TECHNICAL MEMORANDUM
CHANGES TO THE DRAFT FINAL FEASIBILITY STUDY
OLD FIREFIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

1.0 INTRODUCTION

This technical memorandum has been prepared to document the primary changes to the Draft Final Revised Feasibility Study for The Old Fire Fighting Training Area (OFFTA), Naval Station Newport, Newport, Rhode Island, dated December 2009 (Draft Final FS). This Technical Memorandum has been prepared under contract No.N62472-03-D-0057, CTO132, by Tetra Tech NUS, Inc. (Tetra Tech).

This technical memorandum, in conjunction with the Draft Final FS dated December 2009, and changed pages for the Draft Final FS provided as an attachment to this memo, all issued together, constitute the Final Feasibility Study for this site. The following shall be provided for the administrative record:

- a response to comments document, citing response to the January 21 letter from USEPA (Reference Tetra Tech letter submitted 4/19/10);
- this technical memorandum describing the major changes to the FS; and
- a series of changed pages and revised ARAR tables that present technical revisions to wording and tables as agreed to during resolutions and responses to comments.

Together, this technical memorandum and replacement pages serve to update the Draft Final FS and serve as the Final Revised OFFTA FS Report. The Proposed Remedial Action Plan (PRAP) and Record of Decision (ROD) will reflect the major FS revisions as documented in this technical memorandum.

2.0 BACKGROUND

On December 19, 2009 the Navy provided the Revised Draft Final FS for the (OFFTA) site, Site 09, at NAVSTA Newport. On January 21, 2010, the USEPA provided a letter citing a conditional concurrence with the Draft Final FS, circumventing the need for a dispute of that document.

During the comment resolution process, it was agreed that the following adjustments to the FS should be made:

1. Sediment should not be a media of concern due to the lack of information linking CERCLA contaminants at the Site to risk from sediment.

2. Groundwater Alternative 3 is removed because contaminated groundwater is only present under the area where contaminated soils are being managed in place via a waste management area as discussed below. Downgradient to the waste management area, the groundwater is saline and otherwise nonpotable. No CERCLA contaminants were found to pose a risk in groundwater upgradient of the waste management area.
3. Soil contaminants that may be left in place would be managed as a waste management area.
4. RIDEM GA/GB groundwater criteria may be discussed in general within the FS, although they are not applicable to the remedy selected under CERCLA.

3.0 SIGNIFICANT CHANGES TO THE DRAFT FINAL FS

3.1 Establish a Waste Management Area

The areas of the site where contamination is left in place will be identified in the ROD as a waste management area. The waste management area will be the area where CERCLA COCs are present as a result of releases from the site that exceed the PRGs. The boundary of the waste management area will be the same as the site boundary identified in Figure 2-2 of the December 2009 FS report. The boundary of the waste management area will also serve as the compliance boundary for the land use control.

In accordance with the Preamble to the NCP, “remediation levels should generally be attained throughout the contaminated plume, or at and beyond the edge of the waste management area when waste is left in place”. By establishing a waste management area at the site, the groundwater within this area does not need to meet PRGs, does not require remediation, and therefore does not require monitoring. To meet waste management standards, monitoring outside of the waste management area is required to confirm that contaminated groundwater is not migrating beyond the compliance boundary for the Site. Upgradient wells will monitor groundwater at or adjacent to the compliance boundary, while sediment monitoring will be conducted in the adjacent downgradient intertidal/subtidal areas. Downgradient groundwater is saline (ocean water), non potable, and therefore, does not require monitoring.

Long term groundwater monitoring will be needed to ensure contaminated groundwater is not migrating beyond the compliance boundary for the site. Monitoring will be conducted for as long as soil contamination exceeding CERCLA risk-levels remains in place and will include analysis for all the contaminants of concern (organics and metals). Sediment monitoring will ensure that contaminated groundwater is not migrating offshore of the site.

The limit of the waste management area is identified on Figure 2-2 of the Revised Draft Final FS report (December 2009).

3.2 Eliminate Sediment as a Media of Concern

The sediment alternatives are eliminated from the FS because of the low levels of contaminants and sediment risks from CERCLA contaminants. Limited sediment contamination adjacent to the site would also be mitigated by incidental removal of contaminated sediment during the CERCLA removal action which is preceding this remedial action which includes the installation of the revetment wall. Though no CERCLA sediment risk was identified, sediment will be monitored as part of soil and groundwater alternatives.

Therefore, the affected portions of the Revised Draft Final FS (primarily Section 6) are considered deleted, and it is accepted that sediments at and near the OFFTA site do not pose a human health or ecological risk defined under CERCLA that warrant a remedial action. Elimination of the sediment alternatives will be reflected in the PRAP and ROD.

3.3 Eliminate Groundwater Alternative 3 – Treatment

The groundwater treatment alternative is eliminated from the Draft Final FS (groundwater alternative 3). Groundwater contamination associated with the releases at the site does not extend beyond the site boundary (compliance boundary). No remedial action other than institutional controls and monitoring are required for groundwater since all contaminated groundwater is limited to the area of the soil contamination that is being managed in place. Groundwater does not need to be remediated to meet federal drinking water standards under a waste management area or where groundwater is not potable.

3.4 RIDEM Solid Waste Regulations as ARARs

The appropriate provisions of the Rhode Island solid waste regulations are adopted as relevant and appropriate ARARs. The establishment of a waste management area and a soil/asphalt cover will meet the relevant and appropriate sections of these regulations by providing a maintenance plan and inspection schedule for that cover, requiring long-term monitoring for as long as contamination exceeding CERCLA risk-levels remains on Site, and requiring land use restrictions to prevent disturbance to components of the remedy (including the cover and monitoring wells) and prevent use of groundwater from under the Site. Revised Tables 2-3 and 4-14 document these revisions.

3.5 Modification to References to State GA/GB criteria

Discussion of the Rhode Island Groundwater Classifications will remain within the document. This is because these criteria, while they may not be enforceable under a CERCLA action, and are not to be factored into the analysis of the proposed CERCLA remedial alternatives; they are enforced under state law as related to petroleum contamination.

3.6 PAHs and TPH

PAHs are present at the site as a result of the presence of various petroleum products and waste oils, and as a result of uncontrolled burning of these petroleum products. It has been recognized that if PAHs are a constituent of petroleum identified as total petroleum hydrocarbons (TPH), those PAHs would not be considered or dealt with as CERCLA contaminants. However, since petroleum products were routinely burned as part of the operations of OFFTA, PAHs detected at the site are likely a combination of burned and unburned petroleum products. PAHs produced by alteration of petroleum through burning or mixing with CERCLA contaminants fall under CERCLA jurisdiction and are therefore addressed in the FS.

EXECUTIVE SUMMARY

This Revised Feasibility Study (FS) report has been prepared for the Old Fire Fighting Training Area (OFFTA) Site - Site 09 (the site), located at Naval Station Newport (NAVSTA) in Newport, Rhode Island (formerly the Naval Education and Training Center [NETC]). OFFTA is Operable Unit 3 of the Naval Education Training Center Superfund Site. The Remedial Investigation (RI)/FS was initiated by TRC Environmental Corporation (TRC) and the Final RI/FS was completed in 2002 by Tetra Tech NUS, Inc. (TtNUS). Following publication of the Final RI/FS in 2002, a series of predesign steps was conducted to support a draft proposed plan for remedial action at the site. Additional site data developed during the predesign steps indicated that revision of the Final FS was necessary. The required changes have been incorporated in this Revised FS report.

In addition, the future use of the site that had been anticipated during preparation of the 2002 Final RI/FS (unrestricted, available for residential use) has changed. As of 2005, the Navy's planned future use of the site is for parking, roadways, and open space for recreational use by Navy personnel (Dorocz, August 2005). This change in the anticipated future use of the site is significant with respect to the planning of remedial actions.

The remedial action will also incorporate two CERCLA removal actions conducted by the Navy at the Site. During the first removal action, which was completed in March 2005, earthen mounds on the Site were removed totaling 11,100 cubic yards of soil and debris. Approximately 2,500 tons of soil and debris was removed during the second removal action in 2008. Activities completed under the second removal action included: removal of petroleum-contaminated soil; removal of an oil-water separator; and removal of two 8-inch cast iron drainage pipes presumed to have discharged contaminated water and waste from the Site. In addition, the second removal action includes replacement of the shoreline protection system to prevent erosion of contaminated soil to the sediments of Coaster's Harbor. Design of the engineered stone revetment was completed in 2009, and its construction will be completed in 2010. Soil and debris will also be removed from the shoreline as part of the revetment project.

The OFFTA site is located at the northern end of Coasters Harbor Island, on property held by NAVSTA. The former fire fighting training area occupies approximately 5.5 acres and is bordered by Taylor Drive to the south and by Coasters Harbor (part of Narragansett Bay) to the east, north and west. During investigations conducted in 2004, it was determined that contaminants present at the site are contiguous with, and similar to those found at the newly constructed parking area at the Surface Warfare Officers School (SWOS), located south of the site and Taylor Drive. Therefore, contaminants present at these two properties and in the area of Taylor Drive which separates the two properties, are addressed together in this Revised FS. All together, these areas encompass approximately 8.2 acres.

From World War II until 1972, the OFFTA site had been used as a Navy fire fighting training facility. As part of the training operations, fuel oils were ignited in various structures at the site and were then extinguished by trainees. Underground piping reportedly carried oil/water mixtures from underground tanks at the site to the buildings used for fire ignition and extinguishing purposes. Drainage pipes collected the residual oil/water from these buildings and routed it to an oil-water separator, and then to Coasters Harbor where it was discharged.

The fire fighting training facility was closed in 1972. Upon closure, the training structures were demolished and covered with soil, appearing as mounds within the site, and the entire area was covered with topsoil. The site was then converted to a recreational area with a playground, a baseball field, and a picnic area, including an open pavilion and barbecue grills. The recreational area was in use until October 1998 when it was closed because of potential environmental and human health concerns related to the presence of residual contaminants in soil.

Analytical results of samples from various investigations at the site have reported petroleum, petroleum-related chemicals (polynuclear aromatic hydrocarbons [PAHs]), and metals in soil, groundwater and sediment at concentrations that exceed federal and State regulatory criteria, and risk based benchmarks. The concentrations of metals and PAHs have been found to pose cancer- and non-cancer-risks to potential human receptors at the site, including residential, recreational, and industrial/commercial users of the site. As part of site investigations conducted in 1998, risks to ecological receptors were also calculated for marine sediments adjacent to the site.

Preliminary remediation goals (PRGs) were developed using risks calculated for human and environmental receptors. Analytical results from current soil, groundwater, sediment, and shellfish tissue samples were compared with these remediation goals. The following observations are based on these comparisons:

- Soil present at depths above the water table exceeds PRGs that were calculated for industrial/commercial land use, across almost the entire study area. The resulting quantity of vadose zone soil that would be addressed in a remedial action is estimated at 62,000 cubic yards, and remedial actions would affect more than 8 acres of property, from the SWOS building to the south, to Coasters Harbor to the north.

- Groundwater PRGs are exceeded in samples from most wells that were tested, though these PRGs were calculated assuming groundwater is used as a potable water supply. It is recognized that groundwater at the site is not currently used for such purposes, and this use is not

anticipated in the future due to 1) proximity and hydraulic connection to the ocean and salinity in parts of the area, 2) availability of public water supply to the area, and 3) yield capacity limitations of the aquifer.

- Sediment PRGs are exceeded for unrestricted recreational use of the intertidal area along the entire shoreline of the site. However, a new stone revetment to be protective of the shoreline is currently in construction. .

- Sediment PRGs calculated for ecological receptors and those calculated for persons ingesting shellfish from the site were not exceeded in sediment samples collected during the most recent sampling event, and are therefore not considered “actionable”.

After discussions with USEPA and RIDEM in 2009 and 2010, it was determined that if contaminants in soil were left in place, a waste management unit would be needed under CERCLA where those CERCLA contaminants were present above PRGs. It was also determined that groundwater within a waste management area or in an area which is saline does not require remediation under CERCLA. Monitoring of groundwater would be necessary under groundwater and soil alternatives.

Due to the low risk measured and the high uncertainty of a completed exposure pathway for receptors from contaminants in sediment, It was determined that RAOs and remedial alternatives were not needed for sediments. Neither a CERCLA-based human health risk nor ecological risk level was measured in the RI that warrants a CERCLA action. Much of the contamination in the shoreline area will be mitigated by incidental removal of contaminated soil and sediment during the installation of the revetment wall. Sediment monitoring is included as an element of the soil and groundwater alternatives.

Remedial alternatives were developed from applicable technologies to address contaminants exceeding PRGs in soil, and groundwater.

Remedial alternatives evaluated for soil are:

1. No action
2. Excavation, treatment, backfill with treated soil, maintain revetment along the shoreline to prevent erosion of contaminated soil to sediments, and land use controls
3. Excavation, off-site disposal, backfill with clean fill, maintain revetment along the shoreline to prevent erosion of contaminated soil to sediments, and land use controls
4. Soil cover, maintain revetment along the shoreline to prevent erosion of contaminated soil to sediments, and land use controls to reduce exposure to contaminants in soil

Remedial alternatives evaluated for groundwater are:

1. No action
2. Land use controls to prevent use of groundwater for potable water, and monitoring

Note that maintenance of the revetment is included in the soil alternatives.

Evaluations done for each remedial alternative are summarized in Tables ES-1 for soil, and ES 2 for groundwater remediation, respectively.

In accordance with CERCLA, the FS provides an evaluation of viable remedial alternatives, but does not recommend or select a preferred alternative. State and EPA input on the evaluated alternatives is gathered through the review process for this document. Following the finalization of this Revised FS report, a proposed plan will be drafted to present the Navy's preferred alternative. A public meeting, public hearing, and public comment period will be held to solicit comments from the public. Once input from the State and the public is gathered, the Navy will submit a draft Record of Decision (ROD) and Responsiveness summary to EPA and the State. EPA or the State may either concur with the draft document or submit written comments. If comments are submitted, the Navy shall then respond to the comments and issued a revised draft ROD. If the Parties are unable to reach agreement on the draft ROD, selection of the remedy shall be by EPA and EPA will prepare and issue the final ROD.

TABLE ES-1

REMEDIAL ALTERNATIVES FOR SOIL – EVALUATION SUMMARY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Criteria	Alternative 1 No Action	Alternative 2 Excavation, Treatment, Backfill, LUCs[1]	Alternative 3 Excavation, Disposal, Backfill, LUCs[1]	Alternative 4 Soil Cover, LUCs[1]
THRESHOLD CRITERIA				
Overall Protection of Human Health and the Environment	No	Yes	Yes	Yes
Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)	No	Yes	Yes	Yes
BALANCING CRITERIA				
Does Alternative Reduce Residual Risk?	No	Yes	Yes	Yes
Does Alternative Reduce Toxicity, Mobility, or Volume Through Treatment?	No	Yes	No	No
Short-Term Effectiveness: Time Until Remedial Action Objectives Achieved	No remedial action; time >30 years.	Estimated 9-11 months	Estimated 6-8 months	Estimated 3-4 months
Implementability: Constructable?	No construction activities	Yes	Yes	Yes
Cost - Total Present Worth [2]	$0	$18,621,000	$14,966,000	$1,783,000

[1] – LUCs - Land Use Controls
[2] – 5-year review costs are included with the groundwater

TABLE ES-2

REMEDIAL ALTERNATIVES FOR GROUNDWATER – EVALUATION SUMMARY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Criteria	Alternative 1 No Action	Alternative 2 LUCs[1], Monitoring
THRESHOLD CRITERIA		
Overall Protection of Human Health and the Environment	No	Yes
Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)	No	Yes
BALANCING CRITERIA		
Does Alternative Reduce Residual Risk?	No	YES
Does Alternative Reduce Toxicity, Mobility, or Volume Through Treatment?	No	No
Short-Term Effectiveness: Time Until Remedial Action Objectives Achieved	No remedial action; time >30 years.	1 Year
Implementability: Constructable?	No construction activities	Yes
Cost – Total Present Worth	$120,000	$807,000

[1] – LUCs - Land Use Controls

Background Subsurface Soil Results (TtNUS, 2000)

Metal COCs	Arithmetic Mean	Maximum Detected	95% UTL
Antimony	0.168 mg/kg	0.42 mg/kg	0.42
Arsenic	9.65 mg/kg	84.9 mg/kg	6.2[1]
Beryllium	0.307 mg/kg	1.1 mg/kg	1.1
Lead	11.0 mg/kg	16.1 mg/kg	15.4
Manganese	405 mg/kg	992 mg/kg	372

[1] The arsenic background value is a negotiated value proposed by RIDEM for surface and subsurface soils combined.

Concentrations of these metals in the background subsurface soil samples are quite similar to those detected in the natural soil unit at the site, with the exception of antimony and lead. Antimony occurs at the site at concentrations above background; however, it is present at comparable concentrations in all soil units at the site, including surface fill, natural soil, and till. Therefore, of those metals previously identified as COCs, only lead should be considered a site-specific contaminant.

Details on the background soil investigation, including concentrations of metals detected in background surface soil and subsurface soil, are provided in the Background Soil Investigation for the Old Fire Fighting Training Area, Tetra Tech NUS, Inc., August 2000. The EPA accepted the Background Soil Investigation report, however, some details regarding the implementation of the Background Soil Investigation were not agreed to by RIDEM, including the use of some of the data points they believed were outliers. The 95 percent UTL value shown for arsenic in background soil was not an actual calculated value, but instead a value negotiated to be acceptable for use at the OFFTA Site. The arsenic background concentrations to be used for site soil comparisons remain an issue of discussion between the Navy and RIDEM.

1.8.2 Groundwater

Thirteen groundwater monitoring wells were installed onsite during three investigations in 1990, 1994, and 1997. Eleven of these wells were screened across the water table – eight in the overburden and three in shallow bedrock. Five additional wells were installed on the property to the south, known as the SWOS property, because petroleum was found in soil at that property in 2004. These five wells were screened in the overburden in order to intersect the water table.

Petroleum

Monitoring wells were constructed in a manner to allow entry of potential mobile light non-aqueous phase liquid (LNAPL) that may be present at the water table. Seven of the water table wells were located within the area where TPH concentrations detected in soil samples exceeded 500 mg/kg. One monitoring well (MW-102) was installed in a soil boring where TPH was detected at 8,200 mg/kg in a soil sample

collected at the water table. Well MW-101 was installed immediately downgradient of test pit TP-17, where free product was observed in 1997. On five separate occasions, from 1990 through 2004, monitoring wells were screened for the presence of NAPL using an oil/water interface probe. No measurable LNAPL was detected in any of the site monitoring wells, however, sheens have been noted in groundwater purged from wells during well development activities (vigorous surging and pumping).

Groundwater was analyzed for TPH during the 1997 and 2004 sampling events. TPH was not detected in groundwater from any of the 15 wells sampled in 1997, when EPA analytical method 418.1 was used (an infrared spectrophotometric method for total recoverable hydrocarbons). Dissolved TPH was detected in groundwater from 10 wells sampled in 2004, when EPA analytical method 8015 was used (a gas chromatography method modified for extractable hydrocarbons in the C5 to C36 range). In 2004, detected concentrations of TPH (reported separately as DRO and GRO) in groundwater samples ranged from 250 to 1,381 µg/L (this maximum was detected in MW-101). This indicates that a slight dissolution of petroleum from soil to groundwater is occurring in this area, but under steady-state groundwater conditions, this petroleum appears to be remaining in the dissolved phase, and not occurring as a free phase LNAPL or as a sheen. There are no state or federal groundwater numerical standards for petroleum or TPH. Petroleum and TPH are not regulated under CERCLA.

<u>VOCs and PAHs</u>

Groundwater analytical results from 1994 through 2004 showed the presence of low concentrations of a few VOCs and a few SVOCs, primarily PAHs (TtNUS, 2002 and 2005). Concentrations of two SVOCs (2-methylnaphthalene and naphthalene) and one VOC (benzene) exceeded MCLs (and the RIDEM GA [drinking water] standards) in two wells (MW-101 and MW-102) during the 1997 sampling event. However, no VOCs or SVOCs were detected at concentrations exceeding MCLs (or GA standards) during any of the other sampling events (1994, 2002, or 2004).

<u>Metals</u>

Manganese was detected in site groundwater samples at concentrations exceeding EPA manganese health advisory standards and RIDEM Direct Exposure Criteria. The elevated concentrations were not co-located with elevated levels of other groundwater contaminants. Rather, the highest concentrations of manganese in groundwater were detected in samples from the periphery of the site, in wells that are tidally influenced. Manganese is naturally present in the till and in other soils at the site. Reducing conditions, believed to exist in the interior of the site, would facilitate dissolution of manganese from soils, increasing its concentration in groundwater. Groundwater flow would then transport Manganese to the

shoreline, where concentrations could increase over time through alternative redox cycling of oxic/anoxic conditions.

1.8.3 Sediment

At the OFFTA Site, all areas seaward of the mean high water line (high tide) are considered to be marine sediments. These sediments are comprised of a mix of sand, gravel, silt, stone, and fill. A large volume of man-made of debris (concrete, stone blocks, brick, and asphalt) has been loosely placed along the shoreline in an effort to slow erosion of the sediment. Subtidal sediment is substrate below the mean low tide and intertidal sediment is substrate between mean low tide and mean high tide. The mean low and mean high tides were researched for the revetment design (Tetra Tech 2009) and based on a NOAA tidal station on the south end of Coasters Island. The site mean low tide has thus been determined to be 0.76 feet elevation, and the mean high tide is estimated at approximately 4.22 feet elevation, Navy MLW datum.

PAH contamination features heavily in all investigations of site sediments. The highest PAH concentrations in sediments have historically been detected near the two storm drain outfalls that discharge at the shoreline of the site. Samples collected in 1998 showed the highest PAH concentrations in sediments from the sample station closest to storm drain outfall number 075 (OFF-5). Sediment samples collected in November 2001 showed the highest PAH concentrations were present at outfall number 093 (SD-410). This station was re-sampled in July 2002, and the PAHs were found at much lower concentrations. It was speculated that these two storm drain outfalls likely transported sediments with elevated PAHs from properties located to the south of the site where areas of pavement were present prior to their demolition in 2002.

Sediment samples were again collected in 2005 to determine if contaminant concentrations had changed following the removal of the soil mounds at OFFTA. The resulting analytical data provided in the sediment and groundwater monitoring report (TtNUS, 2006a), indicated that lower PAH concentrations were present in the shoreline sediments at the site. It was speculated that the decreases in PAH concentrations could be the result of changes in former anthropogenic sources, including the previous completion of construction activities and demolition of asphalt in areas to the south, as well as the installation of a new storm drain system which included a sediment capture system.

Forensic studies were conducted in 2002 and 2005 to determine the source of PAHs detected in sediments, and to determine if petroleum releases at the site were contributing to PAH levels in sediments. These studies included the collection of: (1) soil and groundwater samples from the site; (2) sediment samples from the storm drains, on site and upgradient of the site; (3) sediment samples at the

storm drain outfalls; (4) sediment samples from the shoreline of the site; (5) sediment samples from other reference areas within Narragansett Bay. Analyses performed on these samples included high resolution hydrocarbon fingerprints and petroleum analysis, PAH analysis, saturated hydrocarbon fingerprint, and titerpane fingerprint (biomarker) analysis. The 2002 study concluded that the PAH signatures in the sediments samples from the shoreline of the site were similar to the PAH signatures in sediments collected from storm drain locations upgradient of the site. The PAHs and hydrocarbon signatures from soil and groundwater samples from test pits indicated presence of severely degraded diesel and were not similar to those present in samples of marine sediments ("light to moderately degraded diesel") collected adjacent to the site (Mattingly, 2002).

A follow-up study was conducted in 2005 that included repeat sediment sampling at most stations, asphalt debris sampling, additional onsite soil sampling, as well as the collection of additional reference samples. This study confirmed the findings of the 2002 study that the PAHs detected in Coasters Harbor sediments originated from non-OFFTA sources. The likely source of the dominant hydrocarbons present in the local and regional sediments is a mixture of asphalt and tar paving materials from regional roadways. In addition, the study found that overall, PAH concentrations detected in sediments near outfall number 093 had significantly declined since 2002 (Mattingly, 2005). A likely contributing factor to the observed decrease in PAHs in 2005 is an upgrade made to the storm water discharge system, as discussed below.

In 2004, as part of the NAVSTA storm water discharge control program, the storm drain that discharges at outfall number 093 (Figure 1-4) was fitted with a vortex interceptor, which is designed to capture oils and sediments prior to the discharge of storm water at the outfall structure. Upgrades such as this are completed with NAVSTA building construction projects, and the (SWOS) construction in 2003 and 2004 allowed an opportunity for this upgrade. It is likely that this capture system greatly reduces PAH contaminants in storm water discharge and ultimately a reduction in contaminant load in sediments at outfall number 093.

1.8.4 Shellfish

Shellfish were collected from sixteen locations in Coasters Harbor, and were analyzed for potential chemical contamination. The types of shellfish collected included blue mussels (7 stations), hard shell clams (16 stations), and lobster (11 stations). The resulting analytical data was used in an evaluation of risk to human health (by ingestion of shellfish from this area) and in an ecological risk assessment.

Concentrations of lead, arsenic, and PAHs detected in shellfish from the site were also compared with available reference data for blue mussels from other parts of Narragansett Bay (NOAA Mussel Watch

Program). This comparison showed similar concentrations of these contaminants in mussels collected from the site, and in the reference area. Local reference data for lobsters and clams were not available to allow a similar assessment for those shellfish types.

1.8.5 Surface Water

Oil sheens or oil seepages have not been observed in surface waters along the shoreline adjacent to the site during any of the documented site investigations, and surface water samples have not been collected at the OFFTA Site. However, the potential for groundwater discharge of contaminants, and related impacts to the surface waters of Coasters Harbor, were evaluated as a part of the CSM. The CSM determined that the relatively low concentrations of contaminants in site groundwater, the estimated groundwater discharge rate, and the large degree of dilution and mixing that would occur after discharge to Coasters Harbor, all indicate that the surface water quality would not be adversely impacted by discharge of contaminants in site groundwater.

1.8.6 Summary of Site-Related Contaminants

The investigation of this Site is being conducted under CERCLA and as such TPH is not regulated under CERCLA, however, the constituents of TPH will be accounted for in this process by evaluating the risks associated with the component chemicals in TPH, such as PAHs. TPH is therefore not listed as a separate site related contaminant. While many chemicals were detected in samples collected during several investigations of OFFTA Site, those that appear to be site-related contaminants include the following, summarized by media:

Soil:

- PAHs, present in excess of RIDEM Direct Exposure Criteria for Residential Soil, including benzo(a)pyrene at concentrations up to 10,000 µg/kg; benzo(a)anthracene at 14,000 µg/kg; and benzo(b)fluoranthene at 14,000 µg/kg.

- Lead, present at concentrations up to 8,250 mg/kg in fill. The average concentration, 81.1 mg/kg in surface soil, was calculated based on samples collected prior to removal of the soil mounds, which has altered surface soil across more than 50 percent of the site.

Groundwater:

- Lead, detected at an elevated concentration of 38.6 µg/L, exceeds the MCL (and the RIDEM GA objective, but well within the RIDEM GB criteria) that is applicable to the site.

- Manganese, detected at concentrations exceeding the EPA manganese health advisory (and the GA objective). There is no GB criterion for manganese.

Sediment:

- PAHs, present at concentrations up to 24.4 mg/kg. PAHs in sediment are similar to those detected in sediments from storm drains that collect runoff from areas upgradient of the site, and to those detected in urban runoff from other areas of the Narragansett Bay. They are dissimilar to the PAHs detected in soils at the site.

- Lead, present in one "hot spot" at 734 mg/kg, and associated with fill. Resampling conducted at a later date indicated lead present at (only) 39 mg/kg.

Shellfish

- None. Concentrations of lead, arsenic, and PAHs in mussels collected from Coasters Harbor, near the site, are comparable to those detected in other areas of Narragansett Bay (areas unrelated to the site).

  Other chemicals detected in shellfish are also not site related: phthalates, trace concentrations of miscellaneous VOCs, and other metals have been addressed in the remedial investigation and in the soil pre-design investigation. These chemicals are not contaminants associated with releases that occurred from Navy activities at the OFFTA Site.

1.8.7 Summary of TPH Related Contamination

The following section discusses TPH contaminants that are regulated under state regulation but are not regulated under CERCLA. As discussed in the previous section, the constituents of TPH will be accounted for in this process by evaluating the risks associated with the component chemicals in TPH. TPH will be remediated as necessary based on the CERCLA contaminants which comprise TPH. TPH, however, will not be used in the analysis of CERCLA alternatives under the NCP criteria. TPH itself will not be used in calculating CERCLA risk at the OFFTA.

Soil:

- TPH, present at concentrations up to 40,000 mg/kg (removed during the 2007-2008 removal action).
- Residual petroleum bound within the soil matrix in subsurface soil at the water table creates a sheen on groundwater only when the soil matrix is disturbed.

Groundwater:

- TPH, dissolved in groundwater at a maximum concentration of 1.4 mg/L.

1.8.8 Summary of Other Contaminants

A few VOCs were detected in samples of site surface soil, subsurface soil, and in shoreline sediment at concentrations below RIDEM residential soil criteria. VOCs were also detected in groundwater at concentrations below RIDEM criteria, although benzene was detected exceeding its Maximum Contaminant Level (MCL, promulgated under the Safe Drinking Water Act) in two wells, during one round of groundwater sampling conducted in 1997. Detected VOCs are limited to fuel-related compounds, which are likely present as a result of the fuels burned and released at the site. Since fuels that have been released to the ground surface degrade over time, the VOCs that are initially present in fuels may not be readily detected in soil and groundwater samples collected at a later time.

SVOCs other than PAHs were detected infrequently and in low concentrations in surface soil and subsurface soil; none of these exceeded RIDEM Residential Direct Exposure Criteria for soil. They were also detected in groundwater at concentrations below MCLs (and RIDEM criteria), however, detected concentrations of 2-methylnaphthalene, dibenzofuran, and naphthalene exceeded the EPA Region IX screening levels.

Pesticides were detected in surface soil and subsurface soil across the site, in storm water, in marine sediment, and in biota samples. Only one pesticide, endrin, was detected in groundwater. All pesticide concentrations were low and were detected infrequently; therefore no pesticides were selected as COPCs as discussed in Section 6.6.3.1 of the Remedial Investigation (Tetra Tech 2001). Among biota, the highest pesticide concentrations were detected in lobster. In marine sediment, the highest pesticide concentrations were detected offshore, east of the site.

PCBs were detected frequently in biota tissue samples. For clam tissue samples, the highest PCB concentrations were detected at offshore locations, near the central portion of the site. For blue mussel

tissue samples, the highest concentrations were detected at locations near the shore, also in the vicinity of the central portion of the site. For lobster tissue samples, the highest PCB concentrations were detected at an area distant to the site opposite the central portion of the site. For PCB fish tissue samples, the highest concentrations were detected at a nearshore area at the west end of the site. The fish tissues were found to contain higher concentrations of PCBs relative to the other biota (shellfish) tissues.

Polychlorinated biphenyls (PCBs) were detected infrequently in surface and subsurface soil, at concentrations below RIDEM Residential Direct Exposure Criteria for soil. All PCB concentrations measured in the soil at the site were below 1 mg/kg (the Toxic Substances Control Act risk-based level for unrestricted use), PCBs were only detected in five of the soil samples collected during the RI. Based on frequency and concentration, PCBs were not deemed to be a Site-related contaminant (Tetra Tech NUS 2001).

1.9 FATE AND TRANSPORT

Spills and leaks of petroleum-based fuels and deposition of fuel combustion byproducts have introduced a wide range of petroleum hydrocarbons to soils at the OFFTA Site.

As previously discussed, in 2002 a limited forensic investigation was conducted for PAHs and fuel components present in samples of shoreline sediment, soil, storm water sediment, and in samples of groundwater from the site. A follow-up forensic study with additional sample collection was conducted in 2005.

The 2002 investigation determined that the PAHs detected in marine sediments were similar to those detected in storm drain sediment samples collected upgradient of the site, and different from those detected in the onsite soil and groundwater samples. The 2005 forensic study determined that the PAHs in shoreline sediments and those in reference area sediments were similar to each other and to PAHs in samples of paving materials collected from the shoreline of the site. It was also determined that contaminated soil collected from onsite test pit TP-11 in 2002 contained severely degraded diesel, whereas only slightly degraded diesel was found in the sediments on the shoreline of the site, indicating different contaminant sources for these two areas. The severely degraded diesel signatures found in the test pit soil were observed in one sediment sample collected from a single storm drain in 2005; however this contaminated storm drain sediment did not appear to be transported to the shoreline sediments.

Petroleum hydrocarbons detected in site soil samples collected in 2005 were also severely degraded, indicating that biodegradation is occurring.

The storm drain system was modified in 2004, re-routing a large portion of the storm drainage water from the upgradient area through a vortex interceptor, which is designed to provide a centrifugal filtration of the discharging water. The water from vortex interceptor discharges at outfall #093, where PAH concentrations have dropped dramatically since 2002. The effectiveness of the new system is described in Section 2 of the CSM (see Appendix A1). As a result of the reconfiguration and the development of the SWOS building and parking areas less water is now carried to outfall #075, and more is carried to outfall #093. The layout of the current storm water drainage system is presented in the draft Final Focused Site Investigation Report for SWOS (TtNUS, 2005).

PAHs are present at the site and are related to the historical use of fuel oil at OFFTA. PAHs are persistent in soil due to their low solubility and low volatility. They tend to sorb onto soil particles, and remain with those soil particles if they are mobilized by wind or water flow. Although elevated concentrations of PAHs are present in soils, they are generally not detected in groundwater, due to their low solubilities. If these soils have sorbed PAHs, these contaminants may then be detected in the more turbid groundwater samples, while they are not present in their dissolved phase in the groundwater under steady state conditions. Since PAHs have a propensity to remain sorbed onto soil particles, they will not dissolve and migrate to the shoreline with site groundwater flow. Similarly, PAHs in the marine sediments will remain sorbed, and will be transported with these sediments as a result of normal marine sediment transport processes such as wave wash (TtNUS, 2001). Groundwater sampling activities themselves may increase the turbidity of water in the wells, beyond the normal turbidity of the groundwater present under steady-state conditions. The increase in turbidity is typically caused by soils that become entrained in the sample, sometimes a result of improper sampling techniques, such as bailing, or due to improperly-sized well screens.

The PAHs sorbed to site soils could potentially erode from the site and be deposited onto the shoreline or into the sediments of Coasters Harbor. In order to eliminate this pathway, the Action Memorandum (January 15, 2007) for the 2007 removal action indicated that a stone revetment should be installed at the site.

Lead concentrations in onsite soil samples were often much higher than those in background samples, indicating that lead is likely a site-related contaminant. The lead appears to be immobile in soils due to mineral solubility constraints, and adsorption to organic matter, clay minerals, and metal oxyhydroxides in soil. The lead in the marine sediment could have originated from both on-site and off-site sources.

The mobility of lead is limited in most soil and groundwater systems because it has a strong affinity to bind with clay particles, and it is relatively insoluble in its prevalent +2 valence state. The mobility of lead is greater in low pH environments because the lead minerals are more soluble in acidic conditions.

Relatively high concentrations of lead were detected in subsurface soil at the site, particularly in the area of MW-2S/2B and SB-404. In 1994 and 1997, elevated levels of lead were also detected in unfiltered groundwater samples that were collected using bailers, however, much lower lead concentrations were detected in the corresponding filtered samples. In 2004, lead concentrations were also noticeably lower in samples collected using low-flow sampling techniques, which does not disturb the soil formation. This indicates that elevated concentrations of lead in unfiltered groundwater samples were associated with colloidal particles artificially entrained in the samples during sampling. The use of low flow procedures to collect groundwater samples minimizes the entrainment of colloids in the samples; analytical results of groundwater samples collected using low-flow sampling procedures show lower concentrations of lead. Therefore, it is concluded that lead in the subsurface soil is not mobile under steady-state conditions at the site.

Lead concentrations in the shoreline sediments are much lower than those in site soils, indicating the likelihood that lead in onsite soils is not mobile, and is not migrating in groundwater or being deposited in the marine sediments (TtNUS, 2001). One “hot spot” with elevated lead concentrations was noted in the sediment samples collected in 2001 at station SD-432 (lead was repeated at 644 mg/kg at 0 to 6 inches, and 734 mg/kg at 18 to 24 inches). This sediment station was re-sampled in 2005, and the lead result was low within (39 mg/kg) the expected range of 10-100 mg/kg. The shoreline in this area comprised of large pieces of debris, including concrete, asphalt, brick, and stone, placed periodically in the past, to slow bank erosion. The source of the isolated high lead detections in the 2001 sediment sample may have been the artificial fill materials that are present along the nearby shoreline. This lead concentration was likely an isolated occurrence.

Shoreline sediments at the OFFTA Site are subject to transport resulting from wave wash, daily tides, and wind-driven currents. In 1996, the University of Rhode Island (URI) conducted Doppler current-profiling in Coasters Harbor and found that wind is the predominant force acting on shaping currents in this area (Kincaid, 1996). Tidal fluctuation at the site is approximately 3.6 feet, and wave heights at the site have been observed to be over three feet, at times. The western portion of the shoreline is more exposed to prevailing winds and erosional forces open area of Narragansett Bay, whereas the eastern portion of the shoreline toward the harbor, is more protected. Erosion of the shoreline results in the removal and re-distribution of terrestrial soil and fill from the shoreline to the subtidal areas, in a down-current direction.

1.10 HUMAN HEALTH RISK ASSESSMENT

This section summarizes conclusions of the human health risk assessments (HHRA) that have been conducted for the site. These include: the Baseline Human Health Risk Assessment prepared in 2001 in support of the RI (and using an “unlimited” land use scenario); a Groundwater Risk Evaluation prepared

in response to a request to consider groundwater use as drinking water, and published with the FS in 2002; and a Supplemental risk Evaluation prepared in 2007 to evaluate industrial and commercial land use scenarios, not accounted for in previous risk assessments.

1.10.1 Baseline Human Health Risk Assessment (2001)

The Baseline Human Health Risk Assessment (HHRA) included in the RI Report (TtNUS, 2001) evaluated exposure to surface soil, subsurface soil, shoreline sediment, and shellfish (lobsters, clams, and mussels). Although finfish samples were also collected at the site, they are not considered an edible species; also, it is believed that ingestion of shellfish would pose a more site-specific risk than other fish.

Using CERCLA guidance, this risk assessment considered the following exposure scenarios: residential, recreational (considered a restricted recreational scenario under RIDEM's regulations), shoreline visitor, excavation worker, and shellfish ingestion (ingestion of shellfish taken recreationally and for subsistence). Summaries of the risks and hazards resulting from soil exposures and from sediment exposures and shellfish ingestion are presented in Tables 1-1 and 1-2, respectively. The EPA's target cancer risk range is 1×10^{-4} to 1×10^{-6}, and RIDEM's benchmark is 1×10^{-5}. For non-cancer hazards, a hazard index (HI) exceeding unity (1.0) for individual target organs indicates that there may be potential non-carcinogenic health risks.

For surface soil, the reasonable maximum exposure (RME) cancer risks under the lifetime recreational and lifetime resident scenarios are 5.4×10^{-6} and 2.5×10^{-5}, respectively. The estimated RME cancer risk for a lifetime resident exposed to surface soil is within EPA's target risk range of 1×10^{-4} to 1×10^{-6}, but slightly greater than the 1×10^{-5} benchmark used by RIDEM. Primary contributors to risk under lifetime exposure to surface soil in a residential scenario include: arsenic, dibenzofurans, benzo(a)pyrene, and dibenzo(a,h)anthracene. Non-cancer HIs for surface soil under all scenarios did not exceed 1.0 for any target organ group.

For subsurface soil, RME cancer risks under the residential and excavation worker scenarios are 4.0×10^{-5} and 1.4×10^{-6}, respectively. The estimated RME cancer risks for a lifetime resident exposed to subsurface soil are within EPA's target risk range of 1×10^{-4} to 1×10^{-6}, but slightly greater than the 1×10^{-5} benchmark used by RIDEM. Primary contributors to risk under lifetime exposure to subsurface soil in a residential scenario include: arsenic, benzo(a)pyrene benzo(a)anthracene, and benzo(b)fluoranthene. Recreational exposures were not calculated for subsurface soil. Non-cancer HIs for subsurface soil under all scenarios did not exceed 1.0 for any target organ group.

For residential children exposed to subsurface soil, the estimated percentage predicted to exhibit a blood lead level above 10 µg/dL is 18.6 percent. This exceeds EPA's protective level cutoff of 5 percent and indicates adverse effects to children living at the site from lead exposure.

EPA has reevaluated reference values for dioxin and related compounds, and this reassessment is in review. EPA has requested that in the meantime, site data be evaluated by comparing the dioxin toxicity equivalency factor (TEQ) for the site data to the published oral slope factor of 1.5×10^{-5} $(mg/kg/day)^{-1}$, and also to the proposed slope factor of 1.0×10^{-6} $(mg/kg/day)^{-1}$. Because this proposed value was not provided during the development of the RI for the OFFTA Site, the risk assessment was performed using the older, published value. However, in completion of the final FS, the dioxin data was reviewed in accordance with the EPA request. This review indicated that, while dibenzofurans were detected at very low concentrations in surface soil at the site, dioxin (2,3,7,8-TCDD) dioxin was not detected, resulting in a maximum TEQ value of 0.0164 µg/kg. With this low TEQ, dioxin and its related dibenzofuran compounds would not be selected as contaminants of potential concern (COPCs). Thus, if the risk assessment were revised to incorporate the EPA-requested evaluation, dioxin would not be included in the quantitative risk assessment, and would not contribute to risks from residential soil exposure.

For shoreline sediment (samples collected from the area between mean high water and mean low water), the cancer risks calculated for the residential exposure and recreational (shoreline visitor, youth, age 1-12) exposure scenarios are 2.2×10^{-5} (future lifetime resident) and 1.1×10^{-6}, respectively. The lifetime resident value is within EPA's target risk range of 1×10^{-4} to 1×10^{-6}, but is slightly greater than the 1×10^{-5} benchmark used by RIDEM. Primary contributors to risk under the lifetime residential scenario are arsenic, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene. Non-cancer risks for shoreline sediment did not exceed 1.0 for any target organ group.

Direct contact exposure scenarios were not evaluated for subtidal sediments.

For shellfish ingestion, the cancer risks exceed the risk range of 1×10^{-4} to 1×10^{-6} under the subsistence fishing scenario for lobster, clams, and mussels, and exceed the lifetime recreational scenario for lobster and clams. The primary contributor to these risks is arsenic, with other contributors that include PCBs, dieldrin, and PAHs. Non-cancer risk exceeds 1.0 under the subsistence fishing scenario for lobster, clams, and mussels. The target organs and the principal COPCs contributing to the non-cancer risk are skin (arsenic and PCBs), central nervous system (CNS) (mercury), kidney (cadmium and chromium), and eye (PCBs). Although the total non-cancer risk exceeds 1.0 under the child and adult recreational scenarios for lobster, clams, and mussels, the risks do not exceed an HI of 1.0 for any target organ group for any of these scenarios, with the exception of children eating clams. For that scenario, one target organ, skin, has an HI greater than 1.0, for which the principal COPCs contributing to the non-cancer risk

are arsenic and PCBs. It is anticipated that PCBs in shellfish tissue are not Site-related, since PCBs were only detected in five of the soil samples collected for the Remedial Investigation at the site, and because detected PCB concentrations were all below 1 mg/kg (Tetra Tech NUS, 2001).

The subsistence fishing scenario, with all associated assumptions, is currently not expected to exist, and is also unlikely to occur in the future: for this scenario, the risk assessment assumes that all of the fisherman's catch would continually be obtained only from waters that are adjacent to the OFFTA Site. This type of fishing is highly unlikely; also, there are no local cultures (such as Native Americans) involved in subsistence fishing in this limited area. Subsistence fishing is typically evaluated as a matter of course in the HHRA process. Despite the uncertainties associated with this scenario, it is described in the risk assessment. Further mitigating factors associated with this risk scenario are summarized below:

- The study area lies within a large area that is closed to shell fishing (bivalves only are restricted).

- Edible crabs and lobsters are mobile animals and may migrate out of the area seasonally, or due to local habitat/population dynamics.

- Concentrations of PAHs and metals measured in mussels from reference areas are similar to those measured in mussels from the site.

- The risk assessment notes that arsenic dominates as the primary risk-driver under the shellfish ingestion scenarios. However, in seafood, arsenic actually exists in an organic state known as arsenobetaine. Approximately 80 to 90 percent of the arsenic in seafood is not toxic (FDA, 1993). Arsenic measurements in the shellfish samples represent total arsenic concentrations. The risk calculations were performed based on the presumption that this arsenic was present entirely in its inorganic form. Therefore, the risk values for seafood ingestion from the site are biased high, and could be overestimated by as much as a factor of ten.

These factors cause further uncertainty to the calculated risks from shellfish ingestion. These uncertainties require consideration in the design of cleanup alternatives for sediment.

In a human health risk assessment, shellfish are an indirect medium of concern in that they provide contaminant exposure to humans by their tissue accumulating chemicals from contaminated sediments that they contact and then that contaminated tissue is ingested by human receptors. Therefore, the risks to persons ingesting shellfish will be mitigated by addressing sediment contamination.

1.10.2 Groundwater Risk Evaluation, 2002

As part of the Final FS, a Groundwater Risk Evaluation (Appendix B) was performed to estimate the potential risks to human health resulting from the presence of contamination in groundwater at the site, and to provide a basis for determining appropriate remedial measures for groundwater, if required. The resulting estimated RME incremental cancer risk for a lifetime resident exposed to groundwater is 1.2 x 10^{-3}, which exceeds EPA's target risk range of 1 x 10^{-4} to 1 x 10^{-6} and RIDEM's benchmark of 1 x 10^{-5}. Non-carcinogenic risks for the residential child and residential adult both exceed an HI of 1.0, indicating the need to segregate groundwater risks according to target organ. For the residential child receptor, the target organs exceeding and HI of 1.0 are listed below, with the principal COPCs contributing to non-cancer risk (individual hazard quotients greater than 1.0): CNS (HI of 43 - manganese), skin and vascular system (HI of 12.4 - arsenic), kidney (HI of 2.7 - chromium), weight loss (HI of 2.3 - 2-methylnaphthalene, and blood (HI of 1.3 - benzene). A summary of the risks and hazards resulting from groundwater exposures are presented in Table 1-3. It is noted that the risk evaluation is based on exposure scenario of unrestricted residential groundwater use as the primary drinking water source for future on-site residents, although groundwater at the site is not currently used for drinking or bathing. This scenario is unlikely to occur for the following reasons: the site's proximity to the ocean and the groundwater salinity measured at the site; and the availability of nearby alternative potable water supplies (in addition, RIDEM has classified groundwater underlying the site as a non drinking water source). This exposure scenario of unrestricted use of groundwater for drinking water is only used in this evaluation to provide a conservative estimate of risk.

1.10.3 Supplemental Risk Evaluation 2007

In April 2006, it was recognized that a more realistic future use of the site is for industrial purposes. The Navy has issued a statement to the public that future plans for the Site include parking areas, roadways, and recreational space for Navy personnel. Neither the previous risk assessment nor the groundwater risk evaluation had considered industrial/commercial exposures or construction worker exposure to groundwater. A Supplemental Risk Evaluation (Appendix C, TtNUS, 2007) was performed to estimate the potential risks to human health resulting from future industrial/commercial exposures to site media, as follows. For soil exposures, soil data from the post-mound removal sampling were used and included only soils collected from the vadose zone. Also considered were exposure to indoor air, and construction worker exposure to groundwater at the OFFTA Site. Summaries of the risks and hazards resulting from exposures to soil and groundwater, as estimated in the Supplemental Risk Evaluation, are included in Tables 1-1 and 1-3, respectively.

For future industrial/commercial worker exposures to soil, the estimated RME cancer risk is 2.3×10^{-5}. This risk falls within the EPA's target risk range of 1×10^{-4} to 1×10^{-6}, but exceeds RIDEM's benchmark of 1×10^{-5}. For soil, the major contributors to cancer risk are four PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene) and arsenic. Individual RME cancer risk estimates for each of these major contributors are greater than 1×10^{-6} under the industrial/commercial worker scenario. As demonstrated in Appendix C, Tables 9-1 and 9-2, the estimated RME cancer risk is 2.46×10^{-7} for construction worker exposure to groundwater. The total risk to the construction worker is calculated by adding the risk from groundwater and the risk from soil. This total risk is 2.34×10^{-5} for the RME cancer risk. Non-cancer hazard indices are less than unity for the industrial/commercial worker exposed to soil, and for the construction worker exposed to groundwater.

2.2.6 Proposed PRGs

Table 2-14 presents the proposed risk-based PRGs, ARAR-based PRGs, and background concentrations, as well as the selected PRGs and the basis for their selection, for all media of concern and the associated exposures routes. Note that separate PRGs are provided for a presumed future site use of unrestricted (residential), and for a presumed site use that is restricted (industrial/commercial). As defined in the Remedial Investigation (Tetra Tech 2001), the soil exposure risk for the recreational use scenario is lower than the soil exposure risk for industrial/commercial worker scenario. Therefore, a soil PRG was not developed for recreational use as the restricted (industrial/commercial) use PRG would also be protective of recreational use. The restricted site use (industrial/commercial) will require that land use restrictions be placed in NAVSTA Newport's Basewide instruction for land use in order to prevent future residential use of they property. The selected PRGs are the chemical concentrations that provide the highest level of protection of human health receptors, and are reasonably achievable by current remediation techniques, given the nature of the site and the availability of a regulatory standard. Information summarized in Table 2-14 indicates that RIDEM remediation standards are, in general, more conservative than the risk-based standards. Table 2-15 summarizes the selected PRGs for all media of concern and the associated exposures.

2.3 IDENTIFICATION OF COCs FOR CONSIDERATION FOR REMEDIAL ACTION

This section presents a comparison of available analytical results for chemicals detected onsite to the applicable PRGs calculated for soil, sediment and groundwater. Those chemicals that exceed PRGs are identified as COCs to be considered for remedial action. COCs serve to focus the RAOs to those contaminants that pose a potential threat to human health or the environment. Table 2-16 presents the selected PRGs, with comments applicable to their recommended use at the site (e.g. "actionable"). PRGs that are not considered "actionable" either do not have a complete exposure pathway or have a high level of uncertainty associated with them. This information is also described in the sections that follow, as applicable.

2.3.1 Soil

The concentrations of chemicals detected in vadose zone soil samples at the site (samples from less than 10 feet bgs) were compared with the PRGs calculated for soil. Those samples with one or more chemicals exceeding PRGs are summarized in Table 2-17 (concentrations exceeding a residential land use PRG are indicated with a black background, and those exceeding an industrial/commercial land use PRG are indicated with a red background).

C of this report) and construction workers (through direct contact during excavation work) do not exceed the target risk ranges, and therefore PRGs are not calculated for these receptors. However, risks to persons using the groundwater as a potable water source do exceed these target risk levels, and PRGs have been developed for these receptors, even though this is not a planned future use of the property.

Recent groundwater monitoring events suggest that contaminants in soil are, for the most part, not being mobilized with the groundwater, however, sheens of petroleum related contaminants have been observed in excavations immediately after the soil matrix was disturbed. Following pumping of water from the excavations the sheens did not return suggesting that the petroleum is confined to the soil matrix under a steady state condition. The exceptions are: lead detected in groundwater in one shoreline well, co-located with a high concentration of lead in soil; and a single detection of benzene in groundwater. The lead concentration in groundwater (38.6 µg/L) does not exceed the GB groundwater criterion for lead.

The groundwater RAO for protection of human health is:

- Prevent the ingestion of, and direct contact with groundwater with chemicals at concentrations that exceed PRGs for the site.

The groundwater RAO for the protection of the environment is:

- Ensure that the transfer of contaminants from site soil to sediment via groundwater transport is not occurring.

2.4.3 Remedial Action Objectives for Sediment

RAOs for site sediment were formulated based on the site-specific risk assessments (RI and supplemental risk assessments provided in Appendices B and C), the Baseline Ecological Risk Assessment (SAIC, 2000), follow-up investigations (TtNUS, 2006 and Newfields, 2005), COC identification, and PRG development presented in the preceding sections.

Future use of the site is considered in the formulation of RAOs. The Navy has indicated that the OFFTA site should be available for industrial or restricted recreational use after the remedial action has taken place. While PRGs were developed based on an unrestricted use of the property, such use is not a current or planned future use. However, as directed by CERCLA, the FS evaluates remedial action alternatives for protection of all possible receptors. Restricting land use is one possible remedial action that may be evaluated in the sections that follow. However, unless an environmental land use restriction

The volume estimate was performed for the current site conditions (post-mound-removal-soil remaining below grade). In the risk assessments, exposure to soil contaminants is calculated for the vadose zone soil, to a maximum depth of 10 feet bgs. For the purposes of soil volume estimates, the following assumptions were made:

- Because the water table at the site has been documented at a depth of approximately 4 to 8 feet below ground surface, the water table depth is considered to be the limiting factor in determining the depth of soil to be included in risk-based remediation.

- The water table has been measured at depths between 4 and 8 feet bgs. Across the entire site, the average depth to water as measured in monitoring wells and piezometers is approximately 5 feet bgs. Due to the widespread distribution of soil exceeding PRGs it was deemed acceptable for the purpose of this FS to estimate the volume of vadose zone soil at the site based on this depth of 5 feet, essentially resulting in the quantification of all areas of soil not underlying buildings.

- The horizontal extent of soils impacted by site contaminants is bounded to the north by the top of the slope to Coasters Harbor and Narragansett Bay. The extent to the east and west and, in part toward the south, coincides with the extent of the investigated area. However, soils sampled from two borings, SB-09 and SB-20, at the extreme southern end of the site, do not exceed PRGs, with the exception of arsenic (SB-09) and PAHs (likely associated with pavement, at SB-20). While it is recognized that this described horizontal extent is approximate, it is believed to be a good indicator of the actual limit of soils with site-related COCs exceeding calculated PRGs.

- Portions of Taylor Drive are included in the soil volume estimate.

- Soils under the site buildings and within 12 feet of the buildings are not included in volume estimates, to ensure that removal activities do not impact building foundations. This is based on an average excavation depth of 6 feet and a 2:1 excavation slope. The actual safe distance the excavation would be offset from they building would depend on the excavation technique and the actual building foundations. The soil within 12 feet of the building was included in the total volume of affected soil, however, it is not included in the total amount of soil that would be excavated (because it could not be removed without impacting the building foundation.

- The extent of soils with COCs that exceed residential PRGs, and soils that exceed industrial/commercial PRGs, is approximately the same.

The areas and volumes of soil to be considered for remedial actions in the FS are as follows:

The areal extent of affected soil is approximately 334,788 square feet (7.68 acres). Of this area, 79,900 square feet are covered by pavement, and 254,858 square feet are soils that are unpaved/exposed.

The volume of affected soil in the vadose zone is approximately 63,139 cubic yards although only 61,992 cubic yards could actually be excavated without impacting building foundations. Of this amount, 14,796 cubic yards are underneath pavement, and 47,196 cubic yards are unpaved/exposed.

2.5.2 Groundwater

Figure 2-3 presents the locations of groundwater monitoring wells where PRGs for potable water use were exceeded in the most recent monitoring round. Groundwater at this site is evaluated as a single unit, and any remedial action should consider the groundwater at the site as one contiguous aquifer. Groundwater quantities are not estimated.

2.5.3 Sediment

The sample stations where COCs exceeded sediment PRGs are located on Figures 2-4 and 2-5. Figure 2-4 shows locations with PRG exceedances for the unrestricted recreational exposure scenario (incidental ingestion and dermal contact). Figure 2-5 shows locations with PRG exceedances for ecological receptors, and locations with PRG exceedances for recreational shellfish ingestion. Area and volume estimates of intertidal sediments that may require remediation are presented below. Area and volume estimates for the subtidal sediments are not calculated because the subtidal sediments do not exceed PRGs.

The horizontal extent of sediments exceeding unrestricted recreational PRGs established for the intertidal area is bounded to the north by the approximate mean low water line of Coasters Harbor and Narragansett Bay (0 feet elevation as measured by LFA on January 2, 2004). The extent is bounded to the south by the top of slope shared with the onshore portion of the site. The extent is bounded to the east and west by the approximate boundaries of the investigation area. It is recognized that this estimated extent may not reflect the true limits of intertidal sediments exceeding PRGs, (particularly for benzo(a)pyrene). However, the origin(s) of the PAHs detected in the intertidal sediment area is questionable, and it is believed that intertidal sediments with COCs originating from releases at the site, if present at all, occur well within the estimated limits described above. The aerial extent of intertidal sediment exceeding PRGs is measured as 70,273 square feet, or 1.61 acres (Figure 2-4). The vertical extent is presumed to be less than two feet, for a total volume of 5,205 cubic yards.

This alternative would meet RAOs for protection of human health by preventing human exposure to the contaminated groundwater. The RAO for protection of the environment would be met over time as natural flushing of the groundwater takes place.

Compliance with ARARs

Tables 5-6, 5-7, and 5-8 summarize chemical-, location-, and action-specific ARARs and TBCs, respectively, for Alternative 2. This alternative meets chemical-specific ARARs because through use restrictions, it prevents exposure to groundwater exceeding PRGs that were derived from federal risk guidances and state remediation regulations . Several non-promulgated criteria (TBCs) were also used in assessing human health risks and developing groundwater PRGs.

Federal and state location-specific ARARs for this alternative include coastal resource management, endangered species, fish and wildlife protection, and historic preservation regulations. Any actions taken under this alternative (e.g., monitoring) that would affect the resources protected by these regulations would be conducted in accordance with the substantive requirements of the regulations.

Action-specific ARARs would be met through the monitoring program.

Long-Term Effectiveness and Permanence

This alternative would rely on use restrictions to limit access to the impacted groundwater and thereby reduce human risk associated with its use. Restrictions on groundwater use would require long-term enforcement the Navy, whether the Navy retained ownership or transferred ownership to another party, to ensure their protectiveness. The yearly reporting requirements to EPA and RIDEM would help confirm that the restrictions were being met.

The limited action alternative would provide no long-term protection of ecological receptors or the environment. However, there is currently no measured risk to ecological receptors from the groundwater contaminants, based on the ecological risk assessment and the groundwater-to-sediment analysis presented in Appendix A2. Annual monitoring and 5-year reviews of this alternative would be required to evaluate the effectiveness of the alternative.

Reduction in Toxicity, Mobility, or Volume through Treatment

This alternative would not include any groundwater treatment processes. Therefore, the limited action alternative would offer no reduction in contaminant toxicity, mobility, or volume through treatment. Some

TABLE 2-1

POTENTIAL CHEMICAL-SPECIFIC ARARs AND TBCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Authority	Requirement	Status	Requirement Synopsis	Consideration
Federal Regulatory Requirements	EPA Human Health Assessment Cancer Slope Factors (CSFs).	To Be Considered	These are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Will be used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.
	OSWER Directive 9200.4-26, Approaches for Addressing Dioxins in Soil at CERCLA and RCRA Sites (Apr. 13, 1998)	To Be Considered	This Directive provides guidance in establishing cleanup levels for dioxins. A 1 µg/kg (ppb) concentration of dioxins (as 2,3,7,8-TCDD TE) has been established for surficial soils involving residential exposure scenarios. A cleanup range of 5 to 20 µg/kg of dioxin (as 2,3,7,8-TCDD TE) has been established for commercial and industrial exposure scenarios.	This OSWER policy aids in the establishment of dioxin PRGs for soil and sediment to be used in the remedial action.
	Reference Dose (RfD)	To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	Were used to calculate potential non-carcinogenic hazards caused by exposure to contaminants.
	Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)	To Be Considered	Guidance for assessing cancer risk.	Were used to calculate potential carcinogenic risks caused by exposure to contaminants.

TABLE 2-1

POTENTIAL CHEMICAL-SPECIFIC ARARs AND TBCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Authority	Requirement	Status	Requirement Synopsis	Consideration
Federal Regulatory Requirements (continued)	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)	To Be Considered	Guidance of assessing cancer risks to children.	Were used to calculate potential carcinogenic risks to children caused by exposure to contaminants.
	Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposure to Lead in Soil	To Be Considered	EPA guidance for evaluating the risks posed by lead in soil	Guidance on assessing lead-impacted soil exceeding adult (and child) risk levels in residential use scenarios.
State Regulatory Requirements	Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Short Title: Remediation Regulations), CRIR 12-180-001, Section 8; DEM-DSR-01-93, as amended August 1996, 2004	Applicable	These regulations set remediation standards for contaminated media. These standards are applicable to a CERCLA remedy when they are more stringent than federal standards. Establishes criteria for groundwater and both direct contact and leachability of contaminants in soil.	The Remediation Regulations are used in the establishment of PRGs for soil for direct contact and leachability to be used in the remedial action.

TABLE 2-2

POTENTIAL LOCATION-SPECIFIC ARARs AND TBCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	CONSIDERATION
Federal Regulatory Requirements	Rivers and Harbors Act (33 U.S.C. Section 403); Section 10	Applicable	These regulations set forth criteria from the Army Corps of Engineers (ACOE) for placing dams/structures in navigable waters of the United States.	Excavation, dredging, and habitat restoration will comply with the Act's substantive environmental standards.
	Clean Water Act - Section 404(b)(1) Guidelines for specification of disposal sites for dredged or fill material (40 CFR Part 230)	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems.	Alternatives may involve discharge of dredged material and/or excavation during O &M of the shoreline revetment. Filling or discharge of dredged material will only occur where there is no other practicable alternative and any adverse impacts to aquatic ecosystems will be mitigated.
	Fish and Wildlife Coordination Act (16 U.S.C. 661), Fish and Wildlife protection (40 CFR Section 6.302(g))	Applicable	This regulation requires that any federal agency proposing to modify a body of water must consult with the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service, and other related state agencies. That federal agency must consult with the appropriate government entity and also take action to prevent, mitigate, or compensate for project-related losses of endangered species, fish and wildlife resources.	Alternatives may modify potential endangered species, fish and wildlife habitats. All appropriate state and federal agencies, such as the USFWS, will be consulted to ensure that losses of these resources will be prevented, mitigated, or compensated.

TABLE 2-2

POTENTIAL LOCATION-SPECIFIC ARARs AND TBCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

AUTHORITY	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	CONSIDERATION
Federal Regulatory Requirements (Cont'd)	Endangered Species Act 16 USC 1531 *et seq.*, 50 CFR Part 200, 50 CFR Part 402	Applicable	If a location contains a federal endangered or threatened species or its critical habitat, and an action may impact the species or its habitat, the U.S. Fish & Wildlife Service or the National Marine Fisheries Service must be consulted.	The federally endangered loggerhead turtle (*Caretta caretta*) and federally threatened Kemp's ridley turtle (*Lepidochelys kempii*) occur in the waters of Narragansett Bay. Appropriate agencies will be consulted to find ways to minimize adverse effects to the listed species and its habitat.
	National Historic Preservation Act 16 USC 470 *et seq.*, 26 CFR Part 800	Applicable	Requires action to take into account effects on properties included on or eligible for the National Register of Historic Places and minimizes harm to National Historic Landmarks	Historic vessels may be sunken in the area. Remedial actions may involve actions that might cause potential harm to historic sites. Such actions would be prevented.
	Coastal Zone Management Act (16 USC Section 1451 et seq.)	Applicable	This act regulates activities affecting the coastal zone including lands there under and adjacent shoreline.	For remedial actions in a coastal zone, requires determination that all activities are consistent to the maximum extent practicable with the State Coastal Zone Management Plan.
State Regulatory Requirements	Coastal Resources Management RIGL 46-23-1 *et seq.*	Applicable	This law creates the Coastal Resources Management Council and authorizes promulgation of regulations for management and protection of coastal resources.	The entire site is located in a coastal resource management area, therefore, applicable coastal resource management requirements need to be addressed. All actions will be consistent, to the extent practicable, with the Coastal Zone Management Plan.
	Endangered Species Act, RIGL 20-37-1 *et seq.*	Applicable	Regulates activities affecting state-listed endangered or threatened species or their critical habitat.	The state listed loggerhead turtle (*Caretta caretta*) and Kemp's ridley turtle (*Lepidochelys kempii*) occur in the waters of Narragansett Bay. Appropriate agencies will be consulted to find ways to minimize adverse effects to the listed species and its habitat.
	Rhode Island Historical Preservation Act, RIGL 42-45 *et seq*.	Applicable	Requires action to take into account effects on properties included on or eligible for the National Register of Historic Places and minimizes harm to National Historic Landmarks	Historic vessels may be sunken in the area. Remedial actions may involve actions that might cause potential harm to historic sites. Such actions would be prevented.

TABLE 2-3

POTENTIAL ACTION-SPECIFIC ARARs AND TBCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Authority	Requirement	Status	Requirement Synopsis	Consideration
Federal Regulatory Requirements	Clean Water Act, (33 U.S.C.. § 1251 et seq.); National Pollution Discharge Elimination System (NPDES) (40 C.F.R. §§ 122-125, 131)	Applicable	Contains discharge limitations, monitoring requirements, and best management practices. Substantive requirements under NPDES are written such that state and National Recommended Water Quality Criteria (NRWQC): are met. Permits are required for off-site discharges. Stormwater standards within these regulations apply to construction projects between one and five acres.	Alternatives may involve shoreline excavation activities and O & M of the soil cover and shoreline revetment that will be managed so as to not discharge contaminants into adjacent waters via point source or storm water discharges. Discharge of any contaminated groundwater during soil excavation into Narragansett Bay will meet applicable standards. Standards also to be used to develop monitoring criteria for surface waters.
	Clean Air Act (CAA), National Emission Standards for Hazardous Air Pollutants (NESHAPS 42 USC 7411, 7412; 40 CFR Part 61	Applicable	NESHAPS are a set of emission standards for specific chemicals, including naphthalene, arsenic, cadmium, chromium, lead, mercury, nickel, PCBs, DDE, and hexachlorobenzene. Certain activities are regulated including site remediation.	Alternatives may involve excavation and treatment of soil and sediment. Monitoring of air emissions will be used to assess compliance with these standards if threshold levels are reached. Operation and maintenance activities will be carried out in a manner that will minimize potential air releases.
	Clean Water Act (33 U.S.C. § 1251 et seq.); General Pretreatment Regulations for Existing and New Sources of Pollution (40 C.F.R. § 403)	Applicable	Standards for direct discharge of waste water into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action, such as from dewatering, treatment or other processing, is discharged to a POTW.
	Safe Drinking Water Act (42 U.S.C. §300f et seq.); National primary drinking water regulations (40 C.F.R. Part 141, Subpart B and G)	Relevant and Appropriate	Establishes maximum contaminant levels (MCLs) for common organic and inorganic contaminants applicable to public drinking water supplies.	Where the groundwater is potentially potable (e.g., not saline), MCLs for the contaminants of concern will be used during long term monitoring as the standards at the waste management area boundary.
	Clean Water Act, Section 304 33 USC 1314; 40 CFR 122.44	Relevant and Appropriate	Establish National Recommended Water Quality Criteria (NRWQC): Guidelines established for the protection of human health and/or the aquatic organisms.	These standards are relevant and appropriate for development of sediment monitoring standards under CERCLA.

TABLE 2-3

POTENTIAL ACTION-SPECIFIC ARARs AND TBCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Authority	Requirement	Status	Requirement Synopsis	Consideration
State Regulatory Requirements	Hazardous Waste Management Act (RI General Laws 23-19.1-6, 23-19.1-7, and 23-19.1-10); Section 5, Generators	Applicable	These regulations apply to all generators of hazardous waste. They include requirements for identification, storage, shipment and labeling of waste.	Alternatives may involve the generation of hazardous waste via excavation, and /or generation of contaminated filters or treatment byproducts. Excavation and generation of treatment byproducts and related activities will comply with this regulation. Wastes generated will be tested for hazardous characteristics as appropriate prior to disposal.
	Water Pollution (RI General Laws 46-12), Environmental Management (RI General Laws 42-17.1, Water Quality Regulations (R.I. Code R. 112-88.97-1), Rule #18	Applicable	Regulations designed to protect state surface water resources. Establishes water use classification and water quality criteria for waters of the state.	Alternatives will include provisions for the protection of Narragansett Bay where construction activities occur in these waters. Remedial actions including dredging and filling will be conducted to minimize degradation to the bay. Will be used to develop long-term monitoring standards.
	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 1.7.14(b)	Relevant and Appropriate	Regulation states that an approved closure plan must be implemented.	The site will be closed under a plan developed in accordance with CERCLA. As such, the closure requirements of the site will be documented in the ROD, the remedial design (RD), and the Operations and Maintenance Plan (O&M) (including a monitoring plan). Compliance with the closure requirements contained in the ROD, RD, and O&M plan will be deemed compliance with this ARAR.
	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 1.7.10	Relevant and Appropriate	Requires dust control.	Dust must be controlled at the site during cover construction and during maintenance activities.
	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 1.7.12 (a)	Relevant and Appropriate	Requires solid waste management facilities be designed and maintained to protect the health and safety of personnel at the facility and persons in close proximity of the facility.	Under this subsection health and safety of construction workers and persons in the proximity of the site would be maintained during construction and maintenance activities.

TABLE 2-3

POTENTIAL ACTION-SPECIFIC ARARs AND TBCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Authority	Requirement	Status	Requirement Synopsis	Consideration
State Regulatory Requirements (Cont'd)	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 1.8.01 (a) and 1.8.01 (b)	Relevant and Appropriate	Requires facilities to monitor groundwater and to meet closure requirements .	This ARAR is cited to memorialize the requirements to monitor groundwater and to meet closure requirements. Remedies that leave contaminants in place will require the site to be closed as a waste management unit, and undergo long term monitoring. The remedial design (RD), remedial action work plan (RAWP), operations and monitoring plan (O&M) (including the long term monitoring plan [LTMP]) developed for this cleanup will contain the specific monitoring and closure requirements for the waste management unit. These requirements may differ from those cited in this regulation for landfill purposes. Compliance with the groundwater monitoring and closure requirements contained in the LTMP, RD, RAWP, and O&M plan for this site will be deemed compliance with this ARAR.
	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 2.1.04	Relevant and Appropriate	Requires a "Sedimentation and Erosion Control Plan" be developed.	An erosion and sediment control plan will be developed for this site. It is intended that the RD and the RAWP, to be developed for this cleanup, will contain the specific erosion and sediment controls requirements for the remedial construction. Compliance with the RD and RAWP requirements for erosion and sediment control will be deemed compliance with this ARAR.
	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 2.1.08 (a) (8)	Relevant and Appropriate	Contains requirements for construction of monitoring wells to monitor a solid waste landfill.	It is intended that this subsection serve as the ARAR memorializing the requirements for construction of new monitoring wells. The specific construction requirements will be described in the Long Term Monitoring Plan (LTMP). Such requirements may differ from those cited in this regulation, and will be developed to be appropriate for this site, and not for a solid waste landfill. Compliance with the monitoring well construction requirements of the LTMP will be deemed compliance with this ARAR.

TABLE 2-3

POTENTIAL ACTION-SPECIFIC ARARs AND TBCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Authority	Requirement	Status	Requirement Synopsis	Consideration
State Regulatory Requirements (Cont'd)	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 2.1.08 (c)	Relevant and Appropriate	Contains requirements for monitoring wells.	It is intended that this subsection serve as the ARAR memorializing the requirement to have and maintain monitoring wells for the purpose of monitoring groundwater conditions at the site. Remedies that leave contaminants in place will be supported with a Long Term Monitoring Plan (LTMP) for groundwater. The LTMP will be directed by a work plan that will contain the specific monitoring requirements. Such requirements may differ from those cited in this regulation, and will be developed to be appropriate for this site, and not for a solid waste landfill. Compliance with the monitoring well requirements of the LTMP will be deemed compliance with this ARAR.
	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 2.2.12 (d) (1) and 2.2.12 (d) (2) (ii)(iii) and (v).	Relevant and Appropriate	Contains requirements for construction and maintenance of the vegetative cover final cover system.	Remedies including cover systems may include appropriate vegetation requirements of a soil cover.
	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 2.3.04(e), (f)	Relevant and Appropriate	Outlines the requirements for the maintenance and permeability of cover material.	Remedies including cover systems will include provisions to maintain the cover, and to assure that cover provides adequate levels of reduced permeability for specific areas cited by RIDEM. It is intended that this subsection serve as the ARAR memorializing the requirement to have and maintain a cover, not to identify permeability requirements. Asphalt has been determined to provide an adequate barrier for specific areas cited by RIDEM, and a two foot soil cover has been determined provide an adequate barrier for the remainder of the land within the waste management area."
	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 2.3.05	Relevant and Appropriate	Establishes requirement for compliance boundary for pollution of ground waters or surface waters.	It is intended that this subsection serve as the ARAR memorializing the requirement that no contamination of groundwater be permitted beyond the boundary of the WMA**.** Remedies that leave contamination in place will undergo groundwater and sediment monitoring to assure that no contaminants are transported to the groundwater or surface water beyond the boundary of the waste management area.

TABLE 2-3

POTENTIAL ACTION-SPECIFIC ARARs AND TBCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Authority	Requirement	Status	Requirement Synopsis	Consideration
State Regulatory Requirements (Cont'd)	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 2.3.10	Relevant and Appropriate	Contains requirements for surface water drainage.	It is intended that this subsection serve as the ARAR memorializing the requirement that appropriate surface drainage considerations must be developed for the WMA cover. Cover systems would be designed to prevent erosion, sedimentation, and standing water on the cover. Minimum slope requirements would not be relevant or appropriate for a soil cover which is not intended to reduce infiltration.
	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 2.3.11	Relevant and Appropriate	Contains requirements for monitoring wells.	It is intended that this subsection serve as the ARAR memorializing the requirement to have and maintain monitoring wells for the purpose of monitoring groundwater conditions. Remedies that leave contaminants in place will be supported with a Long Term Monitoring Plan (LTMP) for groundwater. The LTMP will be directed by a work plan that will contain the specific monitoring well requirements. Such requirements may differ from those cited in this regulation, and will be developed to be appropriate for this site, and not for a solid waste landfill. Compliance with the monitoring well requirements of the LTMP work plan will be deemed compliance with this ARAR.
	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 2.3.14	Relevant and Appropriate	Provides requirements for new solid waste landfill units and expansions that impact wetlands and coastal wetlands, coastal flood zones, etc.	Alternatives will involve alteration of land within a 100 year coastal flood zone. It is intended that this subsection serve as the ARAR memorializing the requirement to protect wetland resources during construction and operation (maintenance) of the waste management area. Remedies that leave contamination in place will require the construction and maintenance of a cover system to minimize exposure to contaminants. It is intended that the RD, the RAWP, and the LTMP developed for this remedy contain the specific requirements for the site. Such requirements will be developed appropriate for this site, which is not a solid waste landfill, and may differ from those cited in the regulation. Compliance with the RD, the RAWP and the LTMP will be deemed compliance with this ARAR.

TABLE 2-3

POTENTIAL ACTION-SPECIFIC ARARs AND TBCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Authority	Requirement	Status	Requirement Synopsis	Consideration
State Regulatory Requirements (Cont'd)	Rhode Island Solid Waste Regulations DEM OWM-SW04-01, 2.3.23	Relevant and Appropriate	Provides requirements for closure of solid waste units in "unstable areas", interpreted to include 100 year flood zones.	Alternatives will require establishing a waste management area within a 100 year flood zone, which is interpreted as an unstable area. This regulation is being cited to memorialize the requirement to close solid waste landfills located in unstable areas. These alternatives meet the intent because the waste management area is not being expanded, but being closed within its footprint behind the replacement stone revetment.
	Clean Air Act (RIGL 23-23 *et seq)* - Emissions Detrimental to Persons or Property RIGL 23-23 *et seq.*; (CRIR 12-31-07)	Relevant and Appropriate	Prohibits emissions of contaminants which may be injurious to humans, plant or animal life or cause damage to property or which reasonably interferes with the enjoyment of life and property.	Alternatives may involve removal, processing, and temporary storage of debris, soil, and sediments involving the release of contaminants.
	Clean Air Act (RIGL 23-23 *et seq)* - Air Toxics RIGL 23-23 *et seq.*; (CRIR 12-31-22)	Applicable	Prohibits the emission of specified contaminants at rates which would result in ground level concentrations greater than acceptable ambient levels or acceptable ambient levels as set in the regulations.	Alternatives may involve removal, processing, and temporary storage of debris, soil, and sediments involving the release of contaminants.
	Clean Air Act (RIGL 23-23 *et seq)* - Fugitive Dust Control RIGL 23-23 *et seq.*; (CRIR 12-31-05)	Applicable	Requires that reasonable precaution be taken to prevent particulate matter from becoming airborne.	Alternatives with removal, processing, and temporary storage of debris, soil, and sediments might generate fugitive dust. Controls would be implemented to prevent material from becoming airborne.
	Clean Air Act (RIGL 23-23 *et seq*)- Air Pollution Control RIGL 23-23 *et seq.*; (CRIR 12-31-09)	Applicable	Establishes guidelines for the construction, installation, or operation of potential air emission units. Establishes permissible emission rates for some contaminants.	Alternatives may involve processing of debris, soil, and sediment, and treatment of dewatering liquid, releasing contaminants and in such instances this regulation will be complied with.
	Clean Air Act (RIGL 23-23); Visible Emissions (CRIR 12-31-01)	Applicable	No air contaminant emissions are allowed for more than 3 minutes in any one hour which are greater than or equal to 20% opacity.	Air emissions from remedial actions will meet these emission levels.

TABLE 2-3

POTENTIAL ACTION-SPECIFIC ARARs AND TBCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Authority	Requirement	Status	Requirement Synopsis	Consideration
State Regulatory Requirements (Cont'd)	Regulations for the RI Pollutant Discharge Elimination System RIGL 46-12, 42-17.1, 42-45	Relevant and Appropriate	Contains discharge limitations, monitoring requirements and best management practices. Substantive requirements under NPDES are written such that state and federal national recommended water quality criteria (NRWQC) are met. Permits are required for off-site discharges.	Discharge of any contaminated groundwater during soil excavation or treated groundwater into Narragansett Bay will meet applicable standards.
	Regulations for the RI Pollutant Discharge Elimination System, Pretreatment Regulations RIGL 46-12, 42-17.1, 42-45	Applicable	Rhode Island standards for discharge to POTWs.	For remedies that entail discharge to a POTW, those discharges will be required to meet these NPDES regulations.
	Rules and Regulations for Dredging and Management of Dredge Materials DEM-OWR-DR-02-03	Applicable	Addresses dredging activities and disposal of dredge spoils.	Any dredging that is required for maintenance of the remedy must comply with the requirements of the regulations.

TABLE 4-2

SUMMARY OF DETAILED ANALYSES OF ALTERNATIVES FOR SOIL REMEDIATION
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Criteria	Alternative 1 No Action	Alternative 2 Removal, Ex situ Treatment, Backfill and LUCs	Alternative 3 Removal, Disposal, and LUCs	Alternative 4 Soil cover, and LUCs
THRESHOLD CRITERIA				
Overall Protection of Human Health and the Environment				
Does Alternative Protect Current and Future Users?	No	Yes	Yes	Yes
Are Environmental Risks Reduced by Alternative?	No	Yes	Yes	Yes
Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)				
Compliance with Chemical-Specific ARARs	No	Yes	Yes	Yes
Compliance with Location-Specific ARARs	Not applicable	Yes	Yes	Yes
Compliance with Action-Specific ARARs	Not applicable	Yes	Yes	Yes
Compliance with Other Criteria	No	Yes	Yes	Yes
BALANCING CRITERIA				
Long-Term Effectiveness and Permanence				
Does Alternative Reduce Residual Risk?	No	Yes	Yes	Yes
Does Alternative Provide Adequate Remedial Controls?	No	Yes	Yes	Yes
Need a 5-Year Review?	Yes	No	No	Yes
Need for Long-Term Management?	Yes	No	No	Yes
Reduction of Toxicity, Mobility, or Volume through Treatment				
Treatment Process Used	None	Volatilization, liquid dissoluton	None	None
Soil Treated	No	Yes	Only if required (minimal volume)	No
Reduction in Toxicity, Mobility, or Volume	None	Toxicity, mobility, and volume – reduced	None	No
Type and Quantity of Residuals Remaining after Treatment	No treatment so no residuals	Solid and liquid residuals; low quantity	No residuals	No treatment so no residuals

TABLE 4-2

SUMMARY OF DETAILED ANALYSES OF ALTERNATIVES FOR SOIL REMEDIATION
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Criteria	Alternative 1 No Action	Alternative 2 Removal, Ex situ Treatment, Backfill and LUCs	Alternative 3 Removal, Disposal, and LUCs	Alternative 4 Soil cover, and LUCs
Short-Term Effectiveness				
Risks to the Community during Remedial Action	No treatment so no construction risks	Minimal	Moderate, primarily due to truck traffic	Minimal
Risk to Workers during Remedial Action	No treatment so no construction risks	Some risks; easily controlled	Some risks; easily controlled	Some risks; easily controlled
Environmental Impacts	No treatment so no additional impacts	Minimal	Minimal	Minimal
Time until Remedial Action Objectives Achieved	No remedial action; time >30 years.	Estimated 9 to 11 months	Estimated 6 to 8 months	Estimated 3 to 4 months
Implementability				
Constructable	No construction activities	Yes	Yes	Yes
Reliability of Technology	No technology implemented	Reliable	Reliable	Reliable
Ease of Undertaking Additional Remedial Action, if Necessary	Easily implementable	High	High	Moderately easy
Ability to Monitor Effectiveness of Remedy	Not applicable	Yes	Yes	Yes
Ability to Coordinate with Other Agencies	Easy	Moderately easy	Moderately easy	Moderately easy
Availability of Off-Site Disposal Services	None required	Available	Available	None required
Availability of Equipment and Specialists	None required	Available	Available	Available
Availability of Prospective Technologies	None required	Available	Available	Available
Cost[a,b]				
Capital Costs	$0	$18,475,000	$14,819,000	$1,419,000
Total Annual Operations and Maintenance (O&M)	$0	$15,000/5 years $5,000 (others)	$15,000/5 years $5,000 (others)	$26,000/5 years $16,000 (others)
5-Year Review Costs[c]	$0	$0	$0	$0
Total Present Worth Project Costs	$0	$18,621,000	$14,966,000	$1,783,000

[a] Detailed cost estimates are presented in Appendix I.
[b] These costs have been rounded off to the nearest $1,000.
[c] 5-Year reviews would be conducted under the groundwater remedy.

TABLE 4-3

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 1: NO ACTION
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
EPA Human Health Assessment Cancer Slope Factors (CSFs).		To Be Considered	These are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.
Reference Dose (RfD)		To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	Used to calculate potential non-carcinogenic hazards caused by exposure to contaminants.
Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)		To Be Considered	Guidance for assessing cancer risk.	Used to calculate potential carcinogenic risks caused by exposure to contaminants.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)		To Be Considered	Guidance of assessing cancer risks to children.	Used to calculate potential carcinogenic risks to children caused by exposure to contaminants.
Recommendations of the Technical Review Workgroup for Lead for an approach to Assessing Risks Associated with Adult Exposure to Lead In soil		To Be Considered	EPA Guidance for evaluating risks posed by lead in soil.	This alternative will not meet these guidelines since it will not address lead-impacted soil exceeding adult and child screening levels.

TABLE 4-3

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 1: NO ACTION
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Short Title: Remediation Regulations)	CRIR 12-180-001, Section 8; DEM-DSR-01-93, as amended February 2004	Applicable	These regulations set remediation standards for contaminated media. These standards are applicable to a CERCLA remedy when they are more stringent than federal standards. Establishes criteria for both direct contact and leachability of contaminants in soil.	This alternative fails to meet this standard because soil exceeding PRGs is not addressed.

TABLE 4-6

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 2: REMOVAL, EX SITU TREATMENT, BACKFILL, LUCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
EPA Human Health Assessment Cancer Slope Factors (CSFs).		To Be Considered	These are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.
Reference Dose (RfD)		To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	Used to calculate potential non-carcinogenic hazards caused by exposure to contaminants.
Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)		To Be Considered	Guidance for assessing cancer risk.	Used to calculate potential carcinogenic risks caused by exposure to contaminants.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)		To Be Considered	Guidance of assessing cancer risks to children.	Used to calculate potential carcinogenic risks to children caused by exposure to contaminants.
Recommendations of the Technical Review Workgroup for Lead for an approach to Assessing Risks Associated with Adult Exposure to Lead In soil		To Be Considered	EPA Guidance for evaluating risks posed by lead in soil.	This alternative will meet these guidelines by excavating and treating lead impacted soil exceeding adult and child industrial and commercial risk levels and establishing land use controls to address remaining residential risks.

TABLE 4-6

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 2: REMOVAL, EX SITU TREATMENT, BACKFILL, LUCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Remediation Regulations	CRIR 12-180-001, Section 8; DEM-DSR-01-93, as amended February 2004	Applicable	These regulations set remediation standards for contaminated media. These standards are applicable to a CERCLA remedy when they are more stringent than federal standards. Establishes criteria for both direct contact and leachability of contaminants in soil.	These standards were used to develop soil PRGs. This alternative meets this standard because soil exceeding PRGs is treated to meet desired goals, ICs would be used to prevent residential use.

TABLE 4-7

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 2: REMOVAL, EX SITU TREATMENT, BACKFILL, LUCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Rivers and Harbors Act	(33 U.S.C. Section 403); Section 10	Applicable	These regulations set forth criteria from the Army Corps of Engineers (ACOE) for placing dams/structures in navigable waters of the United States.	Excavation, dredging, and habitat restoration will comply with the Act's substantive environmental standards.
Clean Water Act	Section 404 (33 U.S.C. s 1344); Section 404 (b)(1) Guidelines for Specification of disposal sites for dredged or fill material (40 CFR Part 230, 231 and 33 C.F.R. Parts 320-323)."	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems. Filling or discharge of dredged material will only occur where there is no other practicable alternative and any adverse impacts to aquatic ecosystems will be mitigated.	Alternatives may involve discharge of dredged material and/or excavation during O &M of the shoreline revetment. Filling or discharge of dredged material will only occur where there is no other practicable alternative and any adverse impacts to aquatic ecosystems will be mitigated.
National Historic Preservation Act	16 USC 470 *et seq.*, 26 CFR Part 800	Applicable	Requires action to take into account effects on properties included on or eligible for the National Register of Historic Places and minimizes harm to National Historic Landmarks	Historic vessels may be sunken in the area. Remedial actions may involve actions that might cause potential harm to historic sites. Such actions would be prevented.
Coastal Zone Management Act	16 USC Parts 1451 *et. seq.*	Applicable	Requires that any actions must be conducted in a manner consistent with state approved management programs.	The site is located next to a coastal zone management area, therefore, applicable coastal zone management requirements need to be addressed**.**

TABLE 4-7

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 2: REMOVAL, EX SITU TREATMENT, BACKFILL, LUCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

FEDERAL REQUIREMENTS (cont)

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Fish and Wildlife Coordination Act	16 U.S.C. 661 et seq	Applicable	Requires Federal agencies involved in actions that will result in the control of structural modification of any stream or body of water for any purpose to take action to protect fish and wildlife resources that may be affected by the action. The Navy must coordinate with appropriate federal and state resource agencies to ascertain the mans and measures necessary to mitigate, prevent, and compensate for project related losses of fish and wildlife resources and to enhance the resources.	Measures to mitigate or compensate adverse project related impacts to fish and wildlife resources will be taken, if determined necessary. The appropriate federal and state resource agencies will be consulted, in particular regarding any revetment O&M
Endangered Species Act	16 U.S.C. 1531 et seq.; 50 CFR Parts 200 and 402	Applicable	Regulates activities affecting federally listed endangered or threatened species or their critical habitat.	The federally-listed loggerhead turtle and Kemps-ridley turtle occur in the waters of Narragansett Bay. Appropriate federal agencies will be consulted to find ways to minimize adverse effects to listed species for the O&M of the revetment.

TABLE 4-7

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 2: REMOVAL, EX SITU TREATMENT, BACKFILL, LUCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Coastal Resources Management	RIGL 46-23-1 *et seq.*	Applicable	Sets standards for management and protection of coastal resources.	The entire site is located in a coastal resource management area, therefore, applicable coastal resource management requirements need to be addressed**.**
Rhode Island Endangered Species Act	RIGL 20-37-1 et seq.	Applicable	Regulates activities affecting state listed endangered or threatened species or their critical habitat.	The State listed loggerhead turtle and Kemps-ridley turtle occur in the waters of Narragansett Bay. Navy will coordinate with appropriate agencies to find ways to minimize adverse effects to listed species for the O&M of the revetment.

TABLE 4-8

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 2: REMOVAL, EX SITU TREATMENT, BACKFILL
FEASIBILTY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Clean Air Act (CAA), National Emission Standards for Hazardous Air Pollutants (NESHAPS)	42 USC 7411, 7412; 40 CFR Part 61	Applicable	NESHAPS are a set of emission standards for specific chemicals, including naphthalene, arsenic, cadmium, chromium, lead, mercury, nickel, PCBs, DDE, and hexachlorobenzene. Certain activities are regulated including site remediation.	Monitoring of air emissions from LTTS will be used to assess compliance with these standards if threshold levels are reached. Operation and maintenance activities will be carried out in a manner which will minimize potential air releases.
Resource Conservation and Recovery Act (RCRA), Subtitle C - Standards for Generators	42 USC 6291 et seq. 40 CFR parts 262	Applicable	Rhode Island is delegated to administer the federal RCRA statute through its state regulations.	Wastes generated by the action will be tested to determine if they constitute hazardous waste. Any hazardous waste generated and treatment residues, filters etc will be tested for hazardous characteristics and will be handled and disposed according to these standards.
Clean Water Act (CWA), Section 402, National Pollutant Discharge Elimination System (NPDES)	33 USC 1342; 40 CFR Parts 122-125, 131	Applicable	These standards govern discharge of water into surface waters. Regulated discharges must meet national recommended water quality criteria.	Any water from temporary storage area will be treated as required to meet this ARAR before being discharged. O & M of the shoreline revetment that will be managed so as to not discharge contaminants into adjacent waters. Discharge of any contaminated groundwater during soil excavation into Narragansett Bay will meet applicable standards.

TABLE 4-8

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 2: REMOVAL, EX SITU TREATMENT, BACKFILL
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STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Hazardous Waste Management - Standards for Generators	RIGL 23-19.1 *et seq.*; CRIR 12-030-003(Section 5)	Applicable	Outlines specifications and standards for design, operation, closure, and monitoring of performance for hazardous waste storage, treatment, and disposal facilities. The standards of 40 CFR Part 264 are incorporated by reference.	Treated soil will be tested to meet all requirements before used as backfill. Any treatment filters or residues will be tested for hazardous characteristics and handled according to applicable standards.
Clean Air Act - Fugitive Dust Control	RIGL 23-23 *et seq.*; CRIR 12-31-05	Applicable	Requires that reasonable precaution be taken to prevent particulate matter from becoming airborne.	Removal, LTTS Treatment and processing, and temporary storage of soil during the implementation of alternative would be implemented to prevent material from becoming airborne.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 1.7.14(b)	Relevant and Appropriate	Regulation states that an approved closure plan must be implemented.	The site will be closed under a plan developed in accordance with CERCLA. Because some residual contaminants will remain in soil in areas that cannot be excavated and treated, those remnant soils would be managed in place as a waste management unit As such, the closure requirements of the site will be documented in the ROD, the remedial design (RD), and the Operations and Maintenance Plan (O&M) (including a monitoring plan). Compliance with the closure requirements contained in the ROD, RD, and O&M plan will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 1.7.10	Relevant and Appropriate	Requires dust control.	Dust must be controlled at the site during maintenance activities.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 1.7.12 (a)	Relevant and Appropriate	Requires solid waste management facilities be designed and maintained to protect the health and safety of personnel at the facility and persons in close proximity of the facility.	Under this subsection health and safety of construction workers and persons in the proximity of the site would be maintained during construction and maintenance activities.

TABLE 4-8

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 2: REMOVAL, EX SITU TREATMENT, BACKFILL
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OLD FIRE FIGHTING TRAINING AREA
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Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 1.8.01 (a) and 1.8.01 (b)	Relevant and Appropriate	Requires facilities to monitor groundwater and to meet closure requirements .	This ARAR is cited to memorialize the requirements to monitor groundwater and to meet closure requirements. Because some residual contaminants will remain in soil in areas that cannot be excavated and treated, those remnant soils would be treated as a waste management unit, and undergo long term monitoring. The remedial design (RD), remedial action work plan (RAWP), operations and monitoring plan (O&M) (including the long term monitoring plan [LTMP]) would contain the specific monitoring and closure requirements for the waste management unit. These requirements may differ from those cited in this regulation for landfill purposes. Compliance with the groundwater monitoring and closure requirements contained in the LTMP, RD, RAWP, and O&M plan for this site will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.1.04	Relevant and Appropriate	Requires a “Sedimentation and Erosion Control Plan” be developed.	An erosion and sediment control plan would be developed for this site. The RD and the RAWP, to be developed for this cleanup, would contain the specific erosion and sediment controls requirements for the remedial construction. Compliance with the RD and RAWP requirements for erosion and sediment control will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.1.08 (a) (8)	Relevant and Appropriate	Contains requirements for construction of monitoring wells to monitor a solid waste landfill.	It is intended that this subsection serve as the ARAR memorializing the requirements for construction of new monitoring wells. The specific construction requirements will be described in the Long Term Monitoring Plan (LTMP). Such requirements may differ from those cited in this regulation, and will be developed to be appropriate for this site, and not for a solid waste landfill. Compliance with the monitoring well construction requirements of the LTMP will be deemed compliance with this ARAR.

TABLE 4-8

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 2: REMOVAL, EX SITU TREATMENT, BACKFILL
FEASIBILTY STUDY
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NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.1.08 (c)	Relevant and Appropriate	Contains requirements for monitoring wells.	It is intended that this subsection serve as the ARAR memorializing the requirement to have and maintain monitoring wells for the purpose of monitoring groundwater conditions at the site. Because this remedy will leave some contaminants in place, it will be supported with a Long Term Monitoring Plan (LTMP) for groundwater. The LTMP will be directed by a work plan that will contain the specific monitoring requirements. Such requirements may differ from those cited in this regulation, and will be developed to be appropriate for this site, and not for a solid waste landfill. Compliance with the monitoring well requirements of the LTMP will be deemed compliance with this ARAR.

TABLE 4-8

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 2: REMOVAL, EX SITU TREATMENT, BACKFILL
FEASIBILTY STUDY
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Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.3.04(e), (f)	Relevant and Appropriate	Outlines the requirements for the maintenance and permeability of cover material .	Because this remedy leaves contaminants in place, provisions to maintain the cover, are necessary, and to assure that cover provides adequate levels of reduced permeability for specific areas cited by RIDEM. It is intended that this subsection serve as the ARAR memorializing the requirement to have and maintain a cover, not to identify permeability requirements. Asphalt has been determined to provide an adequate barrier for specific areas cited by RIDEM, and a two foot soil cover has been determined provide an adequate barrier for the remainder of the land within the waste management area."
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.3.05	Relevant and Appropriate	Establishes requirement for compliance boundary for pollution of ground waters or surface waters.	It is intended that this subsection serve as the ARAR memorializing the requirement that no contamination of groundwater be permitted beyond the boundary of the WMA. Because this remedy leaves contaminants in place, groundwater and sediment monitoring is needed to assure that no contaminants are transported to the groundwater or surface water beyond the boundary of the waste management area.
Rhode Island Solid Waste Regulations DEM	OWM-SW04-01, 2.3.11	Relevant and Appropriate	Contains requirements for monitoring wells.	It is intended that this subsection serve as the ARAR memorializing the requirement to have and maintain monitoring wells for the purpose of monitoring groundwater conditions. Because this remedy leaves contaminants in place, a Long Term Monitoring Plan (LTMP) for groundwater is needed. The LTMP will be directed by a work plan that will contain the specific monitoring well requirements. Such requirements may differ from those cited in this regulation, and will be developed to be appropriate for this site, and not for a solid waste landfill. Compliance with the monitoring well requirements of the LTMP work plan will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations DEM	OWM-SW04-01, 2.3.14	Relevant and Appropriate	Provides requirements for new solid waste landfill units and expansions that impact wetlands and coastal wetlands, coastal flood zones, etc.	This alternative will involve alteration of land within a 100 year coastal flood zone. This regulation is being cited to memorialize the requirement to protect the adjacent coastal wetlands during construction and maintenance of a remedy for soil contaminants. Because this site is not a solid waste landfill, or new landfill unit, the prescriptive requirements of the regulations are not applicable.

TABLE 4-8

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 2: REMOVAL, EX SITU TREATMENT, BACKFILL
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Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.3.23	Relevant and Appropriate	Provides requirements for closure of solid waste units in "unstable areas", interpreted to include 100 year flood zones.	This alternative will include establishing a waste management area within a 100 year coastal flood zone. This regulation is being cited to memorialize the regulations to close solid waste landfills in unstable areas. This alternative meets the intent because the waste management area is not being expanded, but being closed within its footprint behind the stone revetment.
Clean Air Act - Emissions Detrimental to Persons or Property	RIGL 23-23 *et seq.*; CRIR 12-31-07	Applicable	Prohibits emissions of contaminants which may be injurious to humans, plant or animal life or cause damage to property or which reasonably interferes with the enjoyment of life and property.	Removal, LTTS Treatment and processing, and temporary storage of soil during the implementation of alternative would be implemented to prevent material from becoming airborne. Monitoring of air emissions from the LTTS will be used to assess compliance with these standards if threshold levels are reached.
Clean Air Act - Air Pollution Control	RIGL 23-23 *et seq.*; CRIR 12-31-09	Applicable	Establishes guidelines for the construction, installation, or operation of potential air emission units. Establishes permissible emission rates for some contaminants.	Site processing of soil through LTTS and treatment of off-gas will meet the substantive provisions of the standards if threshold levels are reached.
Clean Air Act; Visible Emissions	RIGL 23-23 et seq.: CRIR 12-31-01	Applicable	No air contaminant emissions are allowed for more than 3 minutes in any one hour which are greater than or equal to 20 percent opacity.	Site processing of soil through LTTS and treatment of off-gas will meet the substantive provisions of the standards if threshold levels are reached.
Clean Air Act - Air Toxics	RIGL 23-23 *et seq.*; CRIR 12-31-22	Applicable	Prohibits the emission of specified contaminants at rates which would result in ground level concentrations greater than acceptable ambient levels or acceptable ambient levels as set in the regulations	Monitoring of air emissions from the LTTS facility will be used to assess compliance with these standards if threshold levels are reached. Operation and maintenance activities will be carried out in a manner which will minimize potential air releases.

TABLE 4-8

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
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Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Water Pollution Control - Water Quality	RIGL 42-16 *et seq.*; CRIR 12-190-001	Applicable	Establishes water use classification and water quality criteria for waters of the state. Also establishes criteria for discharge to a water body.	Any water from temporary storage area will be treated as required to meet this ARAR before being discharged. O&M of the shoreline revetment that will be managed so as to not discharge contaminants into adjacent waters.
Water Pollution Control - Pollution Discharge Elimination Systems	RIGL 42-16 *et seq.*; CRIR 12-190-003	Applicable	Contains applicable effluent monitoring requirements, and standards and special conditions for discharges.	The substantive provisions of these standards will be satisfied through on-site treatment of all discharges prior to being discharged.

TABLE 4-9

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 3: REMOVAL, DISPOSAL, LUCS
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
EPA Human Health Assessment Cancer Slope Factors (CSFs).		To Be Considered	These are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.
Reference Dose (RfD)		To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	Used to calculate potential non-carcinogenic hazards caused by exposure to contaminants.
Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)		To Be Considered	Guidance for assessing cancer risk.	Used to calculate potential carcinogenic risks caused by exposure to contaminants.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)		To Be Considered	Guidance of assessing cancer risks to children.	Used to calculate potential carcinogenic risks to children caused by exposure to contaminants.
Recommendations of the Technical Review Workgroup for Lead for an approach to Assessing Risks Associated with Adult Exposure to Lead In soil		To Be Considered	EPA Guidance for evaluating risks posed by lead in soil.	This alternative will meet these guidelines by excavating soil exceeding adult and child industrial and commercial risk levels and establishing land use controls to address remaining residential risks.

TABLE 4-9

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 3: REMOVAL, DISPOSAL, LUCS
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STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
State of Rhode Island Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Short Title: Remediation Regulations)	CRIR 12-180-001, Section 8; DEM-DSR-01-93, as amended February 2004	Applicable	These regulations set remediation standards for contaminated media. These standards are applicable to a CERCLA remedy when they are more stringent than federal standards. Establishes criteria for both direct contact and leachability of contaminants in soil.	These standards were used to develop soil PRGs. This alternative meets this standard because soil exceeding industrial PRGs is removed, ICs would be used to prevent residential use.

TABLE 4-10

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 3: REMOVAL, DISPOSAL, LUCS
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FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Rivers and Harbors Act	(33 U.S.C. Section 403); Section 10	Applicable	These regulations set forth criteria from the Army Corps of Engineers (ACOE) for placing dams/structures in navigable waters of the United States.	Excavation, dredging, and habitat restoration will comply with the Act's substantive environmental standards.
Clean Water Act	Section 404 (33 U.S.C. s 1344); Section 404 (b)(1) Guidelines for Specification of disposal sites for dredged or fill material (40 CFR Part 230, 231 and 33 C.F.R. Parts 320-323)."	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems. Filling or discharge of dredged material will only occur where there is no other practicable alternative and any adverse impacts to aquatic ecosystems will be mitigated.	Alternatives may involve discharge of dredged material and/or excavation during O &M of the shoreline revetment. Filling or discharge of dredged material will only occur where there is no other practicable alternative and any adverse impacts to aquatic ecosystems will be mitigated.
National Historic Preservation Act	16 USC 470 *et seq.*, 26 CFR Part 800	Applicable	Requires action to take into account effects on properties included on or eligible for the National Register of Historic Places and minimizes harm to National Historic Landmarks	Historic vessels may be sunken in the area. Remedial actions may involve actions that might cause potential harm to historic sites. Such actions would be prevented.
Coastal Zone Management Act	16 USC Parts 1451 *et. seq*.	Applicable	Requires that any actions must be conducted in a manner consistent with state-approved management programs.	The site is located next to a coastal zone management area; therefore, applicable coastal zone management requirements need to be addressed**.**

TABLE 4-10

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs
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Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Fish and Wildlife Coordination Act	16 U.S.C. 661 et seq	Applicable	Requires Federal agencies involved in actions that will result in the control of structural modification of any stream or body of water for any purpose to take action to protect fish and wildlife resources that may be affected by the action. The Navy must coordinate with appropriate federal and state resource agencies to ascertain the mans and measures necessary to mitigate, prevent, and compensate for project related losses of fish and wildlife resources and to enhance the resources.	Measures to mitigate or compensate adverse project related impacts to fish and wildlife resources will be taken, if determined necessary. The appropriate federal and state resource agencies will be consulted, in particular regarding any revetment O&M
Endangered Species Act	16 U.S.C. 1531 et seq.; 50 CFR Parts 200 and 402	Applicable	Regulates activities affecting federally listed endangered or threatened species or their critical habitat.	The federally-listed loggerhead turtle and Kemps-ridley turtle occur in the waters of Narragansett Bay. Appropriate federal agencies will be consulted to find ways to minimize adverse effects to listed species for the O&M of the revetment.

TABLE 4-10

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 3: REMOVAL, DISPOSAL, LUCS
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STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Coastal Resources Management	RIGL 46-23-1 *et seq.*	Applicable	Sets standards for management and protection of coastal resources.	The entire site is located in a coastal resource management area, therefore, applicable coastal resource management requirements need to be addressed**.**
Rhode Island Endangered Species Act	RIGL 20-37-1 et seq.	Applicable	Regulates activities affecting state listed endangered or threatened species or their critical habitat.	The State listed loggerhead turtle and Kemps-ridley turtle occur in the waters of Narragansett Bay. The Navy will coordinate with appropriate agencies to find ways to minimize adverse effects to listed species for the O&M of the revetment.

TABLE 4-11

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 3: REMOVAL AND DISPOSAL
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FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Clean Air Act (CAA), National Emission Standards for Hazardous Air Pollutants (NESHAPS)	42 USC 7411, 7412; 40 CFR Part 61	Applicable	NESHAPS are a set of emission standards for specific chemicals, including naphthalene, arsenic, cadmium, chromium, lead, mercury, nickel, PCBs, DDE, and hexachlorobenzene. Certain activities are regulated including site remediation.	Monitoring of air emissions during excavation will be used to assess compliance with these standards if threshold levels are reached. Operation and maintenance activities will be carried out in a manner which will minimize potential air releases.
Resource Conservation and Recovery Act (RCRA), Subtitle C - Standards for Generators	42 USC 6291 et seq 40 CFR 262	Applicable	Rhode Island is delegated to administer the federal RCRA statute through its state regulations.	Wastes generated will be tested to determine if they constitute hazardous waste. Any hazardous waste generated will be handled and disposed according to these standards.
Clean Water Act (CWA), Section 402, National Pollutant Discharge Elimination System (NPDES)	33 USC 1342; 40 CFR Parts 122-125, 131	Applicable	These standards govern discharge of water into surface waters. Regulated discharges must meet national recommended water quality criteria.	Any water from temporary storage area will be treated as required to meet this ARAR before being discharged. O & M of the shoreline revetment that will be managed so as to not discharge contaminants into adjacent waters. Discharge of any contaminated groundwater during soil excavation into Narragansett Bay will meet applicable standards.

TABLE 4-11

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 3: REMOVAL AND DISPOSAL
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STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 1.7.14(b)	Relevant and Appropriate	Regulation states that an approved closure plan must be implemented.	The site will be closed under a plan developed in accordance with CERCLA. Because some residual contaminants will remain in soil in areas that cannot be excavated, those remnant soils would be managed in place as a waste management unit As such, the closure requirements of the site will be documented in the ROD, the remedial design (RD), and the Operations and Maintenance Plan (O&M) (including a monitoring plan). Compliance with the closure requirements contained in the ROD, RD, and O&M plan will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 1.7.10	Relevant and Appropriate	Requires dust control.	Dust must be controlled at the site during maintenance activities.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 1.7.12 (a)	Relevant and Appropriate	Requires solid waste management facilities be designed and maintained to protect the health and safety of personnel at the facility and persons in close proximity of the facility.	Under this subsection health and safety of construction workers and persons in the proximity of the site would be maintained during construction and maintenance activities.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 1.8.01 (a) and 1.8.01 (b)	Relevant and Appropriate	Requires facilities to monitor groundwater and to meet closure requirements .	This ARAR is cited to memorialize the requirements to monitor groundwater and to meet closure requirements. Because some residual contaminants will remain in soil in areas that cannot be excavated and treated, those remnant soils would be treated as a waste management unit, and undergo long term monitoring. The remedial design (RD), remedial action work plan (RAWP), operations and monitoring plan (O&M) (including the long term monitoring plan [LTMP]) would contain the specific monitoring and closure requirements for the waste management unit. These requirements may differ from those cited in this regulation for landfill purposes. Compliance with the groundwater monitoring and closure requirements contained in the LTMP, RD, RAWP, and O&M plan for this site will be deemed compliance with this ARAR.

TABLE 4-11

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 3: REMOVAL AND DISPOSAL
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Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.1.04	Relevant and Appropriate	Requires a "Sedimentation and Erosion Control Plan" be developed.	An erosion and sediment control plan would be developed for this site. The RD and the RAWP, to be developed for this cleanup, would contain the specific erosion and sediment controls requirements for the remedial construction. Compliance with the RD and RAWP requirements for erosion and sediment control will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.1.08 (a) (8)	Relevant and Appropriate	Contains requirements for construction of monitoring wells to monitor a solid waste landfill.	It is intended that this subsection serve as the ARAR memorializing the requirements for construction of new monitoring wells. The specific construction requirements will be described in the Long Term Monitoring Plan (LTMP). Such requirements may differ from those cited in this regulation, and will be developed to be appropriate for this site, and not for a solid waste landfill. Compliance with the monitoring well construction requirements of the LTMP will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.1.08 (c)	Relevant and Appropriate	Contains requirements for monitoring wells.	It is intended that this subsection serve as the ARAR memorializing the requirement to have and maintain monitoring wells for the purpose of monitoring groundwater conditions at the site. Because this remedy will leave some contaminants in place, it will be supported with a Long Term Monitoring Plan (LTMP) for groundwater. The LTMP will be directed by a work plan that will contain the specific monitoring requirements. Such requirements may differ from those cited in this regulation, and will be developed to be appropriate for this site, and not for a solid waste landfill. Compliance with the monitoring well requirements of the LTMP will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.3.04(e), (f)	Relevant and Appropriate	Outlines the requirements for the maintenance and permeability of cover material .	Because this remedy leaves contaminants in place, provisions to maintain a cover, are necessary, and to assure that cover provides adequate levels of reduced permeability for specific areas cited by RIDEM. It is intended that this subsection serve as the ARAR memorializing the requirement to have and maintain a cover, not to identify permeability requirements. Asphalt has been determined to provide an adequate barrier for specific areas cited by RIDEM, and a two foot soil cover has been determined provide an adequate barrier for the remainder of the land within the waste management area."

TABLE 4-11

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 3: REMOVAL AND DISPOSAL
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.3.05	Relevant and Appropriate	Establishes requirement for compliance boundary for pollution of ground waters or surface waters.	It is intended that this subsection serve as the ARAR memorializing the requirement that no contamination of groundwater be permitted beyond the boundary of the WMA**.** Because this remedy leaves contaminants in place, groundwater and sediment monitoring is needed to assure that no contaminants are transported to the groundwater or surface water beyond the boundary of the waste management area.
Rhode Island Solid Waste Regulations DEM	OWM-SW04-01, 2.3.11	Relevant and Appropriate	Contains requirements for monitoring wells.	It is intended that this subsection serve as the ARAR memorializing the requirement to have and maintain monitoring wells for the purpose of monitoring groundwater conditions. Because this remedy leaves contaminants in place, a Long Term Monitoring Plan (LTMP) for groundwater is needed. The LTMP will be directed by a work plan that will contain the specific monitoring well requirements. Such requirements may differ from those cited in this regulation, and will be developed to be appropriate for this site, and not for a solid waste landfill. Compliance with the monitoring well requirements of the LTMP work plan will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations DEM	OWM-SW04-01, 2.3.14	Relevant and Appropriate	Provides requirements for new solid waste landfill units and expansions that impact wetlands and coastal wetlands, coastal flood zones, etc.	This alternative will involve alteration of land within a 100 year coastal flood zone. This regulation is being cited to memorialize the requirement to protect the adjacent coastal wetlands during construction and maintenance of a remedy for soil contaminants. Because this site is not a solid waste landfill, or new landfill unit, the prescriptive requirements of the regulations are not applicable.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.3.23	Relevant and Appropriate	Provides requirements for closure of solid waste units in “unstable areas”, interpreted to include 100 year flood zones.	This alternative will include establishing a waste management area within a 100 year coastal flood zone. This regulation is being cited to memorialize the regulations to close solid waste landfills in unstable areas. This alternative meets the intent because the waste management area is not being expanded, but being closed within its footprint behind the stone revetment.
Clean Air Act - Fugitive Dust Control	RIGL 23-23 *et seq.*; CRIR 12-31-05	Applicable	Requires that reasonable precaution be taken to prevent particulate matter from	Removal and temporary storage of soil during the implementation of alternative would be implemented to prevent material from becoming airborne.

TABLE 4-11

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 3: REMOVAL AND DISPOSAL
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
			becoming airborne.	
Clean Air Act - Emissions Detrimental to Persons or Property	RIGL 23-23 *et seq.*; CRIR 12-31-07	Applicable	Prohibits emissions of contaminants which may be injurious to humans, plant or animal life or cause damage to property or which reasonably interferes with the enjoyment of life and property.	Removal and temporary storage of soil during the implementation of alternative would be implemented to prevent material from becoming airborne. Monitoring of air emissions during removal will be used to assess compliance with these standards if threshold levels are reached.
Clean Air Act - Air Pollution Control	RIGL 23-23 *et seq.*; CRIR 12-31-09	Applicable	Establishes guidelines for the construction, installation, or operation of potential air emission units. Establishes permissible emission rates for some contaminants.	No emissions are expected, however, removal action would be monitored and any if any control system is required it will meet the substantive provisions of the standards if threshold levels are reached.
Clean Air Act - Air Toxics	RIGL 23-23 *et seq.*; CRIR 12-31-22	Applicable	Prohibits the emission of specified contaminants at rates which would result in ground level concentrations greater than acceptable ambient levels or acceptable ambient levels as set in the regulations	Monitoring of air emissions during excavation will be used to assess compliance with these standards if threshold levels are reached. Operation and maintenance activities will be carried out in a manner which will minimize potential air releases.

TABLE 4-11

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 3: REMOVAL AND DISPOSAL
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Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Water Pollution Control - Water Quality	RIGL 42-16 *et seq.*; CRIR 12-190-001	Applicable	Establishes water use classification and water quality criteria for waters of the state. Also establishes criteria for discharge to a water body.	Any water from temporary storage area will be treated as required to meet this ARAR before being discharged. O&M of the shoreline revetment that will be managed so as to not discharge contaminants into adjacent waters.
State of Rhode Island Solid Waste Regulations Solid Waste Regulations Number 1 General Requirements Solid Waste Regulations Number 2 Solid Waste Landfills, effective date 1997	DEM-OWR-SW-04-01 as amended 1997, 2001, and 2005	Applicable	Addresses disposal of construction debris and solid waste and associated remediation and monitoring.	Disposal of solid waste and construction debris must comply with remedial and monitoring requirements of the regulations.
Water Pollution Control - Pollution Discharge Elimination Systems	RIGL 42-16 *et seq.*; CRIR 12-190-003	Applicable	Contains discharge limitations, monitoring requirements, and best management practices. Substantive requirements under NPDES are written such that state and federal NRWQC are met.	Discharge of any contaminated groundwater during soil excavation or treated groundwater into Narragansett Bay will meet applicable standards
Hazardous Waste Management Standards for Generators	*RIGL 23-19.1 et seq.; CRIR 12-030-003 Part 5*	Applicable	Sets standards for handling, design, operation, and monitoring of hazardous waste. The standards of 40 CFR Part 264 are incorporated by reference.	Wastes generated will be tested to determine if they constitute hazardous waste. Any hazardous waste identified will be handled and disposed according to these standards.

TABLE 4-12

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 4: SOIL COVER AND LUCS
FEASIBILTY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
EPA Human Health Assessment Cancer Slope Factors (CSFs).		To Be Considered	These are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.
Reference Dose (RfD)		To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	Used to calculate potential non-carcinogenic hazards caused by exposure to contaminants.
Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)		To Be Considered	Guidance for assessing cancer risk.	Used to calculate potential carcinogenic risks caused by exposure to contaminants.
Recommendations of the Technical Review Workgroup for Lead for an approach to Assessing Risks Associated with Adult Exposure to Lead In soil		To Be Considered	EPA Guidance for evaluating risks posed by lead in soil.	This alternative will meet these guidelines by isolating lead impacted soil exceeding adult and child industrial and commercial risk levels below cover materials and establishing land use controls to address remaining residential risks.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)		To Be Considered	Guidance of assessing cancer risks to children.	Used to calculate potential carcinogenic risks to children caused by exposure to contaminants.

TABLE 4-12

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 4: SOIL COVER AND LUCS
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STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
State of Rhode Island Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (Short Title: Remediation Regulations)	CRIR 12-180-001, Section 8; DEM-DSR-01-93, as amended February 2004	Applicable	These regulations set remediation standards for contaminated media. These standards are applicable to a CERCLA remedy when they are more stringent than federal standards. Establishes criteria for groundwater and both direct contact and leachability of contaminants in soil.	These standards were used to develop soil PRGs. This alternative meets this standard because soil exceeding PRGs is isolated from exposure to receptors with a barrier and soil cover. ICs prevent residential use of property.

TABLE 4-13

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 4: SOIL COVER AND LUCS
FEASIBILTY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Coastal Zone Management Act	16 USC Parts 1451 *et. seq*.	Applicable	Requires that any actions must be conducted in a manner consistent with state-approved management programs.	The site is located next to a coastal zone management area; therefore, applicable coastal zone management requirements need to be addressed**.**
Fish and Wildlife Coordination Act	16 U.S.C. 661 et seq	Applicable	Requires Federal agencies involved in actions that will result in the control of structural modification of any stream or body of water for any purpose to take action to protect fish and wildlife resources that may be affected by the action. The Navy must coordinate with appropriate federal and state resource agencies to ascertain the mans and measures necessary to mitigate, prevent, and compensate for project related losses of fish and wildlife resources and to enhance the resources.	Measures to mitigate or compensate adverse project related impacts to fish and wildlife resources will be taken, if determined necessary. The appropriate federal and state resource agencies will be consulted, in particular regarding any revetment O&M
Endangered Species Act	16 U.S.C. 1531 et seq.; 50 CFR Parts 200 and 402	Applicable	Regulates activities affecting federally listed endangered or threatened species or their critical habitat.	The federally-listed loggerhead turtle and Kemps-ridley turtle occur in the waters of Narragansett Bay. Appropriate federal agencies will be consulted to find ways to minimize adverse effects to listed species for the O&M of the revetment.
Rivers and Harbors Act	(33 U.S.C. Section 403); Section 10	Applicable	These regulations set forth criteria from the Army Corps of Engineers (ACOE) for placing dams/structures in navigable waters of the United States.	Excavation, dredging, and habitat restoration will comply with the Act's substantive environmental standards.

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ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs
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FEDERAL REQUIREMENTS (CONT)

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Clean Water Act	Section 404 (33 U.S.C. s 1344); Section 404 (b)(1) Guidelines for Specification of disposal sites for dredged or fill material (40 CFR Part 230, 231 and 33 C.F.R. Parts 320-323)."	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems. Filling or discharge of dredged material will only occur where there is no other practicable alternative and any adverse impacts to aquatic ecosystems will be mitigated.	Alternatives may involve discharge of dredged material and/or excavation during O &M of the shoreline revetment. Filling or discharge of dredged material will only occur where there is no other practicable alternative and any adverse impacts to aquatic ecosystems will be mitigated.
National Historic Preservation Act	16 USC 470 *et seq.*, 26 CFR Part 800	Applicable	Requires action to take into account effects on properties included on or eligible for the National Register of Historic Places and minimizes harm to National Historic Landmarks	Historic vessels may be sunken in the area. Remedial actions may involve actions that might cause potential harm to historic sites. Such actions would be prevented.

STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Coastal Resources Management	RIGL 46-23-1 *et seq.*	Applicable	Sets standards for management and protection of coastal resources.	The entire site is located in a coastal resource management area, therefore, applicable coastal resource management requirements need to be addressed**.**
Rhode Island Endangered Species Act	RIGL 20-37-1 et seq.	Applicable	Regulates activities affecting state listed endangered or threatened species or their critical habitat.	The State listed loggerhead turtle and Kemps-ridley turtle occur in the waters of Narragansett Bay. The Navy will coordinate with appropriate agencies to find ways to minimize adverse effects to listed species for the O&M of the revetment.

TABLE 4-14

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 4: SOIL COVER AND LUCs
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FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Clean Air Act (CAA), National Emission Standards for Hazardous Air Pollutants (NESHAPS)	42 USC 7411, 7412; 40 CFR Part 61	Applicable	NESHAPS are a set of emission standards for specific chemicals, including naphthalene, arsenic, cadmium, chromium, lead, mercury, nickel, PCBs, DDE, and hexachlorobenzene. Certain activities are regulated including site remediation.	Monitoring of air emissions during regrading will be used to assess compliance with these standards if threshold levels are reached. Operation and maintenance activities will be carried out in a manner which will minimize potential air releases.
Clean Water Act (CWA), Section 402, National Pollutant Discharge Elimination System (NPDES)	33 USC 1342; 40 CFR Parts 122-125, 131	Applicable	These standards govern discharge of water into surface waters. Regulated discharges must meet national recommended water quality criteria.	Erosion from the site will be managed through best management practices. . O & M of the shoreline revetment will be managed so as to not discharge contaminants into adjacent waters.
Clean Water Act; General Pretreatment Regulations for Existing and New Sources of Pollution	33 U.S.C. § 1251 et seq. 40 CFR. Part 403	Applicable	Standards for direct discharge of waste water into a Publicly Owned Treatment Works (POTW).	These standards will apply if water from the remedial action such as from dewatering is discharged to a POTW.

TABLE 4-14

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 4: SOIL COVER AND LUCs
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STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Clean Air Act - Fugitive Dust Control	RIGL 23-23 et seq.; CRIR 12-31-05	Applicable	Requires that reasonable precaution be taken to prevent particulate matter from becoming airborne.	Dust control measures would be incorporated during construction activities to prevent material from becoming airborne.
Clean Air Act - Emissions Detrimental to Persons or Property	RIGL 23-23 *et seq.*; CRIR 12-31-07	Applicable	Prohibits emissions of contaminants which may be injurious to humans, plant or animal life or cause damage to property or which reasonably interferes with the enjoyment of life and property.	Monitoring of air emissions during regrading will be used to assess compliance with these standards if threshold levels are reached.
Clean Air Act - Air Pollution Control	RIGL 23-23 *et seq.*; CRIR 12-31-09	Applicable	Establishes guidelines for the construction, installation, or operation of potential air emission units. Establishes permissible emission rates for some contaminants.	No emissions are expected, however, regrading activities would be monitored and any if any control system is required it will meet the substantive provisions of the standards if threshold levels are reached.
Clean Air Act - Air Toxics	RIGL 23-23 *et seq.*; CRIR 12-31-22	Applicable	Prohibits the emission of specified contaminants at rates which would result in ground level concentrations greater than acceptable ambient levels or acceptable ambient levels as set in the regulations	Monitoring of air emissions during regrading will be used to assess compliance with these standards if threshold levels are reached. Operation and maintenance activities will be carried out in a manner which will minimize potential air releases.
Water Pollution Control - Water Quality	RIGL 42-16 *et seq.*; CRIR 12-190-001	Applicable	Establishes water use classification and water quality criteria for waters of the state. Also establishes criteria for discharge to a water body.	O & M of the shoreline revetment that will be managed so as to not discharge contaminants into adjacent waters.

TABLE 4-14

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 4: SOIL COVER AND LUCs
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OLD FIRE FIGHTING TRAINING AREA
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Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 1.7.14(b)	Relevant and Appropriate	Regulation states that an approved closure plan must be implemented.	The site will be closed under a plan developed in accordance with CERCLA. As such, the closure requirements of the site will be documented in the ROD, the remedial design (RD), and the Operations and Maintenance Plan (O&M) (including a monitoring plan). Compliance with the closure requirements contained in the ROD, RD, and O&M plan will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 1.7.10	Relevant and Appropriate	Requires dust control.	Dust must be controlled at the site during cover construction and during maintenance activities.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 1.7.12 (a)	Relevant and Appropriate	Requires solid waste management facilities be designed and maintained to protect the health and safety of personnel at the facility and persons in close proximity.	Under this subsection health and safety of construction workers and persons in the proximity of the site would be maintained during construction and maintenance activities.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 1.8.01 (a) and 1.8.01 (b)	Relevant and Appropriate	Requires facilities to monitor groundwater and to meet closure requirements .	This ARAR is cited to memorialize the requirements to monitor groundwater and to meet closure requirements. Because contaminants will be left in place the site the site will be closed as a waste management unit, and undergo long term monitoring. The remedial design (RD), remedial action work plan (RAWP), operations and monitoring plan (O&M) (including the long term monitoring plan [LTMP]) developed for this cleanup will contain the specific monitoring and closure requirements for the waste management unit. These requirements may differ from those cited in this regulation for landfill purposes. Compliance with the groundwater monitoring and closure requirements contained in the LTMP, RD, RAWP, and O&M plan for this site will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.1.04	Relevant and Appropriate	Requires a "Sedimentation and Erosion Control Plan" be developed.	An erosion and sediment control plan will be developed for this site. It is intended that the RD and the RAWP, to be developed for this cleanup, will contain the specific erosion and sediment controls requirements for the remedial construction. Compliance with the RD

TABLE 4-14

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
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Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
				and RAWP requirements for erosion and sediment control will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.1.08 (a) (8)	Relevant and Appropriate	Contains requirements for construction of monitoring wells to monitor a solid waste landfill.	It is intended that this subsection serve as the ARAR memorializing the requirements for construction of new monitoring wells. The specific construction requirements will be described in the Long Term Monitoring Plan (LTMP). Such requirements may differ from those cited in this regulation, and will be developed to be appropriate for this site, and not for a solid waste landfill. Compliance with the monitoring well construction requirements of the LTMP will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.1.08 (c)	Relevant and Appropriate	Contains requirements for monitoring wells.	It is intended that this subsection serve as the ARAR memorializing the requirement to have and maintain monitoring wells for the purpose of monitoring groundwater conditions at the site. Because this remedy leaves waste in place, it will be supported with a Long Term Monitoring Plan (LTMP) for groundwater. The LTMP will be directed by a work plan that will contain the specific monitoring requirements. Such requirements may differ from those cited in this regulation, and will be developed to be appropriate for this site, and not for a solid waste landfill. Compliance with the monitoring well requirements of the LTMP will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.2.12 (d) (1) and 2.2.12 (d) (2) (ii)(iii) and (v).	Relevant and Appropriate	Contains requirements for construction and maintenance of the vegetative cover final cover system.	Remedies including cover systems may include appropriate vegetation requirements of a soil cover.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.3.04(e), (f)	Relevant and Appropriate	Outlines the requirements for the maintenance and permeability of cover material .	The ROD will include provisions to maintain the cover, and to assure that cover provides adequate levels of reduced permeability for specific areas cited by RIDEM. It is intended that this subsection serve as the ARAR memorializing the requirement to have and maintain a cover, not to identify permeability requirements. Asphalt has been determined to provide an adequate barrier for specific areas cited by RIDEM, and a two foot soil cover

TABLE 4-14

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
SOIL ALTERNATIVE 4: SOIL COVER AND LUCs
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
				has been determined provide an adequate barrier for the remainder of the land within the waste management area."
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.3.05	Relevant and Appropriate	Establishes requirement for compliance boundary for pollution of ground waters or surface waters.	It is intended that this subsection serve as the ARAR memorializing the requirement that no contamination of groundwater be permitted beyond the boundary of the WMA. Because this remedy leaves contamination in place, groundwater and sediment monitoring will be conducted to assure that no contaminants are transported to the groundwater or surface water beyond the boundary of the waste management area.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.3.10	Relevant and Appropriate	Contains requirements for surface water drainage.	It is intended that this subsection serve as the ARAR memorializing the requirement that appropriate surface drainage considerations must be developed for the WMA cover. The cover system would be designed to prevent erosion, sedimentation, and standing water on the cover. Minimum slope requirements for solid waste landfills would not be relevant or appropriate for a soil cover which is not intended to reduce infiltration.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.3.11	Relevant and Appropriate	Contains requirements for monitoring wells.	It is intended that this subsection serve as the ARAR memorializing the requirement to have and maintain monitoring wells for the purpose of monitoring groundwater conditions. Because this remedy leaves waste in place, it will be supported with a Long Term Monitoring Plan (LTMP) for groundwater. The LTMP will be directed by a work plan that will contain the specific monitoring well requirements. Such requirements may differ from those cited in this regulation, and will be developed to be appropriate for this site, and not for a solid waste landfill. Compliance with the monitoring well requirements of the LTMP work plan will be deemed compliance with this ARAR.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.3.14	Relevant and Appropriate	Provides requirements for new solid waste landfill units and expansions that impact wetlands and coastal wetlands, coastal flood zones,	This alternative will involve alteration of land within a 100 year coastal flood zone. This regulation is being cited to memorialize the requirement to protect the adjacent coastal wetland resources during construction and maintenance of a soil cover over soil containing

TABLE 4-14

ASSESSMENT OF ACTION-SPECIFIC ARARs AND TBCs
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Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
			etc.	residual contamination. The RD, RAWP, and the LTMP will be developed and provide specific requirements, which may differ from those in the cited regulation. Compliance with the RD, RAWP and the LTMP will be deemed compliance with this regulation.
Rhode Island Solid Waste Regulations	DEM OWM-SW04-01, 2.3.23	Relevant and Appropriate	Provides requirements for closure of solid waste units in "unstable areas", interpreted to include 100 year flood zones.	This alternative establishes a waste management area within a 100 year coastal flood zone. This regulation is being cited to memorialize the regulations to close solid waste landfills in unstable areas. This alternative meets the intent because the waste management area is not being expanded, but being closed within its footprint behind the stone revetment.
Regulations for the RI Pollutant Discharge Elimination System	RIGL 46-12, 42-17.1, 42-45	Relevant and Appropriate	Contains discharge limitations, monitoring requirements and best management practices. Substantive requirements under NPDES are written such that state and federal national recommended water quality criteria (NRWQC) are met. Permits are required for off-site discharges, RI Standards apply to POTWs.	Discharge of any contaminated groundwater during soil excavation into Narragansett Bay or POTWs will meet applicable standards.
Pretreatment Regulations	RIGL 46-12, 42-17.1, 42-45	Applicable	Rhode Island standards for discharge to POTWs.	These standards will apply if water from the remedial action such as from dewatering is discharged to a POTW.
State of Rhode Island Rules and Regulations for Dredging and Management of Dredge Materials	Rules and regulations for Dredging and Management of Dredge Materials DEM-OWR-DR-02-03	Applicable	Addresses dredging activities and disposal of dredge spoils.	Any dredging that is required for maintenance of the remedy must comply with the requirements of the regulations.

TABLE 4-15

SUMMARY OF COMPARATIVE ANALYSIS OF SOIL ALTERNATIVES
FESIBILTY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Criteria	Alternative 1 No Action	Alternative 2 Removal, Ex situ Treatment, Backfill, LUCs	Alternative 3 Removal, Disposal, and LUCs	Alternative 4 Soil Cover, and LUCs
THRESHOLD CRITERIA				
Overall Protection of Human Health and the Environment				
Human Health Protection	No reduction in risk	Provides high level of protection. Exposure reduced by excavation and treatment. Treatment reduces exposure hazard from vadose zone soil.	Provides high level of protection. Removal reduces future site exposure hazard from vadose zone soil.	Provides adequate level of protection. Containment reduces future site exposure hazard from vadose zone soil.
Environmental Protection	Allows continued exposure of contaminated soil.	Will prevent further exposure through removal and treatment.	Will provide protection at the site, however, future exposure from contaminants depends disposal facility.	Will prevent further exposure through containment and land use control.
Compliance with Applicable or Relevant and Appropriate Requirements				
Compliance with Chemical-Specific ARARs	No	Will meet PRGs within 1 year.	Will meet PRGs within 1 year.	Will meet PRGs within 1 year.
Compliance with Location-Specific ARARs	Not applicable	Will be performed in accordance with floodplain, wetland, wildlife, and historic preservation regulations.	Will be performed in accordance with floodplain, wetland, wildlife, and historic preservation regulations.	Will be performed in accordance with floodplain, wetland, and wildlife regulations.
Compliance with Action-Specific ARARs	Not applicable	Excavation and treatment systems will require dust suppression, silt fences, etc.	Excavation will require dust suppression, silt fences, etc.	Regrading and soil cover placement will require dust suppression, silt fences, etc.

TABLE 4-15

SUMMARY OF COMPARATIVE ANALYSIS OF SOIL ALTERNATIVES
FESIBILTY STUDY
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Criteria	Alternative 1 No Action	Alternative 2 Removal, Ex situ Treatment, Backfill, LUCs	Alternative 3 Removal, Disposal, and LUCs	Alternative 4 Soil Cover, and LUCs
Long-Term Effectiveness and Permanence				
Magnitude of Residual Risk	Will not meet either RIDEM or EPA risk target levels	Will be less than target cumulative cancer risk of 10^{-5} and HI of 1.0 under the restricted (industrial) land use	Will be less than target cumulative cancer risk of 10^{-5} and HI of 1.0 under the restricted (industrial) land use	Will be less than target cumulative cancer risk of 10^{-5} and HI of 1.0 under the restricted land use and while cover is maintained.
Need for 5-Year Review	Required	Required	Required	Required
Need for Long-Term Management	Not applicable	Prohibitions on land use must be maintained	Prohibitions on land use must be maintained	Prohibitions on land use must be maintained and cover must be inspected and maintained
Adequacy and Reliability of Controls	Not applicable	Provides a good level of reliability of residual management. Controls are adequate and reliable.	Provides a good level of reliability of residual management. Controls are adequate and reliable.	Provides a good level of reliability, soil covers are commonly successfully used.
Reduction of Toxicity, Mobility, or Volume through Treatment				
Amount Destroyed or Treated	None: only natural attenuation, if it occurs.	Contaminant reduction of 99% in treated soil.	Removal (by excavation) efficiency of 99%. Small amount destroyed or treated.	None: only natural attenuation, if it occurs.
Reduction in Toxicity, Mobility, and Volume	None: only natural attenuation, if it occurs.	Mobility and volume reduced	None	None.
Degree to which Treatment Is Irreversible	No active treatment	Low-Temperature Thermal Stripping (LTTS) and soil washing are considered permanent.	Removal and landfill disposal is not considered permanent .	No active treatment
Type and Quantity of Residuals Remaining after Treatment	No active treatment	LTTS and soil washing treatments will produce small quantity of liquids and activated carbon residuals.	Not applicable, no residuals	No active treatment

TABLE 4-15

SUMMARY OF COMPARATIVE ANALYSIS OF SOIL ALTERNATIVES
FESIBILTY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Criteria	Alternative 1 No Action	Alternative 2 Removal, Ex situ Treatment, Backfill, LUCs	Alternative 3 Removal, Disposal, and LUCs	Alternative 4 Soil Cover, and LUCs
Short-Term Effectiveness				
Community Protection during Implementation	No active treatment; no risk to community	Dust and air emissions from excavation and treatment activities can be controlled.	Dust from excavation and removal activities can be controlled. Significant truck traffic in the community.	Dust from regrading can be controlled. minor truck traffic for clean fill in the community.
Worker Protection during Implementation	No active treatment; no risk to workers	PPE required against dermal contact, dust inhalation, and air emissions during construction and treatment.	PPE required against dermal contact and dust inhalation during excavation.	PPE required against dermal contact and dust inhalation during regrading
Environmental Impacts	No impact from alternative implementation	Impacts from dust and air emissions, soil erosion, etc., can be controlled.	Impacts from dust and soil erosion, etc., can be controlled.	None anticipated
Time until Remedial Action Objectives Achieved (from project start)	> 30 years	Estimated 9-11 months.	Estimated 6-8 months	Estimated 3-4 months
Implementability				
Ability to Construct and Operate the Technology	No construction activities	Implementable. Applicability depends on type of soil and pilot testing may be required. Excavation in SWOS area complicated by utilities	Implementable. Contractors and equipment readily available. Excavation in SWOS area complicated by utilities	Implementable. Contractors and equipment readily available.
Reliability of the Technology	No treatment	Average reliability. Requires considerable maintenance.	Better reliability. Properly maintained earthmoving equipment will have few failures.	Better reliability. Properly maintained earthmoving equipment will have few failures.
Ease of Undertaking Additional Remedial Actions, if Necessary	Easily implementable	Additional soil removals can be implemented.	Additional soil removals can be implemented.	Clean backfill thickness is thinner than Alternatives 2 and 3 therefore additional soil removals could be implemented

TABLE 4-15

SUMMARY OF COMPARATIVE ANALYSIS OF SOIL ALTERNATIVES
FESIBILTY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

Criteria	Alternative 1 No Action	Alternative 2 Removal, Ex situ Treatment, Backfill, LUCs	Alternative 3 Removal, Disposal, and LUCs	Alternative 4 Soil Cover, and LUCs
Implementability (cont.)				
Ability to Monitor Effectiveness of Remedy	Not applicable	System efficiencies and failures can readily be monitored. System failure may allow uncontrolled air emissions and backfilling of contaminated soil.	Area and depth of removal can easily be monitored. Monitoring failure could allow contaminated soil to remain in place.	Effectiveness of remedy can be visually monitored to assess erosion.
Administrative Requirements with Regulators	None Expected	Need to comply with all ARAR standards. No on-site permits will be required. Land use controls would be required to limit future site use for industrial purposes.	Federal, state, and/or base permits may be required for transportation, off-site treatment and disposal. Need to comply with all ARAR standards. No on-site permits will be required. TSDF should have a permit. Land use controls would be required to limit future site use for industrial purposes.	Land use controls would be required to limit future site use for industrial purposes and to assure the soil cover is not disturbed.
Availability of Off-Site TSDF	None required	Available	Available	None required
Availability of Necessary Equipment and Specialists	None required	Available	Available	Available
Availability of Prospective Technologies	None required	Available	Available	Available
Cost[a,b]				
Capital Costs	$0	$18,475,000	$14,819,000	$1,419,000
Total Annual Operations and Maintenance (O&M)	$0	$15,000/5 years $5,000 (others)	$15,000/5 years $5,000 (others)	$26,000/5 years $16,000 (others)
5-Year Reviews [(C)]	$0	$0	$0	$0
Total Present Worth Project Costs	$0	$18,621,000	$14,966,000	$1,783,000

[a]Detailed cost estimates are presented in Appendix I.
[b]These costs have been rounded off to the nearest $1,000.
[c] 5-Year Reviews would be conducted under the groundwater remedy.

TABLE 5-3

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs
GROUNDWATER ALTERNATIVE 1: NO ACTION
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
EPA Human Health Assessment Cancer Slope Factors (CSFs).		To Be Considered	These are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media. The No Action Alternative will not meet the risk based standards established by the federal TBC criteria.
Reference Dose (RfD)		To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	Used to calculate potential non-carcinogenic hazards caused by exposure to contaminants. The No Action Alternative will not meet the risk based standards established by the federal TBC criteria.
Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)		To Be Considered	Guidance for assessing cancer risk.	Used to calculate potential carcinogenic risks caused by exposure to contaminants. The No Action Alternative will not meet the risk based standards established by the federal TBC criteria.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)		To Be Considered	Guidance of assessing cancer risks to children.	Used to calculate potential carcinogenic risks to children caused by exposure to contaminants. The No Action Alternative will not meet the risk based standards established by the federal TBC criteria.

STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Remediation Regulations DEM-DSR-01-93 Section 8.03, A to D.		To Be Considered	Sets levels for monitoring of contaminated groundwater when more stringent than federal standards.	Standards were considered in development of GW PRGs based on the use of the groundwater as a water supply. The No Action Alternative will not meet the risk based standards established by the State Remediation Regulations.

TABLE 5-6

ASSESSMENT OF CHEMICAL-SPECIFIC ARARs AND TBCs
GROUNDWATER ALTERNATIVE 2: LIMITED ACTION
FEASIBILTY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
EPA Human Health Assessment Cancer Slope Factors (CSFs).		To Be Considered	These are guidance values used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	Used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in site media.
Reference Dose (RfD)		To Be Considered	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media.	Used to calculate potential non-carcinogenic hazards caused by exposure to contaminants.
Guidelines for Carcinogen Risk Assessment EPA/630/P-03/001F (March 2005)		To Be Considered	Guidance for assessing cancer risk.	Used to calculate potential carcinogenic risks caused by exposure to contaminants.
Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens EPA/630/R-03/003F (March 2005)		To Be Considered	Guidance of assessing cancer risks to children.	Used to calculate potential carcinogenic risks to children caused by exposure to contaminants.

STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Remediation Regulations DEM-DSR-01-93 Section 8.03, A to D.		To Be Considered	Sets levels for monitoring of contaminated groundwater when more stringent than federal standards.	This alternative meets these criteria using institutional controls to control groundwater use.

TABLE 5-7

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs
GROUNDWATER ALTERNATIVE 2: LIMITED ACTION
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

FEDERAL REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Clean Water Act	Section 404 (33 U.S.C. s 1344); Section 404 (b)(1) Guidelines for Specification of disposal sites for dredged or fill material (40 CFR Part 230, 231 and 33 C.F.R. Parts 320-323)."	Applicable	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative with lesser effects is available. If activity takes place, impacts must be minimized to the maximum extent. Controls discharges of dredged or fill material to protect aquatic ecosystems. Filling or discharge of dredged material will only occur where there is no other practicable alternative and any adverse impacts to aquatic ecosystems will be mitigated.	Alternatives may involve sediment sampling and installation/maintenance of monitoring wells along the shoreline. Monitoring activities will be conducted to minimize impact to aquatic systems and mitigate if monitoring activities cause disruption to those aquatic systems.
Coastal Zone Management Act	16 USC Parts 1451 *et. seq*.	Applicable	Requires that any actions must be conducted in a manner consistent with state approved management programs.	The site is located next to a coastal zone management area, therefore, applicable coastal zone management requirements need to be addressed**.**
Fish and Wildlife Coordination Act	16 U.S.C. 661 et seq.	Applicable	Requires Federal agencies involved in actions that will result in the control of structural modification of any stream or body of water for any purpose to take action to protect fish and wildlife resources that may be affected by the action. The Navy must coordinate with appropriate federal and state resource agencies to ascertain the means and measures necessary to mitigate, prevent, and compensate for project related losses of fish and wildlife resources and to enhance the resources.	Measures to mitigate or compensate adverse project related impacts to fish and wildlife resources will be taken, if determined necessary. The appropriate federal and state resource agencies will be consulted, in particular regarding any sediment sampling or monitoring well installation/ maintenance.
Endangered Species Act	16 U.S.C. 1531 et seq.; 50 CFR Parts 200 and 402	Applicable	Regulates activities affecting federally listed endangered or threatened species or their critical habitat.	The federally-listed loggerhead turtle and Kemps-ridley turtle occur in the waters of Narragansett Bay. Appropriate federal agencies will be consulted to find ways to minimize adverse effects to listed species for sediment sampling or monitoring well installation/maintenance.

TABLE 5-7

ASSESSMENT OF LOCATION-SPECIFIC ARARs AND TBCs
GROUNDWATER ALTERNATIVE 2: LIMITED ACTION
FEASIBILITY STUDY
OLD FIRE FIGHTING TRAINING AREA
NAVSTA NEWPORT, NEWPORT, RHODE ISLAND

STATE OF RHODE ISLAND REQUIREMENTS

Requirement	Citation	Status	Synopsis of Requirement	Action to Be Taken to Attain ARAR
Coastal Resources Management	RIGL 46-23-1 *et seq.*	Applicable	Sets standards for management and protection of coastal resources.	The entire site is located in a coastal resource management area; therefore, applicable coastal resource management requirements need to be addressed**.**
Rhode Island Endangered Species Act	RIGL 20-37-1 et seq.	Applicable	Regulates activities affecting state listed endangered or threatened species or their critical habitat.	The State listed loggerhead turtle and Kemps-ridley turtle occur in the waters of Narragansett Bay. Navy will coordinate with appropriate agencies to find ways to minimize adverse effects to listed species for sediment sampling or monitoring well installation/maintenance.