPITAL COSTS					$162,887	

Planning Cost Estimate Summary

Alternative: S-2 Limited Action

O&M COSTS

Description		QTY	UNIT	UNIT COST	Total	Notes
Annual LUC Site inspections (through year 30)		1	each	$1,950	$1,950	Estimated; See attached worksheet
SUBTOTAL					$1,950	
Contingency	0%				$0	
Project Management	10%				$195	
TOTAL O&M ANNUAL COSTS					$2,145	

PERIODIC COSTS

Description	QTY	UNIT	UNIT COST	Total	Notes
Five Year Review (through year 30)	6	each	$5,000	$30,000	Assume one component of base-wide 5-yr review
SUBTOTAL				$30,000	
TOTAL PERIODIC ANNUAL COSTS				$5,000	

PRESENT VALUE ANALYSIS

Cost Type	Year	Total Cost	Total Cost per Year	Discount Factor at 2%	Present Value	Notes
Capital Cost	0	$162,887	$162,887	1	$162,887	Discount rate of 2% is based on the
O&M Cost	1 to 30	$64,350	$2,145	22.3965	$48,040	30-Year Real Interest Rate in Appendix C
Periodic Cost	5	$5,000	$5,000	0.9057	$4,529	of the White House Office of Management
	10	$5,000	$5,000	0.8203	$4,102	and Budget (OMB) Circular A-94, Revised
	15	$5,000	$5,000	0.743	$3,715	December 2013.
	20	$5,000	$5,000	0.673	$3,365	
	25	$5,000	$5,000	0.6095	$3,048	
	30	$5,000	$5,000	0.5521	$2,761	
Total Present Value of Alternative					$232,445	

Planning Cost Estimate Summary

Alternative: S-3 Excavation and Off-Site Disposal

Site: Tank Farm 1, NAVSTA Newport
Location: Portsmouth, Rhode Island
Phase: FS
Date: December 2014

Description: This alternative consists of excavating the full extent of surface soils exceeding PRGs at the EBP and Transformer Vaults with off-site disposal. Short-term LUCs may also be needed at the EBP; however, costs not included since the duration is not known.

CAPITAL COSTS

Description	QTY	UNIT	UNIT COST	Total	Notes
Delineation Soil Sampling					
HASP	1	LS	$2,500	$2,500	
Work Plan/UFP SAP	1	LS	$10,000	$10,000	
Direct push drill rig and operator	2	day	$2,000	$4,000	Assumes 24 0-2 foot depth soil borings
Labor to record and collect samples	4	person-days	$1,500	$6,000	Assume 12-hr field day
Laboratory analyses:					
PAHs	18	EA	$120	$2,160	See Backup for sampling and analysis assumptions. Quantities include field duplicates.
Arsenic	3	EA	$20	$60	
Manganese	7	EA	$20	$140	
Total Chromium	4	EA	$20	$80	
Hexavalent Chromium	4	EA	$65	$260	
pH, ORP, ferrous iron, react. Sulfide	4	EA	$90	$360	
PCBs	10	EA	$60	$600	
Travel	4	person-days	$200	$800	
Field supplies and equipment	1	EA	$1,500	$1,500	Allowance
Data Validation	20	HR	$100	$2,000	Allowance
Surveying	1	LS	$2,000	$2,000	Sample locations, contours, surface features
Tech Memo (2 iterations)	60	HR	$100	$6,000	Allowance
				$38,460	
Site Preparation and Management					
RA Contractor Work Plan	1	LS	$5,000	$5,000	
HASP	1	LS	$2,500	$2,500	
Equipment mobilization	1	LS	$5,000	$5,000	
Temporary facilities	1	LS	$2,500	$2,500	
Erosion control measures	460	LF	$4	$1,840	
Clearing and grubbing	5400	SF	$1	$5,400	
				$22,240	
Excavation					
Excavate soil	420	CY	$15	$6,300	Based on 2 foot depth and area shown on Figures 8 -10
Dust control and air monitoring	1	LS	$2,500	$2,500	
Regrade excavation footprint	5400	SF	$1	$5,400	
Seeding	5400	SF	$5	$27,000	
				$41,200	
Soil Disposal					
Waste Characterization	1	EA	$830	$830	Estimate for VOCs, SVOCs, PCBs, pesticides, TPH, metals; 1 per 500 CY
T&D non-haz soil	630	Ton	$65	$40,950	
				$40,950	
Post-Construction					
Contractor Completion Report	100	HR	$100	$10,000	
Remedial Action Completion Report	150	HR	$100	$15,000	
(2 iterations)				$25,000	
SUBTOTAL				$167,850	

Planning Cost Estimate Summary

Alternative: S-3 Excavation and Off-Site Disposal

Contingency	30%	$50,355	Scope (15%)+ Bid(15%)
SUBTOTAL		$218,205	
Project Management	6%	$13,092.30	
Remedial Design	4%	$8,728.20	
Construction Management	6%	$13,092.30	
TOTAL CAPITAL COSTS		$253,118	
O&M COSTS			
TOTAL O&M ANNUAL COSTS		$0	
PERIODIC COSTS			
TOTAL PERIODIC ANNUAL COSTS		$0	

PRESENT VALUE ANALYSIS

	Year	Total Cost	Total Cost per Year	Discount Factor	Present Value	Notes
Cost Type						
Capital Cost	0	$253,118	$253,118	1	$253,118	
O&M Cost	None	$0	$0		$0	
Periodic Cost	None	$0	$0		$0	
Total Present Value of Alternative					$253,118	

Planning Cost Estimate Summary

Alternative: S-4 Containment

Site: Tank Farm 1, NAVSTA Newport
Location: Portsmouth, Rhode Island
Phase: FS
Date: December 2014

Description: This alternative consists of excavating the full extent of surface soil at TV2 and TV3 that exceeds the selected PRG (including the GA Leachability Criteria). Additionally, this alternative consists of limited surface soil excavation around 2 historic sample locations to address leachability criteria exceedances for naphthalene, installation of a cover system, land use controls, annual site inspections, and five-year reviews.

CAPITAL COSTS

Description	QTY	UNIT	UNIT COST	Total	Notes
Land Use Control Remedial Design (LUC RD)					
Prepare LUC RD (4 iterations)	1	LS	$10,000	$10,000	Estimated
				$10,000	
Delineation Soil Sampling					
HASP	1	LS	$2,500	$2,500	
Work Plan/UFP SAP	1	LS	$10,000	$10,000	
Direct push drill rig and operator	2	day	$2,000	$4,000	Assumes 24 0-2 foot depth soil borings
Labor to record and collect samples	4	person-days	$1,500	$6,000	Assume 12-hr field day
Laboratory analyses:					
PAHs	18	EA	$120	$2,160	See Backup for sampling and analysis
Arsenic	3	EA	$20	$60	assumptions. Quantities include field
Manganese	7	EA	$20	$140	duplicates.
Total Chromium	4	EA	$20	$80	
Hexavalent Chromium	4	EA	$65	$260	
pH, ORP, ferrous iron, react. Sulfide	4	EA	$90	$360	
PCBs	10	EA	$60	$600	
Travel	4	person-days	$200	$800	
Field supplies and equipment	1	EA	$1,500	$1,500	Allowance
Sample management and validation	20	HR	$100	$2,000	Allowance
Surveying	1	LS	$2,000	$2,000	Sample locations, contours, surface features
Tech Memo (2 iterations)	60	HR	$100	$6,000	Allowance
				$38,460	
Site Preparation and Management					
RA Work Plan	1	LS	$10,000	$10,000	
HASP	1	LS	$2,500	$2,500	
Equipment mobilization	1	LS	$5,000	$5,000	
Temporary facilities	1	LS	$2,500	$2,500	
Erosion control measures	460	LF	$4	$1,840	
Clearing and grubbing	5400	SF	$1	$5,400	
				$27,240	
Excavate and Construct Soil Cover					
Excavate soil from TV2, TV3, and 2 areas at EBP	80	CY	$15	$1,200	Based on 4 areas. See Figures 8 - 10
Dust control and air monitoring	1	LS	$1,000	$1,000	
Regrade cap area	5400	SF	$1	$5,400	
Clean fill testing	2	EA	$830	$1,660	Estimate for VOCs, SVOCs, PCBs, pesticides, TPH, metals; 1 sample per fill type
Furnish common fill	360	CY	$15	$5,400	Cover assumed for costing to consist of a
Furnish topsoil	120	CY	$30	$3,600	2-ft clean soil cap with grass
Install clean fill	480	CY	$15	$7,200	
Seeding	5400	SF	$5	$27,000	
Survey to document final cover elevations	1	LS	$2,000	$2,000	
				$54,460	
Soil Disposal					
Waste Characterization	1	EA	$830	$830	Estimate for VOCs, SVOCs, PCBs, pesticides, TPH, metals; 1 per 500 CY
T&D non-haz soil	120	Ton	$75	$9,000	
				$9,830	
Post-Construction					
Contractor Completion Report	75	HR	$100	$7,500	
Remedial Action Completion Report	100	HR	$100	$10,000	
(2 iterations)				$17,500	
SUBTOTAL				$157,490	

Planning Cost Estimate Summary

Alternative: S-4 Containment

Contingency	30%				$47,247	Scope (15%)+ Bid(15%)
SUBTOTAL					$204,737	
Project Management	6%				$12,284.22	
Remedial Design	6%				$12,284.22	
Construction Management	6%				$12,284.22	
TOTAL CAPITAL COSTS					$241,590	

O&M COSTS

Description	QTY	UNIT	UNIT COST	Total	Notes
Maintain soil cover vegetation	2	each	$500	$1,000	Mow 2 times per year
Allowance for maintenance	1	each	$200	$200	Allowance for misc. needs
Annual LUC Site inspections (through year 30)	1	each	$1,950	$1,950	Estimated; See attached worksheet
SUBTOTAL				$3,150	
Contingency	0%			$0	
Project Management	10%			$315	
TOTAL O&M ANNUAL COSTS				$3,465	

PERIODIC COSTS

Description	QTY	UNIT	UNIT COST	Total	Notes
Five Year Review (through year 30)	6	each	$5,000	$30,000	Assume one component of base-wide 5-yr review
SUBTOTAL				$30,000	
TOTAL PERIODIC ANNUAL COSTS				$5,000	

PRESENT VALUE ANALYSIS

Cost Type	Year	Total Cost	Total Cost per Year	Discount Factor at 2%	Present Value	Notes
Capital Cost	0	$241,590	$241,590	1	$241,590	Discount rate of 2% is based on the
O&M Cost	1 to 30	$103,950	$3,465	22.3965	$77,604	30-Year Real Interest Rate in Appendix C
Periodic Cost	5	$5,000	$5,000	0.9057	$4,529	of the White House Office of Management
	10	$5,000	$5,000	0.8203	$4,102	and Budget (OMB) Circular A-94, Revised
	15	$5,000	$5,000	0.743	$3,715	December 2013.
	20	$5,000	$5,000	0.673	$3,365	
	25	$5,000	$5,000	0.6095	$3,048	
	30	$5,000	$5,000	0.5521	$2,761	
Total Present Value of Alternative					$340,712	

Planning Cost Backup Worksheet

Alternative: S-2 Limited Action and S-4 Containment

Site:	Tank Farm 1, NAVSTA Newport	Prepared By: CC	Checked By: NT
Location:	Portsmouth, Rhode Island	Date: 7/9/2014	Date: 7/16/2014
Phase:	FS		
Date:	December 2014		

Assumptions:

EBP Delineation Soil Sampling (including QA/QC)
Sampling and analysis to assess whether hexavalent chromium is present above the PRG or if it should be eliminated as a COC
Assume resampling of previous locations EBP-SB1007, EBP-SB1019, and EBP-SB1036 that had total chromium in excess of the PRG for hexavalent chromium.
Assume analysis for total chromium, hexavalent chromium, pH, ORP, and possibly ferrous iron and reactive sulfide.
Sampling and anlysis to delineate overall extent of PAHs, manganese, and arsenic at the EBP
Assume 3 surface soil samples east and west of EBP-SB1004 with analysis for arsenic to delineate arsenic exceedances.
Assume 7 surface soil samples collected north of EBP-SB1020 and EBP-SB1022 with analysis for PAHs and manganese.
Assume 11 additional surface soil samples collected to delineate horizontal extent of PAHs.
TV2 and TV3 Delineation Soil Sampling (including QA/QC)
Sampling and analysis to delineate overall extent of PCBs
Assume 5 surface soil samples collected around TF1-EV2-E and 5 surface soil samples collected around TV3-SB1026

Work Statement:
Annual Land Use Control (LUC) Inspections and Reporting

Description	QTY	UNIT	UNIT COST	Total	Notes
Travel	1	LS	$200	$200	
Labor for Inspection	12	HR	$100	$1,200	
Report	4	HR	$100	$400	
Misc	1	LS	$100	$150	
TOTAL COST PER ANNUAL INSPECTION				$1,950	

Source of Cost Data:
Engineering Estimate
Cost Adjustment Factor:

FACTOR:		NOTES:
H&S Productivity (labor & equip)		Level D
Escalation to Base Year		
Area Cost Factor		
Subcontractor Overhead & Prof.		
Prime Contractor Overhead & Prof.		

Planning Cost Backup Worksheet

Alternative:	S-3 Excavation and Off-Site Disposal		
Site:	Tank Farm 1, NAVSTA Newport	Prepared By: CC	Checked By: NT
Location:	Portsmouth, Rhode Island	Date: 7/9/2014	Date: 7/16/2014
Phase:	FS		
Date:	December 2014		

Assumptions:

EBP Delineation Soil Sampling (including QA/QC)

Sampling and analysis to assess whether hexavalent chromium is present above the PRG or if it should be eliminated as a COC

- Assume resampling of previous locations EBP-SB1007, EBP-SB1019, and EBP-SB1036 that had total chromium in excess of the PRG for hexavalent chromium.
- Assume analysis for total chromium, hexavalent chromium, pH, ORP, and possibly ferrous iron and reactive sulfide.

Sampling and anlysis to delineate overall extent of PAHs, manganese, and arsenic at the EBP

- Assume 3 surface soil samples east and west of EBP-SB1004 with analysis for arsenic to delineate arsenic exceedances.
- Assume 7 surface soil samples collected north of EBP-SB1020 and EBP-SB1022 with analysis for PAHs and manganese.
- Assume 11 additional surface soil samples collected to delineate horizontal extent of PAHs.

TV2 and TV3 Delineation Soil Sampling (including QA/QC)

Sampling and analysis to delineate overall extent of PCBs

- Assume 5 surface soil samples collected around TF1-EV2-E and 5 surface soil samples collected around TV3-SB1026