U. S. ENVIRONMENTAL PROTECTION AGENCY
REGION 1 - EPA NEW ENGLAND

RECORD OF DECISION
September, 2015

PETERSON/PURITAN, INC. SUPERFUND SITE
CERCLIS EPA ID #: RID055176283
OPERABLE UNIT 2
CUMBERLAND AND LINCOLN, RHODE ISLAND





SDMS DocID 582110

Record of Decision
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**Cover Photos: Peterson/Puritan, Inc. Site File photos depicting the Cumberland, RI side of the Blackstone River and early operations of the J. M. Mills Landfill Facility; late 1950s.

PART 1: THE DECLARATION FOR THE RECORD OF DECISION

A. SITE NAME AND LOCATION

Peterson/Puritan, Inc. Superfund Site
Cumberland and Lincoln, Rhode Island
CERCLIS EPA ID #: RID055176283
Operable Unit 2

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit 2 of the Peterson/Puritan, Inc. Superfund Site (OU 2 or OU 2 of the Site), in Cumberland and Lincoln, Rhode Island, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC § 9601 *et seq.*, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300. The Director of the Office of Site Remediation and Restoration (OSRR) has been delegated the authority to approve this Record of Decision (ROD).

This decision was based on the Administrative Record, which has been developed in accordance with Section 113 (k) of CERCLA, and which is available for review at the Cumberland and Lincoln Public Libraries and at the United States Environmental Protection Agency (EPA) Region 1 OSRR Records Center in Boston, Massachusetts. The Administrative Record Index (Appendix G to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The State of Rhode Island, as the support agency, concurs with the selected remedy (**see Appendix A**).

C. ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect human health and the environment from actual or threatened releases of hazardous substances into the environment.

D. DESCRIPTION OF THE SELECTED REMEDY

This ROD sets forth the selected remedy for OU 2 of the Site, which addresses contaminated floodplain soils, sediment, and groundwater within OU 2 and also follows a

presumptive containment approach[1] for addressing the large volumes of wastes, including hazardous waste, disposed of in landfills and associated debris fields within the boundary of OU 2. More specifically, these waste disposal areas include the J. M. Mills Landfill, the Nunes Parcel, and an island between the two areas located in the Blackstone River and called the "Unnamed Island" (all of which operated for a time as a single landfill and disposal Facility) where contamination from the landfill operations came to be located within the floodplain of the Blackstone River. These disposal areas are identified as contributing to groundwater contamination and leading to the continued release and or threat of release and further migration of hazardous substances to the floodplain soils and pond sediments within the OU 2 boundary. These areas are shown in **Figure 1 (Appendix B)**. The entire portion of OU 2 is also located within the John H. Chafee Blackstone River Valley National Heritage Corridor which, in 2014, the Blackstone River Valley National Historical Park was established. An overarching objective in conducting the cleanup for OU 2 is to minimize any detrimental impacts from remedy construction activities and ensure that aesthetic considerations are incorporated and compatible with the development of the National Historical Park within the Blackstone Valley Heritage Corridor. The cleanup at OU 2 is primarily focused on the following areas/media which form a comprehensive approach that addresses all current and potential future risks caused by the landfilling and disposal practices within OU 2.

J. M. Mills Landfill: Following a presumptive containment approach, debris fields adjacent to the landfill, excavated floodplain soils, sediments from a pond located to the north of the landfill designated as Pond N, and, as appropriate, contaminated media from the Unnamed Island will be consolidated under a protective cap constructed on this landfill, meeting Rhode Island Rules and Regulations for Hazardous Waste Management § 8.2(A) that incorporate the requirements of Resource Conservation and Recovery Act (RCRA) Subtitle C performance standards at 40 C.F.R. Section 264.310) for preventing the release of hazardous waste and other contaminants. A landfill gas management system will be designed and constructed (passive or active collection/treatment to be determined in design). The cap must be constructed to protect against flooding, up to a 500-year event, and effectively manage stormwater. In order to facilitate construction of a protective landfill cap design within the constraints of the floodplain, some waste may need to be disposed of off-site.[2] Some debris may be either clean enough or can be decontaminated to allow recycling off-site. Consolidated contaminated soils and sediments from

[1] 40 C.F.R. Section 300.430(a)(iii)(B) contains the expectation that engineering controls, such as containment, will be used for waste that poses a relatively low long-term threat where treatment is impracticable. At Operable Unit 2 (OU 2), solid waste and industrial waste including hazardous wastes and hazardous substances, as defined in Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), were co-disposed at the J. M. Mills Landfill Facility (all OU 2 waste disposal areas operated for a time as a single landfill and disposal Facility) and have come to be located within the floodplain of the Blackstone River. Because treatment of large volumes and a heterogeneous mixture of co-disposed wastes, including hazardous waste, is impracticable, EPA considers containment to be the appropriate response action, or the "presumptive containment approach" for the J. M. Mills Landfill and the Nunes Parcel areas within the Facility.

[2] In accordance with Section 121(d)(3) of the CERCLA and the NCP at 40 C.F.R. Section 300.440, otherwise known as EPA's Off-site Rule.

the Unnamed Island (see below) will be dewatered and used as shaping substrate under the cap to the extent practical. Wetland and floodplain habitats will be restored after the contamination is addressed, to the extent practicable. Long-term monitoring of groundwater, surface water, sediment, landfill gas, and leachate, coupled with operation and maintenance (O&M) (e.g., cap repairs, mowing) and institutional controls (ICs) are included that will allow potential beneficial reuse that is consistent with the long-term protectiveness of the remedy.

Nunes Parcel: Also following a presumptive containment approach, the cleanup of the Nunes Parcel includes the demolition of existing buildings; excavation of contaminated soils and sediments from an adjacent pond, designated as Pond I; and consolidating these soils under a protective cap constructed over buried wastes on the Nunes Parcel meeting Rhode Island Rules and Regulations for Hazardous Waste Management § 8.2(A) that incorporate the requirements of RCRA Subtitle C performance standards at 40 C.F.R. Section 264.310 for preventing the release of hazardous waste and other contaminants. In addition, contaminated media from the Unnamed Island (see below) will be consolidated and capped within the Nunes Parcel. A landfill gas management system will be designed and constructed (passive or active collection/treatment to be determined in design) and the cap will be constructed to protect against flooding, up to a 500-year event, and effectively manage stormwater. In order to facilitate construction of a protective landfill cap design within the constraints of the floodplain, some waste may need to be disposed of off-site. Some debris may be either clean enough or can be decontaminated to allow recycling off-site. Wetland and floodplain habitats will be restored after the contamination is addressed, to the extent practicable. To ensure protectiveness, long-term monitoring of groundwater, surface water, sediment, landfill gas, and leachate, coupled with O&M (e.g., cap repairs, mowing), and institutional controls are included that will allow potential beneficial reuse that is consistent with the long-term protectiveness of the remedy.

Unnamed Island Soils and Waste Deposits: This portion of the remedy consists of excavating all waste deposits (estimated at 40,000 cubic yards (cy)) and contaminated soils (approximately 62,000 cy) exceeding cleanup levels, which are to be processed and consolidated for placement under the constructed cap(s). All of the excavated material from the Unnamed Island will be consolidated under the Nunes Parcel and/or the J. M. Mills caps (except for some debris that may be decontaminated and recycled, or any other material that is sent to an off-site disposal facility licensed to accept the contaminated media). Wetland and floodplain habitats will be restored after the contamination is addressed, to the extent practicable, and after completion of the work there will be no restrictions on recreational use of the area (the area is unsuitable for residential development due to its location in the floodplain of the Blackstone River).

Sediment (Ponds at Unnamed Island): This portion of the remedy for managing contaminated sediments will include additional sediment studies to finalize the design depth for the dredging[3] and ascertain stability and practicality of appropriate subaqueous cover designs. Currently, one foot of sediment will be removed from each of the Unnamed Island ponds (designated Ponds A, D, and E; approximately 8,700 cy), with confirmatory sampling. The removed sediments will be dewatered and used as shaping substrate under the J. M. Mills and/or Nunes landfill cap(s). Any remaining areas of contaminated sediment will be covered with one foot of sediment/substrate engineered with amendments, as necessary, to limit migration of any remaining contaminants. Any wetland and floodplain habitats altered along the edge of the ponds by the remediation will be restored after the contamination is addressed, to the extent practicable. Institutional controls to protect the subaqueous cover from future disturbance and long-term O&M/monitoring of the subaqueous cover as necessary to ensure protectiveness is included in this action while provisions for passive recreational use (such as canoeing/kayaking) will be permitted.

Groundwater: This portion of the remedy will include the establishment of an OU 2 groundwater compliance boundary around the OU 2 waste disposal areas (discussed above), implementation of institutional controls (preventing use and/or alteration of groundwater within the zone of compliance), and long-term monitoring to ensure that there is no migration of contaminated groundwater beyond the compliance boundary. An additional buffer zone around the compliance boundary may be established during the remedial design phase of the cleanup or, if required, sometime after the remedy is implemented, based on future monitoring data and five-year reviews to prevent wells from being used or installed that have the potential to draw contaminated groundwater away from OU 2.

The selected response action for OU 2 is the second and final comprehensive remedy to be implemented for the Peterson/Puritan, Inc. Superfund Site. It establishes cleanup levels which are protective of recreational use activities and the environment and will establish protective caps/covers on the landfills and pond sediments. The remedy also includes additional investigations, O&M of the remedy, and long-term monitoring, including conducting five-year reviews.

No principal threat waste was identified at OU 2. Principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Wastes generally considered to be principal threats are liquid, mobile, and/or highly-toxic source material. The selected response action addresses low-level threat wastes by: capping waste, including hazardous waste, and consolidating contaminated soils and sediments; controlling potential exposures through institutional controls; restoring habitats disturbed by

[3] If the difference in dredged volume is relatively small, additional dredging will be performed to reduce or potentially eliminate the need for a subaqueous cover and future maintenance. Design studies will also include hydrodynamic modeling to ascertain the selection of appropriate cover materials.

remedial activities; and ensuring continued active or passive recreational use along the river corridor, as practicable.

The excavation and capping components of the remedy will prevent direct contact with contaminants by human and ecological receptors. In addition, the remedy will prevent migration of contaminants to groundwater and surface water or recontamination of sediments. The estimated present value cost of the selected remedy is $40.3 million.

E. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and State requirements that are applicable or relevant and appropriate to the remedial action (unless justified by a waiver), and is cost-effective. There are no principal threat wastes present at OU 2. Because there are no principal threat wastes present and the size and heterogeneous mixture of co-disposed wastes contained in the landfills at OU 2 of the Site make treatment technically impracticable, the selected remedy does not satisfy the statutory preference for treatment as a principal element.

Because this remedy will result in hazardous substances remaining on-site above levels that would allow for unlimited use and unrestricted exposure (and because land use restrictions are necessary), five-year reviews, which have already been initiated at the Site due to the OU 1 remedy,[4] will ensure that the OU 2 remedy continues to provide adequate protection of human health and the environment.

F. SPECIAL FINDINGS

Issuance of this ROD embodies the following specific determinations.

Toxic Substances Control Act (TSCA): Polychlorinated Biphenyl (PCB) Cleanup Plan is Protective

Based on historical industrial activity, PCB-contaminated soil/sediment at OU 2 meet the definition of a PCB remediation waste, as defined under 40 C.F.R. Section 761.3 of regulations promulgated under TSCA, 15 U.S.C. § 2601 et seq., and thus are regulated for cleanup and disposal under 40 C.F.R. Part 761. Under 40 C.F.R. Section 761.61(c), EPA may authorize disposal of PCBs in a manner not otherwise specified provided EPA determines that the disposal will not pose an unreasonable risk of injury to health or the environment.

Consistent with TSCA regulatory requirements at 40 C.F.R. Section 761.61(c), EPA has reviewed the Administrative Record for OU 2 and considered the excavation, passive dewatering

[4] The next five-year review of the Site will be in 2017.

and either on-site or off-site disposal of PCB-contaminated soil/sediment with greater than 10 parts per million (ppm) PCBs from the Unnamed Island, from the riparian buffer of the Blackstone River, and along the perimeter of the J. M. Mills Landfill and Nunes Parcel contained within the boundary of OU 2.

PCB Cleanup Standard

The removal of contaminated soil/sediment with greater than 10 ppm PCBs will address potential human health risks posed by passive recreational activity within these areas. The cleanup number is based on EPA human health and ecological risk assessments that have determined that soil/sediment with PCB levels at less than or equal to 10 ppm do not pose an unreasonable risk to health (for passive recreational use) or to the environment. The 10 ppm PCB standard also will meet the Rhode Island Department of Environmental Management (RIDEM) direct exposure criteria for PCBs. The J. M. Mills Landfill and Nunes Parcel will be subject to institutional controls that will restrict residential use. The Unnamed Island has been determined, due to its location in the Blackstone River, to be unsuitable for residential development and thus a residential use restriction will not be required. Based on these facts, EPA finds that the in-place disposal of soil/sediment with a PCB concentration of less than or equal to 10 ppm on the Unnamed Island, in the riparian buffer of the Blackstone River, and along the perimeter of the J. M. Mills Landfill and Nunes Parcel contained within the boundary of OU 2 will not pose an unreasonable risk of injury to health or the environment provided all soil/sediment requiring removal will be identified based on in situ (pre-excavation) PCB levels and not subject to dilution.

PCB Consolidation and Disposal

The Regional Administrator has determined that the off-site disposal and/or on-site disposal of PCB-contaminated soil/sediment and debris under either one or both of the landfill caps to be constructed on OU 2, as set out in the Administrative Record for OU 2, will not pose an unreasonable risk of injury to health or the environment as long as the following conditions are met:

1. Any PCB-contaminated debris or soil/sediment currently existing within the J. M. Mills and Nunes Parcel landfills shall be covered with landfill cap(s) that meet the TSCA regulatory requirements of 40 C.F.R. Section 761.61(a)(7) and RCRA Subtitle C regulations (40 C.F.R. Section 264.310) or the debris or soil/sediment shall be addressed by Condition #4.[5]

[5] No PCB contamination of soil or sediment above 25 ppm has been identified within OU 2, at this time. Under the Toxic Substance Control Act (TSCA) cap requirements at 40 C.F.R. Section 761.61(a)(7), the Resource Conservation and Recovery Act (RCRA) Subtitle C landfill caps to be established on-site are protective for the disposal of PCB-contaminated materials at greater than 25 ppm provided a long-term monitoring and maintenance plan is prepared and implemented for the caps and for groundwater.

2. Any PCB-contaminated debris or soil/sediment excavated on the Unnamed Island shall be consolidated under one of the on-site landfill caps that will be constructed to meet requirements under TSCA regulatory requirements at 40 C.F.R. Section 761.61(a)(7), and RCRA Subtitle C regulations (40 C.F.R. Section 264.310), or the debris or soil/sediment shall be addressed by Condition #4.[6]

3. All OU 2 soil/sediment exceeding the proposed cleanup standard of 10 ppm PCBs shall be excavated from the floodplain and shall be consolidated under one of the on-site landfill caps that will be constructed to meet requirements under TSCA regulatory requirements at 40 C.F.R. Section 761.61(a)(7), and RCRA Subtitle C regulations (40 C.F.R. Section 264.310).[7]

4. Any soil, sediment, or debris designated for off-site disposal shall be tested for PCBs in-situ, and depending on any PCB contamination identified, shall be managed and dewatered (if necessary) as required under 40 C.F.R. Section 761.61 and disposed of in an off-site disposal facility licensed to accept the level of PCB contaminated material identified, unless it is metal debris that can be decontaminated to meet TSCA decontamination standards at 40 C.F.R. Section 761.79, so as to be suitable for recycling off-site.

5. Water generated from excavations or dewatering of PCB-contaminated soils/debris will be tested for PCBs and, depending on any PCB contamination identified, managed, treated (if required) and disposed of in compliance with TSCA requirements at 40 C.F.R. Section 761.79(b).

6. Water quality monitoring shall be performed during soil/sediment excavation in adjacent water bodies, passive dewatering and on-site management of excavated soil/sediment/debris to ensure that water quality levels comply with the performance criteria specified in the ROD.

7. Air monitoring and appropriate dust suppression measures shall be implemented and maintained to ensure that airborne PCB levels are below levels of concern specified in the ROD during any excavation, passive dewatering, and management of excavated soil/sediment and debris conducted prior to completion of cap construction.

8. Land use restrictions (institutional controls) shall be established on the newly capped J. M. Mills and Nunes Parcel landfills to ensure the long-term effectiveness of the caps. These land use restrictions may include, but not be limited to, restricting residential use, restricting future excavation into and beneath the caps, restricting access for buried utilities, prohibiting the construction of buildings with pilings or basements and maintaining the caps.

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[6] *Id.*
[7] *Id.*

9. A long-term monitoring and maintenance plan shall be developed and implemented for final caps and for groundwater to ensure effectiveness of the caps in eliminating direct contact and ensuring no migration of PCBs from the capped areas.

EPA solicited public comment on its TSCA finding through the Proposed Plan and comments received concerning the TSCA finding are addressed in the Responsiveness Summary (Part 3).

Wetland Clean Water Act Impacts

Further, as defined by Section 404(b) of the Clean Water Act and regulations promulgated under the Act at 40 C.F.R. Parts 230, 231 and 33 C.F.R. Parts 320-323 the Regional Administrator finds that the selected remedy is the least environmentally damaging practicable alternative (LEDPA) for protecting federal jurisdictional wetlands and aquatic ecosystems at OU 2 under these standards. In compliance with standards within relevant and appropriate Wetland Protection and Floodplain Management regulations (44 C.F.R. Part 9), EPA solicited public comment on its LEDPA finding within the Proposed Plan. EPA's responses to general comments regarding wetland issues are located in the Responsiveness Summary (Part 3). In sum, EPA's selected remedy balances the need to address the contamination that poses an ecological risk to the wetlands and waterways and its ability to restore any (temporarily or permanently) altered wetland resources and aquatic habitats impacted by the remediation.

Floodplain Impacts

Further, the Regional Administrator solicited public comment, under 44 C.F.R. Part 9, on its determination that there is no practicable alternative to occupancy and/or modification of portions of the floodplain in the immediate vicinity of the J. M. Mills Landfill, the Nunes Parcel, and the Unnamed Island. To address remedial measures that may affect floodplain resources, EPA will conduct necessary mitigation measures to protect downstream receptors in the floodplain and to address concerns about maintaining the aesthetics of the riparian corridor. However, some level of floodplain armament at the base and a portion of the side slope of the constructed caps will be necessary to protect the selected remedy (caps) from periodic inundation due to flooding, as both landfills are situated within the 500-year floodplain of the Blackstone River. Best management practices (BMPs) will be used to minimize adverse impacts on the floodplain resources while preventing the release of permanently landfilled contaminants into the Blackstone River and riparian zone. BMPs will include: 1) mitigating alteration of riparian floodplain habitat through erosion control measures and proper re-grading and re-vegetation of the impacted areas with indigenous (native) species and; 2) any lost flood storage capacity from the proposed project will be compensated for so that downstream receptors are protected. As part of the remedial design process, it may be determined that some contaminated soil and/or landfill material can be recycled and/or may need to be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) to shape and resize the landfills, to create a protective riparian corridor along the base of the landfills, and to minimize the loss of

flood storage for the Blackstone River. The action to place a subaqueous sediment cover in the Unnamed Island ponds will be designed to prevent any release of contamination in the event of flooding, up to a 500-year event. EPA's responses to general comments regarding floodplain issues are located in the Responsiveness Summary (Part 3).

G. ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record file for OU 2.

- Chemicals of concern (COCs) and their respective concentrations;
- Baseline risk represented by the COCs;
- Remediation levels established for COCs and the basis for the levels;
- Current and future land and ground-water use assumptions used in the baseline risk assessment and ROD;
- Land and groundwater use that will be available at the site as a result of the selected remedy;
- Estimated capital, O&M, and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected; and
- Decisive factor(s) that led to selecting the remedy.

H. AUTHORIZING SIGNATURES

This ROD documents the selected remedy for containing wastes, including hazardous waste, and mitigating the further potential of the release of hazardous substances to the floodplain soils and pond sediments at OU 2 of the Site. This remedy was selected by EPA with concurrence of the Rhode Island Department of Environmental Management.

Concur and recommended for immediate implementation:

U.S. Environmental Protection Agency

By: Nancy Barmakian Date: 09/08/15

Nancy Barmakian
Acting Director
Office of Site Remediation and Restoration
Region 1

PART 2: THE DECISION SUMMARY

A. SITE NAME, LOCATION AND BRIEF DESCRIPTION

The Peterson/Puritan, Inc. Superfund Site (CERCLIS ID #: RID055176283) (Peterson/Puritan Site or Site) encompasses about 500 acres (approximately two miles long by 1,500 to 2,000 feet wide), in a mixed industrial/commercial and residential/recreational community along the Blackstone River, which also includes a portion of the Blackstone River Valley National Historical Park between the Ashton Dam to the north and the Pratt Dam to the south in the towns of Cumberland and Lincoln, Rhode Island. The Site also includes the 26-acre Lincoln Quinnville Wellfield and the Cumberland Lenox Street municipal water supply well.[8]

EPA initiated investigations of the Site in 1987. Subsequently, Site work has been conducted under a Potentially Responsible Party (PRP) lead. During investigations to address groundwater contamination and other threats and releases to the environment, the Site was broken into sub-areas in 1990. Currently, the Site is divided into two operable units for response actions under CERCLA authority. A third area of potential concern, known as the Mackland Farm or Kelly House property and the Ashton Mill property situated below the Ashton Dam and north of Operable Unit 1 (OU 1) were addressed through voluntary actions overseen by the State of Rhode Island. These properties are no longer considered by EPA to be a part of the Peterson/Puritan, Inc. Site. OU 1 is defined as the "Primary Source Area" for groundwater impacts identified within the boundary of the Site and has been addressed through a Record of Decision (OU 1 ROD) in 1993 with source control actions completed and groundwater treatment and long term monitoring continuing at this portion of the Site (see EPA's Administrative Record and Record of Decision for OU 1, September, 1993).

This decision document addresses Operable Unit 2 (OU 2) of the Site. OU 2 is situated immediately southeast and downstream of OU 1. OU 2 contains many parcels within the immediate floodplain of the Blackstone River. These parcels include J. M. Mills Landfill,[9] the Nunes Parcel, and an unnamed island (Unnamed Island); all of which contain waste deposits and were owned and operated by Joseph and Linda Marszalkowski through their business J. M. Mills, Inc., during the time of disposal as a single landfill facility (the "Facility" or OU 2). Contamination from the Facility operations came to be located within the immediate floodplain of the river corridor. **Figure 2** (see **Appendix B**) shows OU 2 divided into individual subareas, as defined by their geographical and physical characteristics. As currently defined, OU 2 is just over 1-mile-long (5,600 feet) and varies in width from approximately 1,200 to 1,900 feet, which

[8] During the Preliminary Assessment process, the Lenox Street Municipal Well site was provided a CERCLIS EPA ID # RID981205693. This site was later identified as being a potential receptor to groundwater contamination associated with the listing of the Peterson/Puritan, Inc. Superfund Site.

[9] During the Preliminary Assessment process, the J. M. Mills Landfill, Inc. site was provided a CERCLIS EPA ID # RID045370251. This site was later identified as being a potential source for groundwater contamination associated with the listing of the Peterson/Puritan, Inc. Superfund Site.

corresponds to a total area of approximately one third of a square mile, or 200 acres. Bordering OU 2 to the north is the Hope Global Company property and the southern portion of OU 1. To the south of OU 2 is the Stop and Shop Market (and strip mall) on Mendon Road, Cumberland (Route 122) and the Pratt Dam. The eastern boundary of OU 2 includes the Providence and Worcester Railroad (P&W) tracks, along the western edge of the large wetlands complex (east of OU 2) forming the eastern extent of P&W's right-of-way. The western boundary of OU 2 is the Blackstone River. OU 2 includes the Unnamed Island in the southern portion of OU 2. The main channel of the Blackstone River flows east around the Unnamed Island, and a secondary channel of the river flows west of the Unnamed Island.

The southern boundary of OU 2 contains a gated access road which links Mendon Road east of the Stop and Shop market complex to a 10-acre parcel currently known as the Nunes Parcel and provides access to all of OU 2. This parcel is bounded by the Blackstone River to the north and west and bounded to east by the P&W railroad easement. Prior to 1987, this southern portion of OU 2 was used to access all landfill operations from Mendon Road where mixed industrial, commercial (including some hazardous) wastes, and municipal trash entered the Facility through this parcel for disposal throughout the Facility. Remedial investigations identified waste disposal both at the surface and buried within this parcel. This parcel includes an inlet and a buried power canal (partially underlying the transfer station building) perpendicular to, and connecting with, the river's edge. Today, this parcel also contains several structures, truck bodies, and shacks.

Immediately southwest and across the river channel from the J. M. Mills Landfill is the 28-acre Unnamed Island located in the Blackstone River, that was also used for Facility operations. Wastes were disposed of on the Unnamed Island and the island's soils were mined from borrow pits, well below the water table in some cases, and used to provide daily cover materials for landfill operations within the Facility. Some of the borrow pits were also used as additional disposal sites during the time in which the Facility was operating. Portions of these pits remain open. The resulting ponds are subject to flooding at times of high flow and are functioning as aquatic habitat. South of the Unnamed Island is the Pratt Dam, which provides an access point to the Unnamed Island. Collectively, the J. M. Mills Landfill, the Nunes Parcel, and portions of the Unnamed Island are identified as principal contaminant sources for OU 2 receptors (including groundwater, floodplain soils, and surface water and sediments in OU 2 ponds).

Other specific subareas investigated during the assessment of OU 2 include the following:

- associated Debris Fields (DFs), staging areas, and suspected disposal trenches along the bank of the Blackstone River;
- gravel/paved access roads in the immediate vicinity of OU 2;

- a series of wetlands to the east of the J. M. Mills Landfill and railroad easement (referred to as Wetlands A through D in the Remedial Investigation (RI) Report (Arcadis, 2012);[10]
- Pratt Dam/and Blackstone River Bikeway;
- P&W rail line running north to south through the Site which borders the J. M. Mills Landfill and the Nunes Parcel to the east;
- Blackstone River main and back channels flowing north to south and around the Unnamed Island; and
- ponds located on the island, immediately above Pratt Dam, and along the eastern shore and floodplain of the river within OU 2.

A further description of OU 2 can be found in Section 1.3.1 of the RI Report, and in Section 2.1 of the Feasibility Study (FS) Report (USEPA, 2014).[11]

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of Site and OU 2

The Blackstone Valley was settled in the seventeenth century and became one of the earliest sites of the Industrial Revolution in America. Regionally and historically, the Blackstone River provided power, supplied water, and served as a conduit for waste water discharge throughout the development of this industrial era.

Groundwater from the Blackstone Valley aquifer was first developed as a municipal water supply source in OU 1 in 1950 when the Town of Cumberland installed the Martin Street well. The Lenox Street well, located near the southern end of the Site in OU 2, was added to the Cumberland system in 1964. By 1967, the Martin Street well was no longer in service due to increasing water quality issues with iron and manganese and by 1979 the Lenox Street well was the source of approximately four percent of the town's water supply.

The Town of Lincoln installed its first supply well in the Quinnville wellfield in 1957. In 1970 and 1975 Lincoln installed two more wells at this location. By 1979, the Quinnville wellfield was supplying Lincoln with approximately 45 percent of its water. During routine statewide sampling of wells in 1979, the Rhode Island Department of Health (RIDOH) discovered volatile organic compounds (VOCs), some at levels exceeding EPA drinking water guidelines, in three Quinnville wells and the Lenox Street well. The primary contaminants were 1,1,1-trichloroethane (TCA) and tetrachloroethylene (PCE) at concentrations ranging from 27 to

[10] ARCADIS. 2012. *Remedial Investigation Report*, Peterson/Puritan, Inc. Superfund Site – Operable Unit 2, Cumberland and Lincoln, Rhode Island. August 2012.
[11] United States Environmental Protection Agency. 2014. *Draft Feasibility Study, Peterson/Puritan, Inc. Superfund Site - Operable Unit 2, Cumberland and Lincoln, Rhode Island.* Agency Revision of the FS prepared by Arcadis in March 2013. July 2014.

166 parts per billion (ppb) in all four wells tested. Trichloroethylene (TCE) was also detected at 14 ppb at Quinnville well #1. All wells were closed, and the Town of Lincoln constructed two new wells in the Blackstone Valley aquifer, one north and one south of the Quinnville wellfield beyond the area of the Site. The Town of Lincoln later took measures to connect to the Providence water system. Cumberland's water shortfall was offset by other town-owned water resources, including the Sneech Pond reservoir and municipal supply wells in the Abbott Run watershed and from the Manville wells, also located in the Blackstone Valley several miles up-river from the Site. Cumberland currently also purchases water from the town of Pawtucket.

Within the area of OU 2, historical maps show a large dammed reservoir present in the valley upstream of Pratt Dam as early as 1870. This is confirmed by 1940 and 1950 aerial photographs of this area. With the possible exception of low lying sand bars and river terraces, the parcels containing the J. M. Mills Landfill operations including the Nunes Parcel and all the Unnamed Island are not observed in these early photographs. At that time, land on both sides of the P&W railroad track was substantially inundated by water, and the railroad track apparently was built on an earthen levee running through a wide pond and channel complex controlled primarily by the Pratt Dam. Based upon a review of aerial photographs from the early 1950s, it appears that the Pratt Dam control structure was no longer in place and this reservoir was drained exposing a meandering river channel and multiple sand bar features. As a result of the draining and filling activities, substantial new tracts of land had opened up in the areas of the current J. M. Mills Landfill, Nunes Parcel, and the Unnamed Island by the mid-1950s.

Disposal activities at the Facility occurred from approximately 1954 to 1986. During this time, assorted hazardous wastes and hazardous substances, as defined in Section 101(14) of CERCLA, were disposed at the Facility.[12] Based upon aerial photos, the most active period of filling and regrading (including movement of the Blackstone River channel from the center to the southwest wall of the valley) occurred in the mid- to late 1960s. The filling and creation of new land in the area of the former New Pond appears to have taken place first in the area that became

[12] Unilever Bestfoods and CCL Custom Manufacturing, Inc. v. American Steel & Aluminum Corp. et al C.A. No. 01-496L, 2001 Complaint and 2002 First Amended Complaint which provides a detailed list of waste disposed of at OU 2 of the Site and presented to the U.S. District Court of Rhode Island by members of the potentially responsible party group. More specifically, see Paragraph 16 of this document which states ""Hazardous substances," as defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), were disposed of at the J.M. Mills Landfill in OU-2 and have come to be located at the Site. These hazardous substances include, without limitation, 1,1,1 trichloroethane, trichloroethylene, methylene chloride, toluene, solvent mixtures, ink, metals, waste oils, absorbents (Speedy-Dry),chlorinated solvents, methyl ethyl ketone, solvents, solid chemical waste (ignitable dust), cyanide, drums, solids and sludges, fly ash, RCRA metals, loose ink, glue waste, hydraulic and lubricating oils, acetone, tetrachloroethene, xylenes, chemical waste, copper hydroxide, plating waste, PCBs, creosote telephone poles, laboratory waste chemicals, formaldehyde, bag house waste, latex sludges, mercury batteries, recycled oils and solvents, plating cyanide solution, hazardous lime sludge with copper and nickel, automotive waste, batteries, assorted hazardous wastes, drums with labels removed, powdered metals, sulfuric acid, caustics, machine oils, waste water treatment sludge, inorganics, heavy metals, hydroxide sludge, still bottoms, filters, leather trimmings and wax plant wastes." This document can be found in the Administrative Record.

the development of the Nunes Parcel by 1963. By 1970, access to the Unnamed Island was gained by crossing a segment of the dam and exiting onto a new constructed earthen levee west of the former control structure leading to the Unnamed Island. Active stockpiling, excavation, and filling activities on the Nunes Parcel, J. M. Mills Landfill, and the Unnamed Island are evident on the aerial photographs through the 1970s and into the early 1980s. Other pertinent features noted in aerial photographs[13] of the J. M. Mills Landfill, Nunes Parcel, and Unnamed Island included pools or trenches of discolored liquids, stained soils, leachate outbreaks, and fifty five gallon drums. The location and the number of pools or trenches and stained soils varied over time, as did the number of drums. The maximum number of drums observed in a particular location occurred on the Nunes Parcel where at least 500 drums were visible in a photograph. According to the final RI Report, a State Inspection Report from 1980 describes a salvage yard located in the southwest corner of the Facility (approximately 50 feet west of the southern tip of the J. M. Mills Landfill – between the toe of the landfill and the Blackstone River). Stacked 55-gallon drums were photographed in the central portion of the western side of the J. M. Mills Landfill, also between the toe of the J. M. Mills Landfill and the Blackstone River. The exact location of these reported areas could not be definitively identified during the subsequent RI. However, aerial photographs depict areas of drums and tanks located on the Facility. In addition, on August 18, 1983, a RIDEM official inspected the Facility and discovered approximately 30 55-gallon drums which contained various waste materials including solvents and oils. Also, on September 1, 1983, the Facility was again inspected and samples were taken from various drums containing oil, waste oil, thinner, alkaline solution, and degreasing solvents. Following the results of these samples, the Facility's Hazardous Waste Manifests and shipping papers document that flammable and corrosive hazardous wastes were shipped off-site on September 16, 1983.

OU 2, including the J. M. Mills Landfill, Nunes Parcel, and the Unnamed Island are shown on **Figure 2** (see **Appendix B**).

A more detailed description of the history of OU 2 can be found in Section 1.3.2 of the RI Report (Arcadis, 2012)[14] and in Section 2.1 of the FS.

2. History of Federal and State Investigations and Removal and Remedial Actions

At the time of the listing of the Site onto the National Priorities List (NPL) on September 9, 1983, the Site was defined as including 920 acres in the well fields of Lincoln and Cumberland along the Blackstone River. The Peterson/Puritan, Inc. facility located on Martin Street in Cumberland was identified as a major source of the groundwater contamination found in the Quinnville municipal wells south and west of the source across the Blackstone River in

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[13] USEPA, 1987. Site Analysis: Peterson-Puritan, Inc. Study Area, Lincoln/Cumberland, Rhode Island. Environmental Monitoring Systems Laboratory, March 1987.
[14] ARCADIS. 2012. *Remedial Investigation Report*, Peterson/Puritan, Inc. Superfund Site – Operable Unit 2, Cumberland and Lincoln, Rhode Island. August 2012.

Lincoln. While similar contamination was observed in the Lenox Street well further down river on the Cumberland (east side) of the Blackstone River suggesting a potential link to the Peterson/Puritan, Inc. source, no definitive evidence was documented during the OU 1 investigations. The Lenox Street well remained closed and was included, with other parcels south of OU 1, in a later remedial investigation for OU 2.

On a periodic basis from 1978-1991, RIDEM performed inspections of the Facility and issued various Notice of Violations. On August 18, 1983, a RIDEM official inspected the OU 2 of the Site and discovered approximately 30 55-gallon drums which contained various waste materials including solvents and oils. On September 1, 1983, OU 2 was again inspected by a RIDEM official who observed in excess of 100 55-gallon drums. Samples were taken from various drums containing oil, waste oil, thinner, alkaline solution, and degreasing solvents. Following the results of these samples, RIDEM performed a removal action. Hazardous Waste Manifests and shipping papers document that hazardous wastes were shipped off-site on September 16, 1983.

EPA conducted a removal action at OU 2 in 1992 which included constructing a fence around the former J. M. Mills Landfill to restrict access and removing drums containing hazardous substances and hazardous wastes from the base of the J. M. Mills Landfill. The Removal PA/SI sampling identified and confirmed contaminant emissions from vent pipes and from the base of the landfill. The water samples indicated contaminants including lead, zinc, copper, barium, chromium, and VOCs. Soils collected from areas along the base of the landfill indicated the presence of similar heavy metals, VOCs, and SVOCs. A hazardous waste manifest from November 1991 identified flammable liquids, along with other items containing hazardous substances. According to the 1991/1992 report prepared by EPA's On-Scene Coordinator, analyses of the drums contents indicated the presence of SVOC's including naphthalene, dimethylphthalate, acetophenone, and heavy metals including arsenic, barium, cadmium, lead, and mercury. In November 1997, a second removal action was conducted at OU 2 to address asbestos-containing wastes found outside of the fenced-in area of the J. M. Mills Landfill. The security fence was also extended to limit further dumping, including asbestos-containing materials, and maintain access restrictions at the OU 2 portion of the Site.

In April 1999, EPA initiated communications with a group of companies identified as CERCLA Potentially Responsible Parties for OU 2 (PRP Group) reminding them of their obligations to complete the RI/FS under the terms of a 1987 administrative order on consent (AOC). An amended AOC was signed on July 13, 2001 and a PRP-lead study followed for OU 2 with oversight by EPA and RIDEM. The RI was completed and released in 2012 and the FS made public in 2014.

During the course of the RI/FS, additional response actions also occurred within the boundary of, or involving, OU 2. These actions are briefly described below.

In 2002, river advocates notified EPA and RIDEM of an abandoned track-mounted 59-ton Bucyrus-Erie excavator located on the Unnamed Island that was thought to once be part of the J. M. Mills Landfill operation. It is believed that the machine was abandoned sometime before the early to mid-1980s. The abandoned excavator had sat in relative obscurity until the increased recreational use of the area brought about by the bike path. With collaboration from EPA, an investigation of the excavator by RIDEM revealed that the condition of the excavator was very poor and immobile, but contained degraded fuel and hydraulic oil in seriously compromised holding tanks. It was also evident that under certain meteorological conditions the island flooded. Approximately 600 gallons of degraded fuel and hydraulic oil was contained within the excavator. RIDEM, taking a response action under the Oil Spill Prevention Administration and Response Fund, and in coordination with EPA, made the decision to remove the oil from the excavator to prevent a future oil spill from the excavator into the Blackstone River.

In 2003, the Owens Corning Company, under the proceedings of a Chapter 11 bankruptcy, entered into an agreement with EPA and RIDEM to resolve its liabilities by removing its waste in various locations, including OU 2. More specifically, Owens Corning conducted a removal action of approximately 55 tons of waste from the Unnamed Island that was disposed of at an approved off-site location. To access the Unnamed Island, Owens Corning improved an access crossing to the Unnamed Island thereby allowing other work to be performed. As a component of Owens Corning's efforts, RIDEM, working with the United States Army Corps of Engineers, coordinated a removal action responding to the dismantling and removal of the above-mentioned excavator from the floodway of the Blackstone River. Moreover, the improved access allowed the PRP Group conducting the OU 2 RI to bring heavy equipment across the main channel of the Blackstone River and conduct a more comprehensive investigation of the Unnamed Island. A completion report for the Unnamed Island Limited Removal Action was approved by EPA and RIDEM in January 2004.

EPA chose to redefine the OU 2 boundary in 2005 through a partial deletion of a portion of the Site, owned by Macklands Realty, Inc. and Berkeley Realty, Co., from the National Priorities List. After reviewing data obtained from the developer for these properties, EPA, with concurrence from the State of Rhode Island, determined that the release impacting OU 2 posed no significant threat to human health or the environment at the Macklands and Berkeley properties and, therefore, warranted no current response action at the properties. The deleted area included two properties, involving 29.8 acres, designated on the Town of Cumberland Tax Assessor's Map Plat 14, Lot 2 and Plat 15, Lot 1, known locally as the Berkeley Commons and River Run developments. The final Notice for this partial deletion is found in the Federal Register, May 9, 2005 (Volume 70, Number 88).

On property immediately south of, and extending onto, the Nunes Parcel the State undertook a cleanup action to construct Segment 4B of the Blackstone River Bikeway (Soil Removal Area). As part of the bikeway construction, floodplain regulations required the Rhode Island Department of Transportation (RIDOT) and RIDEM to construct a floodplain

compensation area for the Blackstone River. With EPA concurrence, this operation included the removal of approximately 8,214 tons of soil characterized as hazardous waste for off-site disposal and an additional 3,396 tons of solid waste, refuse, and soils approved for use as daily cover at the Central Landfill. These wastes and soils were contaminated primarily with lead, and to a lesser extent, arsenic, volatile and semi-volatile organic compounds and trace amounts of pesticides. Completed in July 2004, this soil removal operation indicated to EPA that the extent of the hazardous substances contained in surface and subsurface soils extends onto portions of Lots 4 (west), 8, and 18 of Plat 12 (Nunes Parcel). Further details regarding this response action can be obtained from RIDOT, or by consulting the Remedial Action Closure Report, Blackstone River Bikeway, Segment-4B, Pratt Dam Fill Area (VHB Inc., July 2004) contained in the Administrative Record.

Until 2009, it was believed by EPA and others associated with the RI/FS that no public or private groundwater supply wells were operating within or adjacent to OU 2, and that the entire area was served by public water systems. However, in 2009, following a citizen inquiry concerning the Site, EPA became aware of a home on Wildwood Street (immediately east of the site boundary and south of Lenox Street) using groundwater for consumption. Upon further investigation, EPA learned of two newly constructed homes (2006) located on Dixon Street (north of Wildwood) also using well water. Additional research conducted by EPA in conjunction with the Town of Cumberland, revealed that all other residential properties located within, or near to, OU 2 are currently connected to municipal drinking water. In November 2009, EPA conducted sampling of the three identified residential wells. Trace detections of total recoverable metals and volatile organic analytes were detected, but at concentrations well below health based levels. Currently, the residential well located on Wildwood is not in use due to flooding of the home in 2010 and a determination by the Town of Cumberland that the home is no longer habitable. The two Dixon Street wells remain in use. EPA formally advised the home owners to perform periodic testing of their potable water.

In the Fall of 2011, the Providence and Worchester Railroad Company (P&W), working with its consultant GZA GeoEnvironmental, Inc. (GZA), informed EPA of planned track improvements along its rail easement from Martin Street south to Mendon Road through OU 2 and more specifically, immediately adjacent to, and paralleling, the eastern slope of the J. M. Mills Landfill and the eastern property line of the Nunes Parcel. These improvements included the re-installation of a second spur track which had been previously dismantled in the 1950s. It also required the demolition of EPA's security fence and consideration that construction of this restored second rail could also interfere with the ongoing RI/FS. In response to EPA's and RIDEM's concerns that waste deposits may be located on the proposed second rail, GZA (for P&W) conducted field investigations including a land survey, test pits, and sampling. The test pit explorations showed that the buried landfill waste was only present within the easement along the central section of the length of the proposed restored second track and did not extend up to the location of the proposed restored second track installation. In addition, GZA's evaluation revealed that it was not preferable to place the restored second track on the easterly side of the P&W easement in that this would require filling of wetlands and/or wetland buffer areas and

filling within the 100-year floodplain. In contrast, GZA presented conceptual engineering plans which concluded that the placement of the restored second track is compatible with future landfill closure (capping) requirements that minimizes floodplain filling and does not involve wetland or wetland buffer filling or alterations. P&W proceeded with the construction and in August 2014 informed EPA that the restored rail spur was in service. As an aside, in November 2014, an article in the Boston Globe stated that the Boston Surface Railroad Company has initiated a study evaluating commuter rail service from Worcester to Providence. This service, if it were to run on P&W's lines between Worcester and Providence, would run through the Site.

In May 2014, RIDEM, in review of certain permit applications, issued correspondence to an applicant/developer noting concerns related to parcels under consideration for development (immediately south of Nunes and the Site boundary) which could potentially contain buried waste materials and/or contaminants present due to past operations at OU 2. The subject parcel is Plat 12, Lot 4 (east) and includes Lot 15 to the south. The applicant proposes to improve the abutting parcel to OU 2 (Lot 4) in connection with plans to construct an 8,800 square foot retail commercial building on Lot 15. A portion of Lot 4 is planned to be utilized for additional parking and for a stormwater infiltration basin. Additionally, in historical images dated 1939 and 1954, a "power canal" oriented in a northwest to southeast direction through the area is visible. This power canal also cut through the Nunes Parcel. In the 1962 image, the canal boundary is visible, but the canal is dry indicating that filling of the canal had started. Because landfilling at the J. M. Mills Landfill to the north occurred in the same time frame as the filling of the power canal and that studies indicate the power canal on the Nunes Parcel contained waste, EPA and RIDEM were concerned about the potential for waste to have been used to fill the power canal throughout greater portion of its length. Employing Lakeshore Environmental, the developer conducted a limited site assessment in 2014. Findings from these assessments conducted on Lot 4 indicate that buried waste is not found on Lot 4, soils do not appear to be impacted from OU 2 landfilling activities, shallow groundwater from OU 2 does not appear to flow in the direction of Lot 4 during very dry summer conditions, and a limited groundwater investigation did not identify any contaminants in the shallow aquifer located within Lot 4 (based on a single sampling event conducted in September 2014).

3. History of CERCLA Enforcement Activities

Pursuant to the terms of an amended 1987 Administrative Order on Consent (AOC), Respondents KIK Custom Products, Inc. (f/k/a CCL Custom Manufacturing, Inc., and f/k/a Peterson/Puritan, Inc.) and Waste Management of Massachusetts, Inc., Waste Management Disposal Services of Massachusetts, Inc., Waste Management of Rhode Island, Inc., and Clean Harbors of Braintree, Inc. (collectively referred to as Waste Management) agreed to complete the RI/FS at OU 2 while Waste Management and the Contributing Respondent Conocpo, Inc. (f/k/a Unilever, Inc. and f/k/a Bestfoods) agreed to assume financial responsibility for those EPA costs associated with the RI/FS. In addition, approximately 38 parties agreed to participate as cash-out parties to the AOC.

Approximately 130 parties have been notified of their potential liability for future cleanup costs at OU 2. In addition, the case team has successfully completed a number of bankruptcy settlement agreements to resolve site-specific CERCLA claims.

C. COMMUNITY PARTICIPATION

Throughout the Site's history, community concern and involvement has been low to moderate with the exception that at the time of the OU 2 Proposed Plan community interests increased to a high level. EPA has kept the community and other interested parties apprised of Site activities through informational presentations, fact sheets, information and documents on a public website, press releases, and public meetings. Additionally, EPA maintains the Site information repository at the EPA Region 1 Records and Information Center located at 5 Post Office Square, Boston, Massachusetts and also maintains local repositories in the vicinity of the Site at both the Town of Cumberland and Town of Lincoln public libraries. Below is a brief chronology of public outreach efforts for OU 2.

- In a press release on August 17, 2001, EPA informed the public of its agreement reached with two companies to initiate the planning for comprehensive site investigations and an evaluation of cleanup options for OU 2.

- Development of the Ashton-Pratt Corridor Redevelopment Plan (Crossman Engineering, Inc., 2004).[15] In the summer of 2002, the towns of Cumberland and Lincoln were granted funds from the EPA under the Superfund Redevelopment Initiative Pilot Grant to perform an analysis of the Ashton-Pratt Corridor (which includes OU 2). This analysis included evaluating existing, and reasonably anticipated future land uses, as part of the planning scope. The work also involved community charrettes and planning meetings to engage the public. The final plan was published in 2004 and endorsed by the towns of Cumberland and Lincoln. The plan envisioned a "dynamic node" along the Blackstone River to enhance natural resources and recreation opportunities, preserve the economic base, and establish a sense of place.

- Update to the Community Relations Plan:[16] This was completed in 2003 for the Site with emphasis on OU 2. In preparing this update, the issues and concerns expressed by local officials and citizens were compiled that also included reasonably anticipated future land use and beneficial groundwater uses at OU 2.

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[15] Crossman Engineering, Inc. 2004. *Ashton-Pratt Corridor Redevelopment Plan, Cumberland and Lincoln Rhode Island, July 2004.*

[16] Metcalf & Eddy. 2003. Final Draft Community Relations Plan Update, Peterson/Puritan, Inc. Superfund Site, Operable Unit #2 (including J. M. Mills Landfill), Cumberland and Lincoln, Rhode Island. March 2003. This plan can also be referred to as a Community Involvement Plan.

- EPA held a public information meeting in August 2003 to explain the field components and the process of the RI/FS for OU 2. A fact sheet describing the field work was also widely dispersed within the affected communities. During this same time period, EPA also provided notice in the Valley Breeze to the local community of certain targeted construction work at the Pratt Dam and the Unnamed Island. This specific work included, among other facets, coordination with Owens Corning and the State in the removal of fiberglass and a large excavator from the island.

- Spanning a five-year time frame from 2002 to 2007, EPA completed (for public review) its Second Five-Year Review of the Peterson/Puritan, Inc. Site, which emphasizes the cleanup at OU 1, but also documented in some detail the progress underway at OU 2.

- In March 2010, EPA and RIDEM met with members of Stop Trashing Our Place to discuss residents' issues and concerns related to manufacturing operations and the Site. Issues were raised concerning both OU 1 and OU 2. During the meeting, the EPA Technical Assistance Grant (TAG) coordinator and the EPA Community Involvement Coordinator helped to facilitate the meeting and provide information on resources available to communities impacted by hazardous waste sites. Programs such as TAG and Technical Assistance Services for Communities were discussed as well as facilitation services offered by EPA to help groups with varied interests work together and develop an effective working relationship.

- EPA placed a notice in early July 2010 in the Valley Breeze informing the local community of a letter of intent from the Blackstone River Watershed Council/Friends of the Blackstone to apply for a TAG and to encourage other groups to consolidate and submit a joint application. The Blackstone River Watershed Council/Friends of the Blackstone was subsequently awarded a TAG on December 2, 2010 to aid the communities' understanding of the technical components of the cleanup, monitor OU 1 and OU 2 activities, and help disseminate information locally. A press release to this regard also followed.

- On November 9, 2010, EPA initiated consultation concerning OU 2, pursuant to EPA's obligations under Section 106 of the National Historic Preservation Act of 1966, as amended. Efforts included a meeting held on February 29, 2012 with, among others, representatives of the Narragansett Tribe and Rhode Island Historical Preservation Commission.

- On July 6, 2011, the first TAG meeting was held in Cumberland, Rhode Island. Additional meetings followed.

- The Final RI Report was released to the public in August 2012.

- On December 12, 2012, EPA held a public technical presentation of the findings of the RI of OU 2. Accompanying this meeting were three technical fact sheets[17] published by EPA and widely distributed specifically describing the RI findings, public health risks concerning the consumption of fish taken from the river, and next steps.

- In the fall of 2013, as a component of the information provided to the National Remedy Review Board (the Board) for its review, EPA chose to invite a select number of interested stakeholder groups (representing the local community, the state, natural resource trustees, and PRPs) to submit a written summary of any issues they believed were pertinent to a future cleanup decision, including their recommended approach. These comments were brought to the attention of the Board and are provided in the Administrative Record.

- On July 22, 2014, EPA mailed out "Save the Date" cards announcing the meeting and public hearing on the Proposed Plan. The postcard was mail to over 500 residents and stakeholders. While the Proposed Plan itself was not mailed out, the postcard included a web link to the Proposed Plan.

- On July 31, 2014, EPA published a notice and press release which included a brief analysis of the Proposed Plan in the Valley Breeze. The notice and press release also informed the public of the location of the local repositories (both the Cumberland and Lincoln Public Libraries) and the primary repository located at EPA Records and Information Center, EPA Region 1, Boston, Massachusetts. Lastly, the Proposed Plan requested comment on certain findings, including: a draft determination that the remedy's approach to addressing PCB contamination on-site does not pose an unreasonable risk of injury to health or the environment; a draft determination that the proposed cleanup activities conducted in on-site wetlands is the least environmentally damaging practical alternative (LEDPA), as defined by the federal Clean Water Act, for protecting wetland and aquatic resources; and on EPA's assessment of how the proposed cleanup would address potential alterations of floodplain resources.

- On August 7, 2014, EPA held an informational meeting to discuss the cleanup alternatives presented in the FS and to present the Agency's Proposed Plan to a broader community audience than those that had already been involved in the Site. Copies of the Proposed Plan were made available to attendees at the meeting and also placed at the local information repositories within the Cumberland and Lincoln Public Libraries. A thirty day public comment period was initiated on August 8, 2014. Shortly thereafter, a

[17] 1) Site Update: Peterson/Puritan, Inc. Superfund Site, November, 2012; 2) Community Update: Concerns Identified for Eating Fish from the Blackstone River, December, 2012; and 3) Technical Factsheet: Human Health Implications for Native (Resident) Fish Consumption in the Blackstone River, Peterson/Puritan Inc. Superfund Site, Operable Unit 2. Each can be found in the Administrative Record for OU 2.

written request for a 60-day extension was received and EPA granted an extension to the public comment period to conclude on November 4, 2014. A public hearing was held on August 21, 2014 at which time a request for a second hearing to be held later in the extended public comment period was heard. EPA granted this request and a second public hearing was held on October 8, 2014.

- On September 17, 2014, EPA issued a second "Save the Date" postcard as well as a press release announcing the second public hearing and the comment period extension.

- On October 30, 2014, the Town of Cumberland requested a third extension of the public comment period. In consideration of the Town's request to have a further opportunity to evaluate EPA's proposal, as well as other reports and comments provided to the Town by other interested parties, EPA again extended the public comment period. On October 31, 2014, EPA issued another press release to Rhode Island media announcing the third comment period extension. During this extended period of time and in response to the Town's request, EPA proposed, and the Town accepted, access to technical assistance under TASC, a separate EPA contract managed through EPA Headquarters at no cost to the town. The comment period closed on January 23, 2015. Written comments were also received prior to the close of the public comment period. All oral and written comments received during the public comment period were reviewed by EPA and summarized in Part 3 - Responsiveness Summary to the ROD.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

Response activities at the Site were divided geographically into operable units in 1990 to address the multiple sources of contamination impacting groundwater. EPA has already selected a remedy for OU 1 in a ROD signed in 1993. OU 1 is addressing contamination emanating from the former location of the Peterson/Puritan, Inc. facility and the PAC facility north of OU 2. While several source control response actions have been undertaken within OU 1, the groundwater response actions at OU 1 remain in progress since completing construction of the groundwater treatment system in 1996.

The second operable unit, the subject of this ROD, involves following a presumptive containment approach[18] for landfills and combining components of different remedial

[18] Section 300.430(a)(iii)(B) of the NCP contains the expectation that engineering controls, such as containment, will be used for waste that poses a relatively low long-term threat where treatment is impracticable. At OU 2, solid waste and industrial waste including hazardous wastes and hazardous substances, as defined in Section 101(14) of CERCLA, were co-disposed at the J. M. Mills Landfill Facility (all OU 2 waste disposal areas operated for a time as a single landfill and disposal Facility) and have come to be located within the floodplain of the Blackstone River. Because treatment of large volumes and a heterogeneous mixture of co-disposed wastes, including hazardous waste,

alternatives to address actual and potential health risks resulting from exposure to contamination identified at OU 2. This second operable unit ROD presents the final, comprehensive response action for the Site that addresses all current and potential future risks within the boundary of OU 2 with focus on the J. M. Mills Landfill, the Nunes Parcel, and the Unnamed Island.

The OU 2 remedy was developed to be consistent with federal and state applicable or relevant and appropriate requirements (ARARs) including, but not limited to: RCRA regulations at 40 C.F.R. Part 264.310; Section 404(b) of the Clean Water Act and regulations promulgated under it (33 U.S.C. §1344; 40 C.F.R. Part 240, 231 and 33 C.F.R. Parts 320-323; Wetland Protection and Floodplain Management (44 C.F.R. Part 9); TSCA and regulations promulgated under it (15 U.S.C. 2601 *et seq.*; 40 C.F.R. Part 761); Rhode Island Fresh Water Wetlands Act and rules/regulations promulgated under it (R.I.G.L. 2-1), RI Rules and Regulations for Hazardous Waste Management (R.I.G.L. 23-9.1 *et seq.*; CRIR 12-030-003) and RI Remediation Regulations (C.R.I.R.12-180-001).

Waste disposal practices at OU 2, including the disposal of hazardous waste, waste containing hazardous substances, and solid wastes, constitute low-level threat wastes due to the lengthy exposure duration necessary for the identified contaminants to create an unacceptable risk. There are no principal threat wastes identified for OU 2. The selected response action addresses these low-level threat wastes by: capping, including hazardous waste, and consolidating contaminated soils and sediments; disposing of some contaminated material off-site; controlling potential exposures through institutional controls; and restoring habitats disturbed by remedial activities and assuring continued active or passive recreational use along the river corridor, as allowed by OU 2 property owners.

E. SITE CHARACTERISTICS

The significant findings of the RI can be found in the final RI Report and are summarized below. In addition, Section 2 of the FS contains an overview of the RI results. It should be noted that previous to the OU 2 RI, initial studies were conducted throughout the entire Site between 1987 and 1990, and prior to the breakout of the operable unit designations. These historic results can be found in the Administrative Record within the Remedial Investigation Report for the Peterson/Puritan Site (C-E Environmental, Inc., 1990).[19]

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is impracticable, EPA considers containment to be the appropriate response action, or the "presumptive containment approach" for the J. M. Mills Landfill and the Nunes Parcel areas within the Facility.

[19] C-E Environmental, Inc. 1990. Remedial Investigation Report for the Peterson/Puritan Site, Cumberland, Rhode Island. Report prepared for CPC International, Inc.

1. Physical Setting

This section, summarized from the RI, presents information on the physical setting of OU 2, based on investigations at OU 2 and supplemented, where necessary, with other information for the area.

Site Geology

As mapped by Hermes *et al.* (1994),[20] bedrock in the region consists of late Proterozoic or older (Precambrian) metamorphic rocks of the Blackstone Group. These rocks range in type from quartzite and schists derived from sedimentary rocks to greenstone, amphibolites, and serpentinite derived from volcanic rocks. The Blackstone Group was studied in some detail (Fernald (1983),[21] including the road-cut exposures along Highway I-295 in the Blackstone River Valley, approximately 1.5 miles north of OU 2. The bedrock is described as homogeneous, massive quartzite beds interbedded with phyllite (in some cases, green colored) and micaceous quartzite. Structurally, the Blackstone River Valley follows the axis of a northwest-trending overturned antiform. This structure is truncated between Lonsdale and Valley Falls by a north-trending normal fault system marking the border of the Narragansett Basin, a rift valley of Triassic to Jurassic age. Schistosity dips moderately at 40 degrees to 60 degrees to the northeast. The configuration of the bedrock surface beneath the valley was mapped in the previous Remedial Investigation Report for the Peterson/Puritan Site (C-E Environmental, Inc., 1990)[22] and revised (Shield, 2004)[23] based on bedrock elevations in the literature, test boring logs, and seismic refraction survey results. (See **Figure 2-8** in **Appendix B**)

Regionally, the bedrock is overlain by a thin mantle of till, which is primarily described locally as poorly sorted sand, silt, gravel, cobbles, and boulders, ranging from very dense sandy silt to comparatively loose silty sand (C-E Environmental, Inc., 1990). In the river valleys, thick sand and gravel deposits overlie the till. The surficial Blackstone River Valley deposits were mapped by Chute (1949)[24] as floodplain alluvium, river terrace alluvium, and kame terraces (along the valley walls). The deeper sand deposits within the OU 2 study area have been

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[20] Hermes, O.D., L.P. Gromet, and D.P. Murray. 1994. *Bedrock Geologic Map of Rhode Island.* University of Rhode Island, Department of Geosciences, Kingston, RI. 1994.
[21] Fernald, J.D. 1983. *Geology of the Blackstone Series in the Pawtucket Quadrangle, Rhode Island.* Ph.D. Dissertation. Boston College, MA.
[22] C-E Environmental, Inc. 1990. Remedial Investigation Report for the Peterson/Puritan Site, Cumberland, Rhode Island. Report prepared for CPC International, Inc.
[23] Shield Environmental Associates, Inc. 2004. *RI/FS Phase 1A Initial Site Characterization Report, Peterson Puritan Superfund Site – Operable Unit 2.* Report prepared for Peterson/Puritan OU2 PRP Group. February 2004.
[24] Chute, Newton E. 1949. *Surficial Geology, Pawtucket Quadrangle, Rhode Island-Massachusetts.* U.S. Geological Survey, Geologic Quadrangle Map Series. Scale 1:31,680.

generally characterized by Shield Environmental Associates, Inc. (Shield, 2004) as undifferentiated glaciofluvial deposits.

Significant reworking and mixing of natural surficial deposits has occurred in the recent past. This reworking/mixing has been caused by draining of the former lake behind the Pratt Dam and scouring of the Blackstone River bottom by subsequent spring floods, by filling and sand and gravel extraction, and by the regrading of the Blackstone River Valley in the area of the J. M. Mills Landfill and Unnamed Island. Wetlands have become established in some of the formerly flooded and/or excavated areas, trapping organic and fine sediments in a thin deposit over the coarser glaciofluvial deposits. In the area where a former manmade lake flooded the Blackstone River floodplain, a thin layer of finer sediments (primarily silt) can be expected from sediment settling behind the Pratt dam.

Hydrogeology

The groundwater underlying OU 2 are identified essentially by four hydrostratigraphic units which are identified only by variances in stratigraphy (as seen in cores) and hydraulic conductivity (as measured in the wells): Upper Glaciofluvial Unit, Lower Glaciofluvial Unit, Till, and Bedrock. The hydraulic conductivity of the Upper Glaciofluvial Unit is, in general, an order of magnitude greater than the Lower Glaciofluvial Unit and the underlying Till Unit. There are no known confining layers or low permeability bedding identified within these hydrostratigraphic units throughout OU 2. Groundwater depths rapidly decrease approaching the Blackstone River to 0 feet below ground surface (bgs). Water levels measured in piezometers and monitoring wells installed along the Blackstone River actually show water levels above the ground surface indicating that there is an upward vertical gradient, and that the groundwater observed in the vicinity of the Blackstone River is discharging to the river.

Surface Water Hydrology

OU 2 is located entirely within the Blackstone River drainage basin. The Blackstone River is the main surface water body at OU 2. The Blackstone River flows to the southeast from Worcester, Massachusetts through Woonsocket, Rhode Island (at the state border) to the Seekonk River south of Central Falls and Pawtucket, Rhode Island, and from there into Providence Harbor at the head of Narragansett Bay. OU 2 lies predominantly within (or below) the 500-year floodplain (Federal Emergency Management Agency FIRM, 2009).

Several ponds are also located within the boundaries of OU 2 and are shown on **Figure 2** in **Appendix B**. Ponds A, B, C, F, N, and I are flooded during periods of high water. However, they are not hydraulically connected (by surface flow) to the Blackstone River under normal flow conditions and retain water during base-flow conditions. Other ponds and pools where waste and water are captured after flooding or precipitation are identified on **Figure 2** in **Appendix B**, and these ponds or pools dry out to varying degrees depending on the season and water-table level. These include several ponds (E, D, and P) on the Unnamed Island. The

hydraulic connection between the Blackstone River, groundwater, and the ponds on the Unnamed Island appears to vary seasonally with the Blackstone River water levels.

2. Conceptual Site Model

The sources of contamination, release mechanisms, exposure pathways to receptors for the soil, groundwater, surface water, sediment, and air, as well as other site-specific factors, are considered while developing a Conceptual Site Model (CSM). The CSM is a three-dimensional "picture" of site conditions that illustrates contaminant sources, release mechanisms, exposure pathways, migration routes, and potential human and ecological receptors. It documents current and potential future site conditions and shows what is known about human and environmental exposure through contaminant release and migration to potential receptors. While a presumptive containment approach was followed for the J. M. Mills and Nunes sub-areas within OU 2 as these are typical landfills to be addressed under CERCLA, the risk assessment and response actions for the Unnamed Island (waste deposits), contaminated soil (not within the confines of the J. M. Mills sub-area), groundwater, and contaminated sediments in the island ponds are predominantly based on this CSM. The CSM for OU 2 is represented in two diagrams (**Figures CSM-1 and 7-9** in **Appendix B**) for human health and ecology, respectively.

Known and Suspected Sources of Contamination

Evidence of waste, including hazardous waste, waste containing hazardous substances, and solid waste were disposed at OU 2. The following source areas are distinguished within OU 2: 1) the J. M. Mills Landfill; 2) the Nunes Parcel (buried and surface waste); 3) the Unnamed Island (buried and surface waste); and 4) debris fields (DFs), including DF-1 through DF-3 between the northwestern end of the J. M. Mills Landfill and Martin Street and DF-4 on the southeastern flank of the J. M. Mills Landfill (see **Figure 2** in **Appendix B**).

- Estimates of mixed waste volumes within the Facility include:
  J. M. Mills Landfill – 2.1 million cubic yards (cy);
  Nunes Parcel – 56,000 cy; and
  Unnamed Island – 39, 500 to 44,000 cy.
- Exposed asbestos-containing materials (transite pipe located in associated debris fields).
- Physical hazards, such as metal debris, tires, and broken glass, are also observed at the Facility.
- The exposed waste, and waste observed through test pitting, on the Unnamed Island, the Nunes Parcel, and the DFs appear to be more general industrial refuse in nature, consisting of wood, fiberglass, hosing, rubber parts, tires, scrap metal, mixed with some household waste, and other industrial byproducts.
- Landfill materials are likely undergoing some degree of active biodegradation processes and, as a result, are creating gases, some of which are currently vented from the J. M. Mills Landfill via a series of five small vent pipes.
- While it is generally acknowledged that both the J. M. Mills Landfill and adjacent floodplain are mostly covered with vegetation, including brush and mature trees, closer

examination demonstrates that portions of the landfill soil cover is sparse or nonexistent and waste is exposed, especially in areas where the slope sharply steepens. Over the years, slumping of the landfill crest has also been observed. The floodplain also contains piles of debris and bulky waste materials impinging upon the natural function, use and value of the floodplain.

- The active biodegradation within the J. M. Mills Landfill causes reducing conditions in the groundwater, which in turn promotes the mobilization of naturally-occurring arsenic present in the native soils. This situation has been well documented at numerous sites in the New England area.
- The Blackstone River is an industrialized river that has an extensive history of impacts from urban stormwater runoff and industrial discharges which RIDEM considers an impaired waterway. The Blackstone River has the potential to carry elevated levels of contaminants in both surface water and on entrained particulate matter in the water column. These materials can be deposited and re-deposited across the Blackstone River channel bottom and (during flooding events) on low-lying floodplain soils and standing water bodies (e.g., ponds and vernal pools located within the floodplain). However, the RI identifies landfilling and waste disposal operations at OU 2 as also having contributed contaminants to the associated floodplain and ponds within OU 2. Thus, surface runoff, erosion, and leaching from the OU 2 waste deposits are the dominant mechanisms within OU 2 by which contaminants mobilize, mix with, and impact Site soils and sediments.
- There is no Principal Threat Waste identified at OU 2.

Soil Contamination

A number of constituents, including polyaromatic hydrocarbons (PAHs) (and other SVOCs), PCBs, pesticides, and metals were observed in several locations across OU 2 (the landfill areas themselves were not assessed) at mostly low concentrations; however, a number of the contaminants did exceed the project action levels (PALs) developed during the RI, as well as RIDEM regulatory standards. PALs are not specifically regulatory standards (although some regulatory standards may be used in PAL development), but are used as screening criteria (PALs are often based on risk-based screening levels and benchmarks) by investigators to assess the nature and extent of contamination. All soil sample results are found in Tables 4-11 through 4-19 of the Final RI Report (August, 2012).

J. M. Mills Landfill

Surface soil samples were collected from 17 locations adjacent to the J. M. Mills Landfill. Sampling was deliberately biased based on the presumptive (capping) approach being taken at the J. M. Mills Landfill. As such, samples were collected at the toe of the J. M. Mills Landfill, near future potential migration or exposure pathways. Two additional samples were collected from the surface at Debris Field No. 4 (DF-4), located on the southeastern side of the J. M. Mills Landfill.

Three VOCs (acetone, 2-butanone, and toluene) were detected at least once in surface soil

samples taken adjacent to the J. M. Mills Landfill, but in concentrations below PALs. The remaining VOCs analyzed for were not detected in soil samples taken adjacent to the J. M. Mills Landfill. VOCs were not detected in the two soil samples collected from within DF-4.

PAHs were detected in all surface soil samples taken adjacent to the J. M. Mills Landfill. The concentration of total PAHs ranged from 2,270 to 64,240 µg/kg. Five to seven PAH compounds [benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(a)anthracene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene] were commonly detected. PAH results were generally similar in DF-4 sample SO-W05-DF with a total PAH concentration of 10,000 µg/kg and five of the seven PAH compounds being detected. The PAH results from SO-W06-DF were lower than other landfill samples with a total PAH concentration of 1,740 µg/kg and only one [benzo(a)pyrene] PAH was detected above PALs.

Other SVOCs were detected in surface soil samples taken adjacent to the J. M. Mills Landfill, but at concentrations below their respective PALs. Ten SVOCs [1,1'-biphenyl, benzaldehyde, bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, carbazole, dibenzofuran, di-n-butyl phthalate, di-n-octyl phthalate, dimethyl phthalate, and 4-chloroaniline] were detected at least once in surface soil samples taken adjacent to the J. M. Mills Landfill. The compound 4-nitroaniline was detected in sample SO-W06-DF from DF-4 at an estimated concentration of 53 µg/kg.

PCBs were detected in 16 of 17 surface soil samples taken adjacent to the J. M. Mills Landfill. The concentration of total PCBs ranged from not detected to 1,100 µg/kg. In eight of the 17 samples, either Aroclor-1254 or Aroclor-1260 was detected at a concentration above their respective PALs but below the RIDEM Residential and Industrial/Commercial Direct Exposure Criteria of 10,000 µg/kg. Additionally, samples from DF-4 had higher detections of PCBs. SO-W06-DF exhibited Aroclor-1254 at 2,500 µg/kg and SO-W05-DF exhibited Aroclor-1248 at 6,200 µg/kg. However, the duplicate sample collected from the SO-W06-DF area had a significantly lower concentration of Aroclor-1254 (240 µg/kg). These data suggest potential field variability (sample heterogeneity) and possibly matrix-related analytical issues.

Pesticides were detected in all surface samples taken adjacent to the J. M. Mills Landfill. Dieldrin was the only pesticide exhibiting concentrations above PALs, ranging from 4.8 µg/kg to 38 µg/kg. Dieldrin was not detected in the two samples within DF-4. Other pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, endosulfan sulfate, endrin aldehyde, and gamma-chlordane) were detected at least once but well below PALs. Alpha-benzene hexachloride (α-BHC) was detected in the field duplicate from DF-4 (SO-W06-DF).

Each of the metals analyzed was detected at a concentration greater than the PALs in at least one surface soil sample taken adjacent to the J. M. Mills Landfill, with the exception of antimony, cobalt, selenium, and sodium. Results for the two DF-4 samples were similar in metals detected as to the samples taken adjacent to the J. M. Mills Landfill, except antimony and selenium were detected in SO-W06-DF and cobalt and selenium were detected in SO-W05-DF;

however, all detections were below their respective PALs.

Dioxins/furan analysis was conducted on four surface samples located adjacent to the J. M. Mills Landfill. Dioxin/furan congeners were detected in all four samples. However, 2,3,7,8-tetrachlorodibenzo-p-dioxin total toxicity equivalent quotients (Total TEQs) for the samples ranged from 9.8 to 51.7 nanograms per kilogram (ng/kg), which all exceed the screening level of 4.5 ng/kg.

Unnamed Island

Surface soils were collected from 33 locations on the Unnamed Island. VOC constituents were detected at low levels below applicable PALs in all surface soil samples collected.

PAHs were detected in all of the Unnamed Island surface soil samples. Eight PAHs were detected at concentrations greater than screening criteria in one or more of the samples collected, although within the same range as samples collected upstream of OU 2. Total PAH concentrations ranged from 885 µg/kg to 72,800 µg/kg. Other non-PAH SVOCs detected in one or more of the Unnamed Island surface soil samples included bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, di-n-octyl phthalate, 1,1'-biphenyl, benzaldehyde, carbazole, dibenzofuran, di-n-butyl phthalate, phenol, acetophenone, n-nitrosodiphenylamine, 4-methylphenol, diethylphthalate, and nitrobenzene, although at different frequencies of detection. Only bis(2-ethylhexyl)phthalate in samples SO-086-UI (260,000 J[25] µg/kg) and SO-209-UI (60,700 µg/kg) were detected at concentrations above the PAL.

PCBs were detected in 27 of 29 Unnamed Island surface soil samples analyzed for PCBs. Total PCB concentrations ranged from not detected to 2,800 µg/kg but below the RIDEM Residential and Industrial/Commercial Direct Exposure Criteria of 10,000 µg/kg.

Pesticides were detected in all of the Unnamed Island surface soil samples. Twelve pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endosulfan sulfate, endrin aldehyde, gamma-chlordane, endrin ketone, endosulfan II, methoxychlor, and heptachlor epoxide) were detected at least once in Unnamed Island surface soil samples. In 24 of 30 samples analyzed for pesticide, dieldrin was detected and had concentrations ranging from not detected to 810 µg/kg. The remaining pesticides analyzed were not detected at concentrations greater than screening criteria.

Metals were detected in all of the Unnamed Island surface soil samples. Each of the metals analyzed for was detected in at least one sample. Screening criteria were not exceeded for potassium, sodium, and thallium in this subarea.

[25] The qualifier "J" indicates that the compound was positively identified; however, the associated numerical value is an estimated concentration only.

Dioxins/furans analysis was conducted on 10 surface samples on the Unnamed Island. Dioxin/furan congeners were detected in all samples. However, Total TEQ concentrations for the samples ranged from 8.74 ng/kg and 67.1 ng/kg, with all TEQs above the 4.5 ng/kg screening level.

It is noteworthy that the Unnamed Island partially to completely floods several or more times throughout the year especially at times of seasonal high river flows or during heavy rain events. This same flooding has likely occurred repetitively during the past 50 years. As a result, upstream particulates comprised of metals and organics would be transported downstream and deposited in the surface soils. This type of particulate transport would most likely contribute concentrations of constituents that have higher soil absorption properties, such as metals, PAHs, and PCBs. However, from what is known of the history of the J. M. Mills facility, wastes containing metals and certain other materials were buried on the Unnamed Island in the early years of landfill operation and could also be contributing to the detection of these same constituents in affected media. It should be noted that of the Unnamed Island surface soil samples, only samples associated with the waste in the vicinity of Ponds A, D, and E had lead concentrations above 1,000 mg/kg. Of the remaining 25 samples, only five had lead concentrations above 150 mg/kg (151 to 342 mg/kg). At least for lead, the soil concentrations from samples specifically associated with the wastes are well above those from upstream sources.

With respect to subsurface soils, four samples and a duplicate were collected from test pits and trenches on the Unnamed Island and analyzed for the standard full parameter list in Phase 1A of the RI. Twenty-one subsurface soil samples were sampled in November 2009 as part of the Supplemental Investigation on the Unnamed Island and were analyzed for the standard full parameter list. One additional soil sample and 10 of the 22 subsurface soil samples were also analyzed for polychlorinated dibenzodioxins and polychlorinated dibenzofurans.

Low concentrations of several VOCs, including 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, acetone, benzene, 2-butanone, carbon tetrachloride, chlorobenzene, cyclohexane, methyl cyclohexane, ethylbenzene, isopropylbenzene, tetrachloroethene, toluene, and xylene, were detected in one or more subsurface soil samples, although all were below their respective screening criteria.

PAHs were detected in all of the samples collected. Total PAHs ranged from 95.6 µg/kg to 194,000 µg/kg. Benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)anthracene, chrysene dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene were the most frequently detected above PALs. Fluoranthene, naphthalene, and pyrene in one sample each were the only detected concentrations above their respective screening criteria.

Several other SVOCs were detected in subsurface soil samples, although only bis(2-ethylhexyl)phthalate was detected in four samples greater than the screening criterion.

PCBs were detected at relatively low concentrations in all subsurface samples, and 10 of 23 subsurface samples exhibited concentrations of Aroclor-1254 or Aroclor-1260 above the screening criterion of 110 µg/kg and 220 µg/kg, respectively. All other PCBs were either not detected or detected at concentrations below the screening criteria.

Relatively low levels of pesticides were detected in 19 of the 23 subsurface samples collected. Dieldrin was detected at concentrations ranging from 0.879 J to 426 J µg/kg. All other pesticides were either not detected or detected at concentrations below screening criteria.

Low concentrations of metals were widely distributed in all of the subsurface soil samples collected and most were greater than the screening criteria. Barium, calcium, cyanide, magnesium, potassium, sodium, and thallium were all observed at concentrations below their respective screening criteria.

Nunes Parcel

Surface soil samples were collected from 19 locations and from SO-058-WT (designated WT = wetland, although actually within the boundaries of the Nunes Parcel). VOCs were detected in Nunes Parcel surface soil samples. Nine VOCs (2-hexanone, methylene chloride, 2-butanone, trichlorofluoromethane, PCE, acetone, total xylenes, methyl acetate, and toluene) were detected at least once in surface soil samples, but at concentrations below screening criteria. The remaining VOCs analyzed for were not detected in Nunes Parcel surface soil samples.

PAHs were detected in the Nunes Parcel surface soil samples. Seven PAHs were detected above screening criteria in one or more of the samples. Total PAH concentrations ranged from 940 µg/kg to 83,620 µg/kg. All other PAHs were either not detected or were detected at concentrations below screening criteria.

Other non-PAH SVOCs were detected in Nunes Parcel surface soil samples. Ten SVOCs [1,1'-biphenyl, bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, carbazole, dibenzofuran, di-n-butyl phthalate, di-n-octyl phthalate, benzaldehyde, 4-chloroaniline, and isophorone] were detected at least once in Nunes Parcel surface soil samples but below screening criteria. The remaining SVOCs analyzed were not detected.

PCBs were detected in most of the Nunes Parcel surface soil samples. Aroclor-1254 and Aroclor-1260 were the only Aroclors detected in surface soil samples. Total PCB concentrations ranged from not detected (locations GP-1 and GP-2) to 550 µg/kg (location SO-055-NP) and were greater than screening criteria in a number of samples.

Pesticides were detected in most Nunes Parcel surface soil samples. Dieldrin concentrations were greater than the screening criterion in each sample with the maximum concentration of 310 µg/kg (location SO-052-NP). Nine pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endrin ketone, gamma-chlordane, endosulfan sulfate, and

endosulfan II) were detected at least once in surface soil samples. The remaining pesticides analyzed were not detected.

Metals were detected in all of the Nunes Parcel surface soil samples. Each of the metals analyzed for in surface soil samples were detected in at least one sample at concentrations greater than screening criteria, except for antimony, calcium, cobalt, cyanide, magnesium, nickel, potassium, silver, sodium, and thallium. Even though several metals had one or more PAL exceedances in the Nunes Parcel 2006 soil sample results, most metals had very similar concentrations among the 2006 samples collected, except lead and zinc. Samples SO-107-NP (0-1') and SO-108-NP (3-8') both had lead reported at 1,200 mg/kg. All other lead results were 410 mg/kg or less in the 2006 Nunes Parcel samples. Zinc had three samples [SO-102-NP (2-8.5') – 600 mg/kg, SO-105-NP (2-3.4') – 680 mg/kg, and SO-108 (3-8') – 660 mg/kg] that were higher than the remaining 2006 Nunes Parcel samples with all other zinc concentrations 280 mg/kg or less.

Dioxins/furans analysis was conducted on two surface samples at the Nunes Parcel. Dioxin/furan congeners were detected in both samples. Total TEQ concentrations for the samples ranged from 26 ng/kg to 45 ng/kg, with both TEQs above the 4.5 ng/kg screening level.

Subsurface soil samples were collected from 14 locations on the Nunes Parcel. VOCs were detected in all solid waste transfer station subsurface soil samples. Sixteen VOCs (1,1-DCE, 1,4-dichlorobenzene, 2-butanone, acetone, benzene, carbon disulfide, chlorobenzene, cis-1,2-dichloroethene [cis-1,2-DCE], cyclohexane, methyl cyclohexane, dichlorodifluoromethane, ethylbenzene, isopropylbenzene, methyl acetate, toluene, and xylene) were detected at least once in subsurface soil samples but at concentrations below screening criteria. The remaining VOCs analyzed were not detected. The concentration of VOCs generally increased from surface to subsurface soil samples.

PAHs were detected in all but four Nunes Parcel subsurface soil samples. Total PAH concentrations ranged from 89 µg/kg to 185,400 µg/kg. The concentration of PAHs generally increased from surface to subsurface at locations GP-3 and GP-4, and decreased from surface to subsurface at locations GP-5, GP-1, and GP-2.

Several other non-PAH SVOCs were detected in Nunes Parcel subsurface soil samples. Ten SVOCs [1,1'-biphenyl, 2,4-dimethylphenol, 4-methylphenol, bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, carbazole, dibenzofuran, di-n-butyl phthalate, di-n-octyl phthalate, and n-nitrosodiphenylamine] were detected at least once in subsurface soil samples, but at concentrations below screening criteria, with the exception of di-n-octyl phthalate, which was reported as an estimated value in sample SO-034-NP. The remaining SVOCs analyzed were not detected. The maximum concentrations of detected analytes were typically detected in subsurface samples.

PCBs were detected in all but four Nunes Parcel subsurface soil samples analyzed.

Aroclor-1248, Aroclor-1254, and Aroclor-1260 were each detected in at least one subsurface soil sample. However, Aroclor-1254 was the only PCB detected at concentrations greater than the screening criterion. Total PCB concentrations ranged from not detected to 1,000 µg/kg.

Pesticides were detected in all but two Nunes Parcel subsurface soil samples analyzed. Eight pesticides (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endosulfan sulfate, endrin, and endrin aldehyde) were detected at least once in subsurface soil samples. Alpha-chlordane, 4,4'-DDT, endosulfan sulfate, endrin, and endrin aldehyde were each detected in only one subsurface soil sample. Concentrations of dieldrin exhibited the greatest range, from not detected to 250 µg/kg. The remaining pesticides analyzed were not detected.

Metals were detected in all of the Nunes Parcel subsurface soil samples. Each of the metals analyzed for in subsurface soil samples were detected at least once. The maximum concentrations of metals in the subsurface soil samples were arsenic (10.9 mg/kg), cadmium (6 mg/kg), chromium (209 J mg/kg), copper (644 mg/kg), lead (13,000 mg/kg), mercury (0.31 J mg/kg), nickel (122 mg/kg), and zinc (2,470 J mg/kg). The samples from SO-033-NP (1-5) and SO-102-NP (2-8.5) exhibited the highest concentrations of lead and mercury, respectively. Sample SO-035-NP (5-9) also had elevated concentrations of copper, iron, lead, and zinc. All metals were detected in at least one sample at concentrations greater than screening criteria, except for antimony, calcium, cobalt, magnesium, potassium, and sodium, and were generally similar to the surface soil samples.

Summary

VOCs were generally not detected in soil samples or were not observed at significant levels in samples collected near the J. M. Mills Landfill, the Unnamed Island or the Nunes Parcel. Concentrations of dioxins/furans were above their respective screening levels for residential soil and were identified as a risk driver for the Nunes Parcel.

There are a number of locations in floodplain areas, the Unnamed Island and Nunes Parcel that contain concentrations of PCBs, PAHs, pesticides, and some metals; however, in some areas, these constituents may be the result of historical deposition of contaminated material from upstream areas of the Blackstone River. Sampling was performed in November 2012 to expand the background dataset. The results of this sampling effort confirmed that additional sources exist upstream of OU 2. EPA's review of the data is contained a June 21, 2013 memorandum generated by B. Hoskins (June 21, 2013 Hoskins Memo; USEPA, 2013).[26]

As indicated above, there is evidence of elevated levels of lead above screening criteria, as well as RIDEM regulatory standards, on the Nunes Parcel.

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[26] USEPA, 2013. Review of technical memorandum titled: *Background Screening Levels for Sediment and Soil Supplemental Data Collection Efforts.* Memorandum from Bart Hoskins to Dave Newton. June 21, 2013.

Groundwater Contamination

28 monitoring wells were sampled during a 2003 sampling event, 40 wells were sampled during a 2004 event, 30 wells were sampled during a 2005 event, 15 wells were sampled in a 2007 event, and four wells were sampled in a 2009 event. All groundwater sampling results are presented in Tables 4-2 through 4-9 of the Final RI Report (August, 2012).

Groundwater impacts related to OU 2 appear to be modest and well defined. The Phase 1B RI additional groundwater investigation in 2005, and further validated in early 2007, served to support the delineation of potential constituents of interest in the aquifer.

While a limited number of VOCs have been detected, the VOCs detected in groundwater most frequently or above screening criteria consist of benzene, chlorobenzene, chloroform, and 1,4-dichlorobenzene. During the RI, benzene was present at SEA-603 (at the toe of the J. M. Mills Landfill) above the federal MCL. The majority of other VOC PAL exceedances are marginally above their corresponding PALs. Groundwater affected by these compounds is shallow and, based on predominant shallow groundwater flow directions, likely discharges to the Blackstone River. Furthermore, over the time period of the RI, benzene concentrations in well SEA-603 have declined, as follows:

- October 2003 – 1,100 micrograms per liter (µg/L)
- October 2004 – 730/620 µg/L (duplicate samples)
- November 2005 – 140 µg/L

These data suggest that the VOC impacts to groundwater adjacent to the J. M. Mills Landfill may be attenuating over time.

The distribution of SVOCs was primarily PAHs detected in samples collected from shallow wells. Although at low concentrations relative to their corresponding PALs, PAH exceedances above PALs decreased in number during the second and third rounds of sampling. The VOCs and PAHs identified above are subject to various natural attenuation processes, including biodegradation; therefore, plumes of groundwater containing these compounds are not expected to extend great distances from their sources. Furthermore, PAHs have been detected in some monitoring wells identified as hydraulically upgradient from buried waste areas. Thus, the presence of PAHs may not be completely attributable to OU 2. Additional discussion of the distribution of these constituents with consideration of the CSM may be found in the RI Report, Section 8 (Arcadis, 2012).[27]

[27] ARCADIS. 2012. *Remedial Investigation Report*, Peterson/Puritan, Inc. Superfund Site – Operable Unit 2, Cumberland and Lincoln, Rhode Island. August 2012.

Several inorganics (most frequently detected were arsenic, iron, and manganese) exceeded screening criteria. Upgradient or background groundwater contains detections of some of the same inorganics above screening criteria, indicating that inorganics may not be completely attributable to OU 2. The dissolved metals concentrations in the 2009 Unnamed Island groundwater samples were generally much lower in concentration than the corresponding total metals concentrations, suggesting groundwater metals detections could also potentially be affected by entrained particulate and acidification in the samples collected. Exceedances of arsenic and lead in the total metals samples were all less than their corresponding MCL or Health Advisory Limits in the dissolved metals results. In addition, reducing conditions that occur in groundwater beneath and near-buried waste tend to solubilize inorganics; therefore, elevated inorganics at OU 2 are not unexpected. While no direct correlation was shown between groundwater containing inorganics and buried waste, such contamination, if present, is expected to remain relatively shallow and also migrate toward and discharge into the Blackstone River. As the distance from the buried waste increases, reducing conditions in groundwater can be expected to dissipate. Under such conditions, many inorganics would precipitate. Furthermore, as groundwater discharges to the highly oxygenated Blackstone River water, precipitation reactions are also likely.

Persistent downward hydraulic gradients at the MW-108 well cluster, located away from the Blackstone River along the northern edge of the J. M. Mills Landfill, suggest that downward movement of groundwater may occur in this area. Water quality data from this cluster, however, are not indicative of a deeper plume of affected groundwater. Furthermore, the apparent downward gradients observed in this well cluster may be a function of the lower hydraulic conductivity in the lower hydrostratigraphic units. The high hydraulic conductivity and groundwater flow rate exhibited by this hydrostratigraphic unit tend to confine any contaminants released from buried waste areas to shallow depths in the aquifer. Based on the lack of elevated concentrations of site-related constituents observed in deeper wells, installed as part of the 2005 groundwater sampling event, there is no evidence of a downward migration of constituents in groundwater below the upper portion of the aquifer. Therefore, vertical delineation of constituents detected in the shallow aquifer is deemed complete. In addition, widespread occurrences of mobile substances found in groundwater under aerobic conditions are not likely.

Summary of OU 2 Groundwater Impacts

In summary, impacts to groundwater have been demonstrated in four of the monitoring wells located at OU 2. These monitoring wells are immediately downgradient of the west side of the J. M. Mills Landfill (i.e., SEA-602a, SEA-603, GLF-704, and MW-C2) and monitoring well GLF-706a, located immediately downgradient at the south end of the J. M. Mills Landfill. Each of these monitoring wells is also located on the floodplain immediately adjacent to the Blackstone River. Impacted groundwater was also detected on the Unnamed Island and the north end of the Nunes Parcel but at lower concentrations than the aforementioned wells. The impacts are largely limited to VOCs, mainly benzene (maximum detection of 19 µg/L in Nunes Parcel well GNP-705) and chlorinated benzenes (maximum chlorobenzene detection of 28 µg/L in Unnamed Island well SEA-608, which is below the current PAL of 91 µg/L). While sampling

data have shown that PAHs are found on OU 2, it is possible that some of the PAHs may be attributed to off-site sources. PAHs are prevalent in sediments and surface soils observed at sampling locations at some distance from the J. M. Mills Landfill (see June 21, 2013 Hoskins Memo). Finally, the concentration of inorganics in groundwater is generally low and their presence may be partly attributable to off-site and/or upgradient sources or dissolution of natural materials by leachate-impacted groundwater.

The Lenox Street Well was reported to be contaminated (with chlorinated volatile organic compounds (CVOCs)) in 1979 and closed by the State. The well, while still in place, is no longer used as a public water source. Recent investigations 25 years later show that, with the potential exception of slightly elevated chloroform in a single well, there were no detections of residual CVOC contamination in monitoring wells reasonably adjacent to the municipal supply well. These same monitoring wells exhibited slightly elevated levels of two PAHs and thallium during the RI. Groundwater contaminants were also detected in monitoring wells within the OU, and include VOCs, SVOCs, PAHs, pesticides, PCBs, and metals; many above heath-based standards that are not present in the Lenox Street Well.

Groundwater impacts related to OU 2 appear to be relatively limited in extent and adequately defined. The shallow aquifer contains low levels of organic chemicals typical of landfills. However, there is evidence of attenuation of site-related constituents at depth.

Groundwater impacts are confined to the upper 30 feet of the glaciofluvial aquifer beneath OU 2 and limited to the area immediately downgradient of the west side of the J. M. Mills Landfill along the Blackstone River, and to a lesser extent, the area immediately downgradient at the south end of the J. M. Mills Landfill. There were a few detections on the Unnamed Island and at the north end of the Nunes Parcel. The most prevalent VOCs observed in groundwater above the PALs site screening criteria were benzene, chlorobenzene, and 1,4-dichlorobenzene primarily in shallow wells, most notably in wells downgradient of the J. M. Mills Landfill. Low concentration PAHs above screening criteria were also observed in some shallow monitoring wells. PCBs and pesticides were observed in groundwater at very low levels with only one (out of 95) groundwater sample at GNP-705 exceeding the screening criterion for Aroclor-1254.

EPA Regional Screening Levels were used as screening criteria in the human health risk assessment (HHRA)(USEPA, 2009).[28] Several metals exceeded screening criteria. In addition, inorganic concentrations in some upgradient or reference groundwater also exceeded screening criteria. Reducing conditions that occur in groundwater beneath and near-buried waste tend to

[28] USEPA, 2009. *Baseline Human Health Risk Assessment, Peterson Puritan Superfund Site - Operable Unit 2, Cumberland and Lincoln, Rhode Island.* Agency Revision of the HHRA prepared by Arcadis in September 2008. April 2009.

solubilize metals; therefore, some of the inorganics levels (most notably arsenic) at OU 2 may be a result of this condition.

The concentrations of most detected constituents have historically been below regulatory criteria, which are the federal maximum contaminant levels (MCLs)/maximum contaminant level goals (MCLGs), federal risk based standards, or more stringent Rhode Island groundwater standards. A subset (eight) of the OU 2 wells were sampled in 2012 for a limited list of analytes (benzene, Aroclor-1254, cadmium, and lead at various wells). Concentrations of the analyzed parameters were typically below previous detections at these wells, leading to the conclusion that groundwater concentrations of these contaminants at OU 2 continue to decline.

The primary fate of constituents currently found in groundwater is to ultimately discharge to the Blackstone River, which hydrogeologically serves as a hydraulic discharge boundary in the Blackstone River Valley. The aquifer exhibits strong upward vertical hydraulic gradients toward the Blackstone River, which limits downward migration of contaminants. Furthermore, the aquifer exhibits variable, but generally moderate to high, hydraulic conductivity at monitoring wells adjacent to the J. M. Mills Landfill, which results in moderate-to-relatively rapid groundwater flow rates and fairly rapid discharge to the Blackstone River.

Although there is no current potable use of groundwater within the boundary of OU 2, there are no institutional controls in place at OU 2 that would prohibit the future installation of potable wells. Therefore, potential residential risks/hazards were quantitatively evaluated for a hypothetical future potable use scenario.

Surface Water Contamination

Surface water contaminants, originating from contaminated pond sediments and migration from the landfills and waste deposits, include various metals at concentrations which contribute to the impacts on fish and amphibians in Site ponds. Surface water features contain sediment and debris build-up from stormwater runoff.

All surface water results are presented in Tables 4-30 through 4-37 of the Final RI Report (August, 2012). Generally, VOCs, SVOCs, PAHs, PCBs, pesticides, and metals were rarely detected in surface water samples in the Blackstone River. The surface water data do not suggest ongoing or widespread potential impacts are occurring from OU 2 to adjacent surface water in the Blackstone River or to Wetlands A through D across the railroad tracks to the northeast of the J. M. Mills Landfill and outside of OU 2. Discussion of samples collected and results for constituents detected in these water bodies may be found in the RI Report, Sections 2.6 and 4.6 (Arcadis, 2012).[29]

[29] ARCADIS. 2012. *Remedial Investigation Report*, Peterson/Puritan, Inc. Superfund Site – Operable Unit 2, Cumberland and Lincoln, Rhode Island. August 2012.

Elevated levels of contaminants, however, were found in surface water in ponds within OU 2, with contribution due to OU 2 source areas. These contaminants include aluminum, barium, cadmium, copper, manganese, and lead. Multiple metals exceeded EPA's National Recommended Water Quality Criteria (NRWQC) in site ponds at levels greater than exceedances noted upstream, indicating contributions from OU 2 source areas.

Surface water samples were collected from eight ponds within OU 2 (Ponds A, C, D, E, F, I, N, and P).[30] Ponds A, D, E, and P are located on the Unnamed Island. The water level in each of the ponds appears to drop significantly based on the season and precipitation. Pond P tends to be dry much of the year. Pond C is located at the toe of the J. M. Mills Landfill. Pond F is located along the Blackstone River at the southern (downstream) edge of OU 2. It is flooded and is a part of the Blackstone River flow during high water conditions. Water also flows through Pond A during high water conditions. Pond I (Nunes Inlet) is an inlet from the Blackstone River next to the Nunes Parcel, and Pond N is located in a debris field (DF) at the western (upstream) edge of OU 2 and may be connected to a small stream in this area.

Pond A

A total of 10 surface water samples were collected from Pond A on the Unnamed Island. No VOCs were detected at concentration greater than the screening criteria. Chloromethane was detected in two surface water samples from Pond A at an estimated concentration less than its screening criterion. The remaining VOCs analyzed for were not detected in Pond A surface water samples.

Three Pond A surface water samples contained detected concentrations of PAHs. Benzo(a)pyrene was detected above the screening criterion in two samples and benzo(a)anthracene and chrysene were detected above their screening criteria in one sample. The highest total PAH concentration was detected at 0.9 µg/L.

Bis(2-ethylhexyl)phthalate was the only other SVOC detected in surface water samples from Pond A and was detected in two surface water samples at estimated concentrations 1.3 J µg/L and 1.9 J µg/L. The higher concentration (1.9 J µg/L) slightly exceeded the screening criterion of 1.8 µg/L.

Pesticides and PCBs were not detected in surface water samples from Pond A.

Iron and manganese were detected at concentrations greater than the screening criteria. Where detected, lead (lead was frequently non-detect at a reporting limit greater than the screening criteria) concentrations in Pond A surface water samples often exceeded the screening

[30] Some ponds, initially identified in the RI scoping phase, were found to be ephemeral and/or otherwise not sampled during the RI sampling events. However, pond nomenclature remained consistent as initially identified.

criterion. Lead and manganese concentrations also were greater than screening criterion in filtered samples. Other metals that were detected at concentrations greater than the screening criteria in one or two samples included aluminum, cadmium, and zinc. All other metals were detected at concentrations less than the screening criteria.

Pond C

Two samples were collected from Pond C in 2004. Sample SW-074-LF was collected following a rain event at the same location and several days after collection of co-located sediment sample SE-074-LF because Pond C was dry when the sediment sample was initially collected.

One sample (SW-020-LF) had 11 detected PAHs, seven of which were greater than the screening criteria and a total PAH concentration of 3 µg/L. No other PAHs or other SVOCs were detected in Pond C surface water samples. Sample SW-020-LF had a detected concentration of Aroclor-1260 at 0.3 J µg/L, above the screening criterion of 0.014 µg/L. Compounds 4,4'-DDD and 4,4'-DDE were also detected at a concentration greater than the screening criteria in this sample.

Six metals (aluminum, barium, iron, lead, manganese, and zinc) were detected at concentrations greater than the screening criteria in the sample collected from SW-074-LF. Most of the metals concentrations in the sample SW-020-LF were greater than the screening criteria. The only metals that were not detected above the screening criteria in SW-020-LF were those that were not detected (antimony, mercury, selenium, and thallium).

Sample SW-020-LF had a relatively high turbidity reading (65.5 NTU). The metals, PAHs, and PCBs have a high particle affinity and tend to be associated with particles rather than be in the dissolved phase. The detection of these chemicals in Pond C sample SW-020-LF may be an artifact of suspended particles in the sample and may not represent true dissolved-phase constituents in the surface water sample. Note that the sediment samples collected from the same locations (one sample at location 074 and one sample at location 020) in Pond C were not appreciably different from each other in metals or pesticide concentrations; however, the sediment sample SE-074-LF had a higher PCB concentration (Aroclor-1254 and Aroclor-1260 at a total concentration of 860 µg/kg) than sample SE-020-LF (Aroclor-1254 at 230 µg/kg). Sediment results for all ponds are discussed in more detail later in this section.

Pond D

Two surface water samples were collected from Pond D. Toluene was the only VOC detected at a concentration of 0.6 µg/L, below the screening criterion of 9.8 µg/L.

Each of the two surface water samples from Pond D exhibited detectable concentrations of PAHs. Sample SW-075-UI was reported with six PAHs at concentrations greater than screening criteria and a total concentration of 1.68 µg/L.

No other SVOCs or PCBs were detected in surface water samples from Pond D.

The pesticide gamma-chlordane was detected in one surface water sample from Pond D but less than its screening criterion.

Each of the metals analyzed were detected in Pond D surface water samples, except antimony, cobalt, mercury, selenium, silver, and thallium. Many of the metals detected were at concentrations greater than the screening criteria.

Pond E

The VOC toluene was detected at a concentration less than its screening criterion in one surface water sample from Pond E. The remaining VOCs analyzed for were not detected in Pond E surface water samples.

Three PAHs (fluoranthene, phenanthrene, and pyrene) were detected in surface water samples from Pond Eat concentrations less than their screening criterion.

N-nitrosodiphenylamine was detected below its screening criterion in one surface water sample from Pond E. The remaining SVOCs were not detected in Pond E surface water samples.

PCBs were not detected in surface water samples from Pond E.

Pesticides were detected in one surface water sample from Pond E. Two pesticides, 4,4'-DDD and gamma-chlordane, were detected above the screening criteria in this surface water sample.

Aluminum, arsenic, barium, cadmium, calcium, chromium, iron, lead, manganese, sodium, vanadium, and zinc were detected in Pond E surface water samples. Many of the detected concentrations are greater than the screening criteria.

Pond F

VOCs, PCBs, and pesticides were not detected in surface water samples from Pond F.

PAHs were detected in three surface water samples from Pond F. Single detections of benzo(a)pyrene, benzo(b)fluoranthene, and chrysene were detected in these samples at concentrations greater than the screening criteria.

Aluminum, arsenic, barium, calcium, chromium, iron, lead, manganese, nickel, silver, sodium, vanadium, and zinc were detected in Pond F surface water samples. Barium and chromium were detected in a number of Pond F surface water samples at concentrations below the upstream detection limits. Barium and chromium were not detected in the upstream samples. Many of the metals detected were at concentrations greater than the screening criteria.

Pond I

Pond I, also known as the Nunes Inlet, is located inside the narrow strip of land in the Blackstone River off the Nunes Parcel. Pond I is connected to the Blackstone River at higher water levels and is more of a pond when the water level is lower. Two surface water samples and one duplicate were collected from this location. Chloromethane, benzene, and chlorobenzene were detected in one sample at concentrations less than the screening criteria. The remaining VOCs analyzed for were not detected in Pond I surface water samples.

PAHs were detected in each of the three surface water samples from Pond I. Five PAHs in one sample were detected greater than the screening criteria for a total concentration of 1.39 µg/L. Other SVOCs were not detected in Pond I surface water samples.

One surface water sample from Pond I contained detected concentrations of PCBs (Aroclor-1260 at 0.12 J µg/L) above the screening criterion of 0.014 µg/L. This sample had relatively high turbidity readings (60.3 NTU). PCBs have a high particle affinity and tend to be associated with suspended particulates rather than in the dissolved phase. The detection of PCBs in Pond I surface water likely is an artifact of suspended particles in the sample and is not likely a true dissolved-phase PCB in the surface water sample.

Dieldrin, 4,4'-DDD, endrin ketone, and alpha-BHC were detected in surface water samples from Pond I at concentrations below their respective screening criteria. No other pesticides were detected in the samples.

Each of the metals analyzed for were detected in Pond I surface water samples, except antimony, beryllium, copper, mercury, selenium, silver, and thallium. Many of the metals detected were at concentrations greater than the preliminary screening criteria.

Pond N

A single sample was collected from Pond N near the small stream on the northern end of OU 2. VOCs and PCBs were not detected in surface water samples from Pond N.

PAHs were detected in the surface water sample from Pond N. Nine PAHs were detected in this sample, but at concentrations less than the screening criteria.

4,4'-DDD and alpha-chlordane were detected below screening criteria in the Pond N sample.

Each of the metals analyzed for were detected in Pond N surface water samples, except antimony, barium, beryllium, cobalt, copper, mercury, nickel, silver, and thallium. Many of the detected metals were at concentrations greater than the screening criteria.

Pond P

A single sample was collected from Pond P on the Unnamed Island. VOCs, SVOCs, PAHs, and PCBs were not detected in this surface water sample from Pond P. Five pesticides (4,4'-DDT, alpha-chlordane, gamma-BHC, gamma-chlordane, and heptachlor epoxide) were detected at concentrations less than the screening criteria in this sample.

Aluminum, arsenic, calcium, iron, manganese, potassium, silver, and sodium were detected in Pond P surface water samples. Iron, manganese, and silver were detected at concentrations greater than the screening criteria.

Sediment and Floodplain Soil Contamination

Sediment and floodplain soil contaminants include metals (cadmium, chromium, copper, lead, and zinc) and PAHs. Surface runoff, erosion, and leaching from OU 2 source area deposits are mechanisms by which contaminants mobilize, mix with, and impact OU 2 soils and sediments. All sediment results are presented in Tables 4-21 through 4-29 of the Final RI Report (August, 2012).

A broad range of sediment samples were collected from several areas, including within the Blackstone River proper, as well as upstream of the Ashton Dam. A number of detections of a broad suite of constituents, including several VOCs, SVOCs, PCBs, pesticides, and metals, were observed in these samples. These detections included elevated concentrations that were also found in upstream sample locations, as well as within the defined OU 2 boundary that may indicate contributions from basin-wide sources (historically occurring industrial pollution and stormwater runoff from upstream sources), in addition to those contributions more indicative of Facility disposal practices throughout OU 2. Similar distributions of constituents were observed on the Unnamed Island. Elevated levels of contaminants in sediment in ponds throughout OU 2 were also found. Some of these levels are above reference conditions, as shown in the ecological risk assessment. Some of the ponds on the Unnamed Island become connected with the river flow at times as the Blackstone River rises and falls. All are submerged during significant rainfall events (i.e., generally yearly peak flooding events), more than one of which have occurred in the last few years. Therefore, the Unnamed Island ponds, as well as the vernal pools, may serve as "sinks" for particulate matter entrained in the Blackstone River from upstream sources, while waste deposits in close proximity to the ponds are also identified as a contributor.

While sediment samples were collected in the Blackstone River (both upstream and near/downstream of OU 2), nearby ponds, and wetlands within OU 2, the following discussion focuses on the ponds within OU 2, as constituents detected in the other water bodies did not derive from disposal activities from OU 2 or, if within the boundary of OU 2, were not at levels that posed an actionable risk. Discussion of samples collected and results for constituents

detected in other water bodies may be found in the RI Report, Sections 2.5 and 4.5 (Arcadis, 2012).[31]

Ponds Adjacent to the J. M. Mills Landfill

Five locations were sampled from the ponds at the toe of the J. M. Mills Landfill. All of these areas are inundated by Blackstone River flooding. The locations included three samples from Pond B and two from Pond C at the toe of the J. M. Mills Landfill. Pond B was dry during the 2003, 2004, and 2005 sampling events, and Pond C was dry during the 2004 and 2005 sampling events.

In sediment samples collected from Pond B at the toe of the J. M. Mills Landfill, VOCs were detected in two of three samples collected. Acetone was the only compound detected at a concentration greater than its screening criterion and was detected in only one sample. All other VOCs were either not detected or detected at concentrations less than screening criteria.

All PAHs were detected in at least one sample collected. Most of the individual PAHs were observed at concentrations greater than screening criteria, except for 2-methlynaphalene and naphthalene. Total PAH concentrations ranged from 10,000 µg/kg to 19,000 µg/kg.

Some SVOCs were detected in Pond B sediments, but all were observed at concentrations less than screening criteria.

Aroclor-1260 concentrations ranged from 100 µg/kg to 180 µg/kg in the samples collected. All sample concentrations were greater than screening criteria. No other PCBs were detected in the samples.

Dieldrin, 4,4′-DDD, 4,4′-DDE, and alpha- and gamma-chlordane were detected at concentrations greater than screening in one or more samples collected. All other pesticides were either not detected or were detected at concentrations less than criteria.

Metals were detected in all of the Pond B sediment samples, many at concentrations above screening criteria.

Two sediment samples were collected from Pond C on the eastern toe of the J. M. Mills Landfill. VOCs were only detected in one of the two samples collected. A total of 12 VOCs were detected, but only two constituents (acetone and carbon disulfide) were detected at concentrations greater than the screening criteria. All other VOCs were either not detected or were detected at concentrations less than the screening criteria.

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[31] ARCADIS. 2012. *Remedial Investigation Report*, Peterson/Puritan, Inc. Superfund Site – Operable Unit 2, Cumberland and Lincoln, Rhode Island. August 2012.

PAHs were detected in both sediment samples collected. Total PAH concentrations were 16,500 µg/kg (SE-020-LF) and 22,000 µg/kg (SE-074-LF). All PAHs were detected in at least one of the two samples, and all PAHs were detected at concentrations above screening criteria, except for 2-methylnapthalene and naphthalene.

Aroclor-1254 was detected in SE-020-LF at a concentration of 230 µg/kg and both Aroclor-1254 and Aroclor-1260 were detected in sample SE-074-LF at a total PCB concentration of 860 µg/kg. Concentrations of these two PCBs were above screening criteria. All other PCBs were not detected in the samples.

Dieldrin, 4,4′-DDD, 4,4′-DDE, alpha-chlordane, and endrin aldehyde were detected at concentrations slightly greater than screening criteria in at least one of the two Pond B samples.

Metals concentrations in sediments from Pond C were similar to those from Pond B and are slightly higher than those collected from upstream. Many of the metals detected were at concentrations greater than screening criteria.

Unnamed Island Pond A

In the 12 sediment samples collected from Pond A, acetone (380 J µg/kg), 2-butanone (750 J µg/kg), and carbon disulfide (5.11 µg/kg) were the only VOCs detected consistently at concentrations greater than screening criteria. Most other VOCs were not detected or were detected at concentrations less than screening criteria.

Most of the 17 PAHs were detected in each sample with most individual PAH concentrations greater than criteria, except for sample SE-086-UI, where no PAHs were detected. Total PAHs in the samples, other than SE-086-UI, ranged from 4,000 µg/kg to 30,000 µg/kg.

Aroclor-1254 and Aroclor-1260 were detected in eight of the 12 samples at concentrations that ranged from 50 µg/kg to 650 µg/kg. All concentrations of these PCBs were above screening criteria. All other PCBs were not detected in the samples.

SVOCs were detected at concentrations mostly less than screening criteria. Bis(2-ethylhexyl)phthalate (8,700 µg/kg) and benzaldehyde (1,200 µg/kg) were the only compounds detected at concentrations greater than screening criteria in Pond A samples collected during Phase 1A. T05PA-003 was the only sample exhibiting an SVOC concentration greater than a screening criterion (phenol) in Phase 1B samples. The concentrations of phenol were similar to the detected concentration in the upstream samples.

Several pesticides were detected intermittently in low concentrations in one or more of the Pond A samples. 4,4-DDD, 4,4-DDE, alpha-chlordane, delta-BHC, and gamma-chlordane were detected above the screening criteria in one or more samples collected. All other pesticides were not detected or were detected at concentrations below the screening criteria.

Metals were detected in each of the 12 Pond A samples with SE-079-UI exhibiting the highest concentrations for most of the metals. Most of the metals concentrations were greater than the screening criteria.

Unnamed Island Pond D

Four sediment samples were analyzed from Pond D. Acetone, carbon disulfide, and 2-butanone were detected in the samples collected. Acetone and carbon disulfide were detected above screening criteria in more than one sample. No other VOCs were detected in the samples.

All PAHs were detected at concentrations above the screening criteria in at least one of the samples collected. Total PAHs ranged from 10,000 µg/kg to 22,000 µg/kg.

Aroclor-1260 was the only PCB detected. Aroclor-1260 concentrations ranged from 98 µg/kg to 250 µg/kg, all of which are greater than the screening criterion. No other PCBs were detected in the samples.

The following non-PAH SVOCs were detected in the samples: dibenzofuran, carbazole, benzaldehyde, bis(2-ethylhexyl)phthalate, and 2-methylphenol, but all at concentrations less than the screening criteria. No other SVOCs were detected in the samples.

Pesticides were detected in all of the samples collected. 4,4′-DDD, 4,4′-DDE, endosulfan sulfate, and gamma-chlordane were detected at concentrations greater than screening criteria in at least one of the sample collected. All other pesticides were either not detected or detected at concentrations less than screening criteria.

Most metals concentrations were detected at concentrations greater than the screening criteria.

Unnamed Island Pond E

Two sediment samples were collected from Pond E. No VOCs were observed at concentrations greater than the screening criteria in either of the samples collected.

PAHs were detected in both samples collected. Total PAHs detected were 17,000 µg/kg and 20,000 µg/kg. All PAHs analyzed were detected in one of the samples and concentrations were all greater than the screening criteria in at least one of the samples, with the exception of 2-methylnaphthalene and naphthalene.

Nine non-PAH SVOCs were detected in the one of the two samples; however, they were all detected at concentrations less than the screening criteria.

PCBs were detected in both samples collected. The concentrations of Aroclor-1254 in SE-001-UI and the concentration of Aroclor-1260 in SE-078-UI were greater than their respective screening criteria. No other PCBs were detected in the samples.

Pesticides were detected in both samples collected. Six pesticides (4,4-DDD, 4,4-DDE, alpha-chlordane, dieldrin, endrin aldehyde, and gamma-chlordane) were detected at concentrations greater than the screening criteria in at least one of the samples. All other pesticides were either not detected or were detected at concentrations less than the screening criteria.

Metal concentrations in Pond E were similar to some of the higher concentrations that were found elsewhere on the Unnamed Island. Maximum detected concentrations of chromium (354 mg/kg), copper (653 mg/kg), lead (1,760 mg/kg), and zinc (1,460 mg/kg) were some of the higher concentrations identified on-site. Most metals were detected in concentrations greater than the screening criteria in one of the two samples.

Nunes Inlet - Pond I

Pond I, also known as the Nunes Inlet, is located inside the narrow strip of land in the Blackstone River off the Nunes Parcel. Pond I is connected to the Blackstone River at higher water levels and is more of a pond when the water level is lower. Three sediment samples were collected in this pond. VOC concentrations were detected in all of the samples. Two compounds (acetone and carbon disulfide) were detected at concentrations greater than the screening criteria in at least one of the samples. All other VOCs were either not detected or were detected at concentrations less than the screening criteria.

PAHs were detected in all of the samples collected, and most were detected at concentrations greater than the screening criteria. Concentrations of total PAHs ranged from 15,000 µg/kg to 41,100 µg/kg.

Aroclor-1260 was detected at a concentration of 200 J µg/kg in sample SE-021-NP (above the screening criteria) and at a concentration of 22 J µg/kg in sample SW-069-NP (below the screening criterion). Additionally, concentrations of Aroclor-1254 and Aroclor-1260 in TO5BR-005 were greater than the screening criteria. No pesticides were detected in the samples.

Metal concentrations were similar to those found in sediments elsewhere on-site. Maximum detected concentrations of metals included arsenic (13 mg/kg), cadmium (30 mg/kg), chromium (257 mg/kg), copper (355 mg/kg), lead (300 mg/kg), mercury (0.7 mg/kg), nickel (70 mg/kg), zinc (666 mg/kg), and cyanide (2 mg/kg). Most metals were detected in one of the samples and were typically greater than the screening criteria.

Pond N (inlet off the Blackstone River north of the J. M. Mills Landfill)

One sediment sample was collected from Pond N, an inlet off the Blackstone River. VOCs 2-butanone and acetone were detected at concentrations of 10 J µg/kg and 87 J µg/kg,

respectively. Only acetone was detected above the applicable screening criteria. All PAHs were detected in the sample, which had a total PAH concentration of 11,000 µg/kg. All PAHs, except 2-methylnapthalene and naphthalene, were detected at concentrations greater than the screening criteria. Non-PAH SVOCs were also detected in the sample but at concentrations less than the screening criteria. Aroclor-1260 was the only PCB detected and was detected at a concentration of 550 µg/kg, greater than its screening criterion.

Five pesticides (4,4-DDD, 4,4-DDE, alpha-chlordane, dieldrin, and gamma-chlordane) were detected at concentrations greater than the screening criteria. All other pesticides were either not detected or were detected at concentrations below the screening criteria in the sample. Most metals were detected in the sediment sample. Many of the metals detected were at concentrations greater than the screening criteria.

Fish Tissue

Fish tissue samples were collected from six distinct areas: Blackstone River Area 1 (beginning approximately 1.25 miles upstream of the Ashton Dam and extending for approximately 0.5 mile downstream); Blackstone River Area 2 (beginning at the Ashton Dam and extending approximately 0.65 mile downstream); Blackstone River Area 3 (located within the boundaries of OU 2); Pond A (P-1) (located on the Unnamed Island); Pond F (P-2) (located at the southeastern extent of OU 2); and P-6, used as a reference pond (located approximately 1.6 miles northwest of the Ashton Dam and not near the Blackstone River). Due to the widespread distribution of constituents in all of the subareas, the fish tissue data are discussed in the RI and FS by five classes of constituents: PAHs, SVOCs other than PAHs, PCB homologs, pesticides, and metals. In total, there were over 220 discrete fish tissue samples evaluated. All fish tissue sampling results are presented in Tables 4-38 through 4-49 of the Final RI Report (August, 2012).

In general, fish throughout the portions of the Blackstone River studied, including portions of the Blackstone River flowing by, and upstream of OU 2, exhibit elevated levels of constituents, including the five classes identified above, with PCBs, pesticides, and metals, the most common constituents identified above screening criteria. There was no evident pattern of "hot spots" within the Blackstone River, particularly in areas within and adjacent to OU 2. Therefore, the contaminant sources within OU 2 were not identified as a source of fish tissue contamination above background contaminant levels identified in the River. Additional discussion of samples collected and results for constituents may be found in the RI Report, Sections 2.8 and 4.7 (Arcadis, 2012).[32]

[32] ARCADIS. 2012. *Remedial Investigation Report*, Peterson/Puritan, Inc. Superfund Site – Operable Unit 2, Cumberland and Lincoln, Rhode Island. August 2012.

Air

Several VOCs were observed in samples collected from the five air vents at the J. M. Mills Landfill. Table 4-50 of the Final RI Report (August, 2012) summarizes the data collected. Most exhibited low levels of certain VOCs, carbon dioxide, and methane; however, higher levels of these constituents were observed in Vent #5, with a concentration of 59% by weight of methane, which is more typical of gases resulting from active biological degradation of materials in a municipal landfill. The vents at the J. M. Mills Landfill are not considered representative of ambient air samples at OU 2; therefore, ambient air concentrations were modeled in the HHRA to assess that specific exposure pathway. Lastly, it is also worth noting that during the installation of test pits at the base of the landfill conducted by P&W for its second rail project in 2012, GZA detected hydrogen sulfide in the breathing zone at approximately 148 ppm (exceeding worker health and safety protocols) at location TP-20 which temporarily halted investigations.[33] Hydrogen sulfide levels receded to safe working limits in approximately 45 minutes, at which time the excavation equipment was relocated to the next test pit location and TP-20 was backfilled later the same day. Additional discussion of samples collected and results for constituents may be found in the RI Report, Sections 2.7 and 4.8 (Arcadis, 2012).[34]

Leachate

Historically, leachate samples taken at the base of the J. M. Mills Landfill as part of previous whole-Site investigations (1987-1990) exhibited elevated concentrations of chlorinated solvents, semi-volatile organic compounds, and inorganics (C-E Environmental, Inc., 1990).[35] While seeps were reported by EPA at the time of the RI planning, field crews reported that these seeps were not present when field work was conducted during the OU 2 RI. Therefore, seeps could not be sampled by the field crews during the scheduled RI field investigations. As a part of the CSM for this OU, and consistent with a presumptive approach for containment, leachate production remains plausible and thus was evaluated (using a surrogate method as discussed in the HHRA) as a potential exposure route in the risk assessment. Additional discussion of samples collected and results for constituents may be found in the RI Report, Section 4.9 (Arcadis, 2012).

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[33] GZA. 2012. *Evaluation of Railroad Siding Restored Second Track Adjacent to J M Mills Landfill, Providence and Worcester Railroad Company (P&W)*, Cumberland, Rhode Island. August 2012.
[34] ARCADIS. 2012. *Remedial Investigation Report*, Peterson/Puritan, Inc. Superfund Site – Operable Unit 2, Cumberland and Lincoln, Rhode Island. August 2012.
[35] C-E Environmental, Inc. 1990. Remedial Investigation Report for the Peterson/Puritan Site, Cumberland, Rhode Island. Report prepared for CPC International, Inc.

F. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The Site, including OU 2, falls within the boundaries of the Blackstone River Valley National Heritage Corridor, established in 1986, and created by an Act of Congress to celebrate the history of the Blackstone River and the areas abutting the Blackstone River. Named after the late Senator John Chafee, the legislation acknowledges the Blackstone River as the location of America's Industrial Revolution. The Heritage Corridor Commission works in partnership with a variety of federal, state, and local agencies, including many non-profit and private organizations to protect the sites and resources of the Blackstone Valley, such as the Blackstone River, the historic canal, and heritage sites and natural areas found throughout the Corridor, which includes an established bike path, canoe trail, and increased recreational use throughout the Corridor.

Additionally, the American Heritage Rivers Protection Program was created by Executive Order, Number 13061, signed by President Clinton on September 11, 1997. Selection criteria were developed by the Council on Environmental Quality (CEQ) and on July 30, 1998, President Clinton chose to make 14 designations; the Blackstone and Woonasquatucket river system was one such designation. The American Heritage Rivers initiative is consistent with the existing authorities articulated by Congress in the National Environmental Policy Act of 1969, as well as other authorities granted to agencies (e.g., National Historic Preservation Act, the Housing and Community Development Act, the Clean Water Act, and the Intermodal Surface Transportation Efficiency Act).

On December 19, 2014, President Obama signed legislation that established the Blackstone River Valley National Historical Park (Historical Park). The same legislation also extends the authorization of the John H. Chafee Blackstone River Valley National Heritage Corridor for six years, through the end of Fiscal Year 2021. While the final boundaries of the Historical Park have not been established yet, the Historical Park will include portions of, or be adjacent to, the Site, including, but not limited to, the Blackstone River State Park in Lincoln, RI; Ashton Historic District in Cumberland, RI; the Blackstone River and tributaries of the Blackstone River; and the Blackstone Canal.

In the vicinity of OU 2, the Blackstone River has undergone resurgence through the efforts of federal, state, and local government agencies, non-profit organizations, and the private for-profit sector. Surface water quality is much improved due to enforcement of the federal Clean Water Act (CWA), and wastewater discharge permits are being further tightened to improve water quality. Initiatives are underway to enhance recreation along the river corridor (bikeway and canoe trail), redevelop old mill sites (brownfields), develop and maintain heritage sites (such as the Historical Park), inventory natural resources, study water quality, and restore anadromous fish to the river in Rhode Island.

Collectively, these efforts promise to further river restoration and enhance the river's value to residents and visitors of the Blackstone Valley. Each incremental step signifies the public's

backing and demand for improving the quality of the Blackstone River as a recreational corridor and a vital economic and environmental resource.

1. Land Uses

The following land uses are present in the vicinity of OU 2:

- Interstate 295 Interchange and predominately commercial;
- Route 116 (George Washington Highway) – Primarily office, public facilities, and light industrial uses;
- Mendon Road (Route 122, paralleling OU 2 to the east in Cumberland, RI) – Mix of residential, office, commercial, retail, and mixed commercial/residential;
- Martin Street (north of OU 2) – Industrial with interspersed recreational facilities;
- Lonsdale Mill Complex (south of OU 2) – Mixed commercial and light industrial;
- Route 126 (Old River Road across the river and paralleling west of OU 2 in Lincoln, RI) – Residential; and
- A proposed commercial development abutting the southern boundary of OU 2 is currently under review by the town of Cumberland.

As shown on **Figure 2** in **Appendix B**, OU 2 of the Site was divided into several waste disposal areas, as described previously, for assessment purposes. The properties located within OU 2 are privately and/or publically owned. Access to the J. M. Mills Landfill is restricted by a fence maintained by EPA. From the river side of the OU 2 properties there are no access restrictions along the riverbanks to restrict or prevent trespassing or canoe/kayak landings. Current land use within OU 2 consists of undeveloped, and privately and/or publically owned, industrial/commercial properties (e.g., Nunes Parcel, J. M. Mills Landfill), the railroad right of way, undeveloped open space (the Unnamed Island), and recreational (e.g., bikeway and unauthorized use of riparian areas accessed along the Blackstone River). The Ashton-Pratt Corridor Redevelopment Plan indicates that potential future redevelopment within the corridor, including the OU 2 area, could consist of enhancing recreational uses of the area, maximizing river and canal access, improving transportation facilities and traffic, and overall improvement of aesthetics. Lastly, the exposure pathways evaluated in the HHRA for OU 2 utilized these current and planned future land uses in the assessment.

Areas of Potential Archaeological or Historical Importance

A Phase I reconnaissance survey included in Appendix F of the FS Report and conducted by the Public Archaeology Laboratory, Inc. resulted in the identification of two historic properties listed in the National Register of Historic Places adjacent to OU 2: the Lonsdale Historic District located less than ½ mile south of the OU 2 boundary and the Blackstone Canal located immediately west and across the river from the OU 2 boundary. Two contributing elements within these districts, the Pratt/Lonsdale Dam and Railroad Bridge and the earthen

ramp and stone abutment (Quinnville Wellfield) are also located near OU 2. The visible remains of two structures, the 1903 [former] Power Canal Gate House foundations (located within the Nunes Transfer Station building; traces of the former canal are visible south of OU 2 of the Site) and the Hunt Dam (located immediately north of the Pratt Dam; portions of this structure are visible north of Pond F), are potentially eligible for listing in the National Register as contributing resources within the Lonsdale Historic District.

Potential archaeologically sensitive areas for pre- and post-contact period Native American and EuroAmerican resources have been identified within or adjacent to OU 2, although the OU 2 area has been extensively disturbed from the past landfill Facility operations. To date, no specific sites or materials have been identified within OU 2. The potential remaining sensitive strata for Native American sites consist of natural, undisturbed alluvium identified at varying depths within or adjacent to OU 2. The types of possible Native American cultural deposits in alluvial floodplain deposits date back to the pre-contact, contact, and early historic periods. These deposits could include habitation/resource procurement sites (e.g., fishing and hunting stations), dugout canoes in river and pond sediments, and possible burials in areas of naturally higher ground away from inundated, flood prone landforms.

Based on these findings, EPA will continue to consult with the Rhode Island Historical Preservation and Heritage Commission and Native American tribes and other interested parties, including the Cumberland and Lincoln historical associations, to avoid, minimize, and/or mitigate direct and indirect impacts to historic properties and archaeologically sensitive areas from remedial activities.

2. Ground/Surface Water Uses

The federal groundwater classification for groundwater within OU 2 is Class 2B (a future drinking water resource). Under the Federal Safe Drinking Water Act, Class II ground waters are current and potential sources of drinking water, and water having other beneficial uses. Generally, groundwater affected by OU 2 of the Site is shallow and, based on predominant shallow groundwater flow directions, likely discharges to the Blackstone River. Rhode Island does not have an EPA-approved Comprehensive State Ground Water Protection Program, thus the federal classification for groundwater applies to the federal CERCLA remedial action.[36] All of the groundwater within OU 2 (as depicted in **Figure 3-6 in Appendix B**) underlies waste management areas and under EPA policy[37] does not have to attain drinking water standards. The State of Rhode Island is designated as a natural resource trustee for groundwater.

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[36] The State's classification for the groundwater within OU 2 is GAA (known or presumed to be suitable for drinking without treatment). While it may be seen as functionally equivalent in this case, this classification is not applied to the CERCLA remedial action.

[37] "Summary of Key Existing EPA CERCLA Policies for Groundwater Restoration" (OSWER Directive 9283.1-33, June 26, 2009) citing language in the NCP Preamble at 55 FR 8753-8754, March 8, 1990.

With the exception of two currently operating residential wells east of the OU 2 boundary (see **Figure 2** in **Appendix B**), there is no other known current potable use of groundwater, either on-site or immediately off-site of OU 2. The nearest municipal well field currently in use is maintained by Cumberland approximately four miles upstream of the Site in Manville, Rhode Island. Lincoln also maintains a municipal water well (for emergency and supplemental supply) in Lonsdale approximately one mile south of the Site. Each of these well fields is located within the Blackstone River aquifer.

Historically, the Blackstone River provided both water supply and wastewater drainage for the industries and municipalities along the valley. The Blackstone River is the second largest freshwater tributary to the Narragansett Bay. The Blackstone River is an important natural, recreational, and cultural resource to both Rhode Island and Massachusetts. The wastewater treatment plant for the City of Woonsocket is a major discharger upstream of OU 2. In previous studies, the Blackstone River waters were found to be noticeably degraded by municipal sewage and industrial discharges.

The Blackstone River, from the Rhode Island/Massachusetts border to approximately 1.5 miles downstream of OU 2, is classified by RIDEM under the federal CWA as Class B1 (i.e., suitable for primary and secondary contact recreation and fish and wildlife habitat, recognizing the potential for impacts due to approved wastewater discharges and combined sewer overflows) that has an established goal of "fishable and swimmable." The Blackstone River is listed on the RIDEM 2012 List of Impaired Waters under Section 303(d) of the CWA based on dissolved oxygen, phosphorus, biodiversity impacts, pathogens, as well as metals, and PCBs in fish tissue. As required under that section, RIDEM completed a twofold, multi-year study[38] to determine the Total Maximum Daily Loads (TMDLs) from point and non-point sources in 2008. Based on these results, in February 2013 RIDEM released its final TMDL[39] analysis for the Blackstone River Watershed which included, among other findings, trace metals impairments for cadmium and lead along the river segment incorporating OU 2. The State of Rhode Island has an overall objective to "restore impaired sections of the Blackstone River and its tributaries," which includes restoring the river segment that flows through the OU 2. Lastly, the Rhode Island Rivers and Classification Policy is intended to provide guidance for the management and protection of Rhode Island's river and estuarine watershed resources at the state and local levels. Its broad objectives are to protect drinking water supplies and pristine rivers, to encourage recreational use of rivers, to foster the creation of greenways, and to provide for the cleanup of rivers. Under this policy, the Blackstone River within OU 2 is classified as non-contact recreational.

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[38] Water Quality – Blackstone River Final Report 1: Existing Data, Vols. 1&2; and Water Quality – Blackstone River Final Report 2: Field Investigations, The Louis Berger Group, Inc., January 2004/February 2008

[39] Total Maximum Daily Load Analysis for Blackstone River Watershed Pathogen and Trace Metals Impairments Final Report, RIDEM, February 2013.

G. SUMMARY OF SITE RISKS

A baseline risk assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with OU 2 assuming no remedial action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The baseline human health risk assessment followed a four step process: 1) hazard identification, which identified those hazardous substances which, given the specifics of OU 2, were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at OU 2, including carcinogenic and non-carcinogenic risks and a discussion of the uncertainty in the risk estimates. A summary of those aspects of the human health risk assessment which support the need for remedial action is discussed below followed by a summary of the ecological risk assessment findings.

1. Human Health Risk Assessment

As previously discussed, a baseline HHRA was completed for OU 2 to evaluate the likelihood and magnitude of potential human health effects associated with historical disposal practices. Direct exposures related to the waste in the J. M. Mills Landfill were not evaluated in the HHRA due to the presumption that this area will be closed by capping and subject to deed restrictions limiting its disturbance. The HHRA evaluated the potential for contaminants in soil within and adjacent to OU 2 at the J. M. Mills Landfill (floodplain), Nunes Parcel/Soil Removal Area, Quinnville Wellfield, Southern Bank/Pratt Dam area, Wetlands A-D, and debris fields associated with the landfill disposal activities; ambient air associated with landfill gas emissions from the J. M. Mills Landfill; leachate associated with the J. M. Mills Landfill; surface water and sediment in Wetlands A-D and the Blackstone River/neighboring inlet ponds; fish tissue in the Blackstone River/neighboring inlet ponds; groundwater OU 2; and indoor and outdoor air impacted via subsurface migration of volatile compounds across OU 2 (i.e., trench) to adversely affect human receptor populations. A Supplemental HHRA was also completed for the Unnamed Island (M&E|AECOM, 2010)[40] which evaluated the potential for contaminants in soil, leachate, surface water, sediment, and groundwater to adversely affect human receptor populations. Additional risk refinements were performed as part of the FS to update calculations based on more recent EPA Superfund guidance and toxicity data.[41]

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[40] Metcalf & Eddy|AECOM. 2010. *Supplemental Human Health Risk Assessment – Unnamed Island, Peterson Puritan Superfund Site - Operable Unit 2, Cumberland and Lincoln, Rhode Island.* July 2010.
[41] USEPA, 2014. *Draft Feasibility Study; Peterson Puritan Superfund Site - Operable Unit 2, Cumberland and Lincoln, Rhode Island.* Agency Revision of the FS prepared by Arcadis in March 2013. July 2014.

Identification of Chemicals of Concern

Of the approximately 150 chemicals detected at OU 2, 103 chemicals were selected for evaluation in the baseline and Supplemental HHRAs as chemicals of potential concern. The chemicals of potential concern were selected to represent potential site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment and can be found in Tables 2.1 through 2.19 of Appendix S of the baseline HHRA and Tables 2.1 through 2.8 of the Supplemental HHRA. From this, a subset of the chemicals were identified in the FS as presenting a significant current or future risk and are referred to as the COCs in this ROD and summarized in **Tables G-1 through G-5** (see **Appendix C**) for fish tissue (fillet) in OU 2 ponds and the Blackstone River, surface/subsurface soil and indoor air at the Nunes Parcel/Soil Removal Area, and groundwater throughout OU 2. These tables contain the exposure point concentrations used to evaluate the reasonable maximum exposure (RME) scenario in the baseline HHRA for the chemicals of concern. Estimates of average or central tendency exposure concentrations for the chemicals of concern and all chemicals of potential concern can be found in Tables 3.1 through 3.29 of Appendix S of the baseline HHRA and Tables 3.1 through 3.7 of the Supplemental HHRA.

Exposure Assessment

Current and potential future site-specific pathways of exposure to chemicals of concern were determined. The extent, frequency, and duration of current or future potential exposures were estimated for each pathway. From these exposure parameters, a daily intake level for each site-related chemical was estimated.

As described in the baseline HHRA, OU 2 study area[42] included the land formerly owned and operated as a landfill Facility by Mr. Joseph Marzalkowski and his agent(s)/associate(s) for the purposes of waste transfer and disposal. Specifically, the areas assessed that are within the current OU 2 boundary includes the following areas:

- The J. M. Mills Landfill area, encompassed by the fence line erected by the EPA to restrict access to the landfill in 1992.
- The associated debris fields, staging areas, and suspected disposal trenches along the bank of the Blackstone River.
- The gravel/paved access roads in the immediate vicinity of the J. M. Mills Landfill.
- The solid waste transfer station property (now or formerly owned by Nunes Disposal, Inc. and referred to as the Nunes Parcel), the railroad easement, the associated river channel(s) and Unnamed Island within the river, and the adjacent wetlands.

Areas that are adjacent to OU 2 that were assessed in the baseline HHRA are:

[42] The current boundary of OU 2 was established after the baseline HHRA was issued. The baseline HHRA assessed a larger OU 2 study area than the area that has now been defined as OU 2.

- The Pratt Dam.
- The former Lenox Street municipal well.
- The former Quinnville Wellfield.

Land use categories within OU 2 used by the HHRA are recreational (e.g., Unnamed Island, Pond F, bikeway, river bank) and light industrial/commercial (e.g., Nunes Parcel/Soil Removal Area, J. M. Mills Landfill, railroad right-of-way). The Unnamed Island is not expected to be developed in the future for residential use. According to the Ashton-Pratt Redevelopment Plan for Cumberland and Lincoln, Rhode Island, the following land uses are present in the vicinity of OU 2:

- Interstate 295 Interchange – Predominately commercial
- Route 116 (George Washington Highway) – Primarily office, public facilities, and light industrial uses
- Mendon Road (Route 122) – Mix of residential, office, commercial, retail, and mixed commercial/residential
- Martin Street – Industrial with interspersed recreational facilities
- Lonsdale Mill Complex – Mixed commercial and light industrial
- Route 126 (Old River Road) – Residential

In addition:

- A proposed commercial development abutting the south boundary of OU 2 is currently under review by the town of Cumberland.

The Ashton-Pratt Redevelopment Plan indicates that future redevelopment could consist of enhancing recreational uses of the area, maximizing river and canal access, improving transportation facilities and traffic, and overall improvement of aesthetics. According to the Cumberland Comprehensive Plan (Cumberland Planning Board, 2004), developed land within the Town of Cumberland is primarily residential (27 percent), with commercial, industrial, institutional, and transport and utilities comprising approximately 2 percent of the total developed land use. Recreational land use constitutes a little less than 1 percent of total land use (Cumberland Town Council, 2004). According to the Lincoln Comprehensive Plan (Lincoln Planning Board, 2003), approximately 55 percent of the Town of Lincoln is zoned as residential, and 15 percent as industrial/commercial, with the remaining land classified as other (e.g., utilities) and vacant (undeveloped).

OU 2 is located within the John H. Chaffee Blackstone River Valley National Heritage Corridor (Corridor) which in 2014, the Blackstone River Valley National Historical Park was created. The Blackstone and Woonasquatucket River systems are also designated as American Heritage Rivers, and as such development of the Corridor prompted EPA, under the Superfund Redevelopment Initiative, to work with Corridor Commission staff, the State, town planners and local stakeholders to draft, and later in 2005, adopt the "Ashton-Pratt Corridor Redevelopment Plan."

Since 2005, recreational use on, and along, the river has increased significantly. A regional bike path has been completed which follows the Lincoln side of the river and canal before crossing the Pratt Dam onto the Cumberland side (and entering onto the western tip of the Nůnes Parcel) on the south end of OU 2. The path then follows the eastern side of the river into Lonsdale. With increased recreation in the vicinity of OU 2, reasonably anticipated future land use within and adjacent to OU 2 is expected to include recreational and open space considerations, although future use decisions are under the control of the owners of properties within OU 2. The Valley Falls Fire District and volunteers maintain access to the Pratt Dam for vehicular access across a portion of OU 2 and over property leading to the dam. At this location, a staging and portage area just north of the dam (Cumberland side) is used for first responder lifesaving efforts on the river. Sport fishing occurs on the Blackstone River.

Until 2009, it was believed that no public or private groundwater supply wells were operating within or adjacent to OU 2 and that the entire area was served by public water systems. In November 2009, EPA learned of the installation of private wells in bedrock used for drinking water in the immediate vicinity of OU 2. Sampling of the three private use (residential) wells was conducted by EPA. While minimal traces of groundwater contaminants were detected in two of the three wells, concentrations in the potable water from each residential well were found to meet protective groundwater standards at the time. The affected residents were advised to continue to monitor their household water periodically. Aside from these instances, no other groundwater use has been identified on, or in the immediate vicinity of, OU 2.

The following is a brief summary of the exposure pathways that were found to present a significant risk (Incremental Lifetime Cancer Risk greater than 10^{-4} or a Hazard Index [HI]>1) at OU 2. A more thorough description of all exposure pathways evaluated in the risk assessment including estimates for an average exposure scenario, can be found in Section 6.3 and on Tables 4.1 through 4.13 of Appendix S of the baseline HHRA, and in Section 3.2.3 and Tables 4.1 through 4.10 of the Supplemental HHRA.

The following current/future exposure pathways were found to present a significant risk both within OU 2 and in reference areas outside of the OU:

- Recreational user (young child and adult) due to fish consumption at four locations: OU 2 (Blackstone River portion adjacent to OU 2, including OU 2 ponds and waters upstream of Pratt Dam), BR-1 (Blackstone River portion upstream of Ashton Dam and upstream of OU 2), BR-2 (Blackstone River portion downstream of Ashton Dam but upstream of OU 2), and P-6 (reference pond approximately 3 miles north and upstream of OU 2);[43]

[43] For current/future recreational user fish tissue exposures, the ingestion rate was averaged over a 365 day/yr. time frame. The ingestion rates were 0.014 kg/day (adult) and 0.0061 kg/day (young child). Exposure durations of 24 years and 6 years,

The following future exposure pathways were found to present a significant risk within OU 2:

- Resident (adult and young child) with exposure to untreated groundwater throughout OU 2 (by ingestion, dermal contact, and inhalation);[44]
- Commercial worker with exposure to soil (by ingestion and dermal contact) and indoor air (by inhalation) at the Nunes Parcel/Soil Removal Area;[45]
- Resident (adult and young child) with exposure to soil (by ingestion and dermal contact) and indoor air (by inhalation) at the Nunes Parcel/Soil Removal Area;[46] and
- Construction worker with exposure to lead in soil (by ingestion) at Nunes Parcel/Soil Removal Area.[47]

Note that the baseline HHRA was completed in 2009/2010. In February 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates (USEPA, 2014).[48] Applying these updated standard default exposure factors to the risk assessment would possibly result in a slight decrease of the risk estimates; however, it would not change the previous conclusions regarding unacceptable risks at OU 2. These updated standard default exposure factors have been utilized during development of risk-based performance standards (see Section L of this ROD).

In addition to the quantified risks and hazards mentioned above, asbestos-containing material has been identified which may present significant health risks due to its status as a Class

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respectively, were presumed for an adult and young child. Body weights of 70 kg and 15 kg were used for the adult and young child, respectively.

[44] For future residential exposures to untreated groundwater, drinking water ingestion rates of 2 L/day and 1.5 L/day for the adult and young child, respectively, were assumed. An exposure frequency of 350 days/year was used for a combined exposure duration of 30 years. Dermal contact was assumed with 18,000 cm^2 of surface area for the adult, and 6,600 cm^2 for the young child. Showers/baths were assumed to occur 350 days/year for 0 58 hr/day for the adult and 1 hr/day for the young child. Inhalation during showers/baths evaluated using the Andelman model with a volatilization factor of 0.5 L/m^3.

[45] For future commercial worker soil exposures, an exposure duration of 25 years was presumed. A body weight of 70 kg was used. Dermal contact was assumed with 3,300 cm^2 of surface area. An exposure frequency of 250 days/year was used. For indoor air exposures, an exposure duration of 25 years was presumed. Future indoor air exposures were assumed to occur 8 hours/day for 250 days/year.

[46] For future residential soil exposures, exposure durations of 24 years and 6 years, respectively, were presumed for an adult and young child. Body weights of 70 kg and 15 kg were used for the adult and young child, respectively. Dermal contact was assumed with 5,700 cm^2 of surface area for the adult and 2,800 cm^2 for the young child. An exposure frequency of 350 days/year was used for a combined exposure duration of 30 years. For future residential indoor air exposures, exposure durations of 24 years and 6 years, respectively, were presumed for an adult and young child. Future indoor air exposures were assumed to occur 24 hours/day for 350 days/year.

[47] For future construction worker floodplain soil exposures, a female worker was evaluated for lead exposure using EPA's Adult Lead Model (ALM). Default EPA assumptions and an arithmetic mean exposure point concentration were used as inputs to the model.

[48] USEPA, 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. February 6, 2014. (located online at http://www.epa.gov/oswer/riskassessment/superfund_hh_exposure.htm; items # 22 and #23 [as updated in February 2015] of this web link)

A (known human) carcinogen if fibers are released into the air and inhaled. Lastly, it was identified that physical hazards, such as metal debris, tires, dilapidated buildings, poorly supported structures, demolition debris and broken glass at OU 2 may also present health and safety hazards for site workers and trespassers. These threats were further considered in the FS.

Toxicity Assessment

EPA assessed the potential for cancer risks and non-cancer health effects.

The potential for carcinogenic effects is evaluated with chemical-specific oral cancer slope factors (CSFs) and inhalation unit risk (IURs) values for inhalation exposures. A weight of evidence classification is available for each chemical. CSFs have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk calculated using the CSF is unlikely to be greater than the risk predicted. A summary of the cancer toxicity data relevant to the chemicals of concern at OU 2 is presented in **Table G-6** in **Appendix C**.

The potential for non-cancer health effects is quantified by reference doses (RfDs) for oral exposures and reference concentrations (RfCs) for inhalation exposures. RfDs and RfCs have been developed by EPA and they represent an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure that is likely to be without an appreciable risk of deleterious health effects during a lifetime. RfDs and RfCs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. A summary of the non-carcinogenic toxicity data relevant to the chemicals of concern at OU 2 is presented in **Table G-7** in **Appendix C**.

The toxicity values presented in **Tables G-6 and G-7** in **Appendix C** are those used in the baseline HHRA, except for compounds where a toxicity update occurred since the baseline HHRA was completed in 2010. These updated toxicity values have been utilized in the following section (**Risk Characterization**) to calculate the presented carcinogenic risks and non-carcinogenic hazards for the applicable receptor populations as well as during development of risk-based performance standards (see Section L of this ROD).

Risk Characterization

Risk characterization combines estimates of exposure with toxicity data to estimate potential health effects that might occur if no actions were taken.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the daily intake levels (see **Exposure Assessment**) by the CSF or by comparison to the IUR. These toxicity values are conservative upper bound estimates, approximating a 95% upper confidence limit, on the increased cancer risk from a lifetime exposure to a chemical. Therefore, the true risks are unlikely to be greater that the risks predicted. Cancer risk estimates are

expressed as a probability, e.g., one-in-a-million. Scientific notation is used to express probability. One in a million risk (1 in 1,000,000) is indicated by 1 x 10^{-6} or 1E-06. In this example, an individual is not likely to have greater than a one-in-a-million chance of developing cancer over a lifetime as a result of exposure to the concentrations of chemicals at a site. All risks estimated represent an "excess lifetime cancer risk" in addition to the background cancer risk experienced by all individuals over a lifetime. The chance of an individual developing cancer from all other (non-site related) causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site related exposure is 10^{-4} to 10^{-6}. Current EPA's practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

In assessing the potential for adverse effects other than cancer, a hazard quotient (HQ) is calculated by dividing the daily intake by the RfD or RfC. A HQ $\leq$ 1 indicates that a receptor's exposed dose of a single contaminant is less than or equal to a reference value, i.e., the RfD or RfC, and that adverse health effects are unlikely to occur. Conversely, a HQ >1 indicates that adverse effects as a result of exposure to the contaminant are possible. To account for additive effects resulting from exposure to more than one compound, a Hazard Index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (e.g., liver) within or across those media to which the same individual may reasonably be exposed. A HI $\leq$ 1 indicates that non-carcinogenic adverse health effects are unlikely whereas a HI >1 indicates adverse effects are possible. Generally, EPA views HI values based on site-related exposure in excess of unity as unacceptable. It should be noted that the magnitude of the HQ or HI is not proportional to the likelihood that an adverse effect will be observed.

The following is a summary of the media and exposure pathways that were found to present a significant risk exceeding EPA's cancer risk range (10^{-4} to 10^{-6} or E-04 to E-06) and non-cancer threshold (HI of 1) at OU 2. Only those exposure pathways deemed relevant to the remedy being proposed are presented in this ROD. Readers are referred to Section 6.5 and Appendix S of the baseline HHRA, Section 3.4 and Tables 9.1 through 9.3 of the Supplemental HHRA, and Appendix C of the FS for a more comprehensive risk summary of all exposure pathways evaluated for all chemicals of potential concern and for estimates of the central tendency risk, although, as stated above, results presented below reflect changes to toxicity values which have occurred since the time of the calculations presented in the referenced documents.

Recreational User

Tables G-8 and G-9 in **Appendix C** depict the carcinogenic and non-carcinogenic risk summary for the chemicals of concern in fish tissue evaluated to reflect current/future recreational receptor (adults and young children) exposure corresponding to the RME scenario. For the current/future recreational user, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1 for fish tissue.

Area-specific HIs generally decrease in the following order: BR-2 (downstream of Ashton Dam, but upstream of OU 2), OU 2 (includes stretch of river adjacent to OU 2 and OU 2 ponds), BR-1 (upstream of Ashton Dam), and P-6 (background pond). Non-cancer hazards associated with consumption of fish from the background pond (P-6) were also greater than the EPA target. PCBs were the primary hazard driver for the Blackstone River and site ponds (BR-1, BR-2, and OU 2). PCBs and mercury were the primary hazard drivers for the background pond (P-6).

Area-specific risks generally decrease in the following order: BR-2 (downstream of Ashton Dam, but upstream of OU 2), OU 2 (includes stretch of river adjacent to OU 2 and site ponds), BR-1 (upstream of Ashton Dam), and P-6 (background pond). RME cancer risk (sum of adult and child risks) associated with consumption of fish from the background pond (P-6) was within the target risk range (RME risk = 5×10^{-5}), and, therefore, not presented on **Table G-8** in **Appendix C**. PCBs, carcinogenic PAHs, pesticides, and arsenic were the primary risk drivers for the Blackstone River and site ponds (BR-1, BR-2, and OU 2).

As discussed in the FS, cancer risks to recreational receptors eating resident fish from OU 2, BR-1, and BR-2 were greater than 1×10^{-4} and non-cancer hazards were greater than the EPA target HI of 1. However, the background/reference area pond (P-6) had risks in the range of 10^{-5} and a hazard index greater than 1, which places OU 2 risks into a more regional perspective. Based on the statistical evaluation conducted for fish tissue PCB data, concentrations in fish from upstream portions of the Blackstone River are not significantly different from concentrations found in fish from OU 2. Since the fish study found similar risks from similar contaminants in fish within the boundary of OU 2 and from upstream and reference locations, the potential cause for risks associated with eating fish at the Blackstone River may be due to many sources within the watershed, and not limited to just the portion within the OU 2 boundary. Therefore, no site-specific risk from fish consumption was identified for OU 2. Based on the results of this study, EPA finds that eating contaminated fish may pose a risk to public health and therefore recommends against the taking of resident fish for consumption from the water bodies identified in these investigations. It is important to note that since levels of contamination in fish may not be solely attributable to site-related disposal activities, EPA's plan to address landfill-related contamination with OU 2 is not expected to significantly reduce overall contaminant levels in fish within the river, although there could be some incremental improvements noted over time.

Residential Groundwater Use

Tables G-10 through G-11 in **Appendix C** depict the carcinogenic and non-carcinogenic risk summary for the chemicals of concern in future residential wells evaluated to reflect potential future potable water exposure corresponding to the RME scenario, under the assumption that groundwater from OU 2 is used as a source of potable water in the future. For the future resident using untreated groundwater as household water, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1 for groundwater. The exceedances were due primarily to the presence of arsenic,

carcinogenic PAHs, 1,4-dioxane, 4-chloroaniline, atrazine, bis(2-ethylhexyl)phthalate, naphthalene, 1,4-dichlorobenzene, chloroform, ethylbenzene, methyl tert-butyl ether, trichloroethene, vinyl chloride, aldrin, dieldrin, PCBs, benzene, aluminum, cadmium, cobalt, iron, manganese, and thallium in OU 2 groundwater. It should be noted that tetrachloroethene was originally a primary groundwater risk driver in the baseline HHRA. However, based on changes to toxicity values, risk refinement performed in the FS resulted in the removal of tetrachloroethene as a COC in OU 2 groundwater. Similarly, trichloroethene was originally not a primary groundwater risk driver in the baseline HHRA, but based on changes to toxicity values, risk refinement performed in the FS resulted in the addition of trichloroethene as a COC in OU 2 groundwater.

Future Commercial Worker at Nunes Parcel/Soil Removal Area

Table G-12 in **Appendix C** depicts the carcinogenic risk summary for the chemicals of concern in soil and indoor air evaluated to reflect potential future commercial exposure corresponding to the RME scenario. For the future commercial worker, carcinogenic risk exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6} due primarily to benzene in indoor air. Major contributors to risk are carcinogenic PAHs, bis(2-ethylhexyl)phthalate, dieldrin, dioxins, and/or arsenic in soil and benzene and/or naphthalene in indoor air. It should be noted that tetrachloroethene was originally a primary indoor air risk driver in the baseline HHRA. However, based on changes to toxicity values, risk refinement performed in the FS resulted in the removal of tetrachloroethene as a COC for indoor air at the Nunes Parcel/Soil Removal Area.

Resident at Nunes Parcel/Soil Removal Area

Tables G-13 and G-14 in **Appendix C** depict the carcinogenic and non-carcinogenic risk summaries for the chemicals of concern in soil and indoor air evaluated to reflect potential future residential exposure corresponding to the RME scenario. For the future young child and adult resident, carcinogenic risk exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1. The exceedances are primarily due to benzene, naphthalene, 1,4-dichlorobenzene, ethylbenzene, tetrachloroethene, and/or vinyl chloride in indoor air (contributed from impacted soil and/or groundwater) and carcinogenic PAHs, PCBs, dieldrin, dioxins, bis(2-ethylhexyl)phthalate, and/or arsenic in soil.

Lead Evaluation

The USEPA Integrated Exposure and Uptake Biokinetic (USEPA, 1994)[49] and USEPA Adult Lead Model (ALM)(USEPA, 2003)[50] were used to evaluate the hazard potential posed by exposure of young children less than 7 years of age or the developing fetus, respectively, as the most sensitive receptor groups. Exposures considered included inhalation of house dust based on

[49] USEPA, 1994. Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children. Office of Emergency and Remedial Response, Washington, DC. EPA/540/R-93/081. PB93-963510.
[50] USEPA, 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. Technical Review Workgroup for Lead, Washington DC. EPA-540-R-03-001.

OU 2 soil, OU 2 soil ingestion, fish tissue ingestion, and ingestion of OU 2 groundwater. It is EPA policy to protect 95% of the sensitive population against blood lead levels (BLLs) in excess of 10 µg/dL blood. Initial evaluations in the baseline HHRA and Supplemental HHRA utilized an upper-bound soil ingestion rate of 330 mg/day to evaluate potential lead risks for construction workers. EPA has subsequently approved a soil ingestion rate of 100 mg/day to be used with the lead model as recommended by the lead Technical Review Workgroup (USEPA, 2007)[51] for purposes of the lead evaluation for a construction worker. This revised ingestion rate was applied in the FS. In summary, the following exposure scenarios are the only ones that have estimated lead risks above the EPA target level of no more than 5% of the receptor population having BLL exceeding 10 µg/dL:

- Exposure of construction workers to soils at the Nunes Parcel/Soil Removal Area;
- Exposure of commercial workers to soils at the Nunes Parcel/Soil Removal Area; and
- Exposure of hypothetical young child residents to soil and groundwater from the Nunes Parcel/Soil Removal Area.

Uncertainties

The exposure frequencies used to evaluate soil, sediment, surface water, and leachate exposures for trespassers, recreational users, and commercial workers may be overly conservative given the size of each subarea relative to the entire OU. The OU 2 generally lacks distinguishing physical features that would indicate selective use of one subarea over another. Further, on-site media were assumed to represent 100 percent of potential exposure, which may be conservative given that recreational users may be frequenting other attractive areas within the region rather than just the OU 2 area itself. The ingestion factors (e.g., soil, sediment, fish) are conservative in that they assume an individual's exposure occurs only at OU 2 (i.e., limited to subareas of OU 2; see **Figure 2** in **Appendix B**), and do not consider exposure to other environmental media associated with non-site-related activities (e.g., residential gardening). Using these exposure parameters to estimate potential risk is a conservative approach, indicating site-related risks are unlikely to be higher and may actually be much lower than the risk estimates presented.

For the groundwater dermal contact pathway, risk associated with dermal absorption of the carcinogenic polycyclic aromatic hydrocarbons was not assessed because permeability constants for these compounds are outside the effective predictive range of the correlation modeling. This uncertainty may result in an underestimate of risk. In addition, risk associated with dermal absorption of chlorinated solvents (e.g., trichloroethene) is likely underestimated. Permeability constants for this class of compounds are underestimated by correlation modeling. These uncertainties will be periodically reviewed to address changes in the dermal absorption values for these compounds.

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[51] USEPA, 2007. Frequent Questions from Risk Assessors on the ALM. Available at http://www.epa.gov/superfund/lead/almfaq.htm. Updated August 2, 2007.

Airborne concentrations of volatile compounds for the showering/bathing scenario and for indoor/outdoor air were estimated using accepted EPA methods or exposure models. The use of these methods or models to estimate airborne concentrations of volatile compounds likely results in an overestimate of risk since conservative assumptions were employed in the exposure modeling. As discussed later in Section L of this ROD, current methods for evaluating vapor intrusion exposures due to volatile contaminants in soil do not include modeling from soil to indoor air. Therefore, cleanup levels are developed based on direct contact, along with the establishment of institutional controls which require further evaluation of indoor air impacts/mitigation if a building is to be erected onsite. In addition, as part of the June 2015 periodic updates to EPA's Regional Screening Levels (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm), changes were made regarding the definition of volatile compounds. This change results in the addition/inclusion of inhalation calculations related to 1,4-dioxane, benzo(a)anthracene, PCBs, and aldrin during cleanup level development (Section L of this ROD). The uncertainties associated with volatile compounds will be periodically reviewed in light of technical advances that occur in the evaluation of these air pathways.

A notable uncertainty associated with the lead modeling is the limited analytical data for the Soil Removal Area. The Soil Removal Area was evaluated as a separate subarea within the Nunes Parcel using only three sampling points (five total samples). However, this conservatively assumes that the receptor would preferentially spend all of their time in a relatively small area of OU 2. Lead concentrations in these samples ranged from10 mg/kg (SO-107-NP) to 5,460 mg/kg (SO-033-NP, 1 to 5 feet).

2. Ecological Risk Assessment

A Baseline Ecological Risk Assessment (BERA) (USEPA, 2009)[52] was prepared for OU 2 to evaluate the likelihood and magnitude of potential ecological risks associated with OU 2 and adjacent areas.[53] The technical guidance used to perform the BERA came primarily from "Ecological risk assessment guidance for Superfund: Process for designing and conducting ecological risk assessments. EPA/540/R-97/006" (USEPA, 1997). Following BERA evaluations (including a supplemental evaluation (AECOM, 2010)[54] specific to additional soils collected on the Unnamed Island), risk refinement steps were performed to better define chemicals of concern and associated cleanup levels.

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[52] United States Environmental Protection Agency. 2009. *Baseline Ecological Risk Assessment (BERA) for the Peterson Puritan Superfund Site - Operable Unit 2* Agency Revision of the BERA prepared by Arcadis in September 2008. August 2009.

[53] The current boundary of OU 2 was established after the BERA was issued. The BERA assessed a larger OU 2 study area than the area that has now been defined as OU 2.

[54] AECOM. 2010. *Supplemental Ecological Risk Assessment For Unnamed Island Soils, Peterson Puritan Superfund Site - Operable Unit 2, Cumberland and Lincoln, Rhode Island.* Technical Memorandum. July 27, 2010.

OU 2 is about 5,600 feet long and 1,600 to 1,800 feet wide, covering an area of around 220 acres. Distinct sub-areas of interest consist of several aquatic habitats (i.e., Ponds A, B, C, D, E, F, I, N, and P located within the currently established OU 2 boundary; the Blackstone River; Pond F; and Wetlands A through D; evaluated as aquatic habitat) and terrestrial habitats (i.e., J. M. Mills Landfill, the Unnamed Island, Nunes Parcel, the riparian corridor portion only within the currently established OU 2 boundary, and the Quinnville Well Field, Pratt Dam, and Wetlands A through D evaluated as terrestrial habitat that is outside of the currently established OU 2 boundary). The "ponds" along the shoreline of the Blackstone River (i.e., Ponds B, C, F, and I) are not real ponds but consist instead of quiet river backwaters which are cut off from the rest of the river during normal flow conditions. Ponds A, D, E, and P are located on the Unnamed Island. Under medium river stages, water flows from the Blackstone River to Pond A, but during high river water stages, the entire island may be underwater for long periods of time, completely submerging the four ponds on the Unnamed Island (and also Pond F located in front of Pratt Dam). Finally, Wetlands A through D are not directly connected to OU 2, but may occasionally receive overflow from the Blackstone River during extreme flooding events.

Two off-site aquatic habitats were also evaluated in the BERA to assess the potential risks associated with local background conditions. The reference habitats consisted of a reach of the Blackstone River flowing upstream of the Site for comparison to the Blackstone River flowing through OU 2 (referred to herein as "near-Site"), and Pond P-6 (located about 2.5 miles due north of the Site) for comparison to the various ponds associated with the Blackstone River and the Unnamed Island. In addition, background soil samples were collected from a nearby upland location (approximately 1 mile upstream of OU 2 on the Lincoln side of the Blackstone River) known to not have been affected by site-related waste disposal activities.

As discussed earlier, the Blackstone River has been historically impacted by many industrial, municipal, and non-point sources of pollution located further upstream of the Site. Possible OU 2-related contaminant sources include the waste deposits at the J. M. Mills Landfill, associated landfill debris fields, transfer station properties (referred to as the Nunes Parcel), and waste piles on the Unnamed Island in the river across from the landfill. Suspected sources of contaminants in Wetlands A through D may include stormwater runoff from nearby urban areas unaffected by past OU 2 activities.

Tables G-15 and G-16 in **Appendix C** summarize the receptor groups, lines of evidence, endpoints, and Exposure Areas (EAs) evaluated in the BERA for the two habitat types.

Identification of Chemicals of Potential Ecological Concern

The Screening-Level Ecological Risk Assessment (SLERA) prepared for OU 2 in 2007 (ARCADIS BBL, 2007)[55] identified the Chemicals of Potential Ecological Concern (COPECs) for further evaluation in the BERA by comparing surface water, sediment, and soil analytical data against conservative screening benchmarks. An analyte was retained as a COPEC if (a) the maximum concentration equaled or exceeded the screening benchmark, (b) it did not have a screening benchmark, or (c) the maximum detection/reporting limit (when an analyte was not detected) exceeded its screening benchmark.

The SLERA evaluated all analytes in soil, sediment, and surface water, consisting of metals, VOCs, SVOCs, PAHs, organochlorinated pesticides, dioxins and furans, and PCBs. Dioxins and furans were eliminated from further consideration because they all fell below their project action limits. Many analytes in all the remaining contaminant classes were retained as COPECs for evaluation in the BERA.

Tables G-17 and G-18 in **Appendix C** summarize key analytes identified as aquatic and terrestrial COPECs, respectively. To simplify the data presentation, only those habitats that showed actionable risk in the BERA were included in these tables, as follows: (a) Ponds A, E, C, D, I, N, and P (aquatic habitats); (b) the J. M. Mills Landfill and the Unnamed Island; and (c) Site-Wide (terrestrial habitats).

Exposure Assessment

Complete Exposure Pathways for the Aquatic Habitats

The aquatic portion of the BERA quantified exposures to three different community-level receptor groups and four piscivorous bird and mammal species exposed to the COPECs present in sediment, surface water, and fish collected from the Blackstone River and the ponds. The community-level receptor groups consisted of benthic invertebrates, fish, and amphibians; the target piscivorous bird and mammal species consisted of belted kingfisher (small avian piscivore), great blue heron (large avian piscivore), mink (small mammalian piscivore), and river otter (large mammalian piscivore). Sediment and surface water samples were collected from all the aquatic habitats within OU 2 and the reference locations. Six fish species (i.e., largemouth bass, white sucker, pumpkinseed, golden shiner, common shiner, and/or bluegill) were also collected from the Blackstone River (upstream reference and near-Site), Pond A, Pond F, and Pond P-6 (off-Site reference) for whole fish tissue residue analyses.

Exposure Point Concentrations (EPCs) for COPECs in surface water, sediment, and whole fish were calculated in terms of RMEs and central tendency exposures (CTEs). RMEs

[55] ARCADIS U.S., Inc. (ARCADIS BBL) 2007. Screening-Level Ecological Risk Assessment. February 2, 2007.

were either the maximum detected value or the 95% Upper Confidence Limit (UCL) of the mean, depending on the structure of the datasets. Geometric means were used as CTEs, except for the sediment analytical data used to assess risk to the benthic invertebrate community which were based on arithmetic means.

The fish tissue EPCs were calculated using whole-body residue data from fish collected in the river and several ponds. These data were first sorted in two size classes representing fish less than 15 centimeter (cm) and all the fish combined, regardless of size. The two smaller piscivores (i.e., kingfishers and mink) were assumed to eat only fish of 15 cm or less, whereas the two larger piscivores (i.e., great blue heron and river otter) were assumed to eat all fish regardless of size.

The three aquatic community-level receptor groups were assumed to be directly exposed to sediment and surface water in the Blackstone River (near-Site) and each of the individual ponds. Hence, EPCs were calculated for each of these aquatic EAs. The EPCs for sediment, surface water, and fish used to calculate the Estimated Daily Intakes (EDIs) for the small piscivorous birds and mammals were also derived independently for the Blackstone River (near-Site), Pond A, and Pond F. Each of these aquatic habitats represents a separate EA evaluated in the risk characterization. On the other hand, the EPCs for sediment, surface water, and fish used in calculating the EDIs for the large piscivorous birds and mammals were derived by combining the analytical data from the Blackstone River (near-Site), Pond A, and Pond F into one data set to represent a single large aquatic EA evaluated in the risk characterization.

Complete Exposure Pathways for the Terrestrial Habitats

It was determined that terrestrial plants and soil invertebrates would not be quantitatively addressed in the BERA due to a paucity of soil benchmarks. Instead, the terrestrial portion of the BERA quantified exposures to four omnivorous bird and mammal species exposed to the COPECs present in surface water, soil, and worms. The target omnivorous wildlife species consisted of the American robin (small omnivorous bird), short-tailed shrew (small omnivorous mammal), American woodcock (large omnivorous bird), and red fox (large omnivorous mammal; assumed to feed on 100% soil invertebrates). Soil and surface water samples were collected from all six terrestrial habitats at OU 2 and the reference locations. Tissue residue levels in earthworms were estimated using published COPEC-specific Biota-Soil Accumulation Factors (BSAFs).

EPCs for COPECs in surface water, soil, and earthworms were calculated in terms of RMEs and CTEs. RMEs were either the maximum detected concentration or the 95% UCL of the mean, depending on the structure of the datasets. Geometric means were used as CTEs.

The small omnivorous bird and mammal species were assumed to forage at each terrestrial EA. Hence, the EPCs for surface water, soil, and worms used in calculating the EDIs were derived independently for each terrestrial EA. For the large omnivorous birds and

mammals, the EPCs for surface water, soil, and worms used in calculating the EDIs were derived by combining the analytical data from all six terrestrial habitats into one data set to represent a single large terrestrial EA evaluated in the risk characterization.

Estimated Daily Intakes for Birds and Mammals

Food web modeling was used to calculate COPEC-specific EDIs for the piscivorous and omnivorous wildlife receptors foraging in the aquatic and terrestrial habitats at OU 2. The food web models quantified the EDIs by calculating the intake of COPECs via food ingestion, surface water drinking, and incidental soil or sediment ingestion, which were considered the primary exposure routes.

Ecological Effects Assessment

The potential for effects to aquatic community-level receptor groups (i.e., benthic invertebrates, fish, and amphibians) exposed to COPECs in surface water, sediment, and fish tissue was assessed using published surface water and sediment toxicity benchmarks, fish Critical Body Residues (CBRs), field community studies, and laboratory toxicity tests.

The effects assessment identified toxicity values to evaluate the results of the exposure assessment. The BERA used benchmarks obtained from various sources, including: (a) USEPA National Recommended Water Quality Criteria (NRWQC; USEPA, 2007);[56] (b) USEPA Ecotox Thresholds for Surface Water based on Great Lakes Water Quality Initiative Tier 2 methodology (USEPA, 1996);[57] (c) Secondary Chronic Values for aquatic biota developed by Oak Ridge National Laboratory (ORNL; Suter and Tsao, 1996);[58] (d) Threshold Effect Concentrations (TECs) and Probable Effect Concentrations (PECs; MacDonald *et al.*, 2000);[59] (e) USEPA Office of Solid Waste and Emergency Response Ecotox Thresholds (USEPA, 1996);[60] (f) Ontario Ministry of Environment and Energy Lowest Effects Levels and Severe Effects Levels (SELs; Persaud *et al.*,1993);[61] (g) USEPA Interim Ecological Soil Screening Levels (Eco SSLs;

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[56] USEPA, 2007. *National Recommended Water Quality Criteria.* http://epa.gov/waterscience/criteria/wqcriteria.html.

[57] USEPA, 1996. *Ecotox Thresholds. Office of Solid Waste and Emergency Response.* ECO Update 3(2):1-12. January 1996.

[58] Suter, G.W. and C.L. Tsao. 1996. *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota, 1996 revision.* Environmental Sciences Division. Oak Ridge National Laboratory. ES/ER/TM-96/R2.

[59] MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. *Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems.* Arch. Environ. Contam. Toxicol. 39: 20-31.

[60] USEPA, 1996. *Ecotox Thresholds. Office of Solid Waste and Emergency Response.* ECO Update 3(2):1-12. January 1996.

[61] Persuad, D., R. Jaagumagi, and A. Hayton. 1993. *Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario.* Ontario Ministry of the Environment and Energy. August 1993.

USEPA, 2007);[62] and (h) Oak Ridge National Laboratory (ORNL) Toxicological Benchmarks for Wildlife (Sample *et al.*, 1996).[63]

Safety factors were applied to some of the sediment benchmarks to estimate effect or no-effect levels when one or the other was not available. Based on recommendations by EPA, conservative safety factors for sediment were 13 (for VOCs and PAHs), 25 (for pesticides and PCBs), and 5 (metals). For surface water, a safety factor of 10 was applied. These factors represent the assumed ratio of the effect level to the no-effect level.

The BERA used survival, reproduction, and growth as the preferred measures of adverse effect for the target wildlife species evaluated for exposure using the food chain models. Toxicological information for the actual feeding guild species was not available, and results from laboratory test species were used as surrogates. The assessment focused on Toxicity Reference Values (TRVs) representing No Observed Adverse Effects Levels (NOAELs) and Lowest Observed Adverse Effect Levels (LOAELs). The primary source of the NOAEL and LOAEL TRVs was the 1996 ORNL "Toxicological Benchmarks for Wildlife" (Sample *et al.*, 1996). For SVOCs without measured effects levels, NOAELs were multiplied by a conservative safety factor of 2.0 to estimate corresponding effects levels (i.e., LOAELs).

Sediment toxicity was evaluated in four samples collected from the Blackstone River (near-Site), two samples from Pond A, and one sample each from Ponds D, F, and I using standard EPA laboratory toxicity tests. These sediment sample locations were identical to those used for chemical screening and benthic community assessment in the Sediment Quality Triad (SQT). Juveniles of the amphipod *Hyalella azteca* and larvae of the chironomid fly *Chironomus dilutus* were exposed to these sediment samples for 28 days and 20 days, respectively, to measure survival and growth. The toxicity tests were considered valid based on adherence to test protocols and satisfactory laboratory control survival and growth.

High sediment toxicity was observed in one of the four Blackstone River (near-Site) samples but did not correlate to any particular COPEC; whereas the other three Blackstone River sediment samples showed no significant toxicity. High toxicity was observed in both sediment samples collected from Pond A but none of the COPECs could explain the observed results. High toxicity was observed in the one Pond D sediment sample; it had the highest PAH levels, but the lowest metal levels, measured in the seven pond samples. No significant toxicity was observed in the Pond F sediment sample. Finally, the Pond I sediment sample showed high toxicity. This sample generally had the highest levels of PAHs and metals measured in the sediment from the Blackstone River (near-Site). However, this observation did not explain the toxicity because the chemical concentrations in a nearby sediment sample from the Blackstone

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[62] USEPA, 2007. *Ecological Soil Screening Levels.* http://www.epa.gov/ecotox./ecossl.

[63] Sample, B.E., D.M. Opresko, and G.W. Suter II. 1996. *Toxicological Benchmarks for Wildlife: 1996 revision.* ES/ER/TM-86-R3. U.S. Department of Energy, Office of Environmental Management.

River (near-Site) were generally lower even though the toxic response in that sample was more severe. As such, the sediment toxicity test produced mixed and contradictory results. Finally, the divalent metals identified as pond sediment COPECs (i.e., cadmium, chromium, copper, lead, and zinc) were not expected to be bioavailable based on analyses of Acid Volatile Sulfides, Simultaneously Extracted Metals, and the fraction of organic carbon (f_{oc}) in the sediment samples.

A study was conducted to evaluate the benthic invertebrate community structure and function in aquatic habitats at OU 2 versus upstream/off-Site reference locations. Benthic invertebrate samples were collected from the Blackstone River (near-Site), and Ponds A, D, F, and I. General physical and chemical parameters (e.g., water depth, substrate composition, temperature, surface water velocity [river only], dissolved oxygen, Total Organic Carbon) were also evaluated at each sampling station. The invertebrates were identified to the lowest-practical taxonomic level and the data were summarized into six benthic metrics. Metric scores for each sampling station were totaled and compared to the total metric scores obtained at the background/reference locations. Multivariate statistical analyses were performed on the water quality, grain size, and TOC data to determine potential habitat influences on the benthic community data collected from co-located samples. The results of the evaluation for both the river and the ponds suggested benthic invertebrate impairment associated with OU 2 contamination, whereas other samples showed habitat-related effects (e.g., water temperature or low dissolved oxygen).

A fish survey was conducted at three Blackstone River locations (consisting of two upstream background locations and one near-Site location) and Ponds A and F (plus the off-Site reference pond) using electrofishing and gill netting.

Fish tissue samples were collected from the Blackstone River (near-Site) and Ponds A and F (plus river and ponds reference locations). The fish tissue residue data were used to evaluate the potential for direct effects on fish populations by comparing these values to fish CBRs. The residue data also served as input to the food chain models for piscivorous wildlife.

Ecological Risk Characterization

The history of disposal in the study area, including both the landfills on the east side of the Blackstone River and on the Unnamed Island, represented potential sources of contaminants to the surrounding habitats. Characterization of the risk was difficult in these areas due to the irregular nature of the disposal and buried waste on the Unnamed Island and the history of habitat alterations, including seasonal flooding and water level fluctuations.

The risk characterization used a conservative interpretation to address these uncertainties. Risks identified in the BERA are discussed below and summarized in **Table G-19** in **Appendix**

C, which was generated as part of a memorandum summarizing the ecological risks associated with OU 2 at that time (AECOM, 2010).[64] In general, risk was identified as potentially actionable and retained for further evaluation in the FS if one or more of the following conditions prevailed: (a) the magnitude of the risk was severe based on the data and comparison of Residual Risks (RRs; see below) using the interpretive risk matrix presented in the BERA; (b) more than one line of evidence indicated potential risk to one or more receptor groups; and/or (c) the extent of the affected areas was uncertain due to limited data.

The SLERA identified several individual PAHs as sediment COPECs in some of the ponds associated with the Unnamed Island or the Blackstone River. The BERA further recognized some of these PAHs as potential risk drivers to the benthic invertebrate community. EPA decided to assess them as total PAHs in order to conservatively simplify the development of sediment cleanup levels for this group of compounds.

HQs were calculated to determine risk to (a) aquatic community-level receptors directly exposed to surface water and sediment; (b) fish using measured fish tissue residue levels; and (c) piscivorous and omnivorous wildlife species exposed to contaminated sediment or soil, plus fish or earthworms. An HQ shows how much the concentration of a COPEC exceeds its benchmark, CBR, or TRV. HQs were calculated as follows:

HQ = estimated COC-specific exposure level / benchmark, CBR, or TRV

The BERA also distinguished between risks from site-related versus background-related COPEC levels. RR was calculated for each EA, receptor group, and COPEC by subtracting the background HQs from OU 2 HQs, as follows:

RR = site HQ - background HQ

RRs above 1.0 represented the degree to which the site exposure, adjusted for background, exceeded its toxicity benchmark. The BERA used an interpretive matrix to evaluate the magnitude and the confidence of the risk for each COPEC and receptor.

Two measurement endpoints did not lend themselves to an HQ or RR analysis. The responses observed in the benthic invertebrate toxicity tests were analyzed statistically for significance, whereas the results from the benthic invertebrate surveys in the field were assessed using multivariate statistics. Both of these endpoints were used within the context of a SQT evaluation.

A weight-of-evidence analysis was used to evaluate how well the measurement endpoints represented their assessment endpoints. This analysis integrated all the BERA findings to help

[64] AECOM, 2010. Ecological Risk Summary Technical Memorandum. August 12, 2010.

determine the potential for risk by: 1) assigning a weight (between "low" and "high") to all measurement endpoints; 2) evaluating the magnitude of risk with respect to each measurement endpoint; and 3) determining the concurrence among the measurement endpoints used to answer the questions posed by the assessment endpoints.

Blackstone River

The data from the Blackstone River showed that adverse effects were unlikely to fish, amphibians, and large piscivorous birds, but potentially present in the benthic community. However, no sediment COPECs had RRs above 1, indicating that site-related risk did not exceed background risk. Only one Blackstone River sediment sample showed toxicity, but it could not readily be linked to site-related COPECs. Consequently, risk from exposure of aquatic and semi-aquatic receptors to surface water and sediment of the Blackstone River did not represent a significant ecological risk, and did not need to be further evaluated in the FS.

Wetlands A through D

No severe risks were identified in Wetlands A through D. The evaluation identified possible, but not expected, adverse effects from non-OU 2-related sources of contamination to the benthic invertebrate community in these habitats, and low risk to the fish and amphibian communities. Based on the low magnitude of risk to these three community-level aquatic receptor groups, no actionable risk was identified. Further evaluation in the FS was not recommended.

Ponds on the Unnamed Island (Ponds A, D, E, P, and F)

The triad study (i.e., sediment chemistry, sediment toxicity testing, and benthic community surveys) showed that potential site-related impacts were evident primarily in Ponds A, D, and F. The results were not clear-cut, however, because no consistent link was found between chemistry, toxicity, and community structure. The weight of evidence identified severe sediment toxicity in Ponds A and D, indicating a significant risk for evaluation in the FS.

Possible risk based on benchmark comparisons was identified for benthic invertebrates in Pond F. However, a single sediment sample collected from this pond for toxicity testing did not identify adverse effects to the test species. The evidence for effects on benthic invertebrates was therefore inconclusive. Surface water evaluations identified possible, but not expected, adverse effects, to both the fish and amphibian communities in Pond F. Significant ecological risk in Pond F was not identified, and further evaluation in the FS was not recommended.

Pond E, which is next to Pond A on Unnamed Island, is very small in size. Two sediment samples were evaluated using benchmarks, but no toxicity testing was performed. Several COPECs had elevated RRs (RR of 2 to 11), with the highest RR associated with lead. Further consideration of Pond E sediment in the FS was recommended based on the high sediment concentrations resulting in severe impairment.

The RR analysis showed that severe ecological risk was possible to fish and amphibians exposed to surface water in Pond D (the major risk driver was lead with a chronic RR of 77), and Pond P (the major risk driver was manganese with a chronic RR of 13). Adverse risk was also identified in fish and amphibians exposed to surface water in Pond E (the major risk drivers were barium and lead, with chronic RRs of 55 and 8, respectively). Possible adverse effects to fish and amphibians were also identified in Pond A, where manganese was the only COPEC with RR above 1.0. These findings are generally consistent with the location and disposal history of these aquatic exposure areas. The risks associated with exposures to surface water in each of these ponds on the Unnamed Island were recommended for further consideration in the FS.

Ponds next to the Blackstone River (Ponds B, C, I, and N)

Risk to fish and amphibians in Pond C and at the base of the J. M. Mills Landfill was identified based on a limited number of surface water samples and one line of evidence (i.e., comparing chemistry to surface water benchmarks). Due to the magnitude of the identified risk (severe) to fish and amphibians in Pond C, it was concluded that the risk of exposure to surface water from this habitat needed to be considered in the FS.

In Pond I, adverse effects were determined to be possible to benthic invertebrates, fish, and amphibians. Even though the RRs were small in sediment, the sediment toxicity test identified effects in one of the samples from Pond I. In addition to these risks, the high lead levels in surface water resulted in RR of 10 for both fish and amphibians. Further consideration in the FS was recommended for Pond I since more than one line of evidence indicated potential risk.

The only endpoint evaluated for Pond B consisted of comparing sediment COPEC levels to sediment benchmarks. Cadmium, silver, and 2-methylphenol were the only COPECs with RRs above 1.0. The magnitudes of these exceedances were low (based on three samples). Although adverse effects to the benthic invertebrate community were determined to be possible, no significant risk was identified, and further consideration in the FS was not recommended.

The endpoints evaluated for Pond N consisted of comparing surface water and sediment COPEC levels to benchmarks. For both media, RRs exceeded 1, indicating possible impairment to aquatic receptors. Further consideration in the FS was recommended based on these results.

Terrestrial Habitats

Based on dietary modeling, adverse effects were determined to be possible for large omnivorous birds feeding across the all the terrestrial areas of OU 2 combined. COPECs with high RRs included bis(2-ethylhexyl)phthalate (BEHP), lead, and zinc; the RR for cadmium equaled 1. In addition, adverse effects were possible to small omnivorous birds feeding at the J. M. Mills Landfill. COPECs with high residual risk included BEHP, lead, and zinc; the RR for cadmium was 1.

Adverse effects were not expected for large omnivorous mammals feeding across all the terrestrial areas of the OU 2 combined. Adverse effects were possible for small omnivorous mammals feeding at the J. M. Mills Landfill. COPECs with high RRs included aluminum and zinc. Adverse effects were determined to be possible for small or large omnivorous birds feeding at the Unnamed Island. COPECs with RR values above 1 included BEHP, lead, and zinc. Further consideration in the FS was recommended due to possible risks to avian species from soil exposures on the Unnamed Island.

BERA Refinements

Terrestrial Risk Refinement

As OU 2 moved into the FS phase, EPA found that for some contaminants, the risks presented in the BERA were so wide-spread that it was difficult to prioritize areas for remedial action. This was especially true for BEHP, which is rarely a risk-driving chemical in ecological risk assessments. Zinc and lead also had HQs above what would typically be seen in a BERA based on the concentrations found on OU 2. These unusual findings, combined with the overall difficulty in setting Remedial Action Objectives (RAOs) for terrestrial risk in an urbanized river setting (where site-related contribution to risk may often be difficult to discern from "background" contributions), prompted EPA to re-examine the assumptions in the food chain models to see if further refinement would provide a clearer picture of risks for OU 2. This effort showed that several input variables in the existing BERA could be refined, with the combined effect that the resulting food chain model estimates would help identify areas needing further attention, and would more closely adhere to current Agency-recommended input values.

Using well-supported and standard EPA input values (considered most current and appropriate for OU 2), EPA re-calculated terrestrial food chain model risk for the main risk-driving contaminant of potential ecological concern (April 12, 2012 Hoskins Memo; USEPA, 2012).[65] Refined BSAFs are presented in **Table G-20** in **Appendix C**, with supporting documentation in the April 2012 Hoskins Memo. Refined Wildlife TRVs were also developed (**Table G-21** in **Appendix C**), mainly based on data presented in Eco SSL documents (USEPA, 2005;[66] USEPA, 2007[67]). Those values, presented in **Table G-21** in **Appendix C**, were used in the April 2012 exposure calculations. In addition, the April 2012 terrestrial food chain models used updated TRVs for mammals and birds, where available. The original and refined TRVs used in the April 2012 models are presented in **Table G-21** in **Appendix C**.

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[65] USEPA, 2012. Additional Refinements to Terrestrial Ecological Risk Calculations, Peterson Puritan OU 2, memorandum from Bart Hoskins to David Newton. April 12, 2012.
[66] USEPA, 2005. Ecological Soil Screening Levels for lead. Interim Final. OSWER Directive 9285.7-70
[67] USEPA, 2007. Ecological Soil Screening Levels for zinc. Interim Final. OSWER Directive 9285.7-73

Terrestrial COC Refinement

The refined BSAFs and TRVs were used to calculate updated HQs for omnivorous birds and mammals exposed to the three major risk drivers, namely BEHP, lead, and zinc, in the terrestrial habitats at OU 2. These calculations showed that the refined HQs showed no risk based on LOAEL CTE HQs, and moderate risk based on NOAEL RME HQs (see **Table G-22** in **Appendix C**). EPA concluded that the BERA refinement step better reflected the potential for ecological risk from BEHP, lead, and zinc to omnivorous wildlife receptors foraging at OU 2.

The resulting HQs and evaluation of risk above background levels suggest potential risk from lead and BEHP to small omnivorous birds feeding at the Unnamed Island, with low (BEHP) and moderate (lead) confidence in the risk estimate. The evaluation also suggests potential risk from cadmium to small omnivorous birds feeding at the J. M. Mills Landfill, with moderate confidence in the risk estimate. Lead, cadmium, and BEHP pose a low potential risk site-wide, but with lower confidence in the estimate than observed for the Unnamed Island and J. M. Mills Landfill.

The refined list of COCs in the terrestrial areas, along with recommended protective levels and the basis for each level are presented in **Table G-23** in **Appendix C**. Initial protective levels were included in USEPA, 2012. However, further refinement of the cadmium level was discussed/included in two memoranda developed by EPA (USEPA, 2013a[68]; USEPA, 2013b[69]) based on additional sampling performed in November 2012 to expand the background dataset. This refined value for cadmium is included in **Table G-23** in **Appendix C**.

Sediment Risk Refinement

Further review of the BERA chemistry and toxicity data was performed to confirm/refine the list of COCs to be used as a basis for cleanup in an EPA memorandum on April 11, 2012 (April 11, 2012 Hoskins Memo; USEPA, 2012).[70] Using the 2009 BERA data (sediment chemistry for the ponds and the toxicity testing data set), a consistent method was applied for COC selection in the ponds (A, D, E, I, and N) which showed potential risk in sediment:

- Using the BERA "chemistry" tables showing calculated hazard quotients and residual risks for benthic invertebrates, each analyte was placed into a "risk scenario" category, as defined in the BERA interpretive risk matrix.
- Any analytes in risk scenarios 1, 2, or 3 were removed from further evaluation, as adverse effects due to OU 2 contributions of that contaminant are considered less likely than

[68] USEPA, 2013a. Review of technical memorandum titled: *Background Screening Levels for Sediment and Soil Supplemental Data Collection Efforts* Memorandum from Bart Hoskins to Dave Newton. June 21, 2013.
[69] USEPA, 2013b. Review of memorandum titled: *Peterson Puritan, Inc , Superfund Site Cumberland and Lincoln, Rhode Island, Small Omnivorous Bird Risks at the J.M. Mills Landfill; Supplemental Data Collection Efforts.* Memorandum from Bart Hoskins to Dave Newton. November 18, 2013.
[70] USEPA, 2012. Sediment COC Refinement and PRG Development, Peterson Puritan OU 2, memorandum from Bart Hoskins to David Newton. April 11, 2012.

contributions from analytes in higher risk scenarios. Analytes in risk scenarios 4, 5, or 6 were evaluated further with respect to toxicity and/or relationship to OU 2 waste.

- Using the BERA "toxicity" tables showing triad sediment chemistry and toxicity results, chemistry data were compared to effects criteria to generate a HQ for each analyte, both in OU 2 and reference ponds, using the highest site concentration and lowest reference concentration for ponds with multiple samples. For any site HQs greater than 1, the reference HQ was subtracted from the site HQ to generate a RR comparable to that on the "chemistry" tables. Analytes with a "toxicity" RR greater than 1 were evaluated further with respect to the "chemistry" results and/or relationship to OU 2 waste.

Table G-23 in **Appendix C** presents the refined list of COCs for the OU 2 ponds, along with recommended protective levels and the basis for each level. All three ponds on the Unnamed Island (Ponds A, D, and E) are in proximity to both the waste and each other. While the primary COCs noted above for those ponds were not exactly the same, the evaluations note that similar analytes in each pond were just out of the range for further evaluation. For these reasons, the COCs for those ponds have been combined.

3. Basis for Response Action

In addition to the presumptive containment approach (which presumes risk due to the landfill materials) being taken for the wastes in the J. M. Mills Landfill and Nunes Parcel, the baseline and supplemental human health and ecological risk assessments, along with additional refinements described above, revealed that:

- Nunes Parcel/RIDEM Soil Removal Area - Non-cancer hazards for a hypothetical residential scenario were above the EPA target HI of 1. Under the presumptive approach it is presumed that the Nunes Parcel poses a human health risk.

  Cancer risks were within or less than the EPA's target risk range of 10^{-4} to 10^{-6}, except for future hypothetical residents and future commercial workers exposed to surface and subsurface soils and indoor air. Risk to a future commercial worker exposed to soil and indoor air at the Nunes Parcel exceeded 1×10^{-4} due primarily to benzene in indoor air. Major contributors to risk are carcinogenic PAHs, bis(2-ethylhexyl)phthalate, dieldrin, dioxins, and/or arsenic in soil and benzene, naphthalene, and/or tetrachloroethene in indoor air. In addition, risk to a future resident exposed to soil and indoor air at the Nunes Parcel exceeded a cancer risk of 1×10^{-4}. The exceedance is primarily due to benzene, naphthalene, 1,4-dichlorobenzene, ethylbenzene, tetrachloroethene, and/or vinyl chloride in indoor air and carcinogenic PAHs, PCBs, dieldrin, dioxins, bis(2-ethylhexyl)phthalate, and/or arsenic in soil.

- Groundwater - Non-cancer hazards for potable use of OU 2 groundwater are above the EPA target HI of 1. Therefore, future use of groundwater presents a potential human health non-cancer hazard.

Cancer risks for potable use of OU 2 groundwater are above the EPA's target risk range of 10^{-4} to 10^{-6}. Therefore, future use of groundwater within OU 2 presents a potential human health cancer risk. Risks to hypothetical future residential receptors from ingestion, dermal contact, and inhalation due to potable use of groundwater were greater than 1 x 10^{-4}, even though some contaminants contributing to elevated risks were generally present at concentrations less than their respective drinking water MCLs (e.g., benzene). The major contributors to the groundwater risk are arsenic, carcinogenic PAHs, 1,4-dioxane, 4-chloroaniline, atrazine, bis(2-ethylhexyl)phthalate, naphthalene, 1,4-dichlorobenzene, chloroform, ethylbenzene, methyl tert-butyl ether, PCE, TCE, vinyl chloride, aldrin, dieldrin, PCBs, and benzene.

- Lead - In summary, the following exposure scenarios are the only ones that have estimated lead risks above the EPA target level of no more than 5% of the receptor population having blood lead levels exceeding 10 µg/dL:
    - Exposure of construction workers to soils at the Soil Removal Area;
    - Exposure of commercial workers to soils within the Soil Removal Area; and
    - Exposure of hypothetical young child residents to soil and groundwater from the Soil Removal Area.

- Ecological Receptors:
    - Unacceptable ecological risk to small omnivorous birds from soil at the Unnamed Island (from BEHP and lead);
    - Unacceptable ecological risk to small omnivorous birds from soil at J. M. Mills Landfill (from cadmium); and
    - Unacceptable ecological risk to aquatic receptors (metals in surface water) and benthic invertebrates (metals and PAHs in sediment) in on-site ponds.

In sum, actual or threatened releases of hazardous substances (as defined by Section 101(14) of CERCLA, 42 U.S.C. §9601(14)) from OU 2, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. Further, sampling results indicate the presence of contamination at OU 2 above federal and state regulatory criteria and/or guidelines including documentation of past exceedances of MCLs in groundwater (benzo(a)pyrene, bis(2-ethylhexyl)phthalate, atrazine, benzene, PCBs, arsenic, cadmium, lead, and titanium) from OU 2 sources.[71]

Based on the risk analysis, discussed above, response actions were not warranted for:

[71] Some of these exceedances in groundwater were later shown to have reduced in concentration over time (e.g., benzene).

- Fish Tissue - Non-cancer hazards to recreational receptors eating resident fish from OU 2, BR-1, and BR-2 were greater than the EPA target HI of 1. However, eating fish from the background/reference area pond (P-6) also posed target organ hazard index greater than 1 for recreational receptors. Therefore, no OU 2-specific non-cancer risk from eating resident fish from OU 2 was identified.

  Cancer risks to recreational receptors eating resident fish from OU 2, BR-1, and BR-2 were greater than 1×10^{-4}. However, the background/reference area pond (P-6) had risks in the range of 10^{-5}. Therefore, no OU 2-specific cancer risk from eating resident fish from OU 2 was identified.

  It should be further noted that the Massachusetts Department of Environmental Protection has issued fish advisories for the Blackstone River below Worcester, Massachusetts, to the Rhode Island state line (approximately nine river miles upstream of the OU 2). In December 2012, EPA completed fact sheets[72] for public distribution that expressed concerns for fish consumption in the vicinity of the OU 2. Based upon EPA's data gathered for OU 2 during the RI, the Rhode Island Department of Health (RIDOH) also posted a fish consumption advisory on their website stating that, "with the exception of stocked trout, fish should not be eaten from the Blackstone River". However, "catch-and-release" sport fishing can still be enjoyed in this waterway, as in other urban rivers and ponds within the State. RIDOH is currently working with local stakeholders to educate the public and consider signage along the Rhode Island segment of the Blackstone River.

H. REMEDIAL ACTION OBJECTIVES

Section 300.430(a)(iii)(B) of the NCP contains the expectation that engineering controls, such as containment, will be used for waste that poses a relatively low long-term threat where treatment is impracticable. Waste at CERCLA landfill sites usually is present in large volumes and consists of a heterogeneous mixture of municipal waste frequently co-disposed with industrial waste. As described above, waste disposal practices at OU 2 included the disposal of hazardous waste and waste containing hazardous substances. EPA has determined that general principals of the presumptive approach, in this case "containment," is appropriate for the J. M. Mills Landfill and the Nunes Parcel. The general principals of the presumptive approach relates primarily to containment of the landfill mass and collection and/or treatment of landfill gas. Other measures, such as control of landfill leachate and groundwater at the perimeter of the landfill may also be warranted.

[72] *Id.*

An overarching objective in conducting the cleanup for OU 2 is to minimize any detrimental impacts from remedy construction activities and ensure that aesthetic considerations are incorporated and compatible with the development of the National Historical Park within the Blackstone Valley Heritage Corridor.

Based on information relating to types of contaminants, environmental media of concern, and potential exposure pathways, RAOs were developed to aid in the development and screening of alternatives. These RAOs were developed to mitigate, restore, and/or prevent existing and future potential threats to human health and the environment and to attain ARARs. The RAOs for the selected remedy for each area/media of OU 2 are:

J. M. Mills Landfill:

- Prevent direct contact with landfill contents.
- Prevent direct human contact/ingestion/inhalation with contaminated soils that exceed ARAR and risk-based standards.
- Prevent exposure to ecological receptors from soil contaminants that present an unacceptable ecological risk.
- Prevent soil leaching and landfill cover infiltration and resulting contaminant migration to groundwater and the Blackstone River.
- Control surface water runoff and erosion.
- Prevent infiltration and washout during flooding, up to a 500-year flood event.
- If necessary, collect and treat leachate to prevent further contaminant migration to the Blackstone River, based on federal and State water quality standards and RCRA Subtitle C landfill closure standards.
- Control and, if necessary, treat landfill gas, based on federal and state air pollution control standards and RCRA Subtitle C landfill closure standards.
- Prevent potential future exposure to contaminated indoor air.
- Prevent migration of contaminated soil/debris to pond sediment and the Blackstone River.

Nunes Parcel:

- Prevent direct contact with landfill contents.
- Prevent direct human contact/ingestion/inhalation with contaminated soils that exceed ARAR and risk-based standards.
- Prevent exposure to ecological receptors from contaminants in soil that present an unacceptable ecological risk.
- Prevent soil leaching and landfill cover infiltration and resulting contaminant migration to groundwater and the Blackstone River.
- Control surface water runoff and erosion.
- Prevent infiltration and washout during flooding, up to a 500-year flood event.

- If necessary, collect and treat leachate to prevent further contaminant migration to the Blackstone River, based on federal and State water quality standards and RCRA Subtitle C landfill closure standards.
- Control and, if necessary, treat landfill gas, based on federal and state air pollution control standards and landfill closure standards.
- Prevent potential future exposure to contaminated indoor air.
- Prevent migration of contaminated soil/debris to pond sediment and the Blackstone River.

Unnamed Island:

- Prevent direct contact with waste deposits.
- Prevent direct human contact with contaminated soils that exceed ARAR and risk-based standards.
- Prevent exposure to ecological receptors from contaminants in soil that present an unacceptable ecological risk.
- Prevent soil leaching and resulting contaminant migration to groundwater and the Blackstone River.
- Prevent washout of waste/contamination during flooding, up to a 500-year flood event.
- Prevent migration of contaminated soil/debris to pond sediment and the Blackstone River.

Ponds:[73]

- Prevent exposure to ecological receptors from contaminants in sediment that present an unacceptable ecological risk.
- Minimize migration of contaminants from sediment to surface water that present an unacceptable ecological risk.
- Reduce contamination in surface water from CERCLA sources within OU 2 to acceptable ecological risk levels.
- Prevent washout of contaminated sediment during flooding, up to a 500-year flood event.

Groundwater:

- Prevent potential exposure from ingestion/dermal contact/inhalation by a current or future resident to concentrations of contaminants in excess of ARAR and risk-based standards within the compliance boundary for the waste management area.

[73] Note that because of the periodic flooding of Ponds A, C, D, E, I, N, and P by the Blackstone River, it is not appropriate to directly address surface water in these locations. Instead, surface water exceedances will be addressed by remediating contaminant sources in sediment and from the landfills, with appropriate monitoring of surface water to ensure RAOs are achieved.

- Prevent migration of site contaminants in groundwater from beyond the edge of the compliance boundary of the waste management area.
- Prevent contaminant migration from the source areas to the Blackstone River via groundwater.

A compliance boundary (see **Figure 3-6** in **Appendix B**) encircles the waste management unit encompassing the entire area of OU 2, as defined by the waste deposited in the J. M. Mills Landfill, Nunes Parcel, and Unnamed Island.

Numeric Preliminary Remediation Goals (PRGs)[74] associated with these RAOs were developed in Section 3.5 of the FS. Discussion about the ROD's Remediation Goals (RGs) is presented in Section L of this ROD.

I. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These include that remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. That EPA shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant, or contaminant. In making such assessment, EPA shall specifically address the long-term effectiveness of various alternatives. Response alternatives were developed to be consistent with these statutory mandates.

B. Technology and Alternative Development and Screening

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for OU 2.

With respect to source control, the FS developed a range of alternatives for each of the subareas (J. M. Mills, Nunes Parcel, Unnamed Island, the Ponds, and Groundwater) within OU 2 that mitigate potential current and future human health and ecological risks. This range also

[74] PRGs identified in the FS are now referred to as Remediation Goals (RGs) in this ROD.

included alternatives that involve little or no treatment, but provide protection through engineering or institutional controls;[75] and a no action alternative.

As discussed in Section 4.0 of the FS, potentially applicable technology types and process options were developed for groundwater, soil in areas with buried waste, waste, and sediment. These technology types and process options were then screened based on implementability, effectiveness, and cost.

A presumptive containment approach was applied to source areas with buried, hazardous waste/substances at the J. M. Mills Landfill and the Nunes Parcel, including soil and debris fields next to the source areas. The components of the presumptive containment approach include a landfill cap, waste/debris consolidation under the cap, source area leachate control and treatment, landfill gas collection and treatment, long-term monitoring of groundwater and the Blackstone River, and institutional controls. By using the presumptive containment approach, the technology screening step was eliminated, and the only alternatives considered are the appropriate components of a presumptive containment approach and the required No Action alternative. While there is waste and debris present at the Unnamed Island, a presumptive containment approach has not been applied to this subarea due to the seasonal flooding that occurs over the island and the general instability of the area within the riparian zone.

All OU 2-related contaminated groundwater is located within the compliance boundary for the waste management area, where there is no anticipated future use of the groundwater. However, groundwater treatment technologies were initially considered in an effort to evaluate the potential for improved contaminant reduction in the waste management area.

An initial screening of the technical implementability of each process option and technology type was performed to reduce the number of technologies potentially applicable to OU 2 to a manageable number before performing a more rigorous screening process. Remedial technology types and process options that cannot be effectively implemented were eliminated from further consideration. Sections 5.0 and 6.0 of the FS presented the potential alternatives for remediating groundwater, soil in contact with buried waste, waste, and sediment that were retained from the initial screening. These alternatives were further screened based on effectiveness, implementability, and cost. Each remaining alternative[76] was then evaluated in detail in Sections 7.0 and 8.0 of the FS.

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[75] EPA defines institutional controls as non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for exposure to contamination and/or protect the integrity of a response action. See Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites; OSWER 9355.0-89 EPA-540-R-09-001; December 2012.

[76] Treatment alternatives for groundwater were screened out at this stage of the review.

J. DESCRIPTION OF ALTERNATIVES

General descriptions of the remedial alternatives evaluated in detail in the FS are provided below. All present worth costs associated with O&M and periodic expenditures are based on a 7% discount rate over 30 years.

The descriptions of each remedial alternative are conceptual and are used for costing purposes. The specific design details and costs for the selected remedy will be re-evaluated during the remedial design. As specified in EPA's FS guidance (EPA, 1988),[77] the costs are intended to be within the target accuracy range of -30 to +50% of the actual cost. Note that administrative costs associated with implementation of institutional controls (except for groundwater) and performance of five-year reviews have not been included in the alternatives, but are expected to be within the target accuracy range of costs.

J. M. Mills Landfill (JM-SO)

Including the No-Action Alternative, three alternatives were retained for detailed analysis in the FS. A presumptive containment approach (capping or cap/cover) was considered as a part of each of the J. M. Mills Landfill alternatives (except for No Action). In brief, these alternatives include:

JM-SO-1: No Action

Under this alternative, no response action will be taken at the J. M. Mills Landfill portion of OU 2. Although this alternative does not achieve the RAOs, it is retained as a baseline alternative for comparison in accordance with the NCP and EPA's RI/FS Guidance. This alternative requires no further expenditure of costs ($ 0), but will continue to be evaluated through statutorily required, Site-wide Five-Year Reviews.

JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Using a presumptive containment approach for landfill cleanups, wastes, including hazardous wastes and PCBs would be contained under an engineered RCRA Subtitle C Cap system to meet hazardous waste landfill closure performance standards.[78] To the extent practical, waste materials, soils, and sediments excavated from the Unnamed Island and the flood plains adjacent to the J. M. Mills Landfill may be dewatered and used for the shaping layers

[77] USEPA. 1988. *Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA.* EPA/540/G-89/004. OSWER Directive 9355-3-01. October 1988.

[78] RCRA Subtitle C landfill closure regulations at 40 C.F.R. § 264.310, that are incorporated by reference in the Rhode Island Rules and Regulations for Hazardous Waste Management § 8.2(A), that specify the requirements for the final cover for a hazardous waste landfill.

under the protective cap of the J. M. Mills Landfill. These materials, as appropriate, may also be used in the bedding and the drainage layers. Floodplain soils and sediments (Pond N) exceeding Remediation Goals (RGs) would be consolidated under the constructed cap. Outlying waste deposits (including debris fields) from Facility operations that are adjacent to the landfilled waste would be consolidated for placement under the cap to meet landfill closure requirements. Monitoring will be performed during soil/sediment excavation, dewatering, and on-site management of excavated soil/sediment/debris. A landfill gas management system will be designed and constructed (passive or active collection/treatment to be determined in design). Any leachate seeps (such as observed in Pond C) will be investigated and remediated to meet landfill closure performance standards. The landfill cap design will incorporate a flood control system that will meet flood protectiveness standards up to a 500-year flood event and effectively manage stormwater along the entire slope of the cap. To the extent practical, all areas covered by the protective cap will be planted primarily with native grasses, plants, and shallow rooted shrubs and bushes designed to attract wildlife including migratory birds. Operation and maintenance activities, including mowing, will be conducted in such a manner as to encourage wildlife use while at the same time maintaining the integrity of the cap. The landfill will be designed to address riparian protection concerns, both to prevent the release of contaminants in the event of flooding and to preserve or restore altered riparian habitat, as practicable. The adjacent floodplain will be planted with native trees, bushes, plants, and grasses designed to address local riparian buffer and wildlife concerns. As part of the remedial design process, it may be determined that some landfill material can be recycled and may need to be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) in order to shape and resize the landfill, to address riparian protection/restoration concerns, and to minimize the loss of flood storage for the Blackstone River in the design and construction of the cap. Long-term monitoring of groundwater will be performed to ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause groundwater outside of the compliance boundary to exceed drinking water standards. Long-term monitoring of surface water, landfill gas, and leachate, coupled with operation and maintenance tasks (e.g., cap and flood control repairs, mowing) are also included in this alternative to confirm the continued protectiveness of the remedy. Riparian habitat will be restored, as practicable, and a vegetated cover consisting of native vegetation (e.g., grasses, bushes and trees) will be installed to maintain habitat biodiversity. As part of the remedial design, flood control systems will be evaluated that will support the growth of native vegetation along the Blackstone River. Institutional controls (in the form of deed restrictions) and access restrictions, as required, would be used to prevent residential development and disturbance to landfill infrastructure. There will be at least yearly compliance monitoring to ensure restrictions remain in place and are enforced for the landfill cap. There will be no CERCLA restrictions (such as Institutional Controls) on recreational access to areas covered by the protective cap and of restored riparian habitat along the river so long as: 1) landfill gas analysis and monitoring, as well as other landfill closure considerations, determine that this use does not represent an unacceptable risk to human health; and 2) a determination is made that recreational access to areas of restored riparian habitat along the Blackstone River does not represent an unacceptable risk to human health. However, public access to these areas remains with, and is at the discretion of, the property owner[s] within OU 2.

In addition, there will be periodic reviews no less than every five years as required by statute. Capital Costs are estimated at $21.1 million, with O&M and Periodic Costs estimated at $0.5 million for a total cost for JM-SO-2 at $21.6 million.

JM-SO-3: Combination RCRA Subtitle C Cap (top)/Perimeter Soil Cover (side slopes) of Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

This alternative provides protection to human health by preventing or controlling potential exposures to waste and contaminated soils (including neighboring debris fields) through institutional controls and installation of a RCRA Subtitle C Cap on the upper one-third (in elevation) of the J. M. Mills Landfill and a perimeter soil cap over the lower two-thirds of the J. M. Mills Landfill (including below the 500 foot flood elevation). The landfill design will need to incorporate a flood control system over the soil cover in a manner that will meet flood protectiveness standards up to a 500-year flood event. In addition, stormwater will be managed along the entire slope of the cap/cover. The landfill will need to be designed to address riparian protection concerns, both to prevent the release of contaminants in the event of flooding and to preserve or restore altered riparian habitat, as practicable. As with JM-SO-2 and to the extent practical, waste materials, soils, and sediments excavated from the Unnamed Island and the flood plains adjacent to J. M. Mills Landfill may be dewatered and used for the shaping layers under the protective cap of the J. M. Mills Landfill. These materials, as appropriate, may also be used in the bedding and the drainage layers. Floodplain soils and sediments (Pond N) exceeding Remediation Goals (RGs) would be consolidated under the constructed cap/cover. Outlying waste deposits (including debris fields) from Facility operations that are adjacent to the landfilled waste would be consolidated for placement under the cap/cover to meet landfill closure requirements. Monitoring will be performed during soil/sediment excavation, dewatering, and on-site management of excavated soil/sediment/debris. As part of the remedial design process, it may be determined that some landfill material can be recycled and/or may be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) in order to shape and resize the landfill, to address riparian protection/restoration concerns, and to minimize the loss of flood storage for the Blackstone River in the design and construction of the cap/cover. Any leachate seeps (such as observed in Pond C) will be investigated and, as required, remediated to meet landfill closure performance standards. A landfill gas management system would be required to be designed and constructed (passive or active collection/treatment to be determined in design), although collection of landfill gas may be difficult within the area of the soil-only cover. To the extent practical, all areas covered by the cap/cover will be planted primarily with native grasses, plants, and shallow rooted shrubs and bushes designed to attract wildlife including migratory birds. Long-term monitoring of groundwater will be performed to ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause groundwater outside of the compliance boundary to exceed drinking water standards. Long-term monitoring of surface water, landfill gas, and leachate, coupled with operation and maintenance tasks (e.g., cap/cover and flood control repairs, mowing) are also included in this alternative to confirm the continued protectiveness of the remedy. The adjacent

floodplain will be planted, to extent practical, with native trees, bushes, plants, and grasses designed to address the local riparian buffer and maintain habitat biodiversity. As part of the remedial design, flood control systems will be evaluated that will support the growth of native vegetation along the River. Institutional controls (in the form of deed restrictions) and access restrictions, as required, would be used to prevent residential development and disturbance to landfill infrastructure. There will be at least yearly compliance monitoring to ensure restrictions remain in place and are enforced for the landfill cap/cover. There will be no CERCLA restrictions (such as Institutional Controls) on recreational access to areas covered by the protective cap and of restored riparian habitat along the river so long as: 1) landfill gas analysis and monitoring, as well as other landfill closure considerations, determine that this use does not represent an unacceptable risk to human health; and 2) a determination is made that recreational access to areas of restored riparian habitat along the Blackstone River does not represent an unacceptable risk to human health. However, public access to these areas remain with, and is at the discretion of, the property owner[s] within OU 2. In addition, there will be periodic reviews no less than every five years as required by statute. Capital Costs are estimated at $13.2 million, O&M and Periodic Costs at $0.5 million for a total cost for JM-SO-3 at $13.7 million.

Nunes Parcel/Soil Removal Area (NP-SO)

Including the No-Action Alternative, three alternatives were retained for detailed analysis in the FS for the Nunes Parcel (landfill). In brief, these alternatives include:

NP-SO-1: No Action

No response action would be taken at the Nunes Parcel portion of the OU 2 under this alternative. Although this alternative does not achieve the RAOs, it is retained as a baseline alternative for comparison in accordance with the NCP and EPA's RI/FS Guidance. This alternative requires no further expenditure of costs ($ 0), but will continue to be evaluated through the statutorily required Site-wide Five-Year Reviews.

NP-SO-2: RCRA Subtitle D Cap (meeting State Solid Waste Regulations) of Landfill, Consolidation, and Institutional Controls

In this alternative wastes would be contained at the Nunes Parcel under a RCRA Subtitle D Cap system which complies with Rhode Island Solid Waste Regulations whereby a full solid waste cap system is used over the entire footprint of waste at the Nunes Parcel. To the extent practical, waste materials, soils, and sediments excavated from the Unnamed Island and the floodplains adjacent to the Nunes Parcel may be dewatered and used for the shaping layers under this cap system. Outlying waste deposits (including debris fields) from Facility operations that are adjacent to the landfilled waste would be consolidated for placement under the cap system to meet State landfill closure requirements. These materials, as appropriate, may also be used in the bedding and the drainage layers. Surrounding soils exceeding RGs (and sediments in Pond I which abut the Nunes Parcel) would be consolidated under this cap system. Monitoring will be

performed during soil/sediment excavation, dewatering, and on-site management of excavated soil/sediment/debris. All building structures would be demolished and either consolidated or sent off-site for recycling or disposal. As part of the remedial design process, it may be determined that some landfill material can be recycled and/or may be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) in order to shape and resize the landfill, to address riparian protection/restoration concerns, and to minimize the loss of flood storage for the Blackstone River in the design and construction. A landfill gas management system will be designed and constructed (passive or active collection/treatment to be determined in design). Any leachate seeps (such as observed in Pond I) will be investigated and, as required, remediated to meet landfill closure performance standards. The landfill cap design will incorporate a flood control system that will meet flood protectiveness standards up to a 500-year flood event and effectively manage stormwater along the entire slope of the cap. The landfill will be designed to address riparian protection concerns, both to prevent the release of contaminants in the event of flooding and to preserve or restore altered riparian habitat, as practicable. To the extent practical, all areas covered by the full solid waste cap system will be planted primarily with native grasses, plants, and shallow rooted shrubs and bushes designed to attract wildlife including migratory birds. Operation and maintenance activities, including mowing, will be conducted in such a manner as to encourage wildlife use while at the same time maintaining the integrity of the cap system. Long-term monitoring of groundwater will be performed to ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause groundwater outside of the compliance boundary to exceed drinking water standards. Long-term monitoring of surface water, landfill gas, and leachate, coupled with operation and maintenance tasks (e.g., cap and flood control repairs, mowing) are also included in this alternative to confirm the continued protectiveness of the remedy. Riparian habitat will be restored, as practicable, and a vegetated cover consisting of native vegetation will be installed to maintain habitat biodiversity. Institutional controls (in the form of deed restrictions) and access restrictions, as required, would be used to prevent residential development and disturbance to landfill infrastructure, as well as include performance of a vapor intrusion/mitigation evaluation if a building were considered for construction on the Nunes Parcel. There will be no CERCLA restrictions (such as Institutional Controls) on recreational access to areas covered by the protective cap and of restored riparian habitat along the river so long as: 1) landfill gas analysis and monitoring, as well as other landfill closure considerations, determine that this use does not represent an unacceptable risk to human health; and 2) a determination is made that recreational access to areas of restored riparian habitat along the Blackstone River does not represent an unacceptable risk to human health. However, public access to these areas remain with, and is at the discretion of, the property owner[s] within OU 2. It is recognized that emergency access to the Pratt dam adjacent to the Nunes Parcel is necessary. An access road traversing the Nunes Parcel, as well as, the forging location adjacent to the dam, will be designed and constructed to facilitate emergency egress. There will be at least yearly compliance monitoring to ensure restrictions remain in place and are enforced for the landfill cap. In addition, there will be periodic reviews no less than every five years as required by statute. Capital Costs for this alternative are estimated at $4.81 million with O&M and Periodic Costs at $0.12 million for a total cost for NP-SO-2 at $4.93 million.

NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Using a presumptive approach for landfills, wastes, including hazardous wastes and PCBs, would be contained under an engineered RCRA Subtitle C Cap system to meet hazardous waste landfill closure performance standards.[79] To the extent practical, waste materials, soils, and sediments excavated from the Unnamed Island and the flood plains adjacent to the Nunes Parcel may be dewatered and used for the shaping layers under this cap system. Outlying waste deposits (including debris fields) from Facility operations that are adjacent to the landfilled waste would be consolidated for placement under the cap system to meet State landfill closure requirements. These materials, as appropriate, may also be used in the bedding and the drainage layers. Surrounding soils exceeding RGs (and sediments in Pond I which abut the Nunes Parcel) would also be consolidated under the cap. In addition contaminated soils, sediments, and debris from the Unnamed Island will also be consolidated under the cap. Monitoring will be performed during soil/sediment excavation, dewatering, and on-site management of excavated soil/sediment/debris. All building structures would be demolished and either consolidated or sent off-site for recycling or disposal. A landfill gas management system will be designed and constructed (passive or active collection/treatment to be determined in design). Any leachate seeps (such as observed in Pond I) will be investigated and, as required, remediated to meet landfill closure performance standards. The landfill cap design will incorporate a flood control system that will meet flood protectiveness standards up to a 500-year flood event and effectively manage stormwater along the entire slope of the cap. The landfill will be designed to address riparian protection concerns, both to prevent the release of contaminants in the event of flooding and to preserve or restore altered riparian habitat, as practicable. As part of the remedial design process, it may be determined that some landfill material can be recycled and/or may be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) in order to shape and resize the landfill, to address riparian protection/restoration concerns, and to minimize the loss of flood storage for the Blackstone River in the design and construction of the cap. Long-term monitoring of groundwater will be performed to ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause groundwater outside of the compliance boundary to exceed drinking water standards. Long-term monitoring of surface water, landfill gas, and leachate, coupled with operation and maintenance tasks (e.g., cap and flood control repairs, mowing) are also included in this alternative to confirm the continued protectiveness of the remedy. Riparian habitat will be restored, as practicable, and a vegetated cover consisting of native vegetation will be installed to maintain habitat biodiversity. Institutional controls (in the form of deed restrictions) and access restrictions would be used to prevent residential development and disturbance to landfill infrastructure, as well as include performance of a vapor intrusion/mitigation evaluation if a building were considered for construction on the Nunes Parcel. There will be no CERCLA restrictions (such as Institutional Controls) on recreational access to areas covered by the protective cap and of

[79] *Id.*

restored riparian habitat along the river so long as: 1) landfill gas analysis and monitoring, as well as other landfill closure considerations, determine that this use does not represent an unacceptable risk to human health; and 2) a determination is made that recreational access to areas of restored riparian habitat along the Blackstone River does not represent an unacceptable risk to human health. However, public access to these areas remain with, and is at the discretion of, the property owner[s] within OU 2. It is recognized that emergency access to the Pratt dam adjacent to the Nunes Parcel is necessary. An access road traversing the Nunes Parcel, as well as, the forging location adjacent to the dam, will be designed and constructed to facilitate emergency egress. There will be at least yearly compliance monitoring to ensure restrictions remain in place and are enforced for the landfill cap. In addition, there will be periodic reviews no less than every five years as required by statute. Capital Costs for this alternative are estimated at $5.96 million with O&M and Periodic Costs at $0.12 million for a total cost for NP-SO-3 at $6.08 million.

Unnamed Island Soil and Waste (UI-SO)

Including the No-Action Alternative, three alternatives were retained for detailed analysis in the FS. One alternative specifically addressed surface soil risks and subsurface waste deposits located on the island, while another is a full waste removal (in addition to the soil) option. In brief, these alternatives include:

UI-SO-1: No Action

Under this alternative, no response action would be taken at the Unnamed Island portion of OU 2. Although this alternative does not achieve the RAOs, it is retained as a baseline alternative for comparison in accordance with the NCP and EPA's RI/FS Guidance. This alternative requires no further expenditure of costs ($ 0), but will continue to be evaluated through the statutorily-required Site-wide Five-Year Reviews.

UI-SO-2: Remove/Consolidate Surface Waste/Soil (0 to 2 feet) Exceeding RGs, Geotextile with Riprap where RG Exceedances Remain, and Institutional Controls

This alternative specifically addresses surface soil risks and subsurface waste deposits through excavation of surface waste/soil exceeding RGs from the surface to 2 feet and waste down to 2 feet. A cover consisting of geotextile and rip rap would be placed in areas where RG exceedances and/or waste remain at the bottom of the excavation. The cover must be constructed to protect against flooding, up to a 500-year event, and effectively manage stormwater. Waste and soils that are removed will be consolidated under the Nunes Parcel and/or J. M. Mills landfill caps, except for any debris that can be decontaminated and recycled, or any other material that is sent to an off-site disposal facility licensed to accept the contaminated media. Monitoring will be performed during soil/sediment excavation, dewatering, and on-site management of excavated soil/sediment/debris. No backfilling is planned, except that the riparian habitat will be restored, as practicable, with native vegetation.

Institutional Controls in the form of deed restrictions will be used to protect components of the remedy (e.g., cap, monitoring wells) as waste would remain in-place under this alternative. Once the engineered cover is placed, an assessment would be made to determine whether or not Institutional Controls restricting recreational use/access on restored riparian habitat and protecting the abutting cover are necessary. Public access to the remaining land mass is at the discretion of the property owner[s] within the OU 2. There will be at least yearly compliance monitoring and reporting requirements to ensure restrictions remain in place and are enforced for the geotextile and riprap. The yearly reporting requirements for the cover is to insure that the cover has not been compromised and that contaminants have not migrated from below the cover to the surface. Since the installation of a rip rap cover will increase permeability, the cover areas will be monitored by collecting leachate and groundwater samples. Operation and maintenance activities will be carried out as necessary to ensure cover integrity. In addition, there will be periodic reviews no less than every five years as required by statute. Capital Costs for this alternative are estimated at $4.31 million with O&M and Periodic Costs at $0.06 million for a total cost for UI-SO-2 at $4.37 million.

UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs

This alternative involves the complete removal of all waste deposits from the former Facility operations on the island along with all contaminated soil that exceeds RGs. Under this alternative, there may be some limited treatment of water generated from dewatering of waste and soil/sediment excavated below the water table. All of the excavated material from the Unnamed Island will be consolidated under the Nunes Parcel and/or the J. M. Mills caps (except for some debris that may be decontaminated and recycled, or any other material that is sent to an off-site disposal facility licensed to accept the contaminated media). Monitoring will be performed during soil/sediment excavation, dewatering, and on-site management of excavated soil/sediment/debris. No backfilling is planned, except that riparian habitat would be restored, as practicable, with native vegetation as determined during remedial design. Institutional controls and periodic reviews would not be necessary under this option since no waste or contaminated soil exceeding RGs will remain on the Unnamed Island. There will be no CERCLA restrictions (such as Institutional Controls) on the Unnamed Island and recreational access to areas of restored riparian habitat along the Blackstone River. Public access to these areas is at the discretion of the property owner[s] within the OU. Capital Costs for this alternative are estimated at $6.14 million with O&M and Periodic Costs at $0 for a total cost for UI-SO-3 at $6.14 million.

Sediment (in Ponds on the Unnamed Island) (SE)

Including the No-Action Alternative, four alternatives were retained for detailed analysis for addressing contaminated sediments in Ponds A, D and E located on the Unnamed Island in the FS. Two alternatives address ecological risks through sediment removal (one full removal and another removing/replacing 0-1 ft of sediment), while another applies a subaqueous cover directly over the contaminated sediment (in place/no sediment removal). It is estimated that the

total excavation of sediment results in approximately 5.4 acres of total pond areas disturbed or between 8,700 (for alternative SE-3) to 18,000 cubic yards (considered a maximum volume for costing purposes for alternative SE-2). Excavated sediments will be consolidated under the Nunes and/or J. M. Mills landfill caps, on-site. In brief, these alternatives include:

SE-1: No Action

No response action would be taken for the contaminated sediment in OU 2 ponds (including Ponds A, D, and E) under this alternative. Through no action, impacted sediments would remain and the effects of these impacts on the ecological habitat and pond water quality would be unabated. Although this alternative does not achieve the RAOs, it is retained as a baseline alternative for comparison in accordance with the NCP and EPA's RI/FS Guidance. This alternative requires no further expenditure of costs ($ 0), but will continue to be evaluated through the statutorily-required Site-wide Five-Year Reviews.

SE-2: Remove/Consolidate Sediment Exceeding RGs

This alternative provides for the cleanup of all sediment exceeding RGs by removal of contaminated sediments in Ponds A, D, and E (estimated at 18,000 cy) for consolidation under the engineered cap(s) (at the Nunes Parcel and/or J. M. Mills Landfill) and eliminates risks to the pond ecology and the source of contamination impacting pond water quality. At the time of design, additional sediment profiling will be required to determine more precisely the extent of contamination present and the excavation depths needed to ensure attainment of the RGs in these three ponds. No maintenance of the remedy would be required after implementation of this alternative because all sediments which exceed RGs would be removed. Due to the depth of the sediments in the ponds and their ecological characteristics, no habitat restoration will be required. It is expected that the ponds will restore themselves once the contamination is removed, except for any restoration of shoreline areas altered during the sediment removal process. Monitoring will be performed during soil/sediment excavation, dewatering, and on-site management of excavated soil/sediment/debris. Capital Costs for this alternative are estimated at $8.12 million with O&M and Periodic Costs at $0 for a total cost for SE-2 at $8.12 million.

SE-3: Remove/Consolidate Sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls

This alternative provides for the removal of sediment with RG exceedances only to a depth of 1 foot (approx. 8,700 cu.yds.) from Ponds A, D, and E. At the time of design, additional sediment profiling will be performed to determine more precisely the contamination present and excavation depths needed to reach attainment of the RGs in the ponds. If the difference in dredged volume (between removal of 1 foot of sediment versus removing all sediment exceeding RGs) is relatively small, additional dredging will be performed to reduce or potentially eliminate the need for a subaqueous cover and future maintenance. As otherwise required, a subaqueous cover will be utilized in areas where RG exceedances are not fully

removed. An engineered sediment/substrate comprised of geotextile and a minimum of 1 foot of clean fill would be placed over the remaining sediments not attaining cleanup levels. Design studies will be conducted to ascertain the stability and performance of various cover materials. The cover must be constructed to protect against flooding, up to a 500-year event. Long-term monitoring and maintenance of the engineered cover would be conducted. The use of amendments along with standard cover materials will be evaluated during the remedial design phase to determine if protectiveness (related to future potential erosion) can be improved in a cost-effective manner. In addition, the design will further inform decision makers on the specific type and need for geotextile as part of the cover, as river currents during flooding could potentially disturb the cover more than if it were not in place. Finally, excavated sediments will be consolidated under the Nunes Parcel or J. M. Mills Landfill protective cap. Monitoring will be performed during soil/sediment excavation, dewatering, and on-site management of excavated soil/sediment/debris. Riparian and wetland habitat would be restored, as practicable. Long-term monitoring and deed restrictions will be used to prevent disturbance of the remedy. There will be at least yearly compliance monitoring to ensure restrictions remain in place and are enforced. Institutional controls (in the form of deed restrictions) and access restrictions, as required, would be used to prevent disturbance to the subaqueous cover infrastructure. In addition, there will be periodic reviews no less than every five years as required by statute. Capital Costs for this alternative are estimated at $5.10 million with O&M and Periodic Costs at $0.70 million for a total cost for SE-3 at $5.80 million.

SE-4: Subaqueous Cover (No Sediment Removal) with Institutional Controls

This alternative calls for no excavation but the placement of a subaqueous cover comprised of a cover material in Ponds A, D, and E where sediment is exceeding RGs. The cover must be constructed to protect against flooding, up to a 500-year event. Long-term monitoring and maintenance of the engineered cover would be conducted. Design studies will be conducted to ascertain the stability and performance of various cover materials. The use of amendments along with standard cover materials will be evaluated during the remedial design phase to determine if protectiveness (related to future potential erosion) can be improved in a cost-effective manner. In addition, the design will further inform decision makers on the specific type and need for geotextile as part of the cover, as river currents during flooding could potentially disturb the cover more than if it were not in place. It may be necessary to compensate elsewhere on site for loss of flood storage capacity due to the cover placement. Riparian and wetland habitat would be restored, as practicable. Long-term monitoring and deed restrictions will be used to prevent disturbance of the remedy. There will be at least yearly compliance monitoring to ensure restrictions remain in place and are enforced. Institutional controls (in the form of deed restrictions) and access restrictions, as required, would be used to prevent disturbance to subaqueous cover infrastructure. In addition, there will be periodic reviews no less than every five years as required by statute. Capital Costs for this remedy are estimated at $2.88 million with O&M and Periodic Costs at $0.70 million for a total cost for SE-4 at $3.58 million.

Groundwater (GW)

Including the No-Action Alternative, two alternatives were retained for detailed analysis in the FS. Contaminated groundwater within OU 2 is located completely within the compliance boundary for a waste management area that incorporates the J. M. Mills Landfill, Unnamed Island, and the Nunes Parcel. Therefore, in accordance with the NCP and EPA guidance, groundwater within the compliance boundary does not require treatment, but access to the groundwater will be prevented and measures taken to ensure the contaminated groundwater does not migrate beyond the compliance boundary or into the Blackstone River. Since no groundwater treatment is required, the groundwater alternatives include:

GW-1: No Action

No further action would be taken for groundwater throughout OU 2. Although this alternative does not achieve the RAOs, it is retained as a baseline alternative for comparison in accordance with the NCP and EPA's RI/FS Guidance. This alternative requires no further expenditure of costs ($ 0), but will continue to be evaluated through the statutorily required Site-wide Five-Year Reviews.

GW-2: Limited Action- Institutional Controls and Long-Term Monitoring

Under this alternative, institutional controls (in the form of deed restrictions) to prohibit the use and/or alteration of groundwater within the compliance boundary (as shown in **Figure 3-6 in Appendix B**) of the waste management area and to prevent disturbance to components of the remedy would be implemented. Additional institutional controls may be placed on a buffer zone outside of the compliance boundary to prevent wells from being installed that would draw contaminated groundwater beyond the compliance boundary. There will be at least yearly compliance monitoring to ensure restrictions remain in place and are enforced. Long-term monitoring of groundwater will be performed to ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause groundwater outside of the compliance boundary to exceed drinking water standards. Long-term monitoring of the Blackstone River surface water/sediment will also ensure groundwater contamination is not migrating into the River at levels above performance standards (see Section L of this ROD). Monitoring will include the appropriate sampling strategy to evaluate degradation processes that may decrease contaminant concentrations in groundwater and biogeochemical processes that may increase contaminant concentrations in groundwater (e.g., arsenic) and be performed on a regular schedule so as to provide trend analyses and tracking of contaminant behavior, especially during times of variable wet/dry seasonal events. In addition, there will be periodic reviews no less than every five years as required by statute. Capital Costs for this alternative are estimated at $166,000 with O&M and Periodic Costs at $505,000 for a total cost for GW-2 at $671,000.

K. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a site remedy (Section 7.0 of the FS). The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP:

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with ARARs** addresses whether or not a remedy will meet all Federal environmental and more stringent State environmental and facility siting standards, requirements, criteria, or limitations, unless a waiver is invoked.

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria:

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital and O&M costs, as well as present-worth costs.

Modifying Criteria

The modifying criteria are used as the final evaluation of remedial alternatives, generally after EPA has received public comment on the RI/FS and Proposed Plan:

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives described in the Proposed Plan and RI/FS, and the State's comments on ARARs or the proposed use of waivers.

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This comparative analysis can be found in **Tables 8-1 through 8-5** in **Appendix C** of this ROD. A detailed description of the comparative analysis can be found in Section 8.0 of the FS.

Discussed briefly below are the relative strengths and weaknesses of the alternatives considered for OU 2. The alternatives are compared against the list of nine evaluation criteria that were described above. Of these, the criteria for State Acceptance and Community Acceptance are evaluated after the public comment period.

Comparative Analysis of Source Control Remedial Alternatives

J. M. Mills Landfill

The detailed analysis of source area soil and waste alternatives is intended to provide sufficient information to select the appropriate components of the presumptive containment approach for the J. M. Mills Landfill, the soils with contaminants exceeding RGs along the floodplain and riverbank, sediment in Pond N, and for the waste located in the adjacent DFs. Criteria for the analysis of alternatives and the remedy costs are based on existing data and knowledge of OU 2 and do not take into account the potential to extend the cleanup on to the P&W railroad right-of-way.

As stated above, RCRA "hazardous waste" was disposed of at OU 2, but it is unclear when this disposal took place. Therefore, for the purposes of this ROD, RCRA requirements are not classified as applicable, but are relevant and appropriate. In addition, CERCLA "hazardous

substances" were disposed of at OU 2, including PCBs regulated under TSCA. As summarized in Section 3 of the FS, issues to be addressed at the J. M. Mills Landfill are the waste within the J. M. Mills Landfill itself, soils on the riverbank and floodplain that exceed the RGs, sediment in Pond N, and waste within the adjacent DFs. The riverbank and floodplain soils have contaminants that exceed the human health RGs. Cadmium exceeds the ecological soil RG in shallow soils on the floodplain and riverbank. For the purposes of the detailed analysis, the areal extent of the floodplain and riverbank soil impacts to which the remedy will apply were based on the RI sample results. The vertical extent of the impacts was assumed to include the upper 2 feet of floodplain and riverbank soil. Sampling (including soil and worm tissue) was performed in November 2012 to expand the background dataset. EPA's review of the data and how it relates to the soil RGs is contained in the June 21, 2013 Hoskins Memo (USEPA, 2013).[80] Additional data may be obtained and would be used during the remedial design phase to evaluate the extent of cadmium contamination and add to a more robust database indicating its significance and the extent of historic upriver sources of contaminants.

For any of the J. M. Mills alternatives evaluated in the FS, except the No Action alternative, existing soil data would need to be supplemented with additional sampling as a component of pre-design testing. The areal and vertical extent of contaminant concentrations that pose potential risk would need to be more fully defined for design purposes. During development of the design, a sampling and analysis program would be implemented to delineate areas for remediation.

Three remedial alternatives for the J. M. Mills Landfill have been retained for detailed analysis. All of the active remedial alternatives take into consideration the current conditions of the J. M. Mills Landfill, the setting of the J. M. Mills Landfill along the Blackstone River floodplain, and the recent groundwater, soil, and worm sampling (as discussed above; see USEPA, 2013), as each has a bearing on the selected remedy.

In order to address standards and concerns for a protective closure of a hazardous waste landfill within the 500-year floodplain of the Blackstone River, both of the proposed active landfill alternatives will need to be designed to address riparian protection concerns, both to prevent the release of contaminants in the event of flooding and to preserve or restore altered riparian habitat, as practicable. As part of the remedial design process for each proposed active alternative, it may be determined that some landfill material can be recycled and/or may be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) in order to shape and resize the landfill, to address riparian protection/restoration concerns, and to minimize the loss of flood storage for the Blackstone River in the design and construction of the cap or cap/cover.

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[80] USEPA, 2013. Review of technical memorandum titled: *Background Screening Levels for Sediment and Soil Supplemental Data Collection Efforts.* Memorandum from Bart Hoskins to David Newton. June 21, 2013.

While it is generally acknowledged that both the J. M. Mills Landfill and adjacent floodplain are mostly covered with vegetation, including brush and mature trees, closer examination demonstrates that portions of the current landfill soil cover is sparse and waste is exposed especially in areas where the slope sharply steepens. Over the years, slumping of the landfill crest has also been observed. It appears that portions of the J. M. Mills Landfill possess slope gradients steeper than 3 feet horizontal to 1 foot vertical, the maximum slope allowable by regulatory agencies. The location of the J. M. Mills Landfill between the Blackstone River floodplain and the P&W railroad also places space constraints on the selected remedy. To accommodate the current conditions, both of the proposed active remedial capping alternatives will require clearing and grubbing of the vegetation and extensive regrading of the J. M. Mills Landfill (with the potential need to dispose of some of the material off-site) prior to construction of a cap. Both of the proposed active remedial capping alternatives include the removal of soil and/or debris/waste from the floodplain followed by restoration of the floodplain and riverbank. In addition to incorporating each of the items discussed above, the final design for the selected alternative will need to be integrated with the selected alternatives for the Unnamed Island and Nunes Parcel to allow for the accommodation of excavated soil, waste, and sediment from these subareas. Similarly, any loss of floodplain storage will require compensation/mitigation. For costing purposes, it has been assumed that this balance will be performed entirely within OU 2. It may, however, be necessary to acquire additional property to perform this compensation. Costs for any necessary acquisitions have not been included in this ROD.

For each of the proposed active landfill alternatives, institutional controls (in the form of deed restrictions) and access restrictions would be used to prevent residential development and disturbance to landfill infrastructure. There will be no CERCLA restrictions (such as Institutional Controls) on recreational access to areas of restored riparian habitat along the Blackstone River. Public access to these areas is at the discretion of the property owner[s] within the OU.

For the J. M. Mills Landfill, a comparative analysis was performed on the following alternatives:

- Alternative JM-SO-1: No Action;
- Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls; and
- Alternative JM-SO-3: Combination RCRA Subtitle C Cap (top)/Perimeter Soil Cover (side slopes) of Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls.

A summary of the comparative analysis of the source area remedial action alternatives for the J. M. Mills Landfill is presented in **Table 8-2** (see **Appendix C**). This section provides a comparative analysis of the expected performance of each alternative relative to the other alternatives to identify their respective advantages and disadvantages.

Overall Protection of Human Health and the Environment

The HHRA presumed that the J. M. Mills Landfill will be capped to eliminate exposure to the contaminated waste within the landfill proper. Facility documentation shows that hazardous wastes were disposed of at OU 2. Physical hazards associated with debris fields were also noted that are required to be addressed under landfill closure standards pursuant to RCRA. In addition, the BERA indicated potential ecological risks to birds exposed to floodplain soils near the J. M. Mills Landfill. Alternative JM-SO-1 is not protective as no action would be taken to control exposure to or reduce concentrations in landfill waste, debris fields, and floodplain soils. JM-SO-2 is protective since it addresses current and potential future exposure risks through restricting exposure to landfill waste and other contaminated media (through consolidation, containment, possible off-site disposal, long-term monitoring, and institutional controls). Only alternative JM-SO-2, which includes a RCRA Subtitle C Cap over the entire J. M. Mills Landfill, will be fully protective of human health and the environment by placing a full cap over the landfill that will prevent the movement of contamination beyond the landfill into either groundwater beyond the compliance zone or into the River. The full cap will create a physical barrier between potential receptors and contaminated materials in soil and waste within the landfill, reducing the infiltration and the potential for leaching of contaminants in soil/waste to groundwater, fully addressing potential landfill gas releases, and ensuring that contamination is not eroded or washed out of the J. M. Mills Landfill during any flood, up to a 500-year event. The landfill cap can also be designed and maintained to restore riparian resources along the Blackstone River corridor. JM-SO-3, as presented in the FS, is not protective because it does not establish a completely protective physical barrier between potential receptors and contaminated materials in soil and waste (including hazardous waste and PCBs). JM-SO-3 does not fully reduce the infiltration and the potential for leaching of contaminants in soil and waste to groundwater and the Blackstone River. JM-SO-3 does not fully address potential landfill gas releases. Finally, JM-SO-3 did not incorporate a flood control system over the soil cover in a manner that will meet flood protectiveness standards up to a 500-year flood event to ensure that the release of contamination is prevented from the J. M. Mills Landfill during any flood, up to a 500-year event.

Compliance with Applicable or Relevant and Appropriate Requirements

Alternative JM-SO-1, No Action, will not meet state or federal ARARs related to addressing OU 2 risks or cleanup standards because no action would be taken to control potential exposure pathways or address contaminant concentrations in soil or waste. Alternative JM-SO-2 will fully meet all landfill state and federal closure ARARs, as well as all other chemical, location, and action-specific ARARs standards by capping of the J. M. Mills Landfill (RCRA Subtitle C Cap on entire landfill), by potentially disposing of some contaminated material off-site (depending on design considerations), and by removing or consolidating contaminated material above remedial goals in soil along the riverbank and floodplain. Alternative JM-SO-3 (hybrid cap/cover), as presented in the FS, does not fully meet chemical-specific, location-specific, or action-specific ARARs, because the soil portion of the cap does not meet Rhode Island landfill closure standards and does not comply with RCRA Subtitle C closure standards for landfills that

contain hazardous waste throughout the entirety of the landfill. The proposed cover component also will not allow for landfill gas control standards to be achieved. The soil cover component would not achieve floodplain protection standards (in compliance with 44 C.F.R. Part 9) because the permeable soil cover, even with physical armoring to prevent direct flood erosion, would not prevent the release of contaminants in the event of flooding, up to a 500-year event. As a result, Alternative JM-SO-2 is the only alternative that can be designed and implemented to comply with applicable state and federal ARARs. In addition, Alternative JM-SO-2 meets federal Clean Water Act standards as determined to be the least environmentally damaging practicable alternative (LEDPA), because it provides the best balance of addressing contaminated soil/debris within and adjacent to wetlands and waterways with minimizing both temporary and permanent alteration of wetlands and aquatic habitats on site. EPA solicited public comment on its LEDPA finding within the Proposed Plan. EPA received comments about the finding. EPA's responses to general comments regarding wetland issues are located in the Responsiveness Summary **(Part 3).**

Alternative JM-SO-2 will also meet TSCA regulatory standards by addressing soils, sediment, and/or debris contaminated with PCBs in order to control risk of injury to health or the environment through: 1) institutional controls to prevent residential development in areas where PCB levels between 1 and 10 ppm may be left in place, 2) through excavation of soil exceeding 10 ppm and consolidation under the constructed caps which meet RCRA Subtitle C landfill closure standards, and 3) through the potential off-site disposal of any PCB-contaminated material at a facility licensed to accept the level of PCB-contaminated material identified, unless it is metal debris that can be decontaminated to meet TSCA decontamination standards so as to be suitable for recycling off-site. JM-SO-3 will not meet TSCA regulatory standards for addressing soils, sediment, and/or debris contaminated with PCBs since the excavation and consolidation of PCB contaminated media exceeding 10 ppm under the proposed hybrid cap/cover does not meet TSCA landfill closure standards, which require landfills receiving 10 ppm or higher PCB-contaminated material to meet RCRA Subtitle C landfill closure standards.

Long-Term Effectiveness and Permanence

Alternative JM-SO-1 would provide the least long-term effectiveness because there would be no controls to limit exposure to contaminants in soil or waste. Alternative JM-SO-2 is the only alternative that will address risks associated with hazardous waste, hazardous substance, and PCB disposal by installation of a full RCRA Subtitle C Cap which places a physical barrier between potential receptors and contaminated materials in soil and waste over the entire source area, further reduces the infiltration and the potential for leaching of contaminants in soil/waste to groundwater and the Blackstone River, addresses landfill gas releases, and ensures that contamination is not eroded or washed out of the J. M. Mills Landfill during a flood, up to a 500-year storm event. Alternative JM-SO-2 will be protective of the environment by containing the contaminant mass and eliminating potential exposure pathways. While both Alternatives JM-SO-2 and JM-SO-3 implement deed restrictions to control land use to further protect the integrity of the cap, unlike Alternative JM-SO-2, long-term effectiveness and permanence will not be

achieved through Alternative JM-SO-3 because the soil portion of the cap does not meet RCRA Subtitle C performance standards. Moreover, because of the permeable soil cover, even with physical armoring to prevent direct flood erosion, JM-SO-3 would not prevent the release of contaminants in the event of flooding, up to a 500-year event, or through continued erosion of the side slope soil cover (if not properly maintained) over the long term.

Reduction of Toxicity, Mobility, or Volume Through Treatment

None of the alternatives involve treatment processes.

Short-Term Effectiveness

No short-term impacts to the local community, on-site remedial workers, or the environment will occur under Alternative JM-SO-1. The soil removal activities in the active remedial alternatives (JM-SO-2 and JM-SO-3) are the same and, therefore, the short-term exposure risks to workers, the community, or the environment from soil removal are equal for these alternatives. The soil removal activities will be managed through engineering controls and worker training. Both of the remaining presumptive approach alternatives (JM-SO-2 and JM-SO-3) include removal of all trees, clearing and grubbing of the vegetation, and extensive re-grading of the J. M. Mills Landfill prior to construction of a cap and the areas of the riverbank and floodplain where soil removal will occur that will create short-term exposure risks to workers, the community, or the environment. During implementation, engineering measures will be used to restrict access, control potential air emissions, fugitive dust, or surface water runoff. There may be some limited impact to the local community under Alternatives JM-SO-2 and JM-SO-3 if landfill material is transported off-site for disposal due to the use of local roadways. It may be possible, however, to use the railroad instead of local roads. Comparatively, Alternative JM-SO-2 will require a higher volume of materials to be brought on-site. While Alternative JM-SO-3 may present a lesser impact to the traffic in the surrounding community through reduced materials handling, use of the active rail system may also reduce traffic impacts for both JM-SO-2 and JM-SO-3.

Implementability

Alternative JM-SO-1 is simple to implement and involves no O&M. For the capping alternatives (JM-SO-2 and JM-SO-3), the location and protection of the caps along the riverbank and in the floodplain will present a significant technical challenge. Each alternative requires phased design/construction planning elements, large quantities of material handling, and there are known space and access limitations that may interfere with construction of either cap. Both are equal in that each includes the removal, clearing and grubbing of the vegetation, and re-grading of the landfill (prior to capping) and the areas of the riverbank and floodplain where soil removal will occur (including restoration of riparian areas and potential flood storage compensation). Alternative JM-SO-2 may be more difficult to implement than JM-SO-3 because there is a larger impermeable cap area and larger volumes of material to manage in building a

full RCRA Subtitle C Cap than is required for a hybrid cap/cover. Alternative JM-SO-1 is likely to be administratively feasible, but most likely not acceptable because there will be no controls on potential exposure pathways or the potential leaching of contaminants in soil to groundwater. Alternatives JM-SO-2 and JM-SO-3 are both administratively feasible, but similar to JM-SO-1, JM-SO-3 (hybrid cap/cover) is most likely not acceptable in that this alternative does not fully meet protectiveness standards or ARARs. Alternative JM-SO-3 is easier to implement than Alternative JM-SO-2 given the lower volume of materials required to construct the cap and the proportionally lower truck traffic through the surrounding community. The smaller footprint of the geosynthetics for Alternative JM-SO-3 reduces the complexity of construction, although each alternative will have implementation challenges in order to incorporate a flood control system for the landfill slopes below the 500-year flood elevation. However, steepness of slope and soil cover stability along the side slopes in both the short- and long-term is a factor which may further complicate implementability for JM-SO-3; while constructing JM-SO-2 may be more difficult, it may be the most stable over the long-term by addressing stormwater and landfill gas controls versus JM-SO-3's soil covered side slope design. Both of the proposed active landfill alternatives will need to address riparian protection concerns during implementation, both to prevent the release of contaminants in the event of flooding and to preserve or restore altered riparian habitat, as practicable. With each proposed active alternative, there may be implementability issues with disposing of some landfill material off-site in order to shape and resize the landfill, to address riparian protection/restoration concerns, and to minimize the loss of flood storage for the Blackstone River in the design and construction of the cap or cap/cover.

Cost

The most economical option is Alternative JM-SO-1, at no cost. Alternative JM-SO-2 is the most costly alternative with a present worth cost estimate of $21,559,000. JM-SO-3 presents a lower cost of $13,721,000. The capital costs presented for JM-SO-2 and JM-SO-3 may increase due to design constraints, such as working alongside a new railroad spur, protecting the landfill against river flooding, and addressing riparian restoration/flood storage compensation concerns (including potentially disposing of some material off-site), but these additional costs are expected to be within the margin of error expected at this stage.

Nunes Parcel

The detailed analysis of source area soil and waste alternatives is intended to provide sufficient information to select the appropriate components of the presumptive containment approach for the Nunes Parcel. Criteria for the analysis of alternatives and the remedy costs are based on existing data and knowledge of OU 2. The waste will be addressed through the presumptive approach, a landfill cap that encompasses the waste in its current placement. As previously discussed, RCRA "hazardous waste" was disposed of at OU 2, but it is unclear when this disposal took place. Therefore, for the purposes of this ROD, RCRA requirements are not classified as applicable, but are relevant and appropriate. In addition, CERCLA "hazardous substances" were disposed of at OU 2, including PCBs regulated under TSCA. In addition,

building structures will be demolished, surrounding soil exceeding RGs and ARARs will be consolidated under the cap, along with Pond I sediments.

In order to address standards and concerns for a protective closure of a hazardous waste landfill within the 500-year floodplain of the Blackstone River, both of the proposed active landfill alternatives will be designed to address riparian protection concerns, both to prevent the release of contaminants in the event of flooding and to preserve or restore altered riparian habitat, as practicable. As part of the remedial design process for each proposed active alternative, it may be determined that some landfill material can be recycled and/or may be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) in order to shape and resize the landfill, to address riparian protection/restoration concerns, and to minimize the loss of flood storage for the Blackstone River in the design and construction of the cap or cap/cover. Any loss of floodplain storage will require compensation/mitigation. For costing purposes, it has been assumed that this balance will be performed entirely on-site. It may, however, be necessary to acquire additional property to perform this compensation. Costs for any necessary acquisitions have not been included in this ROD.

For each of the proposed active landfill alternatives institutional controls (in the form of deed restrictions) and access restrictions would be used to prevent residential development and disturbance to landfill infrastructure, as well as include performance of a vapor intrusion/mitigation evaluation if a commercial building were considered for construction on the Nunes Parcel. There will be no CERCLA restrictions (such as Institutional Controls) on recreational access to areas of restored riparian habitat along the Blackstone River, although public access to these areas is at the discretion of the property owner[s] within the OU.

A summary of the comparative analysis of the three source area remedial action alternatives retained for the Nunes Parcel is presented in **Table 8-3** (see **Appendix C**). They are as follows:

- Alternative NP-SO-1: No Action;
- Alternative NP-SO-2: RCRA Subtitle D Cap (meeting State Solid Waste ARARs) of Landfill, Consolidation, and Institutional Controls; and
- Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls.

Overall Protection of Human Health and the Environment

Alternative NP-SO-1 (No Action) is not protective because it will not reduce existing contaminant concentrations in soil or provide measures to eliminate or control potential exposure pathways to soil or waste. Alternative NP-SO-2, as presented in the FS, is not fully protective because it will not meet protectiveness standards for the landfilling of hazardous waste. NP-SO-3 is protective because it will achieve the RAOs for soil and waste which provide overall

protection of human health and the environment by meeting the protective requirements for the hazardous waste cap.

Compliance with ARARs

Alternative NP-SO-1, No Action, does not meet state or federal ARARs, as impacted soils and waste remain in place and are not capped; site risks would not be addressed and cleanup standards would not be achieved. Alternative NP-SO-2 does not comply with RCRA Subtitle C and Rhode Island hazardous waste closure standards. Alternative NPSO-3 attains state and federal RCRA Subtitle C landfill closure ARARs, as well as all other identified chemical, location, and action-specific ARARs. In addition, Alternative NP-SO-3 meets federal Clean Water Act standards to be the LEDPA, because it provides the best balance of addressing contaminated soil/debris within and adjacent to wetlands and waterways with minimizing both temporary and permanent alteration of wetlands and aquatic habitats on OU 2. EPA solicited public comment on its LEDPA finding within the Proposed Plan. EPA received comments about the finding. EPA's responses to general comments regarding wetland issues are located in the Responsiveness Summary **(Part 3).**

Alternative NP-SO-2 will not meet TSCA regulatory standards for addressing soils, sediment, and/or debris contaminated with PCBs since the excavation and consolidation of PCB contaminated media exceeding 10 ppm under the proposed solid waste cap does not meet TSCA landfill closure standards, which require landfills receiving 10 ppm or higher PCB-contaminated material to meet RCRA Subtitle C landfill closure standards. Alternative NP-SO-3 will meet TSCA regulatory standards by addressing any soils, sediment, and/or debris contaminated with PCBs in order to control risk of injury to health or the environment through: 1) institutional controls to prevent residential development in any areas where PCB levels between 1 and 10 ppm may be left in place, 2) through consolidation of soil sediment and debris (either from the Nunes Parcel, the Unnamed Island or elsewhere within OU 2) that potentially contains PCB levels above 10 ppm under the constructed cap which meets RCRA Subtitle C landfill closure standards, and 3) through the potential off-site disposal of any PCB contaminated material at a facility licensed to accept the level of PCB contaminated material identified, unless it is metal debris that can be decontaminated to meet TSCA decontamination standards so as to be suitable for recycling off-site.

Long-Term Effectiveness and Permanence

Alternative NP-SO-1 would provide the least long-term effectiveness because there would be no controls to limit exposure to contaminants in soil or waste, nor would it control the potential for contaminants in soil/waste to leach to groundwater. Alternatives NP-SO-2 and NP-SO-3 are the most effective alternatives in the long-term. These two alternatives would be nearly equally effective and permanent because the landfill caps will equally reduce potential exposure pathways, however, the cap in Alternative NP-SO-2 would allow more infiltration to occur through the cap, thereby allowing for potentially more leachate to be generated via waste contact.

Lastly, both caps will be constructed to meet performance standards to prevent the release of contaminants in the event of a flood, up to a 500-year storm event or through continued erosion by stormwater over the long term.

Reduction of Toxicity, Mobility, or Volume Through Treatment

None of the alternatives involve treatment processes.

Short-Term Effectiveness

Alternative NP-SO-1 is the most effective at attaining short-term results with minimal risks because there will be no activities to implement and, therefore, no exposure risks. Both NP-SO-2 and NP-SO-3 include construction of a landfill cap, which includes removal of vegetation, grubbing, and re-grading that will create short-term exposure risks to workers, the community, or the environment. During implementation, engineering measures will be used to control potential air emissions, fugitive dust, or surface water runoff. There may be some limited impact to the local community under Alternatives NP-SO-2 and NP-SO-3 if landfill material is transported off-site for disposal due to the use of local roadways. It may be possible, however, to use the rail road instead of local roads. Comparatively, Alternative NP-SO-3 will create the highest potential risk to the community, workers, or environment due to the greater volume of materials to be brought on-site and increased amount of labor needed to construct the cap. Alternative NP-SO-2 will require a lower volume of materials and less labor to construct and, therefore, create a lower potential risk to the community, workers, or the environment. In either case, if the active rail system is used, risks to the community and the environment due to the high volume of materials to be brought on-site may be lowered through reduced traffic and emissions.

Implementability

Alternative NP-SO-1 involves no implementation and no O&M. Alternative NP-SO-1 is likely to be administratively feasible, but is not acceptable because there will be no controls on potential exposure pathways or the potential leaching of contaminants in waste/soil to groundwater. For the capping alternatives (NP-SO-2 and NP-SO-3), the location and protection of the caps along the riverbank and in the floodplain will present a significant technical challenge. Each alternative requires phased design/construction planning elements, large quantities of material handling, and there are known space and access limitations that may interfere with construction of either cap. Both are equal in that each includes the removal, clearing and grubbing of the vegetation, and re-grading of the landfill (prior to capping) and the areas of the riverbank and floodplain where soil removal will occur (including restoration of riparian areas and potential flood storage compensation). Alternative NP-SO-1 is likely to be administratively feasible, but most likely not acceptable because there will be no controls on potential exposure pathways or the potential leaching of contaminants in soil to groundwater or the Blackstone River. Alternatives NP-SO-2 and NP-SO-3 are both administratively feasible, but similar to NP-SO-1, NP-SO-2 (solid waste cover) is most likely not acceptable in that this

alternative does not fully meet protectiveness standards or ARARs. In addition, for both Alternatives NP-SO-2 and NP-SO-3 inclusion of the soils/sediments around Pond I will increase the difficulty of implementation. Alternative NP-SO-2 may be somewhat easier to implement than Alternative NP-SO-3 given the lower volume of materials required to construct the cap and the proportionally lower truck traffic through the surrounding community. Each alternative will have implementation challenges in order to incorporate a flood control system for the landfill slopes below the 500-year flood elevation. Both of the proposed active landfill alternatives will need to address riparian protection concerns during implementation, both to prevent the release of contaminants in the event of flooding and to preserve or restore altered riparian habitat, as practicable. With each proposed active alternative, there may be implementability issues with disposing of some landfill material off-site in order to shape and resize the landfill to address riparian protection/restoration concerns and to minimize the loss of flood storage for the Blackstone River in the design and construction of the cap or cap/cover.

Cost

The most economical option is Alternative NP-SO-1, at no cost. Alternative NP-SO-2 is estimated to cost $4,932,000. Alternative NP-SO-3 is the most costly alternative with a present worth cost estimate of $6,080,000. The capital costs presented for NP-SO-2 and NP-SO-3 may increase based on design constraints, such as protecting the landfill against river flooding, addressing riparian restoration/flood storage compensation concerns (including potentially disposing of some material off-site), and inclusion of soils/sediments/debris associated with Pond I and the Unnamed Island, but these additional costs are expected to be within the margin of error expected at this stage.

Unnamed Island

A summary of the comparative analysis of the three source area remedial action alternatives retained for the Unnamed Island is presented in **Table 8-4** (see **Appendix C**). The three remedial alternatives are as follows:

- Alternative UI-SO-1: No Action;
- Alternative UI-SO-2: Remove/Consolidate Surface Waste/Soil (0 to 2 feet) Exceeding RGs, Geotextile with Riprap where RG Exceedances Remain, and Institutional Controls; and
- Alternative UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs.

Overall Protection of Human Health and the Environment

Alternative UI-SO-1 will not reduce existing contaminant concentrations in soil or provide measures to eliminate or control potential exposure pathways to soil or waste. Alternative UI-SO-2 might achieve the RAOs for soil and waste and provide overall protection of human health and the environment if a protective cover can be designed, constructed and maintained to prevent any release of contaminants in the event of a flood, up to a 500-year event.

The protectiveness of the permeable cover is also questionable related to any hazardous substances/ materials/wastes which may exist on the island, as the cover does not meet RCRA Subtitle C and Rhode Island hazardous waste regulation protectiveness standards and may not prevent the migration of contaminants into groundwater or the Blackstone River. UI-SO-3 will achieve all RAOs for soil and waste and will be protective of human health and the environment because all contaminated soil and waste will be removed from the Unnamed Island and disposed of under a protective cap at either J. M. Mills or the Nunes Parcel. Alternative UI-SO-3 will achieve RAOs in the shortest timeframe by removal of all waste and soil exceeding RGs thereby eliminating the need to implement institutional controls and to perform O&M on the cover placed over the soil and waste deposits as envisioned under Alternative UI-SO-2.

Compliance with ARARs

Alternative UI-SO-1, No Action, does not meet ARARs, as impacted soils remain in place and potential exposure pathways are not controlled. Alternative UI-SO-2 will achieve the soil RAOs in soils from 0 to 2 feet bgs, but any remaining contaminants below 2 feet would not meet chemical- and location-specific ARARs, as the cover design does not protect against the release of contaminants through continued leaching or during a flood event because there is no impermeable barrier layer in the cover. Furthermore, Alternative UI-SO-2 would not comply with RCRA Subtitle C and Rhode Island hazardous waste closure requirements. Alternative UI-SO-3 would attain all state and federal ARARs by removing all contaminants that exceed risk or ARAR levels established under state and federal standards and consolidating the material on-site under one of the RCRA Subtitle C landfill caps. UI-SO-3 will comply with federal and state floodplain standards by addressing riparian restoration, as practicable, and achieving flood storage compensation requirements. In addition, Alternative UI-SO-3 meets federal Clean Water Act standards to be the LEDPA, because it provides the best balance of addressing contaminated soil/debris within and adjacent to wetlands and waterways with minimizing both temporary and permanent alteration of wetlands and aquatic habitats on OU 2. EPA solicited public comment on its LEDPA finding within the Proposed Plan. EPA received comments about the finding. EPA's responses to general comments regarding wetland issues are located in the Responsiveness Summary **(Part 3).**

Alternative UI-SO-2 will likely not meet TSCA regulatory standards for addressing soils, sediment, and/or debris contaminated with PCBs since the capping of potential PCB-contaminated media exceeding 10 ppm under the cover does not meet TSCA landfill closure standards, which require landfills receiving 10 ppm or higher PCB-contaminated material to meet RCRA Subtitle C landfill closure standards. Alternative UI-SO-3 will meet TSCA regulatory standards by addressing any soils, sediment, and/or debris contaminated with PCBs in order to control risk of injury to health or the environment through: 1) the finding that there is no residential exposure pathway on the undevelopable Unnamed Island so that any PCB levels between 1 and 10 ppm that may be left in place would not pose a risk and 2) through consolidation of soil sediment and debris from the Unnamed Island that potentially contains PCB levels above 10 ppm under the constructed caps at either J. M. Mills or the Nunes Parcel which

meets RCRA Subtitle C landfill closure standards. The cover, as presented in Alternative UI-SO-2, does not comply with RCRA Subtitle C landfill closure standards and Rhode Island hazardous waste closure standards.

Long-Term Effectiveness and Permanence

Alternative UI-SO-1 would provide the least long-term effectiveness because there would be no controls to limit exposure to contaminants in soil or waste. Alternative UI-SO-2 may not achieve long-term effectiveness and permanence because there is no impermeable barrier layer in the cover, making it likely that a release will occur from continued leaching, further erosion over time, and/or during a flood, up to a 500-year storm event. Alternative UI-SO-3 is the most effective alternative in the long-term because all waste and soils exceeding RGs would be excavated and placed under one of the on-site regulatory compliant landfill caps.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternatives UI-SO-1 and UI-SO-2 do not involve treatment processes. Under UI-SO-3 there may be some limited treatment of water generated from dewatering of waste and soil/sediment excavated below groundwater levels.

Short-Term Effectiveness

Alternative UI-SO-1 is the most effective at attaining short-term results with minimal risks because there will be no activities to implement and, therefore, no exposure risks to the community, workers, or the environment during implementation of the alternative. Alternative UI-SO-2 will require limited activities (limited excavation, soil cover installation, and maintenance) that will result in short-term exposure risks to workers, the community, or the environment, although these activities will be managed through engineering controls and worker training. Under Alternative UI-SO-3, potential risks to the community, workers, and/or the environment will increase compared to Alternative UI SO-2 due to the anticipated larger and deeper excavation area. These potential risks will be managed through engineering controls and worker training.

Implementability

Alternative UI-SO-1 involves no implementation and no O&M. Although the implementation of each of the active alternatives (UI-SO-2 and UI-SO-3) is both technically and administratively feasible, as the remedial technology is conventional and proven for these contaminants, both Alternatives UI-SO-2 and UI-SO-3 will be challenging because the location of the Unnamed Island will require a temporary bridge to move equipment and vehicles, and flooding could disrupt work or damage equipment. Alternative UI-SO-3 will be the most difficult alternative to implement because this alternative requires excavation below the water table. Alternative UI-SO-2 will involve the simplest technical implementation for the active

remedy alternatives due to the shallower depth of excavation. In addition, due to the lower amount of material requiring excavation, uncertainty related to the seasonal construction and potential flooding of the Unnamed Island is significantly reduced. However, the reliability of the cover design for Alternative UI-SO-2 is questionable with respect to protectiveness during flood scenarios.

Alternative UI-SO-1 is likely to be administratively feasible, but most likely not accepted because there will be no controls on potential exposure pathways. Alternatives UI-SO-2 and UI-SO-3 are administratively feasible with the level of difficulty increasing respectively.

Cost

The most economical option is Alternative UI-SO-1, at no cost. Alternative UI-SO-2, estimated to cost $4,374,000, is the most economical of the active remedy alternatives; Alternative UI-SO-3 has a present worth cost estimate of $6,136,000. The capital costs presented for UI-SO-3 may increase based on additional information gathered with respect to waste depth, but these additional costs are expected to be within the margin of error expected at this stage. Note that there would be O&M and institutional control costs associated with maintenance of the cap in Alternative UI-SO-2, but no O&M and institutional control costs associated with waste and soil deposits remaining on the island in UI-SO-3, as they will have been removed.

Comparative Analysis of Remedial Alternatives for Sediments

Criteria for the analysis of alternatives and the remedy costs are based on existing data and knowledge of OU 2. Note that sediments in Pond N and Pond I have been included as part of the presumptive approach actions for J. M. Mills Landfill and Nunes Parcel, respectively. The following evaluation applies to the ponds on Unnamed Island (Ponds A, D, and E).

A summary of the comparative analysis of the pond sediment remedial action alternatives is presented in **Table 8-5** (see **Appendix C**). This section provides a comparative analysis of the expected performance of each alternative relative to the other alternatives to identify their respective advantages and disadvantages. The four remedial alternatives retained for sediment are as follows:

- Alternative SE-1: No Action;
- Alternative SE-2: Remove/Consolidate Sediment Exceeding RGs;
- Alternative SE-3: Remove/Consolidate Sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls; and
- Alternative SE-4: Subaqueous Cover (No Sediment Removal) with Institutional Controls.

Overall Protection of Human Health and the Environment

Alternative SE-1 will not include monitoring to evaluate changes in risks or determine when RAOs are met. Alternative SE-1 does not reduce the potential exposure pathways and is not protective of the environment. Alternatives SE-2, SE-3, and SE-4 achieve the RAOs for sediment and will provide overall protection of the environment. Under these three alternatives, surface water quality in the ponds is expected to achieve water quality standards once the sediment remedy is implemented. Alternative SE-2 will achieve the RAOs in the shortest period of time through removal of all sediments with contaminants exceeding RGs, with on-site consolidation under the Nunes Parcel cap, or as shaping substrate under the J. M. Mills cap. In contrast, Alternatives SE-3 and SE-4 will permanently require long-term monitoring and maintenance of the subaqueous covers and institutional controls (necessary to protect the remedy) as long as the underlying sediment still poses a risk. Alternative SE-3 will be more protective of the environment than Alternative SE-4 because contaminant mass in the top 1 foot of sediment will be removed and consolidated in one of the on-site landfills to be capped, as well as with covering any areas with deeper exceedances. Alternative SE-4 will cover sediments, but not actively reduce contaminant mass or volume from the ponds.

Compliance with ARARs

Alternative SE-1 would not reduce existing contaminant concentrations below risk-based levels (as developed using To Be Considered guidance documents) in sediments or provide measures to eliminate or control potential exposure pathways associated with possible future use of OU 2 and, therefore, does not meet ARARs. Alternatives SE-2 through SE-4 can all achieve these standards. Alternatives SE-2 through SE-4 would all be designed/implemented to comply with ARARs and TBC standards. Subaqueous covers included in Alternatives SE-3 and SE-4 would be engineered (through use of amendments, if necessary) to remain protective in the event of a flood, up to a 500-year event. In addition, Alternative SE-3 meets federal Clean Water Act standards to be the LEDPA, because it provides the best balance of addressing contaminated sediments within the ponds while protecting wetland and aquatic resources. EPA solicited public comment on its LEDPA finding within the Proposed Plan. EPA received comments about the finding. EPA's responses to general comments regarding wetland issues are located in the Responsiveness Summary **(Part 3).**

Long-Term Effectiveness and Permanence

Alternative SE-1 would provide the least long-term effectiveness because there would be no controls to limit exposure to contaminants in sediment. Alternative SE-4 would be more effective than Alternative SE-1 because a cover, periodic monitoring, O&M of the cover, institutional controls, and statutory review would be implemented to reduce potential exposure pathways. Alternatives SE-2 and SE-3 would be more effective than Alternative SE-4 because sediment removal will be implemented to prevent potential exposure to contaminants in sediment. Alternative SE-3 will use a combination of excavation and covering to reduce potential exposure pathways and institutional controls to protect the cover. As part of Alternative SE-3, some impacted sediments will stay in place under the cover and require

periodic monitoring and O&M of the cover, maintenance of institutional controls, and statutory review. Alternative SE-2 will excavate all sediments exceeding RGs and provides the greatest permanence in the shortest timeframe. Alternative SE-2 also eliminates the need for further monitoring, O&M, institutional controls, and statutory review because all contaminated sediments that exceed RGs will be fully removed. Although the overall OU-2 remedy will address contaminant source areas (from the landfills, Unnamed Island waste, and the pond sediment), in the future, pond sediments under all of the active sediment alternatives may be impacted to a limited extent from upriver sources of contaminated sediments (discussed in the Blackstone River Watershed TMDL report). However, it is not expected that contaminant concentrations in the pond sediments would reach actionable levels in the future from upstream, non-Site related contaminant sources.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative SE-1 will not involve treatment processes. Both Alternatives SE-2 and SE-3 may have limited treatment of water from the sediment dewatering process. In addition, the addition of any supplements to the cover material under Alternatives SE-3 and SE-4 may reduce the mobility of any contaminants that migrate into the cover material.

Short-Term Effectiveness

Alternative SE-1 is the most effective at attaining short-term results with minimal risk, because there will be no activities to implement and, therefore, no additional exposure risks. Alternative SE-4 will require less intrusive activities (subaqueous cover periodic monitoring and maintenance) that will result in short-term exposure risks to workers, the community, and/or the environment, although these activities will be managed through engineering controls and worker training. However, there is also the potential for loss of ecological habitat in shallower zones when placing the cover without prior excavation. In addition, any flood storage capacity lost during cover installation in Alternative SE-4 will require mitigation elsewhere at OU 2. Under Alternative SE-3, potential risks to the community, workers, or the environment will increase compared to Alternative SE-4 due to the addition of excavation. These potential risks will be managed through engineering controls and worker training. The sediment excavation included as Alternative SE-2 may result in the greatest short-term exposure risks to workers (predominantly due to excavation and consolidation), but these potential risks will be managed through engineering controls and worker training. Alternative SE-2 may also result in the highest short-term exposure risks to the environment and community, because this alternative has the largest volume of sediment to be transported off of the Unnamed Island and disposed of under the Nunes Parcel landfill cap, or as shaping substrate for the J. M. Mills cap.

Implementability

Alternative SE-1 involves no implementation and no maintenance. Implementation of Alternatives SE-2, SE-3, and SE-4 is technically and administratively feasible, as the remedial

technologies are conventional and proven for the OU 2 contaminants. Services and materials necessary for implementing the alternatives are readily available, although design studies will be performed to ascertain the stability and performance of the various cover options and treatability studies may be needed if amendments are to be used as part of any subaqueous cover (Alternatives SE-3 and SE-4). The longer duration required for the excavation under Alternative SE-2 increases risk to equipment due to periodic flooding of the Unnamed Island. In addition, dewatering of the excavated sediment will most likely be required prior to consolidation at the Nunes Parcel. Alternative SE-3 also requires excavation, as well as installation of a subaqueous cover, while Alternative SE-4 will include only a subaqueous cover. Alternatives SE-2, SE-3, and SE-4 will use conventional equipment that is readily available, but a temporary bridge will be required to move heavy equipment and trucks across the Blackstone River. Due to the difficulties of moving equipment and materials across a channel of the Blackstone River and the potential for flooding to disrupt work or damage equipment, the implementability of the alternatives is primarily controlled by the level of uncertainty in the volume of material requiring transport and the duration of the remedy activities. Thus, Alternative SE-2 has the most implementability issues and Alternative SE-4 (of the three active alternatives) has the least.

Cost

Alternative SE-1, with no cost, is the most economical option. Alternative SE-2 is the most costly alternative, with a present worth cost of $8,120,000 and the highest degree of cost uncertainty due to the potential for excavation beyond currently assumed horizontal and vertical extents. Alternative SE-3 at $5,804,000 has a higher capital cost than SE-4 (at $3,584,000) because of the removal of the uppermost sediment prior to placement of a subaqueous cover.

Comparative Analysis of Remedial Alternatives for Groundwater

A summary of the comparative analysis of the groundwater remedial action alternatives is presented in **Table 8-1** (see **Appendix C**). This section provides a comparative analysis of the expected performance of each alternative relative to the other alternatives to identify their respective advantages and disadvantages. Two groundwater remedial alternatives have been retained for comparative analysis. The alternatives are:

- Alternative GW-1: No Action; and
- Alternative GW-2: Limited Action: Institutional Controls and Long-Term Monitoring.

Overall Protection of Human Health and the Environment

Alternative GW-1 is not protective because it does not address risks posed by contaminated groundwater within the OU. Alternative GW-1 will not provide measures to eliminate or control potential migration of contaminants in groundwater. Alternative GW-2 will achieve the RAOs identified for groundwater once ICs are established and a groundwater monitoring plan is implemented. Alternative GW-2 is protective of human health and the environment by limiting potential exposure pathways through the implementation of ICs and by

ensuring contaminated groundwater from OU 2 does not migrate beyond the compliance boundary for the waste management area or into the river at levels which would exceed performance standards identified in the ROD.

Compliance with ARARs

Alternative GW-1 does not meet ARARs or risk-based standards for addressing contaminated groundwater because no action would be taken to control potential exposure pathways or address contaminant concentrations in groundwater consistent with the requirements of the Safe Drinking Water Act Maximum Contaminant Levels and the Rhode Island Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases. Alternative GW-2 meets all ARARs requirements through ICs and long-term monitoring. ARARs and risk-based Performance Standards will be used to ensure that groundwater contamination is not migrating beyond the compliance boundary for the waste management area or into the Blackstone River at levels which would exceed performance standards to be identified in the ROD.

Long-Term Effectiveness and Permanence

Alternative GW-1 would provide the least long-term effectiveness because there would be no controls to limit potential exposure to contaminants in groundwater or monitoring to indicate when Performance Standards have been reached. Alternative GW-2 will be more effective than Alternative GW-1 because ICs will limit potential exposure to contaminants in groundwater and site-wide groundwater monitoring will verify when Performance Standards are not being exceeded outside of the compliance boundary and in the river.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Neither of the alternatives involves treatment processes.

Short-Term Effectiveness

Alternative GW-1 is the most effective at attaining short-term results with minimal risks, as there would not be any activities to implement and, therefore, no potential exposure risks. Alternative GW-2 would permanently require limited activities (long-term groundwater monitoring), which would result in minor short-term exposure risks to workers, the community, or the environment. These activities would be managed through engineering controls and worker training.

Implementability

Alternative GW-1 requires no implementation and involves no O&M. Alternative GW-2 is also highly implementable, although there may be administrative impediments with

establishing ICs on buffer zone properties surrounding the OU, if required. Alternative GW-1 is unlikely to be administratively feasible because there will be no controls on potential exposure pathways or monitoring of contaminant concentrations in groundwater. Alternative GW-2 is administratively feasible because potential exposure pathways will be limited and groundwater concentrations will be monitored.

Cost

Alternative GW-1, with no cost, is the most economical option. Alternative GW-2, estimated to cost $671,000, is economical, with monitoring costs spread over 30 years.

L. THE SELECTED REMEDY

1. Summary of the Rationale for the Selected Remedy

The selected remedy is a comprehensive remedy which primarily utilizes source control components to address the principal OU 2 risks. EPA has combined the following FS alternatives for the selected remedy that is primarily focused on the following areas throughout OU 2 (see **Figure 2** in **Appendix B**):

- J. M. Mills Landfill, Alternative JM-SO-2;
- Nunes Parcel, Alternative NP-SO-3;
- Unnamed Island Soils and Waste Deposits, Alternative UI-SO-3;
- Sediment in Ponds at Unnamed Island, Alternative SE-3; and
- Groundwater, Alternative GW-2.

The selected remedy addresses contaminated floodplain soils, sediment, and groundwater within OU 2 of the Site and also follows a presumptive containment approach for addressing the large volumes of wastes, including hazardous waste, disposed of in both landfills and associated debris fields within the OU 2 boundary and immediate floodplain of the Blackstone River. The remedy includes the J. M. Mills Landfill, the Nunes Parcel, and the "Unnamed Island" (all of which operated for a time as a single landfill and disposal Facility) where contamination from the landfill operations came to be located within the floodplain of the Blackstone River. The remedy generally includes the following components:

- Design and construct caps meeting hazardous waste landfill closure performance standards on both the J. M. Mills Landfill and Nunes Parcel to contain wastes in the landfills as well as contaminated soils and sediments consolidated therein as part of the remedy;
- Remove buildings/structures located on the Nunes Parcel (to facilitate cap construction);
- Consolidate associated debris fields and contaminated soils under areas to be capped;

- Consolidate (into areas to be capped) contaminated soil/sediment from riverbank and floodplain;
- Excavate and consolidate (into areas to be capped), on-site waste and soil/sediment exceeding cleanup levels from the Unnamed Island;
- Excavate (to a depth of approximately one foot) and consolidate into areas to be capped, sediment exceeding cleanup standards from ponds on the Unnamed Island and apply a subaqueous cover (minimum 1 foot thickness) where cleanup level exceedances in deeper sediments may remain;[81]
- As needed in order to shape and resize the landfill to meet landfill cap performance standards and address riparian protection concerns, dispose of some landfill material off-site;
- Restore areas disturbed by remediation, including excavated riverbanks and riparian zone, to return such areas to pre-remediation conditions (e.g., the functions, values, characteristics, vegetation, habitat, species use, and other attributes), to the extent feasible;
- Implement long-term monitoring (e.g., groundwater, surface water in the Blackstone River and ponds, sediment, and performance monitoring for cap and subaqueous cover effectiveness) where contamination will be left on-site;
- Establish and administer land use restrictions (institutional controls) to prevent use of groundwater within the groundwater compliance boundary and any potential buffer zone to be established and restrict disturbance of components of the cleanup (including the landfills, sediment cover, monitoring wells); and
- Conduct statutorily-required five-year reviews.

The excavation and capping components of the remedy will prevent direct contact with contaminants by human and ecological receptors. In addition, the remedy will prevent migration of contaminants to groundwater and surface water or recontamination of sediments. The estimated present value cost of the selected remedy is $40.3 million.

2. Description of Remedial Components

EPA has evaluated a number of design measures for capping that address the need to maintain the aesthetic and habitat characteristics of the riparian corridor. An overarching objective in conducting the cleanup for OU 2 is to minimize any detrimental impacts from remedy construction activities and ensure that aesthetic considerations are incorporated and

[81] At the time of design, additional sediment profiling will be performed to determine more precisely the contamination present and excavation depths needed to reach attainment of the RGs in the ponds. If the difference in dredged volume (between removal of 1 foot of sediment versus removing all sediment exceeding RGs) is relatively small, additional dredging will be performed to reduce or potentially eliminate the need for a subaqueous cover and future maintenance. As otherwise required, a subaqueous cover will be utilized in areas where RG exceedances are not fully removed.

compatible with the development of the National Historical Park within the Blackstone Valley Heritage Corridor. The selected remedy is consistent with EPA's preferred alternative outlined in the July 2014 Proposed Plan and is consistent with a combination of alternatives JM-SO-2, NP-SO-3, UI-SO-3, SE-3, and GW-2, outlined in the Feasibility Study.

Capping of the J. M. Mills Landfill and the Nunes Parcel

The main component of the selected remedy is the construction of low permeability engineered cap systems at both the J. M. Mills Landfill and the Nunes Parcel to meet ARARs (see **Figures 4 and 5** in **Appendix B**). Capping will be conducted after the excavation and consolidation of additional contaminated soils, sediments and debris outlined below. Engineered caps will be designed and constructed to meet hazardous waste landfill ARARs to prevent migration of landfill contamination beyond the groundwater compliance boundary or into the Blackstone River (see **Figure 3-6** in **Appendix B**).[82] Soils and sediments exceeding cleanup goals, including those in areas adjacent to the landfills, in floodplain areas, and in Pond I and Pond N will be consolidated into areas to be capped. Contaminated soils, sediment, and debris from the Unnamed Island and its ponds will also be dewatered and consolidated under the cap or disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440). To the extent practical, materials, soils, and sediments excavated from the Unnamed Island and the flood plains adjacent to the J. M. Mills Landfill and the Nunes Parcel may be used for shaping layers of the J. M. Mills Landfill and the Nunes Parcel protective caps. These materials, as appropriate, may also be used in the bedding layer and the drainage layer below the protective caps under the scenario in which a fully protective cap is deployed over the entire footprint of waste at these landfills. All building structures on the Nunes Parcel will be demolished and either consolidated or sent off-site for recycling or disposal. Outlying waste deposits (including debris fields) from Facility operations that are adjacent to the landfilled waste will also be consolidated for placement under the caps. A landfill gas management system will be designed and constructed (following additional landfill gas concentration and treatment option assessments) for each landfill cap (passive or active collection/treatment to be determined in design).[83] The protective cap designs will incorporate a flood control system that will meet flood protectiveness standards up to a 500-year flood event and effectively manage stormwater along the entire slope of each of the caps. Operation and maintenance activities, including mowing, will be conducted in such a manner as to encourage wildlife use while at the same time maintaining the integrity of the cap. Due to the location within the 500-year floodplain of the Blackstone River (and considering the location of OU 2 within the Blackstone River Valley National Historical Park and the Heritage Corridor), the caps will be designed to address riparian

[82] In addition to the requirement in the Rhode Island Hazardous Waste regulations, groundwater monitoring and surface water monitoring around the capped landfills will be conducted in accordance with the substantive requirements of the Rhode Island Solid Waste Regulations (DEM OWM-SW0401, 2.1.08(c)).
[83] In addition to the requirements in the Rhode Island Hazardous Waste regulations, the landfill gas management system will be designed to meet the substantive requirements of the Rhode Island Solid Waste Regulations (DEM OWM-SW0401, 2.3.08).

protection concerns, both to prevent the release of contaminants in the event of flooding and to preserve or restore altered riparian habitat with native species to maintain habitat diversity, as practicable. To the extent practical, all areas covered by the protective caps will be planted primarily with native grasses, plants, shallow rooted shrubs and bushes, and designed to attract wildlife, including migratory birds. The adjacent floodplain will be planted with native trees, bushes, plants, and grasses designed to address flood control, the local riparian buffer and wildlife concerns. Any known, persistent leachate seeps observed (e.g., Pond C at the J. M. Mills Landfill and at Pond I located at the north east corner of the Nunes Parcel) will be investigated as part of the remedial design and remedial measures, if required, (e.g., a barrier and/or leachate collection system) will be designed and constructed to meet landfill closure requirements. As part of the remedial design process for the protective cap, it may be determined that some landfill material can be recycled and/or may be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) in order to shape and resize the landfills, to address riparian protection/restoration concerns, and to minimize the loss of flood storage for the Blackstone River in the design and construction of the caps.

A conceptual cross section for the engineered caps, based on the Region 1 Alternative Cap Guidance, is shown on **Figures 4** and **5** in **Appendix B**. This is one conceptual solution that is appropriate and acceptable for Region 1 CERCLA sites requiring hazardous waste closure, and for which the FS cost estimate and comparative analysis is based. Other cap construction components, as identified during the remedial design, may also satisfy the above-specified performance standards depending upon site-specific conditions and upon a determination by EPA, in consultation with RIDEM, that an alternative cap component adequately fulfills these regulatory requirements. Appropriate cap components that comply with the Rhode Island Hazardous Waste Regulations and RCRA Subtitle C requirements, TSCA Requirements (in 40 C.F.R. Section 761.61(a)(7)), and wetland/floodplain protection requirements will be considered during this remedial design phase. EPA intends to engage public stakeholders (e.g., state and local officials, representatives in support of the National Historical Park, and others) during the design to ensure that the caps are constructed to be protective while also taking into consideration the aesthetic qualities, view corridor, and land use considerations along the Blackstone River and heritage corridor.

Unnamed Island Soils and Waste Deposits

The selected remedy includes the complete removal of all waste deposits (including fiberglass, hosing, rubber parts, tires, scrap metal, household waste, and/or other industrial byproducts) from the former Facility operations along with all contaminated soil/sediment that exceeds cleanup levels and removal of all of the excavated material from the Unnamed Island for consolidation under the on-site cap(s) or off-site disposal (in accordance CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) or recycled, as appropriate (see **Figure 6** in **Appendix B**). Riparian habitat will be restored, including using native species to maintain habitat diversity, as practicable, as determined during remedial design. Since contaminated materials will be removed to recreational use standards, there will be no CERCLA restrictions (such as

Institutional Controls) on recreational access to areas of restored riparian habitat along on the Unnamed Island, although public access to these areas is at the discretion of the property owner[s] within OU 2 (the area is unsuitable for residential development due to its location in the floodplain of the Blackstone River).

Sediment in Ponds at Unnamed Island

In ponds located at the Unnamed Island, contaminated sediment exceeding cleanup levels in the top 1 foot (currently estimated to be approximately 8,700 cubic yards) will be excavated and consolidated into one of the areas to be capped (see **Figure 7** in **Appendix B**). Sediment exceeding cleanup levels at depths greater than 1 foot which are not excavated as part of this action will be capped in place via a subaqueous cover described below. At the time of design, additional sediment profiling will be performed to determine more precisely the contamination present and excavation depths needed to meet sediment cleanup levels in the ponds. If the difference in dredged volume (between removal of one foot of sediment versus removing all sediment exceeding RGs) is relatively small, additional dredging will be performed to reduce or potentially eliminate the need for a subaqueous cover, future maintenance, and institutional controls. A subaqueous cover comprised of geotextile and a minimum of 1 foot of clean material will be placed over the remaining sediments not attaining cleanup levels. Design studies will be conducted to ascertain the stability and performance of various cover materials, including consideration of the appropriateness of and need for the geotextile component of the cover, the appropriateness of sediment amendments, and the need for a habitat layer at the surface of the cap to promote benthic recolonization, if found necessary. The cover must be constructed to withstand flooding, up to a 500-year event. Long-term monitoring and maintenance of the engineered cover will be conducted. The use of sediment amendments along with standard cover materials will be evaluated during the remedial design phase to determine if protectiveness (related to future potential erosion) can be improved in a cost-effective manner. Riparian and wetland habitat along the edge of the ponds altered by the remedial action would be restored with native species to maintain habitat diversity, as practicable. Due to the depth and nature of the ponds, it is expected that restoration of the ponds' benthic community will occur naturally on the subaqueous cover within a short time period.

Other Remedy Components

EPA's remedy establishes cleanup levels which are protective of recreational use activities and the environment and the selected remedy will establish protective caps on the landfills, and covers on pond sediments, as may be necessary. The remedy will also include additional investigations, further cultural resource assessments (pursuant to Section 106 of the National Historic Preservation Act of 1966) as may be required, a flood assessment (for addressing the long term performance of the caps and any subaqueous covers), riparian restoration (including the potential off-site disposal of some landfill material and the use of bio-engineering technologies as part of capping/flood control of the landfills), long-term monitoring, and maintenance of the remedy, including conducting five-year reviews. As stated above,

restoration of the river corridor (including using bio-engineered technologies) that will allow native trees and other vegetation to be established on the flood control features of the landfill slopes and other measures to provide appropriate habitat (including support of aquatic life) and aesthetic qualities commensurate with the Blackstone River Valley National Historical Park and Heritage Corridor will be addressed to the extent practical as a part of the comprehensive remedy through the remedial design process.

Potential community impacts were assessed in the evaluation of the remedy. A temporary increase in truck traffic is anticipated to occur within the immediate area, including along Mendon Road. It is anticipated that construction materials will need to be delivered to OU 2 along Mendon Road and entering from the south of the Site in order to backfill excavated areas, construct the landfill caps and carry out restoration activities. In addition, some demolition materials (from on-site structures) and potential landfill material that is to be disposed of off-site will need to be trucked from OU 2 via local roads. Vehicular noise may also increase during construction. As a component of the design and during the construction planning phase, EPA will work with the community on these issues. Shipments will be handled and transported so that there are no releases from the disposal vehicles in transit. EPA will coordinate with local officials to determine the best routes for minimizing truck traffic concerns and will notify the community before activities begin. There is also the potential to use the active railroad system which may lessen the disturbance to the community and the environment through reduced traffic and emissions by more efficiently managing the high volume of materials to be handled. An access corridor between Mendon Road and the Pratt Dam (which is also a bike path river crossing) will be maintained and controlled in order to provide expedited access for emergency response activities at this high hazard dam.

Construction zones are anticipated to be established in areas north of Stop-n-Shop and adjacent to the bikeway. These zones will be fenced and the access road to OU 2 would be controlled to restrict public access. Construction operations will be carried out in such a manner that erosion will be controlled, water and air pollution minimized, and work zones managed so as to control any potential disturbances to adjacent riparian areas and the floodplain, to the extent practical. In addition, construction vehicles will be covered and washed before leaving the construction zone as necessary to make sure contamination would not spread and to reduce dust.

Air quality monitoring will be provided, as required, during the excavation of waste, contaminated soils and sediments as part of the proposed remedy. Any option that disturbs the wastes during cleanup has the potential to present short-term airborne risks during excavation, consolidation, capping, or other construction activities. Air monitoring will be performed to protect on-site workers and to ensure that the surrounding neighborhood air quality is not impacted. Dust suppression and odor suppression methods will be employed as necessary. In addition, landfill gas contaminant concentrations and volume will be monitored to design appropriately landfill gas management and treatment infrastructure. The design will take into account the appropriate management requirements for landfill gas production at both the J. M. Mills Landfill and Nunes Parcel. The design will also consider both passive and active treatment

technologies, engineering alternatives to minimize individual exposed gas vents, as may be required, or practical, to control landfill gas emissions for the protection of human health and environment while also taking into consideration the aesthetic qualities, the view corridor and land use interests along the Blackstone River and Heritage Corridor.

Long-Term Monitoring and Institutional Controls

Long-term monitoring of groundwater will be performed to ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause groundwater outside of the compliance boundary to exceed drinking water standards. Groundwater monitoring locations will be established (wells identified and/or constructed) to provide an adequate monitoring and compliance network. In addition, and as a part of the long-term monitoring program, two residential wells located on Dixon Street in close proximity of OU 2 will be monitored periodically (if permitted by the homeowners). The groundwater compliance boundary (shown in **Figure 3-6** in **Appendix B**) has been set at the perimeter of the known waste management areas on OU 2. Due to the multiple waste management areas in OU 2 and their close proximity to each other, a single boundary has been established to encompass all of these areas that historically operated as a single waste disposal Facility. This compliance boundary only relates to groundwater and whether it will or will not achieve drinking water standards within and outside this boundary. Within the groundwater compliance boundary federal and State surface water quality standards need to be achieved throughout OU 2. As part of the federal and State hazardous waste monitoring requirements, there will be sufficient groundwater, surface water, and sediment monitoring[84] to confirm that contamination from the capped landfills is not migrating or exceeding federal and State standards within and beyond the compliance boundary. In addition, a groundwater buffer zone (that is also intended to include the Lenox Street Municipal Well) may also be established to identify an area where groundwater extraction needs to be prevented beyond the compliance boundary (see **Figure L-1** in **Appendix B**).

Additionally, long-term monitoring, including trend analyses, of floodplain soils and sediments in the vicinity of the Unnamed Island and the floodplain within OU 2 will be conducted to assess (over time) the potential for recontamination of the remediated areas and whether any potentially observed future contamination is/is not significantly site related. Landfill gas, and leachate, coupled with operation and maintenance tasks (e.g., cap/flood control repairs, mowing) are also included to confirm the continued protectiveness of the remedy.

Institutional controls (ICs, in the form of deed restrictions on land use) and access restrictions would be used to prevent residential development and disturbance to landfill infrastructure, as well as include performance of a vapor intrusion/mitigation evaluation if a

[84] Specific monitoring benchmarks for surface water and sediment will be established as a monitoring component of the remedy during the development of the OU 2 Remedial Design/Remedial Action work plan.

commercial building were considered for construction on the Nunes Parcel. These land use restrictions shall be established on the J. M. Mills and Nunes Parcel landfill caps to ensure the long-term effectiveness of the protective caps. These land use restrictions may include, but are not be limited to, restricting residential use, restricting future excavation into and beneath the caps, restricting access for buried utilities, prohibiting the construction of buildings with pilings or basements and maintaining the caps. It is also recognized that emergency access to the Pratt dam adjacent to the Nunes Parcel is necessary. An access road traversing the Nunes Parcel, as well as, a fording location for small watercraft adjacent to the dam, will be designed and constructed to facilitate emergency egress. There will be no CERCLA restrictions (such as ICs) on recreational use/access to the capped areas and areas of restored riparian habitat along the river so long as landfill gas analysis and monitoring, as well as other considerations, determine that it is does not represent a human health risk nor will the access harm components of the remedy. However, public access to these areas is at the discretion of the property owner(s) within OU 2. There will be at least yearly compliance monitoring to ensure restrictions on land and groundwater use remain in place and are enforced, both within the compliance boundary and within any well-restriction buffer zone that is established.

A monitoring well network will be established during Remedial Design to identify the wells that will be used to monitor the remedy's performance at the compliance boundary. Monitoring wells already in place for OU 2 will be supplemented by additional wells, as necessary. Long-term monitoring will be performed to ensure that groundwater contamination within the compliance boundary does not migrate beyond the compliance boundary or into the River at levels that exceed groundwater and surface water/sediment performance standards. Monitoring will include the appropriate sampling strategy to evaluate degradation processes that may decrease contaminant concentrations in groundwater and biogeochemical processes that may increase contaminant concentrations in groundwater (e.g., arsenic) and be performed on a regular schedule so as to provide trend analyses and tracking of contaminant behavior, especially during times of variable wet/dry seasonal events in order to further assess any contaminant migration risks. Due to the proximity of current local groundwater use, periodic monitoring of two residential wells on Dixon Street will also be included (if permitted by the landowners).

As required by statute, EPA will review the protectiveness of the OU 2 remedy as part of its overall review of the Site at least once every five years since hazardous substances, pollutants or contaminants will remain at the Site (both in OU 1 and OU 2). The trigger for the initial review was the initiation of the OU 1 remedial action. The next Site five-year review will be in 2017.

The selected remedy may change somewhat as a result of the remedial design and construction processes. Changes to the remedy described in this Record of Decision will be documented in a technical memorandum in the Administrative Record for OU 2, an Explanation of Significant Differences (ESD), or a Record of Decision Amendment, as appropriate.

3. Summary of the Estimated Remedial Costs

The total estimated cost of the selected remedy is approximately $40.3 million. Summary tables of the major capital and annual O&M cost elements for each component of the selected remedy are shown in **Tables L-5 through L-14** in **Appendix C**. The discount rate used for calculating total present worth costs was 7%. The time frame estimated in the FS over which O&M expenditures are calculated is 30 years. All of these remedial components, including institutional controls, are anticipated to be in place at least that long. Administrative costs associated with performance of Five-Year Reviews, and maintenance of ICs are not included, but assumed to be within the range of costs presented. Capital costs associated with establishment of ICs are presented in the groundwater alternative (GW-2). These ICs may include, but not be limited to, restricting residential use, restricting future excavation into and beneath the caps, restricting access for buried utilities, prohibiting the construction of buildings with pilings or basements, maintaining the caps/covers, and limiting potential exposure to contaminants in groundwater. Costs for establishment of an additional buffer zone beyond the groundwater compliance boundary are assumed to be within the range of costs presented.

Alternative JM-SO-2 (Additional details presented in **Tables L-5 and L-6** of **Appendix C**)

CAPITAL COSTS	
Site Preparation	$753,300
Floodplain and Riverbank	$2,686,074
RCRA Subtitle C – Equivalent Cap Construction	$11,066,110
Off-site disposal of waste/soil/debris[85]	
Quality Assurance for Cap Construction	$829,799
Stormwater Controls/Drainage Channels	$219,000
Restoration	$371,300
Professional Services	
Design, Permitting, Procurement (8% of Capital Costs)	$1,275,000
Construction Management (7% of Capital Costs)	$1,115,000
SUBTOTAL	$18,315,583
Contingency (15%)	$2,747,338
TOTAL CAPITAL COST	$21,063,000
O&M and PERIODIC COSTS	
Annual Cover Maintenance	$40,000

[85] Potential off-site disposal of ¼ of the estimated waste/debris/soil volume is expected to be within the range for sensitivity of costs (+50 to -30%), as permitted by EPA guidance.

30-year time frame	
PRESENT VALUE COST (O&M and PERIODIC)	$496,000
Total Present Value of JM-SO-2 (CAPITAL plus O&M/PERIODIC)	$21,559,000

Alternative NP-SO-3 (Additional details presented in **Tables L-7 and L-8** of **Appendix C**)

CAPITAL COSTS	
Site Preparation	$623,400
Riverbank and Additional Soils	$318,819
RCRA Subtitle C – Equivalent Cap Construction	$3,209,638
Off-site disposal of waste/soil/debris[86]	
Quality Assurance for Cap Construction	$212,360
Stormwater Controls/Drainage Channels	$29,000
Restoration	$108,500
Professional Services	
Design, Permitting, Procurement (8% of Capital Costs)	$361,000
Construction Management (7% of Capital Costs)	$316,000
SUBTOTAL	$5,178,716
Contingency (15%)	$776,807
TOTAL CAPITAL COST	$5,956,000
O&M and PERIODIC COSTS	
Annual Cover Maintenance	$10,000
30-year time frame	
PRESENT VALUE COST (O&M and PERIODIC)	$124,000
Total Present Value of NP-SO-3 (CAPITAL plus O&M/PERIODIC)	$6,080,000

Alternative UI-SO-3 (Additional details presented in **Table L-9** of **Appendix C**)

CAPITAL COSTS	
Site Preparation	
Mobilization/Demobilization	$91,000
Silt Fence	$15,000

[86] *Id.*

Clearing and Grubbing	$64,279
Bridge Installation	$15,000
Bridge Rental	$85,000
Equipment/Material Staging Areas/Temp. Const. Roads	$40,000
Surveying	$25,000
Soil and Waste Removal	
Sediment Controls	$95,200
Excavation of Impacted Soils	$1,400,000
Excavation of Waste	$1,200,000
Temp. Water Treatment Setup and Operation	$75,000
Transport, Place, and Grade Excavated Soils	$933,333
Transport, Place, and Grade Excavated Waste	$600,000
Off-site disposal of waste/soil/debris[87]	
Professional Services	
Design, Permitting, Procurement (8% of Capital Costs)	$372,000
Construction Management (7% of Capital Costs)	$325,000
SUBTOTAL	$5,335,812
Contingency (15%)	$800,372
TOTAL CAPITAL COST	$6,136,000
O&M and PERIODIC COSTS (none)	
Total Present Value of UI-SO-3 (CAPITAL plus O&M/PERIODIC)	$6,136,000

Alternative SE-3 (Additional details presented in **Tables L-10 and L-11** of **Appendix C**)

CAPITAL COSTS	
Site Preparation	
Equipment Mobilization/Demobilization	$76,000
Temporary Dock Structure	$50,000
Bridge Rental	$42,500
Equipment/Material Staging Areas/Temp. Const. Roads	$160,000
Pond Dredging and Subaqueous Cover	
Sediment Dredging	$2,510,648

[87] *Id*

Sediment Management	$86,574
Temp. Water Treatment Setup and Operation	$150,000
Transport, Place, and Grade Dredged Sediments	$216,435
Geotextile Installation	$175,312
Supply and Place Sand Cover	$389,583
Restoration of Construction Areas[88]	
Identification Signage (e.g., no anchorage)	$600
Professional Services	
Design, Permitting, Procurement (8% of Capital Costs) (Includes pre-design extent sampling)	$309,000
Construction Management (7% of Capital Costs)	$271,000
SUBTOTAL	$4,437,653
Contingency (15%)	$665,648
TOTAL CAPITAL COST	$5,103,000
O&M and PERIODIC COSTS (assuming the remedy does not end up removing all of the contaminated sediments)	
Annual Cover Maintenance[89] 30-year time frame	$50,000
Year 5 Cover Evaluation Study	$105,000
PRESENT VALUE COST (O&M and PERIODIC)	$701,000
Total Present Value of SE-3 (CAPITAL plus O&M/PERIODIC)	$5,804,000

Alternative GW-2 (Additional details presented in **Tables L-12 to L-14** of **Appendix C**)

CAPITAL COSTS	
Monitoring Well Installation	$143,000
Institutional Controls	$23,000
TOTAL CAPITAL COST	$166,000
O&M and PERIODIC COSTS	
Annual Monitoring (including well replacement, as necessary) & Reporting	$41,000

[88] Restoration costs for Unnamed Island pond shorelines are included in the UI-SO-3 alternative.
[89] Long-term monitoring (e.g., surface water and sediment) associated with any cover has not been included, but is expected to be within the range of costs presented.

30-year time frame[90]	
Well decommissioning, as necessary	$15,000
PRESENT VALUE COST (O&M and PERIODIC)	$505,000
Total Present Value of GW-2 (CAPITAL plus O&M/PERIODIC)	$671,000

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost, as permitted by EPA guidance.

4. Expected Outcomes of the Selected Remedy

An expected outcome of the selected remedy is that OU 2 will no longer present an unacceptable human health or ecological risk due to exposures to waste, contaminated soil, sediment, surface water (in the Unnamed Island ponds), and groundwater upon completion of construction and establishment of institutional controls. Another expected outcome of the selected remedy is that groundwater within the compliance boundary (including any established buffer zone) will not be used for any purpose, and will be monitored to confirm that it is not migrating beyond the compliance boundary or into the River in excess of established performance standards. Riparian characteristics altered by the remedial action will be restored, to the extent practicable. It is anticipated that the selected remedy will also allow for passive recreational use upon construction completion, although this is contingent on access being permitted by the OU 2 property owner[s].

a. Cleanup Levels and Performance Standards

Cleanup Levels and Performance Standards (PSs) have been developed for OU 2 to prevent exposure to soils, sediment, and groundwater with site-related contaminant concentrations that may present human health and/or ecological risks. PSs have been established for groundwater, and additional monitoring of River surface water/sediment will be performed to ensure no OU 2 source contamination is migrating beyond the groundwater compliance boundary or into the River at levels above PSs. Cleanup Levels and PSs were developed based on an evaluation of risk-based RGs, background concentrations, practical quantitation limits

[90] While long-term monitoring costs include both groundwater and surface water, potential costs associated with sediment monitoring (related to groundwater discharge) in the River have not been included, but are expected to be within the range of costs presented.

(PQLs), and other site-specific considerations (e.g., ARARs). If there are established ARARs for chemical-specific concentrations (e.g., RI Remediation Regulations), these are often selected as cleanup levels. In the absence of established ARARs, risk-based goals are often developed using EPA guidance in Development of Risk-Based Preliminary Remediation Goals (EPA, 1991),[91] following the consideration of background/reference concentrations and PQLs.

i. Groundwater Performance Standards

PSs have been established for groundwater for all chemicals of concern identified in the HHRA (and refinements performed in the FS) found to pose an unacceptable risk to public health. All contaminated groundwater within OU 2 is located within the compliance boundary for OU 2's waste management area. Therefore, no cleanup of the groundwater within the compliance boundary is required and only PSs to establish monitoring standards have been developed. The PSs are based on a residential scenario with potential future cumulative cancer risks greater than 10^{-4} or target organ HIs greater than 1 considering the ingestion, dermal contact, and inhalation exposure pathways. Risk-based PS development was established for each chemical with an individual cancer risk above 10^{-6} or with an HQ above 1 (see **Table 1** in **Appendix E.1** of this ROD).

The human health risk-based PSs developed in **Appendix E.1** of this ROD correspond to a target cancer risk level of 10^{-6} and a target non-cancer HQ of 1. For each of the contaminants, risk-based PSs were calculated using equations and exposure assumptions presented in Table 2 in **Appendix E.1** of this ROD, which were the same as those used in the Baseline HHRA (and original PS calculations presented in the FS) except as highlighted in **Table 2** in **Appendix E.1** of this ROD.[92] Exposure parameters which changed included the following: ingestion rate for both an adult [2.5 liters/day] and child [0.78 liters/day]; adult exposure duration [20 years]; adult body weight [80 kg]; bathing/showering exposure time for both the adult [0.54 hr/event] and child [0.71 hr/event]; and the skin surface area for both the adult [20,900 cm^2] and child [6,378 cm^2]. Toxicity values used in the calculation of the risk-based PSs are presented in **Tables G-6 and G-7** in **Appendix C** of this ROD. As discussed in **Section G** of this ROD, as part of the June 2015 periodic updates to EPA's Regional Screening Levels (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm), changes were made regarding the definition of volatile compounds. This change results in the

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[91] USEPA. 1991. *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part B, Development of Risk-based Preliminary Remediation Goals.* EPA/540/R-92/003. Office of Emergency and Remedial Response. Washington, D.C. December 1991.

[92] The HHRA was completed in 2009/2010. In February 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates (USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. February 6, 2014. [located online at http://www.epa.gov/oswer/riskassessment/superfund_hh_exposure.htm; items # 22 and #23 (as updated in February 2015) of this web link]). Applying these updated standard default exposure factors to the risk assessment would possibly result in a slight decrease of the risk estimates; however, it would not change the conclusions regarding unacceptable risks at OU 2.

addition/inclusion of inhalation calculations related to 1,4-dioxane, benzo(a)anthracene, PCBs, and aldrin during development of performance standards. **Tables 3-6** in **Appendix E.1** of this ROD present intermediate PS calculations, accounting for adult, child, and chemical mutagenic mode of action. The human health risk-based PSs selection process for each contaminant is summarized in **Table 7** in **Appendix E.1** of this ROD. The PSs are selected by considering the ARARs, risk-based standards, quantitation limits, and background data.

Table L-1 in **Appendix C** of this ROD presents the human health groundwater PSs, which include 1,4-dichlorobenzene, benzene, chloroform, ethylbenzene, methyl tert-butyl ether, TCE, vinyl chloride, 1,4-dioxane, 4-chloroaniline, atrazine, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, indeno(1,2,3-cd)pyrene, naphthalene, PCBs, aldrin, dieldrin, aluminum, arsenic, cadmium, cobalt, iron, lead, manganese, and thallium. Many of these PSs represent EPA MCLs, but some are based on a cancer risk level of 1×10^{-6} or an HQ of 1. In situations where a review of PQLs showed that the cancer risk level of 1×10^{-6} would be difficult to achieve, the PQL was used as the basis for the PS. This applied to benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, aldrin, and dieldrin.

Additional monitoring of the Blackstone River surface water/sediment will be performed to ensure no OU 2 source contamination is migrating into the Blackstone River at levels above PSs. While no current human health or ecological risk has been identified from exposure to Blackstone River surface water or sediments the groundwater PSs (i.e., the contaminants monitored in groundwater), in addition to federal/state water quality standards, will be used as the basis for long-term monitoring (of Blackstone River surface water/sediment) to ensure the protectiveness of the OU 2 remedy.

ii. Soil Cleanup Levels

Human Health

Soil cleanup levels were developed for the following scenarios:

- OU 2 Soil – Unrestricted Recreational User Scenario
- Nunes Parcel/Soil Removal Area – Commercial Worker Scenario
- Nunes Parcel/Soil Removal Area – Construction Worker Scenario

While the baseline HHRA included calculations for potential future development of the Nunes Parcel as residential property, the EPA determined that the presumptive containment approach would be implemented in this area of OU 2 in addition to the J. M. Mills Landfill property. Based on the property layout, unrestricted recreational use is the most likely future exposure scenario. The baseline HHRA did not show an unrestricted recreational user risk to soil at OU 2, but the RIDEM Remediation Regulations establish Direct Exposure Criteria (DEC)

which apply to OU 2. While there are no separate DECs for an unrestricted recreational user, RIDEM applies the residential DEC when evaluating unrestricted recreational user exposures. OU 2 soil cleanup levels developed under the unrestricted recreational user scenario include those analytes whose detections exceeded RIDEM's residential DEC and/or leachability criteria. These contaminants include benzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, pyrene, chlordane, dieldrin, PCBs, antimony, arsenic, beryllium, lead, manganese, and thallium.

Risk-based PRGs were initially developed for soil in Appendix C.6 of the FS. However, as discussed in **Section G** of this ROD and in the groundwater performance standard section, a 2014 EPA directive (updated in February 2015) provided revised exposure parameters which have been utilized in soil cleanup level development.[93] Cleanup levels were developed for soil contaminants associated with potential future cumulative cancer risks greater than 10^{-4} or target organ HIs greater than 1 considering the ingestion, dermal contact, and inhalation exposure pathways in a commercial worker exposure scenario. For those soils, risk-based cleanup level development was required for each chemical with an individual cancer risk above 10^{-6} or with an HQ above 1 (see **Table 1** in **Appendix E.2** of this ROD). These contaminants include benzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, dibenz(a,h)anthracene, naphthalene, dieldrin, arsenic, lead, and dioxins.

The human health risk-based cleanup levels provided in **Appendix E.2** of this ROD correspond to a target cancer risk level of 10^{-6} and a target non-cancer HQ of 1. For each of the contaminants, risk-based cleanup levels were calculated using equations and exposure assumptions presented in **Table 2** in **Appendix E.2** of this ROD, which were the same as those used in the HHRA (and the initial PRG calculations in Appendix C.6 of the FS), except those that changed via EPA directive since that time (i.e., adult worker skin surface area [3,527 cm^2], body weight [80 kg], and soil adherence factor [0.12 mg/cm^2]).[94] In addition, cleanup levels were calculated including particulate inhalation, even though this exposure was not included in the HHRA (assumed at the time to be a negligible contribution to risk compared to other exposure pathways).

Toxicity values used in the calculation of the risk-based cleanup levels are presented in **Tables G-6 and G-7** in **Appendix C** of this ROD, while the dermal worksheet used to develop cleanup levels for the dermal pathway is presented as **Table 3** in **Appendix E.2** of this ROD. As discussed in **Section G** of this ROD, as part of the June 2015 periodic updates to EPA's Regional Screening Levels (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm),

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[93] USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. February 6, 2014. (located online at http://www.epa.gov/oswer/riskassessment/superfund_hh_exposure.htm; items # 22 and #23 [as updated in February 2015] of this web link)

[94] *Id.*

changes were made regarding the definition of volatile compounds. This change results in the addition/inclusion of inhalation calculations related to benzo(a)anthracene and dioxins (in addition to benzene and naphthalene) during development of cleanup levels.

Tables 4 through 7 in **Appendix E.2** of this ROD present intermediate cleanup level calculations, accounting for adult, child, and chemical mutagenic mode of action. The human health risk-based cleanup level selection process for each contaminant is summarized in **Table 8** in **Appendix E.2** of this ROD. The cleanup levels are selected by considering the ARARs, risk-based standards, quantitation limits, and background data. As discussed in **Section G** of this ROD, current methods for evaluating vapor intrusion exposures due to volatile contaminants in soil do not include modeling from soil to indoor air. Therefore, commercial worker cleanup levels for benzene and naphthalene have been developed based on direct contact, along with the establishment of institutional controls which require further evaluation of indoor air impacts/mitigation if a building is to be erected onsite.

The human health risk-based soil cleanup levels for each contaminant are summarized in **Table L-2** in **Appendix C** of this ROD. The cleanup levels are selected by considering the ARARs, risk-based calculations, quantitation limits, and reference/background data.

Appendix C.6 of the FS also presents lead PRGs for a construction worker (910 milligrams per kilogram [mg/kg]) and a commercial worker (2,240 mg/kg), which were developed using the EPA's Adult Lead Model (ALM). The same exposure factors were used in the ALM to develop the lead PRG, with the exception of the construction worker soil ingestion rate of 100 mg/day, which was used in the human health risk refinement, as discussed in Section 3.1.3 of the FS, (resulting in only the Nunes Parcel/Soil Removal Area showing an exceedance). It should be noted that these PRGs were developed using a target blood lead level of 10 µg/dL, consistent with current EPA recommendations (USEPA, 2003).[95] However, ongoing discussions in the EPA Technical Review Workgroup for Lead may result in reducing the target blood lead level to 5 µg/dL. This revised standard would then need to be adopted into the remedy through a future CERCLA decision document in order to modify the lead cleanup levels to remain protective.

Cleanup levels for soil generally correspond to RIDEM DEC, selected as ARARs for OU 2, except for commercial worker cleanup levels for benzo(a)pyrene, dioxin, and arsenic, which have been shown to have higher site-specific reference concentration (see **Table 8** in **Appendix E.2** of this ROD for reference concentrations). Per CERCLA and the NCP, EPA does not require cleanup to below background levels. Therefore, cleanup levels for benzo(a)pyrene, dioxin, and arsenic are set at reference/background levels. Cleanup levels for the remaining

[95] USEPA, 2003. Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. Technical Review Workgroup for Lead, Washington DC. EPA-540-R-03-001.

contaminants for the commercial worker include benzene, benzo(a)anthracene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, dieldrin, beryllium, and lead which are based on a cancer risk level of 1 x 10^{-6}, RIDEM DEC, or leachability criteria (as identified in RIDEM's Remediation Regulations).

Ecological Receptors

For soils, the ecological risk-based cleanup levels were developed for the J. M. Mills Landfill (cadmium) and the Unnamed Island (lead and BEHP). The cleanup levels are based on risks to small omnivorous birds. However, for cadmium and lead, the risk-based values were below values selected from the existing dataset to represent reference background. Therefore, reference background values were identified by the EPA as the cleanup level. In a memorandum from EPA dated November 18, 2013 (see Appendix D.6 of the FS), the cadmium PRG was refined further based on additional review of toxicity values and site-specific data. Ecological cleanup levels for soil are presented in **Table L-3** in **Appendix C** of this ROD.

iii. Sediment Cleanup Levels

For sediment, the ecological risk-based cleanup levels were selected by the EPA based on the reference sample with the highest/best survival in sediment toxicity tests (Sample TO5BL-004). Ecological cleanup levels for sediment are presented in **Table L-4** in **Appendix C** of this ROD.

It is important to note that most of the ecological risk-based soil cleanup levels and all of the ecological risk-based sediment cleanup levels are based on limited reference datasets. In response to the limited reference data, additional soil and sediment sampling was conducted in November 2012. The sampling included the collection and analysis of soil and sediment samples from areas upstream of OU 2. Collectively, the reference/background data indicate that metals and total PAHs are elevated throughout the Blackstone River, including areas upstream of OU 2. Appendix D.5 of the FS includes an EPA memorandum dated June 21, 2013 which discusses the available reference/background data (USEPA, 2013).[96]

M. STATUTORY DETERMINATIONS

The remedial action selected for implementation at OU 2 is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, will comply with ARARs and is cost effective. In addition, the selected remedy utilizes permanent solutions to the maximum extent practicable.

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[96] USEPA, 2013. Review of technical memorandum titled: *Background Screening Levels for Sediment and Soil Supplemental Data Collection Efforts.* Memorandum from Bart Hoskins to Dave Newton. June 21, 2013.

1. The Selected Remedy is Protective of Human Health and the Environment

The remedy at OU 2 will adequately protect human health and the environment by eliminating, reducing, or controlling exposures to human and environmental receptors through soil and sediment excavation and capping or off-site disposal, and institutional controls. More specifically, the remedy includes source control response actions for wastes, soils, and sediment and also includes long-term groundwater monitoring.

Waste:

The selected remedy will eliminate direct contact exposures related to waste through installation of caps on the J. M. Mills Landfill and Nunes Parcel. Wastes on the Unnamed Island will be excavated and placed under these on-site caps. Some waste may also be disposed/recycled off-site at facilities licensed to accept the waste.

Soil:

The selected remedy includes excavation of soil in the floodplain of the J. M. Mills Landfill, on Unnamed Island, and on the Nunes Parcel/Soil Removal Area. These soils will be placed under the on-site caps, thereby preventing exposure to human and ecological receptors. Some soils may also be disposed of off-site at facilities licensed to accept the level of contamination present in the soil.[97]

Sediments:

The selected remedy includes excavation of sediments in Ponds N and I, which are near the J. M. Mills Landfill, and Nunes Parcel proposed caps, respectively. In addition, the top 1 foot of sediment in the ponds (Ponds A, D, and E) on Unnamed Island will be excavated. All excavated sediments will be placed under the on-site caps, thereby preventing exposure to ecological receptors. At the time of design, additional sediment profiling will be performed to determine more precisely the contamination present, ascertain stability and practicality of appropriate subaqueous cover designs and excavation depths needed to reach attainment of the RGs in the ponds. If the difference in dredged volume (between removal of 1 foot of sediment versus removing all sediment exceeding RGs) is relatively small, additional dredging will be performed to reduce or potentially eliminate the need for a subaqueous cover and future maintenance. Conversely, any sediment exceeding cleanup levels remaining in the ponds on Unnamed Island will be covered in place to prevent exposure to ecological receptors and to permit the restoration of surface water within the ponds.

[97] In accordance with Section 121(d)(3) of CERCLA and 40 C.F.R. Section 300.440, otherwise known as EPA's Off-site Rule) .

Groundwater:

Groundwater use restrictions will prevent exposure to and use of contaminated groundwater, prevent contaminated groundwater being drawn out from the compliance zone by preventing well installation in the buffer zone, and will be protective of human health. Compliance monitoring will ensure restrictions remain in effect and are enforced. Long-term monitoring of groundwater will confirm that contaminated groundwater is not migrating beyond the compliance boundary for OU 2 or into the Blackstone River at levels which exceed PSs.

2. The Selected Remedy Complies With ARARs

The selected remedy will comply with all federal and any more stringent state ARARs that pertain to OU 2. The selected remedy will also incorporate procedures and processes identified by a number of TBC policies, advisories, criteria, and guidance documents. These ARARS and TBCs are identified in **Tables I-2, I-4, I-8, I-11, and I-14** in **Appendix D**. The tables also include a description on how the selected remedy will attain each requirement.

Issuance of this ROD embodies specific ARARs determinations made by the Regional Administrator pursuant to CERCLA. Consistent with TSCA regulatory requirements at 40 C.F.R. § 761.61(c), and in view of site-specific land use conditions and human health and ecological exposure assumptions developed for the OU 2 risk assessments, a finding is made that the removal of contaminated soil/sediment with greater than 10 ppm PCBs will address potential human health risks posed by passive recreational activity within these areas. The cleanup number is based on EPA human health and ecological risk assessments that have determined that soil/sediment with PCB levels at less than or equal to 10 ppm do not pose an unreasonable risk to health (for passive recreational use) or to the environment. The 10 ppm PCB standard also will meet the Rhode Island Department of Environmental Management (RIDEM) direct exposure criteria for PCBs. The J. M. Mills Landfill and Nunes Parcel will be subject to institutional controls that will restrict residential use, as well as include performance of a vapor intrusion/mitigation evaluation if a building were considered for construction on the Nunes Parcel. The Unnamed Island has been determined, due to its location in the Blackstone River, to be unsuitable for residential development and thus a residential use restriction will not be required. Based on these facts, EPA finds that the in-place disposal of soil/sediment with a PCB concentration of less than or equal to 10 ppm on the Unnamed Island, in the riparian buffer of the Blackstone River, and along the perimeter of the J. M. Mills Landfill and Nunes Parcel contained within the boundary of OU 2 will not pose an unreasonable risk of injury to health or the environment provided all soil/sediment requiring removal will be identified based on in situ (pre-excavation) PCB levels and not subject to dilution.

The Regional Administrator has determined that the off-site disposal and/or on-site disposal of PCB-contaminated soil/sediment and debris under either one or both of the landfill caps to be constructed on OU 2, as set out in the Administrative Record for OU 2, will not pose

an unreasonable risk of injury to health or the environment as long as the following conditions are met:

1. Any PCB-contaminated debris or soil/sediment currently existing within the J. M. Mills and Nunes Parcel landfills shall be covered with landfill cap(s) that meet the TSCA regulatory requirements of 40 C.F.R. Section 761.61(a)(7) and RCRA Subtitle C regulations (40 C.F.R. Section 264.310) or the debris or soil/sediment shall be addressed by Condition #4.[98]

2. Any PCB-contaminated debris or soil/sediment excavated on the Unnamed Island shall be consolidated under one of the on-site landfill caps that will be constructed to meet requirements under TSCA regulatory requirements at 40 C.F.R. Section 761.61(a)(7), and RCRA Subtitle C regulations (40 C.F.R. Section 264.310), or the debris or soil/sediment shall be addressed by Condition #4.[99]

3. All OU 2 soil/sediment exceeding the proposed cleanup standard of 10 ppm PCBs shall be excavated from the floodplain and shall be consolidated under one of the on-site landfill caps that will be constructed to meet requirements under TSCA regulatory requirements at 40 C.F.R. Section 761.61(a)(7), and RCRA Subtitle C regulations (40 C.F.R. Section 264.310).[100]

4. Any soil, sediment, or debris designated for off-site disposal shall be tested for PCBs in-situ, and depending on any PCB contamination identified, shall be managed and dewatered (if necessary) as required under 40 C.F.R. Section 761.61 and disposed of in an off-site disposal facility licensed to accept the level of PCB contaminated material identified, unless it is metal debris that can be decontaminated to meet TSCA decontamination standards at 40 C.F.R. Section 761.79, so as to be suitable for recycling off-site.

5. Water generated from excavations or dewatering of PCB-contaminated soils/debris will be tested for PCBs and, depending on any PCB contamination identified, managed, treated (if required) and disposed of in compliance with TSCA requirements at 40 C.F.R. Section 761.79(b).

6. Water quality monitoring shall be performed during soil/sediment excavation in adjacent water bodies, passive dewatering and on-site management of excavated soil/sediment/debris to ensure that water quality levels comply with the performance criteria specified in the ROD.

7. Air monitoring and appropriate dust suppression measures shall be implemented and maintained to ensure that airborne PCB levels are below levels of concern specified in the

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[98] *Id.*
[99] *Id.*
[100] *Id.*

ROD during any excavation, passive dewatering, and management of excavated soil/sediment and debris conducted prior to completion of cap construction.

8. Land use restrictions (institutional controls) shall be established on the newly capped J.M. Mills and Nunes Parcel landfills to ensure the long-term effectiveness of the caps. These land use restrictions may include, but not be limited to, restricting residential use, restricting future excavation into and beneath the caps, restricting access for buried utilities, prohibiting the construction of buildings with pilings or basements and maintaining the caps.

9. A long-term monitoring and maintenance plan shall be developed and implemented for final caps and for groundwater to ensure effectiveness of the caps in eliminating direct contact and ensuring no migration of PCBs from the capped areas.

EPA solicited public comment on its TSCA finding through the Proposed Plan and comments received concerning the TSCA finding are addressed in the Responsiveness Summary **(Part 3)**.

Further, as defined by Section 404(b) of the Clean Water Act and regulations promulgated under the Act at 40 C.F.R. Parts 230, 231 and 33 C.F.R. Parts 320-323 the Regional Administrator finds that the selected remedial action is the least environmentally damaging practicable alternative (LEDPA) for protecting federal jurisdictional wetlands and aquatic ecosystems at OU 2 under these standards. In compliance with standards within relevant and appropriate Wetland Protection and Floodplain Management regulations (44 C.F.R. Part 9), EPA solicited public comment on its LEDPA finding within the Proposed Plan. EPA's responses to comments concerning its LEDPA finding, as well as general comments regarding wetland issues are located in the Responsiveness Summary **(Part 3).**

Further, the Regional Administrator solicited public comment, under 44 C.F.R. Part 9, on its determination that there is no practicable alternative to occupancy and/or modification of portions of the floodplain in the immediate vicinity of the J. M. Mills Landfill, the Nunes Parcel, and the Unnamed Island. To address remedial measures that may affect floodplain resources, EPA will conduct necessary mitigation measures to protect downstream receptors in the floodplain and to address concerns about maintaining the aesthetics of the riparian corridor. However, some level of floodplain armament at the base and a portion of the side slope of the constructed caps will be necessary to protect the selected remedy (caps) from periodic inundation due to flooding, as both landfills are situated within the 500-year floodplain of the Blackstone River. Best management practices (BMPs) will be used to minimize adverse impacts on the floodplain resources while preventing the release of permanently landfilled contaminants into the Blackstone River and riparian zone. BMPs will include: 1) mitigating alteration of riparian floodplain habitat through erosion control measures and proper re-grading and re-vegetation of the impacted areas with indigenous (native) species and; 2) any lost flood storage capacity from the proposed project will be compensated for so that downstream receptors are protected. As part of the remedial design process, it may be determined that some contaminated soil and/or

landfill material can be recycled and/or may need to be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) in order to create a protective riparian corridor along the base of the landfills. The action to place a subaqueous sediment cover in the Unnamed Island ponds will be designed to prevent any release of contamination in the event of flooding, up to a 500-year event.

3. The Selected Remedy is Cost-Effective

The selected remedy is cost-effective because the remedy's costs are proportional to its overall effectiveness (40 C.F.R. Section 300.430(f)(1)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (*i.e.*, that are protective of human health and the environment and comply with all federal and any more stringent ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated by assessing three of the five balancing criteria -- long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness, in combination. The overall effectiveness of each alternative then was compared to the alternative's costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent.

From this evaluation, EPA has determined that Alternatives JM-SO-2, NP-SO-3, UI-SO-3, SE-3, and GW-2 are cost effective, as they meet both threshold criteria and are reasonable given the relationship between the overall effectiveness afforded by other alternatives and costs compared to other available options. Refer to **Tables 8-1 to 8-5** in **Appendix C** for a comparison of costs and effectiveness for each of the alternatives.

The estimated present worth cost of the various source areas and media that comprise the selected soil remedy is $40.3 million.

4. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

Once the Agency identified those alternatives that attain or, as appropriate, waive ARARs, and that are protective of human health and the environment, EPA identified which alternatives utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility or volume through treatment; 3) short-term effectiveness; 4) implementability; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community

and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

OU 2 consists of low-level threat wastes that can be reliably managed in the long-term using permanent solutions consisting of managing wastes by containment under RCRA Subtitle C Caps for the J. M. Mills and Nunes landfills, consolidation of contaminated soils and sediments under either of the protective caps, the potential disposal of some contaminated media off-site at a licensed landfill, and the use of long-term monitoring and institutional controls to prevent potential exposures. **Tables 8-1 to 8-5** in **Appendix C** demonstrate how the respective selected remedies provide the best balance of trade-offs when compared against the evaluation criteria. Removal of the source of groundwater contamination (J. M. Mills Landfill and Nunes Parcel waste) is not practicable and action is not required since there was no current threat to groundwater outside of the waste management area compliance boundary. Capping of the Unnamed Island waste is not practicable based on the flooding which inundates the island.

5. The Selected Remedy Significantly Reduces the Mobility and Volume of the Hazardous Substances through Treatment as a Principal Element

The selected remedy does not satisfy the preference for treatment which permanently reduces the toxicity, mobility and volume of hazardous substances as a principal element (some limited treatment of contaminated media, principally water generated from dewatering activities, is a component of the remedy, but only addresses a small amount of the contamination within OU 2).

6. Five-Year Reviews of the Selected Remedy Are Required

Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a Site-wide review will be conducted at least every five years (initiated with the start of the OU 1 remedial action) to ensure that the remedy continues to provide adequate protection of human health and the environment. The five-year reviews will not have to address the remediation of the Unnamed Island since all contamination exceeding risk and ARARs-based standards will be removed by the remedial action. The next five-year review will be in 2017.

N. DOCUMENTATION OF SIGNIFICANT CHANGES

In compliance with statutory requirements for ensuring the public has the opportunity to comment on major remedy selection decisions, a proposed plan was prepared presenting Alternatives to EPA's preferred alternatives. On August 7, 2014, EPA held an informational meeting to discuss the cleanup alternatives presented in the FS and to present the Agency's Proposed Plan for OU 2 to the community. A public hearing was held on August 21, 2014 at which time a request for a second hearing later during public comment period was received. EPA granted this request and a second public hearing was held on October 8, 2014.

EPA reviewed all written and verbal comments submitted during an extended public comment period (from August 8, 2014 to January 23, 2015). The public, PRPs, and local representatives expressed strong concerns about certain aspects of EPA's preferred alternative. In particular, EPA's proposal was deemed by some to be too prescriptive or inflexible with regards to the design and final appearance of the protective caps. Unfortunately, significant public comments were generated in response to inaccurate representations of the remedial alternatives created by the PRPs, without EPA input. The concerns centered on the perceived height of the completed landfills, and/or conceptual appearance of the flood control measures required for each alternative. As is addressed in the Response to Comments (Part 3 of the ROD), although these figures were not created by EPA and do not accurately represent the potential design options for the OU 2 landfills, EPA has responded to the public's expressed concerns. Since the Proposed Plan, EPA has evaluated a number of design measures for capping the landfills that take into account public desires to maintain the aesthetic and habitat characteristics of the riparian corridor.[101] EPA intends to hold additional public outreach sessions throughout the Remedial Design and Remedial Action phases to ensure public interests on aesthetics are addressed. Included amongst these interests was the desire that the appearance of the capped landfills be compatible with the development of the National Historical Park within the Blackstone Valley.

The landfill closure technology outlined in the Proposed Plan is the baseline, conceptual protective cap that was used for cost comparison purposes with other capping alternatives, consistent with EPA guidance and standards. EPA has enhanced the selected remedy described in the Proposed Plan, as further described in this ROD to address public comments received concerning the protection of aesthetic and habitat considerations within the riparian corridor. EPA has added as a component to the selected remedy the option of disposing of some amount of landfill material which may be recycled and/or may be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) in order to provide additional design options for capping the landfills within the floodplain. The off-site disposal of some landfill material, if incorporated into the design, may provide more options for addressing flood control, habitat protection and aesthetic concerns. EPA intends to allow for design flexibility which is consistent with the RCRA Subtitle C performance standards described in the relevant and appropriate regulations at 40 C.F.R. § 264.310. The remedy costs and the alternative cost tables in **Appendix C** reflect this change. Moreover, EPA has modified the draft TSCA finding initially presented in the Proposed Plan to include the options for either the on-site or off-site disposal of PCB-contaminated material that is consistent with the statute's protectiveness standards.

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[101] AECOM, 2015. Technical Memorandum: Innovative Technologies for use in Cap Design and Construction at the Peterson/Puritan, Inc. Superfund Site, Operable Unit 2. June, 2015. This document is included in the OU 2 Administrative Record.

Based on changes made by EPA to default exposure parameters since release of the FS and Proposed Plan (see Sections G and L of this ROD for further discussion), performance standards/cleanup levels were revised in this ROD. Changes to groundwater performance standards were primarily made based on review of proposed risk-based cleanup levels versus PQLs. Following the revised calculations and review of PQLs, groundwater performance standards for 1,4-dioxane, benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, aldrin, and dieldrin were changed from that presented in the Proposed Plan. With respect to soil, cleanup levels associated with two analytes (benzene and naphthalene) were changed from that presented in the Proposed Plan based primarily on the changed approach to vapor intrusion as it relates to volatile compounds in soil (see Sections G and L of this ROD for further discussion).

The NCP allows EPA to re-evaluate its remedy preference in response to new information and in consideration of comments received during the public comment period. After consideration of all the public comments received on the Proposed Plan, and in light of any new information, EPA is of the opinion that the changes described above do not require issuance of a revised Proposed Plan or solicitation of further comment.

O. STATE ROLE

RIDEM reviewed the various alternatives and has indicated its support for the selected remedy. The State also reviewed the RI, Risk Assessment, and FS reports to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental and facility siting laws and regulations. The State of Rhode Island, as the support agency, concurs with the selected remedy for OU 2. A copy of the declaration of concurrence is attached as **Appendix A**.

United States
Environmental Protection Agency
Region I - New England

SUPERFUND

Part 3 - Record of Decision
The Responsiveness Summary
Peterson/Puritan, Inc. Operable Unit 2
Cumberland and Lincoln, RI

Final

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INTRODUCTION

The U.S. Environmental Protection Agency (EPA) held, at the request of several interested parties, an extended 170-day public comment period from August 8, 2014 to January 23, 2015 to provide an opportunity for interested parties to comment on the Proposed Plan, the Remedial Investigation/Feasibility Study (RI/FS) and other documentation included in the Administrative Record developed to address Operable Unit 2 (OU 2) of the Peterson/Puritan, Inc. Superfund Site (the Site) in Cumberland and Lincoln, Rhode Island. The Proposed Plan and the Feasibility Study (FS) were released for public review on August 7, 2014. These documents address contaminated floodplain soils, sediment, and groundwater within OU 2 and also follows a presumptive containment approach to address the large volumes of wastes, including hazardous waste, disposed of in landfills and associated debris fields within the boundary of OU 2. More specifically, these waste disposal areas include the J. M. Mills Landfill, the Nunes Parcel, and an island between the two areas called the "Unnamed Island" (all of which operated for a time as a single landfill and disposal Facility) where contamination from the landfill operations came to be located within the floodplain of the Blackstone River. These disposal areas are identified as contributing to soil and groundwater contamination and leading to the continued release and further migration of hazardous substances to floodplain soils and pond sediments within the OU 2 boundary. Further detailed descriptions of these disposal areas are found in the RI/FS and further summarized in this Record of Decision (ROD).

The Agency received written comments on its preferred remedy during the public comment period, and during two formal public hearings in the town of Cumberland on August 21, and October 8, 2014, respectively. Both written and oral comments are documented in the OU 2 Administrative Record. EPA's responses to these comments are presented herein. The purpose of this Responsiveness Summary is to document EPA's responses to the questions and comments raised during the public comment period on the RI/FS, Proposed Plan, and other documents contained in the Administrative Record. EPA reviewed and considered all comments prior to selecting the final remedy for OU 2. The remedy, and the basis for its selection, is further documented in the ROD.

The Administrative Record is a collection of all the documents considered by EPA in selecting the final remedy for OU 2. The Administrative Record is made available to the public at the EPA Records Center, at 5 Post Office Square in Boston Massachusetts and at both the Cumberland and Lincoln Public Libraries (located at 1464 Diamond Hill Road, Cumberland and 145 Old River Road, Lincoln Rhode Island, respectively). An index to the Administrative Record for OU 2 is provided as Appendix E to the ROD.

SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

Twenty (20) written submittals were received by EPA during the extended public comment period and as many as twenty-four (24) individuals presented oral comments at one or both of the two public hearings held by EPA in the town of Cumberland. Comments were received either orally or in writing from private citizens, non-government organizations, including the Audubon Society of Rhode Island, Blackstone River Valley National Heritage Corridor Commission (the Corridor Commission), Blackstone River Valley Tourism Council (BVTC), Save The Bay (STB),

Blackstone River Watershed Council/Friends of the Blackstone (BRWC/FOB; also the recipient of the Technical Assistance Grant (TAG) from EPA for the Site), and from local, State and Federal government agencies (towns of Cumberland, Lincoln and representation from the Village of Lonsdale, The Greater Providence Chamber of Commerce, and Rhode Island Department of Health). The U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA), as federal Natural Resource Trustees, also provided written comments. Written and oral comments were also received from consultants working for the Potentially Responsible Parties (PRPs); including Waste Management and Teknor Apex, Inc.

This Responsiveness Summary is presented in three sections: A) Community Comments, B) Natural Resource Trustees Comments; and C) Potentially Responsible Parties and their Representatives' Comments.

Section A (Community Comments) includes those comments received from various federal, state and local governments and organizations which have a specific interest, as a stakeholder, to the cleanup of OU 2 and to the Blackstone River. Of the comments received, most generally fit into one or more of the themes identified below:

- the type of engineered cap needed for J. M. Mills and Nunes Parcel landfills;
- the Site cleanup approach and conceptual appearance as it relates to the development of the National Historical Park within the Blackstone Valley;
- floodplain and wetland disturbances during construction;
- stabilization and restoration of the natural riparian habitat;
- use of the presumptive containment approach and need for additional characterization;
- risk assessment assumptions and preliminary remediation goals;
- provisions for active and meaningful community participation during the Proposed Plan and future design process; and
- cleanup plan in general and opinions on alternatives not selected.

Other comments are also identified and included under the Community Comments section.

Section B (Natural Resource Trustees Comments) contains comments from the Federal Trustees who have been involved with the Site for many years. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 USC § 9601 *et seq.* authorizes the United States, States, and Indian Tribes to act on behalf of the public as Natural Resource Trustees for natural resources under their respective trusteeship (CERCLA §107(f)(1)). No written or oral comments were received from the State, in its capacity as a Trustee for groundwater, or from any Indian Tribe. However, in their capacity as Federal Natural Resource Trustees, comments were received from the USFWS and from NOAA. Comment themes identified are:

- support for protective caps;
- maximize the wildlife habitat retained;
- consider greater removal depths for sediment remedy prior to covering;
- provide robust restoration goals for habitat restoration; and
- mitigate for lost habitat.

Section C (Potentially Responsible Parties and their Representatives' Comments) contains comment summaries and responses received from consultants representing the various PRP interests. These comments fit into a number of themes as identified below:

- evidence of hazardous waste disposal leading to Resource Conservation and Recovery Act (RCRA) Subtitle C[1] performance standards;
- conceptual design and prescriptive nature of the EPA's preferred alternative;
- flood protection and infiltration;
- landfill gas management;
- determination of background concentrations;
- development of Preliminary Remediation Goals (PRGs);
- other adjacent areas investigated as part of the OU2 RI Study Area;
- determining the Least Environmentally Damaging Practicable Alternative (LEDPA); and
- cleanup plan in general and opinions on alternatives not selected.

Specific comments regarding the remedy selected in this ROD are addressed below. Some overlap of comments between the defined sections introduced above are also recognized. It can also be noted that there is significant overlap in the written comment themes and what was expressed at the hearings. Where possible, EPA has grouped and summarized similar comments, and prepared a single response and has also referenced other responses accordingly.

A. Community Comments

*1. **Comment Summary:** EPA reviewed comments and questions about its choice of Alternative JM-SO-2 for the J. M. Mills Landfill and Alternative NP-SO-3 for the Nunes Parcel. Comments concerning these caps were highly variable and split with some in favor of EPA's cap option as described, while other commenters were either questioning the aesthetic qualities and the relative finished height of the caps, or dismissing EPA's proposal in favor of potentially less intrusive options, or a different conceptual cap design all together. In particular, it has been expressed that the design options for the selected landfill caps were inflexible and could not be developed in a manner that would preserve the riparian character of the area. Also stated was that the cleanup should provide a long-term, durable solution that fully recognizes the hazardous nature of the Site and the risks that it poses. The cleanup should be effective in containing the threats to groundwater, protecting the Blackstone River, wildlife, future maintenance workers and recreational users, and useful to the surrounding neighborhood and community in the future.*

EPA Response:

[1] As noted in the ROD and FS ARARs tables, Rhode Island is delegated to administer the federal RCRA statute through its Rhode Island Rules and Regulations for Hazardous Waste Management. The standards of 40 C.F.R. Part 264, with some exceptions, are incorporated in the Rules and Regulations by reference. For purposes of description in this Responsiveness Summary, as well as in the ROD, these are referred to as "RCRA Subtitle C" performance standards.

a. Protectiveness of EPA's Selected Remedy

As discussed in greater detail in response to other comments presented in Section C of this Responsiveness Summary, solid waste and industrial wastes including assorted hazardous wastes and hazardous substances, were disposed at OU 2. Since hazardous wastes were delivered to OU 2, RCRA Subtitle C requirements are relevant and appropriate to the design of EPA's selected caps for both J.M. Mills Landfill and the Nunes Parcel. The regulations establish general performance standards for designing a protective remedy. More specifically, RCRA Subtitle C landfill closure regulations pursuant to the Rhode Island Rules and Regulations for Hazardous Waste Management § 8.2(A) that incorporate the requirements of RCRA Subtitle C performance standards at 40 C.F.R. Section 264.310, specify the requirements for the final cover for a hazardous waste landfill. These standards give EPA the flexibility, as part of the remedial design process that will be undertaken and completed after the ROD is issued, to develop caps for the J. M. Mills Landfill and the Nunes Parcel that will be both protective of human health and the environment and comply with Applicable or Relevant and Appropriate Requirements (ARARs), as well as preserve the riparian functions and values of the river corridor. Cap infiltration performance is determined by the engineered materials installed as a component of the cap below the visual vegetated layer. Moreover, as part of requirements to address future climate change and the risks posed by maintaining these landfill caps in the floodplain, the caps need to be able to withstand up to a 500-year flood event[2] without releasing contamination from the landfills and impairing the Blackstone River and downstream receptors. Only EPA's selected remedy for the J. M. Mills Landfill, JM-SO-2 and the Nunes Parcel, NP-SO-03, incorporates a flood control system meeting flood protectiveness standards up to a 500-year flood event and effectively manages stormwater. The landfill will be designed to address riparian protection concerns, both to prevent the release of contaminants in the event of flooding and to preserve or restore altered riparian habitat, as practicable.

EPA's selected remedy also address the design considerations raised by the community in consideration of the Site's location within the Blackstone River Valley National Heritage Corridor, whereby the cap will be designed to address riparian protection concerns, both to prevent the release of contaminants in the event of flooding and to preserve or restore altered riparian habitat with native species to maintain habitat diversity, to the extent practicable. Following the issuance of this OU 2 ROD, the project will eventually begin the Remedial Design phase. It is during this future phase of the OU 2 cleanup that the specific materials, components, construction methods, and construction sequencing are further defined in order to meet the required objectives and satisfy ARARs. Contrary to the PRP Group's position on this matter, the performance standards that are included in a RCRA Subtitle C cap do not preclude any form of cap revegetation. The riparian area along the edge of the Blackstone River which will be disturbed during the construction phase will also be restored/revitalized at the completion of the cleanup. Native tree species can be planted along the river bank to enhance the ecological utility of OU 2. Native plants and trees can serve as habitat to native animal species and enhance the riparian zone by stabilizing the river bank and controlling runoff. Several EPA guidance/fact

[2] Floodplains Management (Executive Order 11988), 44 C.F.R. Part 9.

sheets[3] summarizing the importance of ecological revitalization are included in the Administrative Record. These fact sheets contain recommendations and technologies that may be useful for the revitalization and remediation of OU 2. Guidance from the EPA on implementing native grass, shrubs, and trees on top of RCRA Subtitle C landfill caps is also included in these guidance/facts sheets. These guidance documents also include advice on selecting the species of plants and implementing plans to establish native ecosystems at contaminated sites. EPA will continue to solicit stakeholder input, particularly during the early stages of the remedial design, to develop caps that will meet the regulatory performance standards for protection of human health and the environment, as well as preserving and restoring the riparian characteristics along the river corridor within OU 2.

b. Physical Appearance of Final Remedy

Many comments discussed the conceptual (artistic) renderings which were prepared by a representative hired by the PRP Group and formally presented at the hearings (PRPs' renderings). The purpose of these PRP renderings was their attempt to show what EPA's preferred alternative for the J. M. Mills Landfill and Nunes Parcel might look like and compare it with the PRPs' preferred alternative. However, these PRPs' renderings do not represent EPA's vision, nor were these renderings provided to EPA for review or consideration during the FS process or prior to the start of the public comment period. These renderings, for both the J. M. Mills Landfill and the Nunes Parcel, are not endorsed by EPA nor does EPA find them to be an accurate representation of what the landfills will look like, once the caps are installed, for a variety of reasons discussed below and also in Section C of this Responsiveness Summary.

i. J. M. Mills Landfill

Based on the comparisons of two of the landfill closure alternatives presented in the FS for the J. M. Mills Landfill (JM-SO-2 which is EPA's preferred alternative, and JM-SO-3), EPA disagrees with the appearance and interpreted differences between the renderings as presented by the PRP Group. EPA believes that there would be no appreciable difference in the visual appearance of either cap, once constructed. The final height of the J. M. Mills Landfill is primarily governed by the amount of waste already contained within the landfill. It is important to note that with both JM-SO-2 and JM-SO-3 landfill caps, the design engineer will be required to address slope stability, infiltration, and flood protection as a common thread. Thus, site preparation activities for either landfill closure alternative, as evaluated in the FS, would require the same construction footprint for consolidation, installation of the cap, management of gas, and restoration requirements. In either case, the J. M. Mills Landfill would require considerable grubbing of existing vegetation and reshaping prior to any cap installation. Terraced slopes would be expected in both scenarios to manage erosion and control drainage from precipitation. In consideration of public comments, EPA has broadened its remedy to allow for some landfill

[3] Two examples of EPA guidance include: "Ecological Revitalization: Turning Contaminated Properties into Community Assets" (EPA 542-R-08-003, February 2009); and Closed Waste Sites as Community Assets: A Guide for Municipalities, Landfill Owners, and Regulators (EPA/600/R-14/349, November 2014).

material to be recycled and/or disposed of off-site[4] in order to shape and resize the landfill, to address riparian protection/restoration concerns, and to minimize the loss of flood storage for the Blackstone River. Thus, it is not expected that the height or area of the J. M. Mills Landfill would appreciably increase.

A small number of landfill gas pipes that are currently, passively venting gases are located on the top of the J. M. Mills Landfill but are improperly installed and/or damaged. The limited number of these gas vents would not be considered in compliance with current landfill closure requirements. Landfill gas control, whether passive through vent pipes, or through active treatment, is a common design element relevant to both landfill closure options. The number of gas ventilation penetrations are governed by landfill gas volume estimates that will be calculated during the remedial design to minimize the number of penetrations through the cap. For both capping alternatives, it is anticipated that the number and size of the gas vents, and location of vents would be similar, however, engineering considerations can also allow for options in gas vent design/installation (e.g., landfill gas can be collected in a gas header pipe installed underneath the surface of the cap limiting the number of gas ventilation penetrations).[5] State and federal regulations require landfill gas management associated with all landfill closures (e.g., Standards of Performance for Municipal Solid Waste Landfills, 40 C.F.R. Part 60, Subpart WWW) which are relevant and appropriate requirements. Landfill closure designs which would allow for uncontrolled release of landfill gas emissions would not be in compliance with state and federal regulations.

Additionally, EPA does not expect any significant difference in the cap installation thickness between Alternative JM-SO-3 (combination cap/cover) and Alternative JM-SO-2 (RCRA Subtitle C cap) as presented in the FS and Proposed Plan. The visual perception of any significant difference in height or steepness in slope as presented for comparison by the PRPs' renderings are misleading. The comparison of heights between the two landfill closure alternatives are predominantly governed by the same volume of waste to be covered or capped. The horizontal footprint of the two caps would be controlled by floodplain siting requirements which would dictate the terminus of the landfill base in proximity to the location to the water's edge. In addition, regardless of the type of cap selected flood protection is required and the river bank and lower portion of the floodplain must be remediated to meet cleanup standards to be protective of human health and the environment. Cleanup actions may include, but are not limited to, pulling waste back and out of the river shoreline, removing and managing contaminated soils and sediments, consolidating excavated wastes and soils on to the adjacent landfill, and restoring the floodplain as necessary. As part of remedial design, the final extent and height of the J. M. Mills Landfill will be established so a protective remedy, revegetated with native species that takes the aesthetics of the area into account, will be implemented.

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[4] In accordance with Section 121(d)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the NCP at 40 C.F.R. Section 300.440, otherwise known as EPA's Off-site Rule.

[5] AECOM, 2015. Technical Memorandum- Innovative Technologies for use in Cap Design and Construction at the Peterson/Puritan, Inc. Superfund Site, Operable Unit 2, June 2015 (Innovative Technologies Memo). This document is found in the Administrative Record for the OU 2 ROD.

ii. Nunes Parcel

With regards to the PRPs' Nunes Parcel rendering, several details are noted that appear to be misleading. First, the prescribed armament feature as depicted may be overly embellished. EPA would agree that past waste disposal and filling practices have incised and changed the character of the Blackstone River channel to an extreme 90 degree bend to the west along the northeast corner of this parcel. Once Pond I (immediately adjacent to the Nunes Parcel) is addressed (by consolidating river bank soils and sediments not meeting cleanup standards under a protective cap), erosion control may be necessary and would potentially be of benefit for river bank stabilization and flood control in this immediate vicinity. This is why EPA's preferred alternative allows for restoration of the river bank, if needed. As such, EPA recognizes that shoreline excavation is required to pull back waste and contaminated soils from the existing river bank. Thus, the final shape and footprint of the Nunes Parcel has not been determined and may be rather different from what is depicted in the PRPs' rendering. However, as the Blackstone River proceeds west and then turns south towards the Pratt dam, design considerations may also allow for variability in the bank stabilization measures applied, thereby lessening the amount of hardscape armoring needed. Bioengineering technologies are alternative or innovative approaches which can also be considered in the design phase in shaping and protecting the cap in this reach (see Innovative Technologies Memo, AECOM 2015).

Landfill gas control, as stated above, is a common design element for all of the Nunes Parcel landfill closure alternatives. The number of gas ventilation pipes shown on the PRPs' rendering may be over represented, as the landfill gas management system requirements will be determined in the design and based on site-specific engineering specifications (e.g., landfill gas wells can be attached to a gas header underneath the surface of the cap limiting the number of gas ventilation stacks rising above each well penetration).[6]

The PRPs' rendering of the Nunes Parcel also depicts an overly aggressive slope and height than is expected to be constructed. It is expected that the height of the Nunes Parcel will increase moderately since wastes from the Unnamed Island and sediment from the pond cleanups will likely be consolidated onto this Parcel. However, the issue of the landfill's height in relation to the volume of wastes expected to be disposed of there could be resolved by utilizing the entirety of the northeast portion of the Nunes Parcel. This area of the Nunes Parcel is readily available for additional waste consolidation since EPA's plan also requires the demolition of the dilapidated transfer station in this area. Thus, the shape and height of the Nunes Parcel would be different from what is depicted in the PRPs' rendering. As part of remedial design, the final shape and height of the Nunes Parcel will be established so that a protective remedy, revegetated with native species that takes the aesthetics of the area into account, will be implemented.

Lastly, in response to public comments, EPA has added a component of the remedy which may alleviate landfill height concerns. As part of the remedial design process, it may be determined that transporting a portion of the waste for off-site disposal (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) and/or recycling instead of placing this waste under the

[6] See footnote #3 above

Nunes cap will address riparian protection/restoration concerns and minimize the loss of flood storage for the Blackstone River. While this option may increase costs, and appropriate waste characterization would be required to be performed, such volumes would not be expected to increase costs above EPA's cost criteria (+50%/-30%). Off-site disposal would increase truck traffic, unless the rail road can be used for transporting materials, but roadway use would be coordinated with local officials to minimize community impacts.

c. Flexibility of Proposed Cap Design

RCRA Subtitle C landfill closure regulations pursuant to the Rhode Island Rules and Regulations for Hazardous Waste Management § 8.2(A) that incorporate the requirements of RCRA Subtitle C performance standards at 40 C.F.R. Section 264.310, specify the requirements for the final cover for a hazardous waste landfill. These standards give EPA the flexibility, as part of the remedial design process that will be undertaken and completed after the ROD is issued, to develop caps for the J. M. Mills Landfill and the Nunes Parcel that will be both protective of human health and the environment and comply with ARARs, as well as preserve the riparian functions and values of the river corridor.

In response to general public comments regarding cap requirements, EPA wishes to clarify that under the regulatory requirements and those recommendations found in EPA's Region 1 guidance documents, there is flexibility in designing a protective cap that meets regulatory performance standards. While such a design might include a multi-layer engineered cap, such a cap is not specifically prescribed by the regulations. EPA's ROD specifies the regulatory performance standards that permits design flexibility for caps as follows:

1. Provide long-term minimization of migration of liquids through the closed landfill.
2. Function with minimum maintenance.
3. Promote drainage and minimize erosion or abrasion of the cover.
4. Accommodate settling and subsidence so that the cover's integrity is maintained.
5. Have a permeability less than or equal to the permeability of any bottom liner system or natural soils present.

In addition, other requirements, such as wetland and floodplain regulations and requirements for landfill gas management, will also be used to guide the design of the ROD remedy.

Lastly, the landfills at OU 2 do not have engineered bottom liners. Therefore, following the requirements of 40 C.F.R. Section 264.310(a)(5), a cap for this type of facility could be designed and constructed with relatively permeable materials. Although 40 C.F.R. Section 264.310(a)(5) allows for a more permeable design, EPA believes that more effective long term minimization of rainwater infiltration through the closed landfill would be provided by the cap design recommended in EPA guidance.[7] EPA recognizes that other cap designs may be acceptable,

[7] USEPA, 2001. EPA Region 1 Technical Memorandum: Revised Alternative Cap Design Guidance Proposed for Unlined, Hazardous Waste Landfills in the EPA Region 1. February 5, 2001 (more specifically, the accompanying cover memorandum describing the purpose for the Region 1 Guidance, and further referencing EPA Technical

depending on site specific conditions and a determination by the Agency that the alternative design adequately fulfills the regulatory requirements.

*2. **Comment Summary:** The Greater Providence Chamber of Commerce wrote to formally request that the EPA agree to conduct a second public hearing on the Proposed Plan for OU 2. It stated that an additional public hearing was necessary, in order to give its organization and others in the community the proper time to fully analyze and respond to the Proposed Plan and FS. The Chamber of Commerce added that since EPA has extended the written comment period by 60 days, it believed there is clearly sufficient time to schedule a second public hearing. More importantly, it will ensure that the public and other interested parties have had an opportunity to fully review and comprehend the significant alteration to this very important resource.*

EPA Response: EPA received the Greater Providence Chamber of Commerce's correspondence on August 21, 2014. In response to this request and those made by other commenters, EPA held a second hearing on October 8, 2014. In addition, based on requests by several interested parties, including the Town of Cumberland, EPA had an extended public comment period on the Proposed Plan for a total of 170-days from August 8, 2014 to January 23, 2015 to provide ample opportunity for interested parties to comment on the Proposed Plan.

*3. **Comment Summary:** The Greater Providence Chamber of Commerce said EPA has neither presented nor discussed the variety of alternatives included in the FS with the public. It was seen as unrealistic to presume that the public had a sufficient amount of time to obtain, review and understand the details contained within nearly 1,200 pages of the FS.*

EPA Response: EPA respectfully disagrees with this opinion. See Comment Response A6 below and Part 2 Section C of this ROD, for a detailed list of EPA's long history of outreach to the community, towns, and PRP Group by keeping them apprised of Site activities through informational meetings, fact sheets, press releases, information and documents on a public website, and public meetings. More recently, on August 7, 2014, EPA held a public meeting to present the Proposed Plan, which provided a summary comparison of alternatives presented in the FS and compared all alternatives with EPA's preferred comprehensive remedy approach. All supporting documents, including the RI, FS, and Proposed Plan were, at the time of this meeting, available to the public online and at designated local repositories at the two town libraries within the towns of Lincoln and Cumberland, respectively. The FS, as drafted by the PRP Group, and as revised by EPA to meet the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, contained a sufficient number of technologies and cleanup alternatives following a presumptive containment approach for landfills. The Proposed Plan summarized these alternatives sufficiently, as EPA followed the requirements consistent with CERCLA, the NCP, and other Superfund guidance concerning notification and the presentation of the Plan. The Rhode Island Department of Environmental Management (office located in Providence, RI) and the regional office of EPA (Boston, MA) maintains a copy of these documents for continued review. Finally, as noted in Comment Response A2, EPA held an

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Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments; EPA/530-SW-89-047, July 1989)

extended 170 day public comment period to provide amble time for review of the Proposed Plan and supporting documents.

*4. **Comment Summary**: Senator Ryan Pearson, representing the Towns of Lincoln and Cumberland, RI, noted that, due to the amount of information being shared at this time and since it is now announced that the public comment period has been extended, that there also be held a second public hearing to allow for a broader representation of the actual community here in Cumberland, and also in Lincoln.*

EPA Response: In accommodating this request, a second public hearing was held at the Cumberland Public Library on October 8, 2014.

*5. **Comment Summary**: In correspondence received from the Mayor of Cumberland in October 2014, it was requested that EPA consider an additional extension of the public comment period in order to allow the Town to further consider its position on EPA's Proposed Plan and other materials made known to the Town. The letter also inquired if there may be funding assistance available to the Town for completing its technical review.*

EPA Response: In consideration of the Town of Cumberland's written request for an extension, EPA agreed to further extend the public comment period to January 23, 2015 in order to allow for a coordinated formal response from the Town during the transition of the newly elected Mayor. EPA also proposed, and the Town accepted, access to technical assistance during this period through a separate EPA contract managed through EPA Headquarters at no cost to the Town. In addition, the Town financed an independent consultant to help with formulating specific comments from the Town.

*6. **Comment Summary**: A number of comments and questions were received from the BRWC/FOB and as the Technical Assistance Grant (TAG) Coordinator, the Town of Cumberland, and the Corridor Commission, among others, concerning stakeholder and municipal interactions and provisions for active and meaningful community participation during the design process. A comment was also included which requested continued involvement by the Town of Cumberland, such that key design deliverables are properly vetted and receive public input in a timely fashion. The Corridor Commission requested that information be depicted through illustrative site/concept plans that will provide the Corridor Commission with opportunities to determine consistency with Congressional mandates, and to consider whether the proposed solution avoids a significant adverse impact to the resources of this National Heritage Corridor. With respect to proposed revegetation as a component of the restoration of the floodplain, the Corridor Commission would request better delineation of the area proposed for revegetation so that it may gain a better understanding of any concerns it may have with this approach.*

EPA Response: In the Superfund process, the formal public comment period on cleanup alternatives is concluded and a cleanup plan is selected and documented by EPA in the Record of Decision (ROD) before the engineering design phase can start. After the ROD is signed, and in

accordance with the NCP and the Superfund Community Involvement Handbook,[8] EPA must make the ROD available for public inspection and copying at or near the site prior to the commencement of any remedial action. Also, EPA must publish a notice of the ROD's availability in a major local newspaper of general circulation. The notice must state the basis and purpose of the selected action. Although a formal public comment period is not typically held during the engineering design phase, EPA nonetheless will incorporate opportunities for public involvement as it proceeds with the implementation of the cleanup plan for OU 2. At a time after the completion of negotiations with the PRPs regarding the remedial design/remedial action (RD/RA) and prior to the commencement of the remedial design, EPA will likely revise the current OU 2 Community Involvement Plan,[9] as necessary, to reflect community concerns discovered during the public comment period that pertain to the remedial design and construction phase. This is also the appropriate time in which members of the community may contact EPA's community involvement coordinator or the RPM, either directly, or through the TAG, to inform the agency on recommendations for community involvement activities.

Routinely, EPA will coordinate with State, municipal, and other local officials to seek input in design planning such as addressing soil erosion and sediment control, flood and stormwater management, traffic and construction management, and health and safety. Also, based upon the comments received during this public comment period related to aesthetic concerns, view scape, and impacts to the Historical Park, EPA published an Innovative Technologies Memo (AECOM 2015) which is in the Administrative Record. This Memo identifies guidance documents and illustrates a number of design measures for capping landfills and protecting against erosion that take into account public desires to maintain the aesthetic and habitat characteristics of the riparian corridor.[10] The Agency intends to host design charrettes as an additional planning tool to inform stakeholders.

In addition, EPA will coordinate closely with residents who reside on any potentially impacted properties within the well restriction area of OU 2. As the remedial design progresses, several design documents will be prepared which outline the construction and monitoring plans in detail. These design documents may also be shared with the public, town officials and other interested parties. Likely mechanisms for sharing engineering design information include posting design documents on the Site web page, making them available at the information repositories, distributing an OU 2 factsheet highlighting the design information, convening collaborative stakeholder meetings and/or holding public informational meetings to improve the communication throughout the design process. The ROD envisions a process for these planning activities should a number of stakeholders, including the TAG, the Towns, Corridor Commission, and/or others, be interested in participating in such a process.

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[8] EPA 540-K-05-003, April 2005.

[9] Metcalf & Eddy. 2003. *Final Draft Community Relations Plan Update, Peterson/Puritan, Inc. Superfund Site, Operable Unit #2 (including J.M. Mills Landfill)*, Cumberland and Lincoln, Rhode Island. March 2003. (Also known as a Community Relations Plan).

[10] See footnote #2.

*7. **Comment Summary:** A comment from the Town of Cumberland noted that the Proposed Plan was very prescriptive, which would limit capping options available to the remedial designers, which could reduce the value of the land for future use as recreational open space. The Town believes the Proposed Plan, as written, stifles the application of evolving science and engineering solutions in waste site closure, ignores ' green' and 'low-impact' considerations, and may leave the remediated areas in a barren state compared to the adjacent natural riverbank habitat. In a Referendum recorded by the Town and submitted in writing to EPA by the Town Council for the Town of Lincoln Rhode Island, and also presented as Town views at the Public Hearing, the Council supports a remediation plan for OU 2 that allows for development of a more scenic path for those enjoying the Blackstone River on the water or on the bike trail; a plan that provides a respite for fish, fowl and wildlife; a plan that leaves as much of the existing vegetation in place as possible; and a plan that not only meets environmental goals, but also keeps the River open and accessible to all. Additionally, comments were received from others regarding future site use opportunities. Further, a recommendation was made by the Town of Cumberland (and others) to revise the language in the Proposed Plan, ROD, and Statement of Work to allow for more flexibility in the RD phase of the work. A comment was also included which recommended minimizing any increase in surface elevation at the Nunes Parcel to better allow for potential future recreational uses.*

EPA Response: With respect to the "prescriptive" language concerning the type of landfill cap needing to be implemented at the J. M. Mills Landfill and Nunes Parcel, the landfill closure technology outlined in the Proposed Plan is the baseline, conceptual protective cap that was used for cost comparison purposes with other capping alternatives, consistent with EPA Region I's Landfill Cap Guidance. EPA has clarified the remedy in the Proposed Plan, as further described in this ROD, to address public comments received concerning the protection of aesthetic and habitat considerations within the riparian corridor. EPA intends to allow for design flexibility while emphasizing that the RCRA Subtitle C performance standards are relevant and appropriate at OU 2 and need to be met as set forth in 40 C.F.R. § 264.310. The ROD now includes language which allows flexibility in the cap design as identified above (see Comment Response A1 above).

Consistent with CERCLA and the NCP, EPA must ensure that CERCLA remedies protect human health and the environment and comply with ARARs as a "threshold" matter. Evaluating the protectiveness of a remedy includes an analysis of the underlying assumptions for exposure based on the reasonably anticipated future use at the Site.[11] EPA does not select or establish the future uses for a site, rather these future uses are identified by the site owner, municipality, and/or local stakeholders. In this case, based on the location of the Site in a National Heritage Corridor, and now a National Historical Park, and through working closely with the community, municipalities, local stakeholders and the State, recreational activity is known and anticipated in the future at this Site. This current and future use at the Site triggered more protective cleanup standards under Rhode Island Department of Environmental Management (RIDEM) regulations than would an industrial use scenario, more typical of a landfill site. These future land use considerations

[11] See "Considering Reasonably Anticipated Future Land Use and Reducing Barriers to Reuse at EPA-lead Superfund Remedial Sites"; EPA OSWER Directive 9355.7-19, March 17, 2010.

(derived from the Reuse Plan[12] and in consideration of these public comments) will be taken into account during the design phase of the project. EPA's 1995 Land Use Directive[13] urges regional offices to consider the interplay of land use (including reasonably anticipated future land use) with remedy implementation and the remedy itself (e.g., protectiveness, compliance with ARARs, long-term effectiveness) so that the remedy can, wherever practicable, support those indicated future uses.

At this Site, EPA believes that the reasonably anticipated future use options are no more restrictive in performing EPA's selected remedy (meeting RCRA Subtitle C performance standards) than the other proposed remedial alternatives presented in the FS. In fact, with the RCRA Subtitle C cap there will be no CERCLA restrictions on recreational access to areas of restored riparian habitat along the Blackstone River, although public access to these areas is at the discretion of the property owner(s) within OU 2. The main difference is that EPA's selected remedy for the J. M. Mills Landfill and Nunes Parcel are more protective of human health and the environment and are envisioned to withstand 500-year flood events. More specifically, EPA's selected remedy establishes cleanup levels which are protective of recreational use activities and the environment thereby allowing for continued active or passive recreational use along the river corridor following remedy implementation.

In addition, as with all Superfund remedy decisions, EPA has taken all comments received, including but not limited to those from the PRP's, interested members of the community, the Towns of Lincoln and Cumberland and the State, into consideration in selecting the final remedy for OU 2 as embodied in the ROD. In addition to providing flexibility in the cap design (as noted above), in this particular case, to address the concerns raised during the comment period, EPA has broaden its approach on the preferred cleanup alternative. EPA is incorporating the opportunity to remove some portion of waste for off-site disposal, after appropriate characterization is completed, as a component of the design of the RCRA Subtitle C caps at the J. M. Mills Landfill and Nunes Parcel. This approach will allow for the possibility to lessen the severity of the slope and/or reduce the height of the consolidated wastes added to the landfills prior to capping. This design option may also provide certain flexibility in increasing the width of the riparian buffer and allow for more flood storage along the Blackstone River while continuing to be protective of human health and the environment.

8. <u>Comment Summary</u>: *Specific comments were made by the Town of Cumberland regarding future land use, including consideration of the goals from the July 2004 Ashton-Pratt Corridor Redevelopment Plan. Comments included:*

- *Development of the Unnamed Island into an extension of the existing bike path;*
- *Use of the landfills for passive recreation;*
- *Improved vehicular access and parking;*
- *Inclusion of an emergency right-of-way and staging area near Pratt Dam; and*

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[12] See: Peterson/Puritan Inc. Superfund Site Preliminary Reuse Plan, March 2002 and Ashton-Pratt Corridor Redevelopment Plan, July 2004. Both of these documents are included in the Administrative Record and on line at http://www.epa.gov/region1/superfund/sites/peterson.

[13] Land Use in the CERCLA Remedy Selection Process, OSWER Directive No. 9355.7-04, May 1995.

- *Incorporating access for water sports into the final design.*

The Town of Cumberland sees the potential for the development of the Unnamed Island into an extension of the existing bike path (Blackstone River Bikeway), perhaps including a gravel or paved circulator around the island that connects with the Lincoln branch of the bike path, and also incorporates rest areas/picnic areas. Likewise, the landfills themselves could be used for passive recreation consisting of walking trails/hiking paths that are connected to the existing bike path and the Unnamed Island via gravel paths and wooded trails. Vehicular access and parking proximate to the Site should be considered to improve access to the existing (Pratt Dam) and future facilities. Additionally, a water access possibly onto the Nunes Parcel or Unnamed Island should be incorporated into the final designs to integrate the bike path, walking paths, and recreational water sports (e.g., canoeing, kayaking, fishing, sightseeing, etc.). Restrooms, food services and access for emergency vehicles and first responders have also been identified as important considerations for redevelopment in the Site area along this stretch of the Blackstone River.

Other commenters, including the Corridor Commission and The Audubon Society of Rhode Island, also emphasized the goals within the Ashton-Pratt Corridor Redevelopment Plan and identified the OU 2 area as adjacent to high value and high-volume recreational use of the river. As such, its floodplain and remediation that respects the values of those uses must be included in the plan. An additional comment was also included regarding the use of residential PRGs as part of the remedial objectives for the floodplain soils surrounding J. M. Mills Landfill. As this area will not be used for future residences, the comment suggested that these Preliminary Remediation Goals (PRGs) were too conservative.

EPA Response: EPA's selected remedy follows the recommended goals generally indicated in both the March 2002 and July 2004 reuse plans; the latter written in consultation with the Towns of Lincoln and Cumberland, the State of RI, and interested members of the community, as it relates to CERCLA response actions and the cleanup of OU 2. In accordance with the RI/FS documents (2012 and 2014, respectively), EPA has incorporated, to the extent practical, the recommendations provided from the Ashton-Pratt Corridor Redevelopment Plan in establishing the reasonably anticipated future use for OU 2 of the Site. Consistent with this plan, EPA's selected remedy addresses contaminated floodplain soils, sediment, debris, and groundwater within OU 2 of the Site and also follows a presumptive containment approach for addressing the large volumes of wastes, including hazardous waste, disposed of in both landfills and associated debris fields within the OU 2 boundary and immediate floodplain of the Blackstone River.

With respect to the Unnamed Island, it is estimated that 39,500 to 44,000 cubic yards of wastes, including waste containing hazardous substances were disposed of in pits or in piles on the Unnamed Island. This waste also consists of general industrial refuse, wood, fiberglass, hosing, rubber parts, tires, scrap metal, mixed with some household waste, and other industrial byproducts. Excavated material from the Unnamed Island will be consolidated under the Nunes Parcel cap (except for some debris that may be decontaminated and recycled, or any other material that is sent to an off-site disposal facility licensed to accept the contaminated media). Thus, to be protective of human health and environment, the configuration of the Unnamed Island may be altered. However, shoreline areas disturbed by the remediation, including excavated riverbanks and the riparian zone, will be restored to return such areas to pre-remediation

conditions (e.g., the functions, values, characteristics, vegetation, habitat, species use, and other attributes), to the extent feasible. For more specific components of the remedy see Section L of this ROD.

The properties within OU 2 are privately owned, so currently there are no redevelopment plans for public use of the area, except the current use along the Blackstone River by recreational watercraft. EPA's proposed remedy is designed to clean up the riparian corridor to recreational standards and cap the landfills in a manner that will not preclude potential future recreational redevelopment.

Generally, where future land uses are known at the time of design, and are within the scope of CERCLA authority, it may be appropriate for the Agency to incorporate remedial components that will facilitate the future land use as part of the remedy selected in the ROD. As an example, access roadways needed to implement and maintain the remedy can be designed to also provide emergency access to the Blackstone River for local emergency services. For actions that are not within the scope of EPA's authority, however, some other actions (e.g., rest rooms or food services) are beyond the scope of CERCLA response actions, as defined in the NCP. Any future plans or proposed future use activities undertaken by other parties at OU 2 must be in coordination with the Superfund cleanup process so that it does not conflict with the institutional controls that will be established as part of the CERCLA remedy to protect the integrity of the CERCLA remedial action over the long term. In addition, any and all permitting requirements associated with OU 2 reuse improvements would be borne by those implementing the improvement project(s).

Regarding EPA's selection of PRGs as part of the remedial objectives for the floodplain soils surrounding J. M. Mills Landfill, it should be noted that RIDEM's residential Direct Exposure Criteria (DECs) do not distinguish between exposure concentrations for residential use and recreational use. It is currently RIDEM's policy to use the residential DECs as criteria for recreational scenarios. As human exposures at OU 2 are currently recreational in nature (and expected to continue as recreational use), the Residential DECs apply at OU 2. As such, the PRGs established for the soil and sediment cleanup are reasonable and derived in accordance with the NCP. See also Comment Responses C5 and C7 below.

9. Comment Summary: *A number of comments (including those from the Town of Cumberland, BRWC/FOB (TAG) and the Audubon Society of Rhode Island) were made regarding the lack of geotechnical data, delineation of waste, and additional engineering analyses needed prior to design. It was also recommended that pre-design investigations be conducted at OU 2 Such investigations would include shallow groundwater and leachate impacts on river and pond sediments, and due to the non-homogeneous nature of the landfills, additional monitoring along the downgradient edge in wetlands, ponds, and drainage channels to assess compliance. Save the Bay (STB) anticipated that the pre-design investigations will provide more clarity on the surface configuration of the final cap, flood protection requirements for the river bank and cap slopes, and characterization of leachate impacts to shallow groundwater. STB is concerned that the proposed plan relies on monitoring for leachate migration but does not require direct control of leachate. Contingencies for leachate control in wetland areas and drainage channels should be addressed. Continuous monitoring should be required during the removal of debris and that*

appropriate sampling and remedial action be taken should any intact barrels or other suspicious materials become evident. Also, a protocol should be developed for monitoring results that exceed standards to trigger further cleanup actions should it be required.

EPA Response: The selected remedy addresses contaminated floodplain soils, sediment, and groundwater within OU 2 of the Site and also follows a presumptive containment approach for addressing the large volumes of wastes, including hazardous waste, disposed of in both landfills and associated debris fields within the OU 2 boundary and immediate floodplain of the Blackstone River. As the comment notes, sampling of the waste within the J. M. Mills Landfill and the Nunes Parcel was limited because EPA determined during the RI that these source areas (J. M. Mills and Nunes Parcel) were landfills that would ultimately require protective caps. As a result, the RI focused on the need to address potential risks from the migration of site-related contaminants (such as those impacting groundwater, surface water, soil, and sediment) not otherwise addressed by a protective cap.

EPA agrees with the comments that additional geotechnical data, more detailed delineation of waste deposits, and additional engineering analyses are needed in support of, and prior to, completing the design of the protective caps. EPA also agrees that a floodplain analysis should be included as part of the design. Moreover, precise limits on the lateral and vertical extents of the contamination warranting excavation of floodplain debris, soils, and sediments need to be determined. If the waste is removed for off-site disposal as part of the work to be performed, then characterization of that waste is necessary to ensure proper handling and off-site disposal (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440).

As part of EPA's selected remedy, one of the Remedial Action Objectives (RAOs) presented in the ROD states that, if necessary, the remedy will collect and treat leachate to prevent further contaminant migration to the Blackstone River, based on federal and State water quality standards and RCRA Subtitle C landfill closure standards. One of the RAOs for groundwater seeks to prevent contaminant migration from the source areas to the Blackstone River via groundwater. Thus, controlling landfill leachate (beyond the installation of the protective caps), or groundwater, with contaminant concentrations above the established performance standards which may migrate beyond the compliance boundary, can be implemented as a component of the presumptive approach, if required. Periodic post-construction monitoring will be performed and the data gathered will support the statutory review of the remedy no less than every five years[14] to assure that human health and the environment are being protected by the remedial action implemented. The design studies and analyses to determine compliance will be further detailed in the Statement of Work for performance of the remedy and in the RD/RA planning documents.

[14] Section 121 of CERCLA requires that remedial actions that results in any hazardous substances, pollutants, or contaminants remaining at the site shall be subject to a review no less often than each 5 years after the initiation of such remedial action to assure that human health and the environmental are being protected by the remedial action being implemented. See also· Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P, dated June 2001.

10. Comment Summary: *Comments were received from the Town of Cumberland, among others, in support of the implementation of an evapotranspiration (ET) cap (a soil and vegetated cover system, or "cover") if it can be designed to meet EPA's remedial objectives and performance standards associated with a RCRA Subtitle C cap. It was suggested that the final landfill closure surface be landscaped to blend into the surrounding area with a mixture of trees, shrubs, and grasses similar to the surrounding area. Example ET cover systems were provided. Further, it was recommended to consider minimizing any increase in surface elevation at the Nunes Parcel to better allow for potential future recreational uses.*

EPA Response: See Section C of this Responsiveness Summary for a detailed response. An ET cover (as described by others) may not meet the equivalency of RCRA Subtitle C performance standards to ensure a protective remedy for OU 2.

11. Comment Summary: *A comment was included by the Town of Cumberland and others that a suitable landfill gas control system can be incorporated into all landfill cap designs being considered and that landfill gas control should not be a determinative factor in cap selection. The comment also noted that there does not appear to be sufficient landfill gas data available to support design decisions.*

EPA Response: The RI Report identified the presence of landfill gas emanating from the five landfill gas vents located at the top of the J. M. Mills Landfill. Most vents exhibited low levels of certain volatile organic compounds (VOCs), carbon dioxide, and methane with the exception of one vent having more significant levels of these constituents including a concentration of 59% by weight of methane.

In preparation for installation of its second rail project, the Providence & Worcester Railroad, Co. (P &W) hired GZA GeoEnvironmental, Inc. (GZA) to take some samples between the base of the J. M. Mills Landfill and the existing rail line. During the installation of test pits in 2012 at the base of the J. M. Mills Landfill, GZA detected hydrogen sulfide in the breathing zone at approximately 148 ppm (exceeding worker health and safety protocols) at one location between the J. M. Mills Landfill and rail extension which temporarily halted P&W's investigations.[15] Therefore, additional landfill gas contaminant concentrations and volume will need to be monitored to adequately design the necessary landfill gas management and treatment infrastructure from both J. M. Mills Landfill and Nunes Parcel. The design will also consider both passive and active treatment technologies, engineering alternatives to minimize individual exposed gas vents, as may be required, or practical, to control landfill gas emissions for the protection of human health and environment while also taking into consideration aesthetics, the view corridor, and land use interests along the Blackstone River and Heritage Corridor. State and federal regulations require landfill gas management associated with all landfill closures (e.g., Standards of Performance for Municipal Solid Waste Landfills, 40 C.F.R. Part 60, Subpart WWW). Landfill closure which would allow for uncontrolled release of landfill gas emissions (such as the soil cover component in Alternative JM-SO-03) would likely not be able to include a

[15] GZA. 2012. Evaluation of Railroad Siding Restored Second Track Adjacent to J. M. Mills Landfill, Providence and Worcester Railroad Company (P&W), Cumberland, Rhode Island. August 2012.

landfill gas collection system that would comply with state and federal regulations. This issue is discussed in greater detail in Comment Response C5 below.

12. Comment Summary: *Comments were received from the Town of Cumberland, and the Audubon Society of Rhode Island, among others, concerned with extended earth work activity and management of stormwater during the active construction phase of the cleanup. Construction phase stormwater management should be addressed with the goal being to prevent uncontrolled discharge to the Blackstone River. Any river-bank armoring should be softened with layered coir bales or equivalent that could be planted with appropriate wetland shrubs. Further, it was recommended that cap construction be staged so as not to expose waste materials being consolidated to precipitation and leaching into the Blackstone River during construction. Comments were received regarding the work to be performed in the floodplain and floodway. A request was made to include pre-and post-remedial construction floodplain analysis to evaluate the regional impact of the proposed topography changes. Based on the results of the study, floodplain compensation may be necessary. Additionally, commenters recognized that flooding occurs periodically, and with the projected increase in intensity and frequency of storms in Rhode Island due to the impacts of climate change, the OU 2 remediation not only needs to be designed for these events, but its design should not increase impacts to surrounding commercial and industrial uses, despite the questionable decisions to permit their existence in flood plains.*

EPA Response: To address remedial measures that may affect floodplain resources, the remedy includes the necessary mitigation measures to protect downstream receptors in the floodplain and to address concerns about maintaining the aesthetics of the riparian corridor. However, some level of floodplain armament at the base and a portion of the side slope of the constructed caps will likely be necessary to protect the selected remedy (caps) from periodic inundation due to flooding, as both landfills are situated within the 500-year floodplain of the Blackstone River. Best management practices (BMPs) will be used to minimize adverse impacts on the floodplain resources while preventing the release of permanently landfilled contaminants into the Blackstone River and riparian zone. BMPs will include: 1) mitigating alteration of riparian floodplain habitat through erosion control measures and proper re-grading and re-vegetation of the impacted areas with indigenous (native) species and; 2) any lost flood storage capacity from the proposed project will be compensated for so that downstream receptors are protected. As part of the remedial design process, it may be determined that some contaminated soil and/or landfill material may need to be recycled and/or disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) to shape and resize the landfills, to create a protective riparian corridor along the base of the landfills, and to minimize the loss of flood storage for the Blackstone River. The action to place a subaqueous sediment cover in the Unnamed Island ponds will be designed to prevent any release of contamination in the event of flooding, up to a 500-year event.

Construction-phase stormwater management requirements will be incorporated in the RD/RA documents. As identified above, guidance for erosion control measures and bank stabilization methods are outlined in the Rhode Island Soil Erosion and Sediment Control Handbook (Revised August 2014), and otherwise specified in the Rhode Island Stormwater Design and Installation Standards Manual (December 2010); among other guidance documents that will be followed in order to properly manage and control construction-phase stormwater as well as protecting against

flood events.

EPA also agrees that a floodplain analysis will be included as part of the design and will incorporate this evaluation into the RD/RA scope of work. The FS acknowledged the potential need for floodplain compensation. Moreover, it is recognized that the J. M. Mills Landfill and Nunes Parcel are located in the floodway of the Blackstone River and, therefore, the landfill cap (for each) must also be protected against flood damage, up to a 500 year flood elevation. This standard is also consistent with the President's Climate Change Action Plan (June, 2013). The use of native vegetation and various bioengineering and structural systems that also provide ecological function will be evaluated in design to provide the aesthetic qualities defined by users of the Blackstone River Corridor (see Innovative Technologies Memo, AECOM 2015).

As discussed above, EPA is also broadening its approach on the preferred cleanup alternative to incorporate the opportunity to remove some portion of waste for recycling and/or off-site disposal (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440), after appropriate characterization is completed, as a component of the design of the RCRA Subtitle C caps at Nunes and the J. M. Mills Landfill. In providing this design flexibility, and guided by the floodplain analysis and other factors, options to minimize the loss of flood storage and maximize riparian protection/restoration for the Blackstone River can be realized in the design and construction of the protective caps.

13. <u>Comment Summary</u>: *The Audubon Society of Rhode Island and the Rhode Island Department of Health questioned if perhaps the slope/incline of repose affected the decision not to consolidate all debris (combining the wastes from both Nunes and the Unnamed Island) into the J. M. Mills Landfill. Although this would add more expense, it would free up future development of the Nunes site and it was rationalized that the additional value associated with unrestricted use could compensate for the added cleanup expense. Also, it was pointed out that the smaller Nunes site will not be as useful for grassland habitat, that it blocks downstream flow of the river, and the hydrology of the river curving sharply at the Nunes parcel will tend to erode that bank and could present a maintenance problem to the integrity of the RCRA Subtitle C cap. Further, the Nunes site may be more vulnerable to flood inundation than the J. M. Mills Landfill and therefore, would create a safer solution to remove the waste from this low lying site near the Blackstone River. Therefore, EPA should consider designing the Nunes site at a similar elevation to the remediated Unnamed Island so that a contiguous larger wetland be formed to mitigate the loss of wetlands that has occurred as development has been permitted between the railroad tracks and the river channel. The waste from Nunes could potentially be deposited at J. M. Mills Landfill or at another RCRA landfill. Additionally, the BRWC/FOB provided a comment in support of the planned removal of all contaminated waste from the Unnamed Island. This portion of the Site has a potential for recreational use and the volume of contaminated waste is deemed to be manageable for removal.*

<u>EPA Response:</u> EPA followed a presumptive containment approach for the J.M. Mills Landfill and Nunes Parcel at OU 2 which was consistent with Section 300.430(a)(iii)(B) of the NCP in that it identifies the expectation that engineering controls, such as containment, will be used for waste that poses a relatively low long-term threat where treatment is impracticable. As further defined in Section C of this Responsiveness Summary, EPA believes that waste disposed at OU 2

is a heterogeneous mixture of industrial and municipal waste, including hazardous waste. EPA has determined that the general principals of the presumptive approach, in this case "containment," is applicable to the J. M. Mills Landfill and the Nunes Parcel. EPA's evaluation of the Nunes Parcel determined that waste can be safely capped within the floodplain in a manner that will prevent any releases of contamination during floods, up to a 500-year event. Therefore, EPA proposed containment as the appropriate response action for this portion of OU 2. Moreover, due to the extensive amount of waste and land use constrictions observed at OU 2 including, but not limited to, the railroad corridor to the east of the J. M. Mills Landfill and the Blackstone River bank in close proximity to the west side of the Landfill, EPA recognized that consolidation of all waste contained within the Nunes Parcel and including wastes buried on the Unnamed Island onto the J. M. Mills Landfill would not be feasible and would noticeably increase the current height of the Landfill which was strongly objected to by several commenters. Treatment of the Nunes Parcel waste is also believed to be impracticable (cost prohibitive), so containment (with proper floodplain protection), with some waste potentially being disposed of off-site, has been determined to be the only implementable alternative.

Regarding the Unnamed Island, as discussed in the FS, unique characteristics and conditions identified at the Unnamed Island do not support a presumptive containment approach. Although waste material disposed in this area of the Facility is similar to that in the J. M. Mills Landfill and Nunes Parcel, the continual flooding of this area make it unsuitable for a presumptive containment approach. Thus, removal of the wastes at the Unnamed Island for consolidation under the protective cap(s) was identified as the most cost-effective alternative. The removal of the waste deposits may appreciably decrease the overall size and shape of the Unnamed Island potentially leaving both shallow sand bars and open water that would provide aquatic habitat, passive recreational uses, and essential water quality improvements for the river while also providing flood compensation.

In response to comments received during the public comment period, EPA has broadened its approach as described in the selected remedy. EPA is incorporating the opportunity to remove some portion of waste from OU 2 for recycling or off-site disposal, after appropriate characterization is completed, as a component of the design of the RCRA Subtitle C caps at the J. M. Mills Landfill and Nunes Parcel. This approach will provide additional design flexibility intended to: 1) lessen the severity of the slope; 2) reduce the height of the consolidated wastes added to the landfills prior to capping; 3) provide options for increasing the width of the riparian buffer; and 4) allow for more flood storage along the Blackstone River while continuing to be protective of human health and the environment.

14. <u>Comment Summary:</u> *The Audubon Society of Rhode Island found that the BERA (Baseline Ecological Risk Assessment) identified the potential for "severe ecological risk to omnivorous birds feeding" at the sites from lead, bis(2-ethylhexyl)phthalate and zinc. Soil sampling, and sampling for invertebrates (particularly earth-worms) needs to ascertain concentrations that would be harmful to avian species like Woodcock which are known to use low, scrubby wetlands as habitat and which eat earthworms. Earthworms provide a source of protein for many mammalian, avian, amphibian and reptilian species and through the food web as birds and mammals feed on other taxa. Lead is a neuro- and renal-toxin. Remediation through removal and replacement with clean topsoil should follow biological and not political guidance for depth.*

Birds, like American Robins, are year-round residents and would have greater exposure than migratory birds to any toxins. Robins often resort to such swampy areas for winter where they can find food and shelter. Great Blue Herons eat a variety of small vertebrate and invertebrate prey and with increasing winter temperatures and open water (not ice-covered) are being seen in Rhode Island year round. In addition, small ground-nesting birds like the Ovenbird and Eastern Towhee may be adversely impacted by soils, according to reports associated with this Proposed Plan. The Unnamed Island should be remediated, under the proposed alternative, to be restored as viable habitat for these birds because the change in habitat imposed by construction of RCRA Subtitle C caps will prevent these birds from nesting.

EPA Response: EPA agrees that there are unacceptable risks to omnivorous birds at OU 2. The Baseline Ecological Risk Assessment (BERA) (USEPA, 2009) and additional refinement memoranda (see Appendix D of the FS; USEPA, 2014) performed food chain modeling using species representative of those found at OU 2. For floodplain soils, the ecological risk-based cleanup levels were developed for the J. M. Mills Landfill (cadmium) and the Unnamed Island (lead and BEHP). The cleanup levels are based on risks to small omnivorous birds assuming potential year-round exposure to OU 2 contaminants. However, for cadmium and lead, the risk-based values were below values selected from the existing dataset to represent reference background. Therefore, reference background values were identified by the EPA as the cleanup level for these contaminants. In a memorandum from EPA dated November 18, 2013 (see Appendix D.6 of the FS), the cadmium PRG was refined further based on additional review of toxicity values and site-specific data. Ecological cleanup levels for soil are presented in Table L-3 in Appendix C of this ROD. Based upon the findings and conclusions of the Ecological Assessment, including EPA's technical refinements and other factors, EPA agrees that the Unnamed Island should be remediated. The Unnamed Island is not a completely natural feature of the Blackstone River. It was greatly impacted by the removal of the Pratt Dam control structure, extensive earth moving activities, and subsequent waste disposal operations. Removal of wastes may result in an island with a different combination of upland and wetland habitats. This combination of riparian habitats that exist following waste removal, however, would be restored, as practicable, with native vegetation as determined during remedial design to enhance use by wildlife (including support of aquatic life).

In addition, even though protective caps, meeting RCRA Subtitle C performance standards, are being selected for installation at the J. M. Mills Landfill and Nunes Parcel, the habitat there and along the riparian buffer will be restored, as practicable, with native vegetation such that nesting by resident bird species may still occur.

15. Comment Summary: *A citizen commented that EPA's proposed remedy appears to be protective of the Human Health and Environment and is a well-reasoned solution based on historic sampling data (results) and the actual, continuing and threatened releases of Containments of Concern from OU 2. A cap is the only reasonable solution and from a performance standpoint should meet the substantive requirements of RCRA "C" and "D". Reconsolidation of diverse areas of solid and hazardous wastes is cost efficient and will lead to the excavated areas being available for reclamation and future less restricted reuse sooner. While the alternative approach (identified as the PRP Plan) would have less short term disturbances, it is not protective of the Human Health and Environment and it appears to be*

inconsistent with the National Contingency Plan. The design does not appear to meet the slope and impermeability requirements of both RCRA "C" and "D" cap design. While reasonable cost efficient alternatives should be considered, any alternative that does not meet the substance of, or performance requirements of RCRA cannot be determined to be protective of the Human Health and Environment Further comments were received by the BRWC/FOB and STB which echoed support of EPA's Proposed Plan as the only remedy that addresses ongoing threats to water quality, recreation and the surrounding community. This remedy should be implemented without further delay. STB supports the presumptive cleanup as the potentially responsible parties have not adequately characterized the wastes on site. Any alternative cap design would require further investigation and characterization of waste. This Site has been languishing for almost thirty years and it is time to stop investigating and start implementing a remedy.

EPA Response: EPA is in agreement with these commenters' remarks in support of its selected remedy. As stated above in Comment Response A26, and also further addressed in Section C of this Responsiveness Summary, EPA did not select Alternative JM-SO-3 (combination cap/cover as detailed in the FS and this ROD), because Alternative JM-SO-3, as presented in the FS, does not meet all relevant and appropriate closure requirements specified in Rhode Island Rules and Regulations for Hazardous Waste Management § 8.2(A) that incorporate in the requirements of RCRA Subtitle C performance standards at 40 C.F.R. Section 264.310 for preventing the release of hazardous waste and other contaminants. In EPA's view, the selected remedy which includes Alternatives JM-SO-2 and NP-SO-3 (both alternatives constructed meeting RCRA Subtitle C and State hazardous waste regulation requirements) is the most protective remedy for the landfills, is the least environmentally damaging practicable alternative (LEDPA), and, with the inclusion of design flexibility (as discussed above), this remedy also addresses many of the concerns raised by the community.

16. Comment Summary: *The BRWC/FOB commented that the OU 2 portion of the Peterson/Puritan, Inc. Superfund Site is not, and never was, a conventional community solid waste management facility; the OU 2 was an uncontrolled industrial waste dump that received hazardous wastes. These wastes remain on OU 2 and will continue to remain there after the remedial process is completed. Further there is support for a full RCRA Subtitle C Landfill Cap (RCRA Subtitle C Cap) on the J. M. Mills Landfill and the Nunes Parcel portions of OU 2 to fully contain those hazardous wastes that will remain at OU 2. Testing and characterization of the wastes has been inadequate for anything less that the protection provided by a full cap.*

EPA Response: EPA agrees with BRWC/FOB regarding the above statement. As stated in Section 2.2.2 of the FS, and supported by documents located in the Administrative Record (and discussed further in Section C of the Responsiveness Summary), solid waste and industrial wastes including assorted hazardous wastes and hazardous substances, as defined in Section 101(14) of CERCLA, were disposed at OU 2 of the Facility from approximately 1954 to 1986. As previously discussed, RCRA "hazardous waste" was disposed of at OU 2, but it is unclear when this disposal took place. In addition, CERCLA "hazardous substances" were disposed of at OU 2, including polychlorinated biphenyls (PCBs) regulated under the Toxic Substances Control Act (TSCA) 40 C.F.R. Section 761.61.

17. ***Comment Summary:*** *Comments were received from the Fire Chief for the Town Cumberland, STB, and BRWC/FOB that the final cleanup plan developed by EPA provide safe reliable access to the Pratt (high hazard) Dam area through the Nunes Parcel portion of OU 2 for the Town's first responders. The Pratt Dam portion of the Blackstone River attracts many adventurous young people and thus poses a serious public safety issue for the community. First responders must have direct and unimpeded access to that part of the Blackstone River. Also, in commenting on site safety and past emergency response history, it was requested that consideration for maintained vehicle access through various portions of the Site and also a request for a simple high, solid, anchoring system be installed (on the Site, up river from the dam) whereby rescue rope lines could be secured and equipment deployed to assist in rescue operations and keep response personnel safe.*

EPA Response: EPA understands that expedited access to the Pratt Dam is crucial for first responders and that access to the dam (which is also a river crossing) must be maintained in order to provide access, first and most importantly, to support river rescue response activities at the Pratt (high hazard) Dam. Throughout the RI/FS, EPA continually coordinated with Cumberland Police and Fire and maintained a controlled access corridor expressly for this purpose. The Proposed Plan and ROD both emphasize that an access corridor between Mendon Road and the Pratt Dam (which is also a bike path river crossing) needs to be maintained and controlled in order to provide expedited access for emergency response activities at this high hazard dam. Site-specific health and safety plans will also be developed and will require a sufficient access corridor for OU 2 operations during the cleanup while also limiting environmental impacts to the riparian zone.

Controlled and maintained access within this Mendon Road to Pratt Dam corridor for safe river portage, and local bikeway access is also understood to be a desire by both local and regional decision makers for current/future use and potential future development opportunities. As stated above, where such future land uses are within the scope of CERCLA authority, it may be appropriate for the Agency to include them as part of the remedy selected in the ROD. EPA will design and install an access road system within OU 2 for implementation of the cleanup and that will also allow for long-term access to the Blackstone River. Access to the Blackstone River, along with other sections of OU 2 that safety officials may want to maintain access to will need to be coordinated with the property owners within OU 2.

Actions that are not necessary for the performance of the cleanup, and thus would not be within the scope of EPA's authority, may be funded by other parties (e.g., state, PRP, local government, watershed council, property owner). Any future plans or proposed future use activities undertaken by other parties at OU 2 must be in coordination with the Superfund cleanup process and ensure that they do not adversely impact the integrity of the CERCLA remedial action or be in conflict with institutional control requirements to be placed on OU 2 for the protection of human health and the environment and the remedial action over the long term.

18. ***Comment Summary:*** *The BRWC/FOB raised a concern that an area of the Nunes Parcel that contains a former power trench has not been tested.*

EPA Response: A site assessment in 2014 on the adjacent developable property immediately to

the south of the Nunes Parcel and west of the railroad tracks (Lot 4) was conducted by a private party with oversight by RIDEM. The information on the adjacent parcel was shared with EPA and others. The area of the filled power canal south of the transfer station on the Nunes Parcel and south of the OU 2 boundary was characterized as part of this assessment. Data and results from this site assessment, performed by Lakeshore Environmental, can be found in the Administrative Record. Findings from these assessments indicate that buried waste is not found on Lot 4, soils do not appear to be impacted from OU 2 landfilling activities, shallow groundwater from OU 2 does not appear to flow in the direction of Lot 4 during very dry summer conditions, and a limited groundwater investigation did not identify any contaminants in the shallow aquifer located within Lot 4 (based on a single sampling event conducted in September 2014).

19. Comment Summary: *BRWC/FOB and STB request that EPA limit major expansion of the existing waste footprint and restrict use of land not already occupied by waste materials. Figure 4 of the Proposed Plan illustrates the Approximate Extent of RCRA Subtitle C Cap that does not extend to the edge of the river. The Proposed Plan includes moving waste from the riparian zone and other debris fields in the vicinity of the J. M. Mills Landfill for consolidation under the cap. Once waste is moved from these areas, the PRP should not be allowed to use the newly cleaned areas to widen the footprint of the RCRA Subtitle C Cap. Rather, it should be done in a manner that would allow restored wetland vegetation in cleared areas as much as feasible. The proposed plan includes moving waste from the riparian zone, and this area should remain as active riverbank.*

EPA Response: EPA generally agrees with this comment. The final footprint of the two protective caps will be a function of the final design following compliance with federal and state regulations. Consistent with federal Wetland Protection and Floodplain Management regulations at 44 C.F.R. Part 9, EPA's Regional Administrator solicited public comment, on its determination that there is no practicable alternative to occupancy and/or modification of portions of the floodplain in the immediate vicinity of the J. M. Mills Landfill, the Nunes Parcel, and the Unnamed Island and has responded to the comments received in this Responsiveness Summary. To address remedial measures that may affect floodplain resources, EPA will conduct necessary mitigation measures to protect downstream receptors in the floodplain and to address concerns about maintaining the aesthetics of the riparian corridor. However, some level of floodplain armament at the base and a portion of the side slope of the constructed caps will likely be necessary to protect the selected remedy (caps) from periodic inundation due to flooding, as both landfills are situated within the 500-year floodplain of the Blackstone River. As noted in the Innovative Technologies Memo (AECOM 2015) areas of armament can be designed and constructed to allow for revegetation of the armored areas to provide riparian habitat. Best management practices (BMPs) will be used to minimize adverse impacts on the floodplain resources while preventing the release of landfilled contaminants into the Blackstone River and riparian zone. Lastly, as part of the remedial design process, it may be determined that some contaminated soil and/or landfill material can be recycled and/or may need to be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440), to create a protective riparian corridor along the base of the landfills. The ROD has incorporated this additional flexibility into the selected remedy.

20. Comment Summary: *BRWC/FOB points out that the Remedy Review Board called into question grouping the waste source areas within one groundwater compliance boundary (Figure 8 of the Proposed Plan). Because of the unique location of the waste source areas (J. M. Mills Landfill and Nunes Parcel), with an active river channel flowing between them, establishing a compliance boundary that includes a portion of the river does not protect the Blackstone River from contaminant loading. The Review Board indicated that "landfill leachate may flow unimpeded into the river." Even low contaminant concentrations over time can add up to significant loading to the river. We believe that compliance monitoring wells should be installed in close proximity to the downgradient border of the capped areas to monitor and document long term leachate quality and trends. A member of the BRWC/FOB states that by capping the dump site and leading the flow through the Pratt Dam, it is believed that it would still leave a possibility of deadly chemicals leaching back into the river.*

EPA Response: Contaminated groundwater within OU 2 is located completely within the compliance boundary for a waste management area that incorporates the J. M. Mills Landfill, Unnamed Island, and the Nunes Parcel. Therefore, in accordance with the NCP and EPA guidance, groundwater within the compliance boundary does not require treatment, but access to the groundwater will be prevented and measures taken to ensure the contaminated groundwater does not migrate beyond the compliance boundary or into the Blackstone River at levels above groundwater performance standards, and surface water and sediment monitoring benchmarks (see Part 2, Section L, of this ROD). Institutional controls (in the form of deed restrictions) to prohibit the use and/or alteration of groundwater within the compliance boundary of the waste management area and to prevent disturbance to components of the remedy will be implemented. Additional institutional controls may be placed on a buffer zone outside of the compliance boundary to prevent wells from being installed that would draw contaminated groundwater beyond the compliance boundary. There will be at least yearly compliance monitoring to ensure restrictions remain in place and are enforced. Long-term monitoring of groundwater will be performed to ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause groundwater outside of the compliance boundary to exceed drinking water standards. Long-term monitoring of the Blackstone River surface water/sediment will also ensure groundwater contamination is not migrating into the River at levels above performance standards (see Part 2, Section L, of this ROD). Monitoring will include the appropriate sampling strategy to evaluate degradation processes that may decrease contaminant concentrations in groundwater and biogeochemical processes that may increase contaminant concentrations in groundwater (e.g., arsenic) and be performed on a regular schedule so as to provide trend analyses and tracking of contaminant behavior, especially during times of variable wet/dry seasonal events. In addition, there will be periodic reviews no less than every five years as required by statute.

The caps to be installed and maintained on the landfills will need to be designed to prevent the generation of leachate seeps that have the potential to flow into the Blackstone River. Long-term monitoring, operation and maintenance, and 5-year reviews will ensure that the caps remain compliant with standards that require no migration of leachate.

21. Comment Summary: *The BVTC, and the Corridor Commission commented that the Blackstone River Valley is an important resource to our nation and to the people that live here.*

Any negative facet of redevelopment of the Blackstone River Valley has to be seen as a threat to the future of returning the Blackstone Valley to a livable landscape to tell the story of America's industrialization and deindustrialization. The important nature of how the Blackstone River is treated and its importance not just to the people who live in the Blackstone Valley; but to the national story we are telling with our new National Historical Park cannot be overstated. We do not see the EPA plans meeting these needs. Each organization requested that the cleanup plan must call for an approach that makes the Site environmentally safe, while emphasizing the Site is adjacent to and part of the floodplain of one of America's Heritage Rivers.

Further, enhancing public access and enjoyment of the natural resources of the Blackstone River Valley National Heritage Corridor is a critical goal of the Commission's Congressional mandate. A denuded landscape along this National Heritage Corridor results in a de facto barrier, which in turn constitutes a blight on this most valued national resource. There is an opportunity to remedy the site conditions in a manner that protects our natural resources, enhances our interaction with our heritage, and promotes our local and regional economies. The Corridor Commission points out that the final clean-up plan must recognize, embrace and advance the longstanding and continued commitment to steward the resources of our National Heritage Corridor. The remediation plan should use an approach that is also esthetically pleasing and useful for recreation and tourism. Scenic paths, vegetation and river access are minimal requirements for this Site.

EPA Response: EPA is aware that the entire portion of OU 2 is located within the John H. Chafee Blackstone River Valley National Heritage Corridor which, in 2014, became a part of the Blackstone River Valley National Historical Park. The Blackstone and Woonasquatucket River systems are also designated as American Heritage Rivers, and as such development of the Corridor prompted EPA, under the Superfund Redevelopment Initiative, to work with Corridor Commission staff, the State, Town planners and local stakeholders to draft, and later in 2005, adopt the Ashton-Pratt Corridor Redevelopment Plan.

Since 2005, recreational use on, and along, the Blackstone River has increased significantly. A regional bike path has been completed which follows the Lincoln side of the river and canal before crossing the Pratt Dam onto the Cumberland side (and entering onto the western tip of the Nunes Parcel) on the south end of OU 2. The path then follows the eastern side of the river into Lonsdale. With increased recreation in the vicinity of OU 2, reasonably anticipated future land use within and adjacent to OU 2 is expected to include recreational and open space considerations, although future use decisions are under the control of the private owners of properties within OU 2. The Valley Falls Fire District and volunteers maintain access to the Pratt Dam for vehicular access across a portion of OU 2 and over property leading to the dam. At this location, a staging and portage area just north of the dam (Cumberland side) is used for first responder lifesaving efforts on the river. Sport fishing occurs on the Blackstone River.

EPA acknowledges the need to protect human health and the environment while maintaining continued recreational use along the Blackstone River and using an approach that is aesthetically pleasing. The selected response action for OU 2 is the second, and final, comprehensive remedy to be implemented for the Peterson/Puritan, Inc. Superfund Site (Site or Peterson/Puritan Site). It establishes cleanup levels which are protective of recreational use activities and the environment

and will establish protective caps/covers on the landfills and pond sediments (if necessary). The remedy will also include additional pre-design investigations, riparian restoration (including the potential off-site disposal of some landfill material and the use of bio-engineering technologies as part of capping/flood control of the landfills), long-term monitoring, and maintenance of the remedy, including conducting five-year reviews. Restoration of the river corridor (including using bio-engineered technologies that will allow native trees and other vegetation to be established on the flood control features of the landfill slopes) and other measures to provide appropriate habitat and aesthetic qualities commensurate with the Heritage Corridor will be addressed to the extent practical as a part of the comprehensive remedy through the remedial design process. Finally, as stated in Comment Response A6 above, during the design phase EPA intends to host design charrettes as an additional planning tool to inform stakeholders and is also willing to consider and lead other community planning activities should a number of stakeholders, including the TAG, the Towns, Corridor Commission, and/or others, be interested in participating in such a process.

22. ***Comment Summary:*** *STB stated that the Blackstone River is one of the largest contributors of fresh water to Narragansett Bay and is an important ecological, recreational and historical resource for Rhode Island and Massachusetts communities. Along with many project partners, we have worked to re-establish an anadromous fish run into the river and to clean up nutrient pollution from waste water treatment plants. The river has come a long way from its industrial past, and the clean-up efforts continue. Addressing the ongoing risks posed by the Peterson/Puritan Superfund Site (OU 2) is critical for further clean-up efforts.*

EPA Response: EPA's selected remedy for OU 2 is protective of human health and the environment while protecting the Blackstone River and the many other important resources in and downstream of this Site. Best management practices (BMPs) will be used to minimize adverse impacts on the floodplain resources while preventing the release of permanently landfilled contaminants into the Blackstone River and riparian zone. BMPs will include: 1) mitigating alteration of riparian floodplain habitat through erosion control measures and proper re-grading and re-vegetation of the impacted areas with indigenous (native) species and; 2) any lost flood storage capacity from the proposed project will be compensated for so that downstream receptors are protected. As part of the remedial design process, it may be determined that some contaminated soil and/or landfill material can be recycled and/or may need to be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) to create a protective riparian corridor along the base of the landfills. The action to place a subaqueous sediment cover in the Unnamed Island ponds will be designed to prevent any release of contamination in the event of flooding, up to a 500-year event.

23. ***Comment Summary:*** *STB commented that the goal and mandate of the Environmental Protection Agency is to select and implement a remedy that is protective of human health and the environment and ensure that the selected remedy maintains such protection over time (40 C.F.R. § 300 430(a)). STB finds that because restoration of ground water to its beneficial uses is not practicable for OU 2, EPA is charged with preventing further migration of the plume and exposure of contaminated ground waters (40 C.F.R. § 300 430 (a)(l)(n)(F)). STB finds that the only alternative that will meet the Superfund statutory goals is EPA's preferred alternative (Proposed Plan) and fully supports the Proposed Plan as it is the only one that will:*

1. Result in the permanent reduction of contaminant concentrations in soil along the riverbank and floodplains;
2. Eliminate the potential for direct contact with contaminants in soil;
3. Ensure that that contamination is not eroded or washed out of the J. M. Mills Landfill during flooding up to a 500-year storm event by consolidating all contaminated materials under a full RCRA Subtitle C cap; and
4. Reduce, to the maximum extent practicable, the potential exposure pathways and potential for contaminants to leach to groundwater.

EPA Response: EPA agrees with STB's findings.

24. Comment Summary: *STB states that the full RCRA Subtitle C cap will prevent approximately ninety-nine percent (99%) of rainwater from infiltrating through the cap. STB notes that the soil portion of the cap evaluated as Alternative JM-SO-3 does not meet TSCA protectiveness standards for PCBs or RCRA Subtitle C performance standards. JM-SO-3 will allow almost twenty percent (20%) of the rainfall to infiltrate through the cap and may not contain contaminants during a 500-year storm event. Further JM-SO-3 does not effectively address landfill gas emissions.*

EPA Response: EPA agrees with STB's comparison of the two alternatives (EPA's selected alternative, JM-SO-2, verses JM-SO-3). Based on historical industrial activity, PCB-contaminated soil/sediment at OU 2 meet the definition of a PCB remediation waste, as defined under 40 C.F.R. Section 761.3 of regulations promulgated under TSCA, 15 U.S.C. §2601 *et seq.*, and thus are regulated for cleanup and disposal under 40 C.F.R. Part 761. Under 40 C.F.R. Section 761.61(c), EPA may authorize disposal of PCBs in a manner not otherwise specified provided EPA determines that the disposal will not pose an unreasonable risk of injury to health or the environment.

Consistent with TSCA regulatory requirements at 40 C.F.R. Section 761.61(c), EPA has reviewed the Administrative Record for OU 2 and considered the excavation, passive dewatering and either on-site or off-site disposal (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) of PCB-contaminated soil/sediment with greater than 10 parts per million (ppm) PCBs from the Unnamed Island, from the riparian buffer of the Blackstone River, and along the perimeter of the J. M. Mills Landfill and Nunes Parcel contained within the boundary of OU 2. The removal of contaminated soil/sediment with greater than 10 ppm PCBs will address potential human health risks posed by passive recreational activity within these areas. The cleanup number is based on EPA's human health and ecological risk assessments that have determined that soil/sediment with PCB levels at less than or equal to 10 ppm do not pose an unreasonable risk to human health (for passive recreational use) or to the environment. The 10 ppm PCB standard also will meet the RIDEM DECs for PCBs. The J. M. Mills Landfill and Nunes Parcel will be subject to institutional controls that will restrict residential use for areas with PCB levels between 1 and 10 ppm. The Unnamed Island has been determined, due to its location in the Blackstone River, to be unsuitable for residential development and thus a residential use restriction will not be required. Based on these facts, EPA finds that the in-place disposal of soil/sediment with a PCB concentration of less than or equal to 10 ppm on the Unnamed Island, in the riparian buffer of the Blackstone River, and along the perimeter of the J. M. Mills Landfill and Nunes Parcel contained

within the boundary of OU 2 will not pose an unreasonable risk of injury to health or the environment provided all soil/sediment requiring removal will be identified based on *in situ* (pre-excavation) PCB levels and not subject to dilution. For more information about PCB consolidation and disposal requirements, see Section F (Declaration) of the ROD and also Section M (Statutory Determinations) in the Decision Summary of the ROD.

In previous Comment Responses EPA has discussed how JM-SO-03, as presented in the FS, does not meet RCRA Subtitle C requirements for a protective cap. EPA's selected cap alternatives for J.M. Mills and the Nunes Parcel does meet these requirements.

25. Comment Summary: *STB commented that it would like to continue to receive information and results on pre-design investigations as it is updated. STB also requested involvement in the development of the restoration plan and the Natural Resources Damages Assessment and identified the RIDEM wetlands staff as key players in the planning and assessment as well.*

EPA Response: As discussed in Comment Response A6 above, EPA routinely coordinates with State, municipal government, and others on these types of matters and, based upon the comments received during this public comment period, EPA is willing to consider and lead certain planning activities during the design phase of the cleanup.

Regarding potential natural resource damage issues, 40 C.F.R. Part 300, Subpart G explains the designation and responsibilities of Trustees for Natural Resources. Pursuant to Section 122(j)(1) of CERCLA, EPA shall notify federal and state Trustees of RD/RA negotiations and shall encourage the participation of such trustees in these negotiations. During this period of time, the Trustees would determine the need for a natural resources damages assessment if an injury, or loss, or threat to natural resources are, or potentially may be, affected. Any such restoration plan in response to injured resources, or protection for threatened resources, will be reviewed by RIDEM and offered for public review.

26. Comment Summary: *A [now former] Town Council member representing the district of Lonsdale within the Town of Lincoln finds that his district will be affected by this proposal and asks that the impacted areas be kept as attractive as possible to continue to draw the people who are currently using the bike path because it has a real good impact on the local economy. In addition, as a representative for the district citizens that live immediately across the river in Lincoln (especially along Maria Street, Ashley Drive, Riverside Drive, and houses that sit rather high up on River Road), he noted that these citizens will be impacted by the work and the increased height of the landfill. Therefore this person supports an alternative such as the Sub-C Hybrid Cap (Alternative JM-SO-3) which will keep the heights of the landfills to a minimum.*

EPA Response: EPA realizes that the established bike path on the Lincoln side of the Blackstone River and the development of the Blackstone River State Park is an important asset for the community. EPA also recognizes that, for a period of time during implementation of the selected remedy, Lincoln residents in a portion of your district will likely observe the construction work located along the Cumberland side of the Blackstone River.

As discussed in Comment Response A1 above (and elsewhere in this Responsiveness Summary),

EPA does not believe there is any appreciable difference in cap installation thickness between the Alternative JM-SO-3 (combination cap/cover) and Alternative JM-SO-2 (full RCRA Subtitle C cap) as presented in the FS and Proposed Plan. So the perception of a significant difference in height or steepness in slope as presented for comparison by the PRPs' renderings are misleading. The comparison of heights between the two landfill alternatives are predominantly governed by the same volume of waste to be covered or capped. The horizontal footprint of the two caps would be controlled by floodplain siting requirements which would dictate the terminus of the landfill base in proximity to the location to the water's edge. In addition, flood protection is required regardless of the type of cap selected. Lastly, regardless of the type of cap installation, the river bank and lower portion of the floodplain must be remediated to meet cleanup standards to be protective of human health and the environment. This may include, but is not be limited to, pulling waste back and out of the river shoreline, removing and managing contaminated soils and sediments, and consolidating excavated wastes and soils onto the adjacent landfill and restoring the floodplain as necessary.

It is important to note, however, that as discussed in more detail in Section C of this Responsiveness Summary and in this ROD, Alternative JM-SO-3 (combination cap/cover) is less protective to human health and the environment than EPA's selected remedy. Alternative JM-SO-3, as presented in the FS, does not fully meet chemical-specific, location-specific, or action-specific ARARs, because the soil portion of the cap does not meet Rhode Island Rules and Regulations for Hazardous Waste Management § 8.2(A) that incorporate in the requirements of RCRA Subtitle C performance standards at 40 C.F.R. Section 264.310 for landfills that contain hazardous waste. JM-SO-3, as presented in the FS, is not protective because it does not establish a completely protective physical barrier between potential receptors and contaminated materials in soil and waste (including hazardous waste and PCBs). JM-SO-3 does not fully reduce the infiltration and the potential for leaching of contaminants in soil and waste to groundwater and the Blackstone River. JM-SO-3 does not fully address potential landfill gas releases. Finally, JM-SO-3 did not incorporate a flood control system over the soil cover in a manner that will meet flood protectiveness standards up to a 500-year flood event to ensure that the release of contamination is prevented from the J. M. Mills Landfill during any flood, up to a 500-year event Lastly, to minimize the landfill heights at both the J. M. Mills Landfill and Nunes Parcel, EPA is providing flexibility in the selected remedy to address the concerns raised during the comment period. EPA has broadened its approach on the preferred cleanup alternative to include the potential removal of some portion of waste for off-site disposal, after appropriate characterization is completed, as a component of the design of the RCRA Subtitle C caps at the Nunes Parcel and J. M. Mills Landfill. This approach will allow for the possibility to lessen the severity of the slope, and/or to reduce the height of the consolidated wastes added to the landfills prior to capping. This design option may also provide certain flexibility in increasing the width of the riparian buffer and allowing for more flood storage along the Blackstone River while continuing to be protective of human health and the environment.

27. <u>Comment Summary:</u> *A [now newly elected] Town Council member representing the district of Lonsdale within the Town of Lincoln asked whether the potential impacts (as seen from Maria Street, Ashley Drive, Riverside Drive, and along River Road) are mainly aesthetic or are there other environmental effects to the residents of that area? In addition, why isn't there more signage informing the public of the site health conditions and lastly, do the citizens have a voice*

in the various design options?

EPA Response: As determined by the human health and ecological risk assessments contained in the RI/FS, the contaminant risks associated with OU 2 are located on the Cumberland side of the Blackstone River. A summary description of the findings of the risk assessments can be found in the Proposed Plan, or if further details are needed, the risk assessments themselves are in the Administrative Record, in the Site repositories in Lincoln and Cumberland (as well as at EPA's office in Boston), and can be found on line at: http://www.epa.gov/region1/superfund/sites/peterson.

Concerning signage at OU 2, the PRP Group has elected not to perform this task to date. EPA, however, has routinely placed signs and repaired the OU 2 fence on numerous occasions over the past 25 years. The majority of the signs are located on the fence along the Providence and Worcester (P & W) railroad corridor and at the OU 2 gates in Cumberland as this is primarily where trespassers enter the OU 2 portion of the Site. Signage is also posted along the Cumberland side of the Blackstone River and along the fence separating the J. M. Mills Landfill from the P & W railroad right-of-way, on the Nunes Parcel, and in the vicinity of the Pratt Dam. As an example, in November, 2009, EPA purchased and installed 60 warning signs throughout the OU 2 area. Routinely, EPA, or its contractor, inspects the Site for signage and repairs the vandalized fence and signs as necessary. These efforts are to limit trespassing onto portions of OU 2 where people are more likely to come in contact with contaminants and/or physical hazards.

Lastly, as discussed in detail in response to Comment A6 above, EPA anticipates public involvement during the design phase of the cleanup.

28. Comment Summary: *A citizen who lives near the wetlands A through D (formally known as Mooney's Beach) east of the boundary of OU 2 raised concerns which were read into the record and submitted in writing at the time of the second hearing. Comments identified that the subject wetlands are in such a state of decay that their originally intended use is lost and that flooding often occurs resulting in property damage to residents living in low lying areas. Sediment, tires, industrial cabling, air conditioners and old fridges, etc. currently pollute the wetland. As indicated by this citizen, the Rhode Island Department of Environmental Management built the series of connecting ponds back in the 1950's. Subsequently year after year, these ponds whose depth are steadily decreasing due to sediment deposition, filling, and indiscriminant dumping, now tend to flow over their banks flooding properties within the neighborhood of Lenox, Franklin, and Wildwood Streets.*

EPA Response: EPA has visited and observed the condition of the above described wetlands. There is no doubt that indiscriminant dumping, disturbance, and filling has occurred within this wetland area east of the boundary of OU 2 and where restorative stormwater management actions could be taken under another jurisdiction outside of the CERCLA process. EPA, however, has no evidence of landfill operations east of the railroad easement so any alteration of the area is not under the jurisdiction of the CERCLA remedy.

The surface water data collected during the RI also do not suggest ongoing or widespread potential impacts are occurring from OU 2 to the adjacent surface waters identified as Wetlands A

through D across the railroad tracks to the northeast of the J. M. Mills Landfill and outside of OU 2. A discussion of samples collected and results for constituents detected in these water bodies may be found in the RI Report, Sections 2.6 and 4.6 (Arcadis, 2012).[16]

The commenter may contact the State concerning compliance issues under the Rhode Island Pollution Discharge Elimination System (RIPDES) Stormwater Program (Stormwater Phase 2), Wetlands, or other State-managed regulatory programs that may have jurisdiction over the issue.

29. Comment Summary: *Speaking at the hearing, a member of the BRWC/FOB urges that EPA include in this remediation project the return of the Blackstone [River] to its historic past by redirecting the river flow back to its original state. In addition, the member urges the EPA to remove the granite blocks that block the original flow of the Blackstone, and fill in the Pratt Channel, which leads to the Pratt Dam. In doing so, this may curtail boating incidents and injuries while opening up a 3.5 mile area, creating a much larger habitat for the Fish Ladder Project that has raised over $4.5 million in donations and grants.*

EPA Response: EPA understands this comment to mean that the party requests that EPA re-position the main stem of the Blackstone River back to a time prior to anthropogenic disturbances (the Pratt Dam). There is no basis for EPA to remove or alter the Pratt Dam as part of its remedy because the Pratt Dam is not related to the contamination found at the Site. EPA's remedy does include, however, long-term monitoring of groundwater, surface water in the Blackstone River and ponds, sediment and performance monitoring for the landfill caps.

Further, the Blackstone River is known for its national heritage as a working river. As one example, prior to the Pratt Dam, the Hunt Dam (remnants of this historic dam can be seen immediately north of the Pratt spillway) harnessed the river flow for earlier industrial period mills operating in Lonsdale. A number of historical features are located within the immediate vicinity of OU 2 as identified by the Rhode Island Historical Preservation & Heritage Commission and is documented in the Phase I Cultural Resources Reconnaissance Survey, Appendix F of the FS Report. (PAL, 2012)[17] and also discussed in more detail in this ROD.

30. Comment Summary: *The Corridor Commission stated that the goals of a safe and accessible river experience are not mutually exclusive. Whether considering environmental remediation, heritage preservation or economic development, we must be willing to embrace the value of the river valley landscape and integrate it into our approach and implementation. The Ashton Pratt Corridor Redevelopment Plan, adopted by both Lincoln and Cumberland, RI and available on the EPA's web site reflects this position and outlines several key areas of concern and opportunity. The Corridor Commission supports a clean-up plan that is consistent with and advances this Plan.*

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[16] ARCADIS. 2012. Remedial Investigation Report, Peterson/Puritan, Inc. Superfund Site – Operable Unit 2, Cumberland and Lincoln, Rhode Island. August 2012.

[17] PAL, 2012. Phase 1 Cultural Resources Survey Reconnaissance Survey, Peterson/Puritan, Inc. Superfund Site-Operable Unit 2, [Revised] June 2012.

EPA Response: EPA generally agrees with the above position and the values which are expressed here. As discussed in previous responses, however, EPA is limited to taking actions that are connected directly to the contaminant releases and uncontrolled landfills within OU 2. In the summer of 2002, the Towns of Cumberland and Lincoln, Rhode Island were awarded a $100,000 grant from EPA under the Superfund Redevelopment Initiative Pilot Grant to perform an analysis of the Ashton-Pratt Corridor (which includes OU 2). This analysis included evaluating existing, and reasonably anticipated future land uses, as part of the planning scope. The end result of the analysis was the publishing of the Ashton-Pratt Corridor Redevelopment Plan[18] (July 2004) to which the Corridor Commission formally contributed and was also endorsed by the two Towns. The Ashton-Pratt Corridor Redevelopment Plan indicates that potential future redevelopment within the corridor, including the OU 2 area, could consist of enhancing recreational uses of the area, maximizing river and canal access, improving transportation facilities and traffic, and overall improvement of aesthetics. Lastly, the exposure pathways evaluated in the human health risk assessment for OU 2 utilized these current and reasonably anticipated future site land uses.

Further, pursuant to Section 106 of the National Historic Preservation Act of 1966, (see Appendix F of the FS), a Cultural Resources Reconnaissance Survey (PAL, 2012) was performed. The report documents historic and archaeological resources and sensitive areas within OU 2. The report also recommends that further studies may be needed prior to site remediation activities. Archival research including local informant interviews, a review of available environmental site investigation (geotechnical) data, Native American consultation, and a visual field walkover of the project area was conducted.

Since the inception of the Blackstone River Valley National Heritage Corridor in 1986, EPA has committed various resources within the watershed under multiple programs aimed at environmental assessment, water quality, cleanup and other measures.

In sum, EPA's remedy decision must be protective of human health and the environment, and meet all applicable, or relevant and appropriate federal and state regulations, in accordance with CERCLA and the NCP. Furthermore, EPA also remains committed to embrace the value of the river valley landscape, as is generally supported in the Ashton-Pratt Corridor Redevelopment Plan, and integrate these attributes into the design and implementation of the cleanup for OU 2 to the extent practical.

***31. Comment Summary**: The Corridor Commission states its position that, at a minimum:*

- *Scenic paths accessible to the public should be provided;*
- *These cleanup areas [within OU 2] can and should be vegetated with native grasses and bushes that promote and support local habitats, while functioning to stabilize the slopes and sites;*
- *The toes of the landfill slopes should be designed in such a manner as to facilitate riverside access; they should not be steeper than 3 horizontal: 1 vertical;*
- *There should be no physical or psychological barriers to accessing the properties;*

[18] See footnote #11 contained in Comment Response A7 above.

• Grading is important to stabilize the site, facilitate public access and also support the efforts of emergency personnel who rely on this access point to provide life-saving assistance in and along this portion of the river. Accordingly, access to - and from - the river must be designed and constructed in a manner to support emergency operations; and
• The proposal to plant trees in the floodplain must be evaluated in greater detail. While doing so can enhance the river user experience, and provide shade canopy which in turn supports wildlife habitats, there is also the risk of introducing vegetative debris that further challenges the river, particularly during storm events.

EPA Response: Taken in sum, EPA generally agrees with the points identified by the Corridor Commission. Under its legal authorities, EPA's primary responsibility at Superfund sites is to select and undertake remedial actions that are protective of human health and the environment, and that meet all applicable, or relevant and appropriate federal and state regulations. The final remedy must be protective of any reasonably anticipated future use. Many of the uses described by the commenter could be considered reasonable uses.

It is important to note, however, that the majority of OU 2 of the Site is either privately owned or co-owned by the Town of Cumberland. EPA does not own any of the properties located within OU 2. With the exception of enforcing certain institutional controls (deed restrictions) incorporated into the selected remedy for the protection of the landfill caps, certain property rights are maintained by the current land owners and/or with the municipality that have the option of permitting or excluding public access. EPA acknowledges the need to maintain a corridor for emergency access at the Pratt Dam and to restore the riparian corridor that is used by recreational boaters on the Blackstone River, but the remedial design cannot include recreational amenities, such as scenic paths, on the landfills themselves.

During design, preference will be given to reducing or controlling the construction footprint to the extent practical, and restoring and stabilizing the riparian buffer to limit scour and erosion through the use of native plantings, soil bioengineering, and structural systems. Ecological functions and values along riverbank, through the combination of hard (riprap revetment) and soft (vegetation) engineering practices, are anticipated that will also function to provide the aesthetic qualities defined by users of the Blackstone River Corridor. Such measures for erosion control and bank stabilization methods (including bioengineering solutions) are outlined in the Rhode Island Soil Erosion and Sediment Control Handbook (Revised August 2014), and otherwise further specified in the Rhode Island Stormwater Design and Installation Standards Manual (December 2010), among other guidance documents.

*32. **Comment Summary**: A citizen and local business man expressed that his livelihood depends on the river and the quality of the river running guided trips, fishing, and kayak rentals, bike rentals, and so forth. The citizen raised the concern that during the construction and the excavation of the debris, what will be done for the safety concerns, and about not reintroducing anymore contaminants into the river and the surrounding air while people are using either the bike path or using the river?*

EPA Response: EPA understands this concern and has incorporated into the selected remedy spelled out in this ROD, numerous environmental safeguards that will need to be implemented

during the construction phase of the cleanup (including controls on air and erosion/stormwater). As a component of the design and during the construction planning phase, EPA will also work with the community to address these concerns. For example, EPA will coordinate with local officials to determine the best routes for minimizing truck traffic concerns and will notify the community before activities begin. There is also the potential to use the active railroad system which may lessen the disturbance to the community and the environment through reduced truck traffic and emissions by more efficiently managing the high volume of materials to be handled.

Construction zones are anticipated to be established in areas north of Stop-n-Shop and adjacent to the bikeway. These zones will be fenced and the access road to OU 2 via the Nunes Parcel would be controlled to restrict public access. Construction operations will be carried out in such a manner that erosion will be controlled, water and air pollution minimized, and work zones managed so as to control any potential disturbances to adjacent riparian areas and the floodplain, to the extent practical. In addition, construction vehicles will be covered and washed before leaving the construction zone as necessary to make sure contamination would not spread and to reduce dust.

Any action that disturbs the wastes, soils and sediments during the cleanup has the potential to present short-term air-borne risks during excavation, consolidation, capping, or other construction activities. Air monitoring will be performed to protect on-site workers and to ensure that the surrounding neighborhood air quality is not impacted. Dust suppression and odor suppression methods will be employed as necessary. In addition, landfill gas contaminant concentrations and volume will need to be monitored to adequately design the necessary landfill gas management and treatment infrastructure from both J. M. Mills Landfill and Nunes Parcel. State and federal regulations require landfill gas management associated with all landfill closures (e.g., Standards of Performance for Municipal Solid Waste Landfills, 40 C.F.R. Part 60, Subpart WWW). The design will also consider both passive and active treatment technologies, engineering alternatives to minimize individual exposed gas vents, as may be required, or practical, to control landfill gas emissions for the protection of human health and environment while also taking into consideration aesthetics, the view corridor, and land use interests along the Blackstone River and Heritage Corridor.

33. <u>Comment Summary</u>: *The Corridor Commission recognizes that this particular landfill is adjacent to and part of the floodplains of one of America's Heritage Rivers, so that introduces a separate set of paramount goals to provide continued access to the Blackstone River and its shores for recreation and tourism. Enhancing public access and enjoyment of the Blackstone River Valley National Heritage Corridor is a critical goal of our congressional mandate. The Corridor Commission states that it is its goal to achieve a healthy and safe environmental condition in and along the Blackstone River, and we are grateful to the EPA for its efforts in this regard. No less vitally important, Congress established goals requiring that the Corridor Commission promote the heritage landscape, preserve natural resources, and provide accessible recreational and interpretive opportunities. In addition, the decision document must recognize, embrace, and advance the longstanding and continued commitment to steward the resources of the National Heritage Corridor and that any cleanup option facilitates and advances those town priorities referenced in the Ashton-Pratt Corridor Redevelopment Plan adopted by the Towns of Lincoln and Cumberland.*

EPA Response: EPA understands the Corridor Commission's goals of its congressional mandate, and many of those same goals are reflected in this ROD. For example, the Superfund Program requires that the cleanup must be protective of human health and environment and meet ARARs, first and foremost. As stated above, design elements will take into account the known heritage landscape as described in the Ashton-Pratt Corridor Plan[19] and, as discussed above in Comment Response A31, enhance natural resources, provide open space (to the extent practicable), and also allow for passive recreational use upon construction completion (although this is contingent on access being permitted by the OU 2 property owner(s)). Further measures to be taken to implement a protective remedy, consistent with the Corridor Plan, include instituting land use restrictions to protect the landfill caps and other components of the remedy, and preventing the use or alteration of groundwater within the boundary of OU 2.

34. *Comment Summary:* *At the hearing, a representative for the Corridor Commission requested that illustrative site/concept plans [of the cleanup] be provided in determining consistency with the Congressional goals for the Heritage Corridor, and to consider whether the proposed solution avoids significant adverse impact to the resources of the National Heritage Corridor. A citizen also reasoned that it was difficult to comment on EPA's plan without an understanding of what the remedy will look like with all the elements combined in a visual form and what it might look like in 10 to 20 years.*

EPA Response: As discussed in more detail in Comment Response A6 above, EPA fully expects to have an open and informative design process to address any community concerns. EPA has evaluated a number of alternatives for capping the landfills, and EPA has always been committed to, and mindful of, the Corridor Commission's goals concerning the Heritage Corridor. EPA believes that the selected remedy, being protective of human health and the environment over the long term, also addresses the future use and value concerns raised for the Blackstone River Valley as a vital and historical natural resource.

35. Comment Summary: *State Representative Jim McLaughlin (representing the Town of Cumberland) expressed at the public hearing that the Town of Cumberland has lost two [municipal drinking] water wells (one being the Lenox Street Municipal Supply Well) due to contamination along the river. He also said that the Town is currently looking to replace the loss of these wells with new installations. Representative McLaughlin questioned what progress has been made towards the settlement for the loss of service/cost for replacement of these wells and the cost to the Town for paying for Pawtucket water service since 1979.*

EPA Response: EPA acknowledges the Town's loss of the use of the aquifer at the Site. The Lenox Street Well was reported to be contaminated (with chlorinated volatile organic compounds) in 1979 and has since been closed by the State. As mentioned in the introduction above, CERCLA authorizes the United States, States, and Indian Tribes to act on behalf of the

[19] See the Ashton-Pratt Corridor Plan (2004), Senate Report 113-62 establishing the Blackstone River Valley Historical Park (2014), among other sources.

public as Natural Resource Trustees for natural resources under their respective trusteeship (CERCLA §107(f)(1)). As discussed in Comment Response A25 above, pursuant to Section 122(j)(1) of CERCLA EPA shall notify the federal and state Trustees of the upcoming RD/RA negotiations and shall encourage the participation of such trustees in these negotiations. During this period of time, the Trustees would determine the need for a natural resources damages assessment if an injury, or loss, or threat to natural resources are, or potentially may be, affected. Any such restoration plan in response to injured resources, or protection for threatened resources, would be offered for public review. RIDEM is designated in its capacity as the Natural Resource Trustee for groundwater and should be consulted further regarding this inquiry.

36. Comment Summary: *At the hearing, a consultant representing the TAG postulated that this Site has not entered the design phase and that the PRPs' renderings displayed at the public hearings were simply interpretive drawings that are not an approved design, while consultants representing the PRP Group inferred that there is not a lot of flexibility with a RCRA Subtitle C cap and that the renderings represented what the Site was really going to look like.*

EPA Response: EPA agrees that, in compliance with CERCLA and the NCP, the ROD (EPA's decision document) is based upon the findings of the RI/FS and predates the start of a comprehensive design process. At the present time, no formal component of the selected remedy has been designed, submitted, or reviewed by EPA, or otherwise initiated by EPA. EPA fully expects to have an open and informative design process to address any community concerns. See Comment Response A1 above for a more detailed response to the PRP Group's renderings.

37. Comment Summary: *At the hearing, a citizen asked if rather than building a rip-rap barrier along the river, can some type of bio-engineered solution be implemented that will be aesthetically pleasing and conducive to recreation, while still being able to withstand the 500-year flood? A citizen also questioned if it will be possible to create open grassland habitat as part of the cap? The TAG (and many others – see prior Comments above) restated its vision for full restoration of the natural habitat in the areas surrounding the proposed caps. The TAG also noted its support for potential reuse of the landfill site for sustainable low impact energy, preferably in the form of low impact solar panels as an option.*

EPA Response: As stated in Comment Response A14 above, and elsewhere in this document, EPA expects that the design process will be flexible enough so that the landfill caps can be constructed to support native vegetation (particularly native grasses and other plantings) and support wildlife and passive recreational use. Restoration of the river corridor (including using bio-engineered technologies that will allow native trees and other vegetation to be established on the flood control features of the landfill slopes) and other measures to provide appropriate habitat and aesthetic qualities commensurate with the Heritage Corridor will be addressed, to the extent practical, as a part of the comprehensive remedy approach.

38. Comment Summary: *A citizen attending the hearing wanted to know how one could learn more about the Site. This citizen also raised a concern as to why we are going through all of this cost to change an area that basically looks like a wildlife area. A question was also raised concerning the cost of the cleanup.*

EPA Response:
As identified in the Proposed Plan, information concerning OU 2 of the Peterson/Puritan, Inc. Site can be found in the OU 2 Administrative Record, which includes all documents, including this ROD, which EPA has considered or relied upon in selecting the remedy. This Administrative Record is available for public review at the EPA Records and Information Center located in Boston, Massachusetts, and locally at both the Cumberland and Lincoln Public Libraries. Information is also available for review online at:
www.epa.gov/region1/superfund/sites/Peterson.

With respect to the need for EPA's selected remedy, EPA has determined that a risk to human health and the environment exists at OU 2 from the hazardous substances disposed of within this portion of the Site. EPA's selected remedy, which generally involves excavation, consolidation and capping, will be designed to prevent exposure to these substances/contaminants by human and ecological receptors. The remedy will prevent migration of contaminants to groundwater and surface water or recontamination of sediments. As discussed in Comment Response A37 above, EPA expects the design process to be flexible enough so that the landfill caps can be constructed to support native vegetation (particularly native grasses and other plantings) and support wildlife and passive recreational use. Restoration of the river corridor (including using bio-engineered technologies that will allow native trees and other vegetation to be established on the flood control features of the landfill slopes) and other measures to provide appropriate habitat and aesthetic qualities commensurate with the Heritage Corridor will be addressed, to the extent practical, as a part of the comprehensive remedy approach. At an estimated cost of $40.3 million (total present value), the remedial action selected for implementation at OU 2 is consistent with CERCLA and, to the extent practicable, the NCP, is protective of human health and the environment, will comply with ARARs, and is cost effective. For more information see Part 2, Section L, of this ROD.

39. Comment Summary: *The Town of Cumberland noted the remedial objectives (Preliminary Remedial Goals [PRGs]) were selected based on a residential future use scenario of the area surrounding the J. M. Mills waste cell. This resulted in an appropriately conservative baseline evaluation of potential risks to human health assuming no remediation was conducted and future Site uses were left uncontrolled. However, as described in the Proposed Plan, the landfills will be capped, and surrounding debris will be cleaned up and consolidated under the caps, preventing future direct exposure to waste and associated contaminants. Activity and use limitations will also be placed on the property, which prevent future residential development of the OU 2 properties, as well as preventing the use of groundwater as a potable source. The EPA can now use the existing environmental characterization data, in conjunction with the closure plan details and a recreational future use plan similar to that envisioned in Ashton-Pratt Corridor Redevelopment Plan, to reassess human health risks posed by contaminants remaining in the surrounding floodplain, wetlands and ponds (sediments and soils). This will result in more appropriate risk-based PRGs that likely result in significantly lower impact to the ecology of the area. This approach would likely not change regulatory (ARARs) and environmental risk-driven PRGs, but may reduce the required floodplain cleanup to isolated hot spots which have been identified.*

EPA Response: EPA establishes numeric Preliminary Remediation Goals (PRGs) during the FS

(see Section 3.5 of the FS) and in the development of the Proposed Plan based on the risks identified in the baseline human health and ecological risk assessments, as well as ARARs-based standards. Under EPA's risk assessment procedures, baseline risks are calculated at the beginning of the assessment process and are not recalculated based on conditions once components of the remedy are implemented (such as institutional controls) that prevent residential development). The area of contaminated soil, sediment, and debris requiring cleanup at OU 2 is based on both risk-based and ARAR-based standards and is reasonable and derived in accordance with the NCP.

40. Comment Summary: *A citizen raised concerns at the hearing that the displayed PRP renderings represented an aesthetically unpleasing vision that would not enhance the environment nor provide habitat. Moreover, the PRP renderings present a wall that would further channelize the river contributing to future flooding and would make it difficult, when necessary, to exit the river.*

EPA Response: EPA agrees with this comment and reiterates that the PRPs' renderings do not accurately represent how the area may actually look once EPA implements the selected remedy. Please see Comment Response A1 for a detailed response to this comment.

41. Comment Summary: *At the hearing, a consultant (representing the TAG) spoke in support of the removal of all waste from the Unnamed Island because of the seasonal flooding of this riparian feature that can cause erosion and relocation of waste materials. The Unnamed Island has a great potential for recreational use by the community. The TAG also supports removing at least one foot of sediment from Pond A on the Unnamed Island, and not relying solely on a subaqueous cover, because the longevity of a subaqueous cover is uncertain.*

EPA Response: EPA agrees that full removal of all waste and contaminated soil (Alternative UI-SO-3) from Unnamed Island provides the best balance among the selection criteria in the FS, and has selected this alternative in the ROD. This is especially true since contaminated materials will be removed to recreational use standards and there will be no CERCLA restrictions on recreational access to areas of restored riparian habitat along on the Unnamed Island; however, public access to these areas is at the discretion of the property owner[s] within the OU 2. EPA also agrees with the comment concerning contaminated sediment and selected a sediment remedy (Alternative SE-3) addressing sediments exceeding cleanup standards from site ponds on the Unnamed Island. This selected sediment remedy requires excavation (to a depth of approximately one foot) and consolidate these sediments into areas to be capped, and apply a subaqueous cover (minimum 1 foot thickness) where cleanup level exceedances in deeper sediments may remain.[20]

42. Comment Summary: *A consultant (representing the TAG) spoke at the public hearing to a*

[20] At the time of design, additional sediment profiling will be performed to determine more precisely the contamination present and excavation depths needed to reach attainment of the RGs in the ponds. If the difference in dredged volume (between removal of 1 foot of sediment versus removing all sediment exceeding RGs) is relatively small, additional dredging will be performed to reduce or potentially eliminate the need for a subaqueous cover and future maintenance. As otherwise required, a subaqueous cover will be utilized in areas where RG exceedances are not fully removed.

finding that the area of Nunes Parcel is currently accessible, unlike the J. M. Mills Landfill. Therefore, more characterization could be done to ensure that localized areas or hot spots are not present below the water table, and that this be considered further by EPA before the area is used to landfill more waste, and future access is impeded. The TAG expects that EPA will require further evaluation of this issue in pre-design. Also, general concerns were raised related to unknown impacts in the historic canal trench, and uncertainty in how impacts below the water table at the Nunes parcel will be addressed.

EPA Response: The Nunes Parcel is presently gated on the south entry and signage is placed at access points in an attempt to deter entry. Nonetheless, trespassing is prevalent especially from the railroad right of way. A black five foot chain link gate and fence, installed by the State, currently deters access onto the Nunes Parcel from the bike path at the Pratt Dam crossing. Both gated locations are locked with chain and padlocks that are maintained by EPA and the keys are shared with the Town's fire department in case of an emergency. Vandalism and numerous fires at the former Nunes transfer station have left the structure close to collapse creating further physical hazards on the Nunes Parcel.

Regarding more characterization of the Nunes Parcel, a number of test pits were performed during the RI. As presented in the ROD, no principle threat waste has been identified that would indicate a need to treat any hot spot contamination on this Parcel. It is anticipated, however, that further design investigations are necessary to further delineate waste deposits.

Lastly, EPA is also aware of the location of former power canal, as noted by a previous commenter. A site assessment conducted in 2014 on the adjacent developable property immediately to the south of the Nunes Parcel was conducted by a private party with State oversight (see Comment Response A18 for more information). Staining, leachate, and a depression observed north of the former Nunes transfer station appears to indicate a preferential pathway between the Blackstone River and shallow groundwater north and west of the former Nunes transfer station. This immediate area will be investigated further as part of the design for the cleanup of the Nunes Parcel.

43. Comment Summary: *At the hearing, a citizen commented that he resides at Berkeley Commons [east of OU 2], and in speaking for the Berkeley Commons Association, he raised concerns about odors, height of the landfills, assuring minimal impact on wetlands east of OU 2. He also noted that he was reasonably in agreement with the reuse options.*

EPA Response: EPA recognizes the citizen's concerns, and those voiced by others. It should be noted that odor and dust control during construction will be required as a component of the construction specifications. In addition, landfill gas contaminant concentrations and volume will need to be monitored to adequately design the necessary landfill gas management and treatment infrastructure from both J. M. Mills Landfill and Nunes Parcel. State and federal regulations require landfill gas management associated with all landfill closures (e.g., Standards of Performance for Municipal Solid Waste Landfills, 40 C.F.R. Part 60, Subpart WWW). The design will also consider both passive and active treatment technologies, engineering alternatives to minimize individual exposed gas vents, as may be required, or practical, to control landfill gas emissions for the protection of human health and environment while also taking into

consideration aesthetics, the view corridor, and land use interests along the Blackstone River and Heritage Corridor.

See Comment Response A1 for a detailed discussion regarding the relative heights of the various capping alternatives. For reasons stated in Comment Response A1 above, EPA does not expect that the height of the J. M. Mills Landfill would appreciably increase. It is expected that the height of the Nunes Parcel will increase moderately since wastes from the Unnamed Island and sediment from the pond cleanups will likely be consolidated onto this Parcel. However, the final shape and footprint of the Nunes Parcel has not been determined. Lastly, EPA expects no adverse impacts to the wetlands east of the OU 2 since no cleanup efforts are required under CERCLA in this area.

44. Comment Summary: *A citizen working for the Audubon Society of Rhode Island commented at the hearing that we don't want to have a site that looks like an industrial site around this beautiful river, but was also concerned about the pollutants that remain on this site and continue to leach. Further it was expressed that filling the floodplain in the first place is an egregious act and that the river will continue its dynamic ebb and flow. Constricting it will only push the water somewhere else. So, to the extent practical, this area should replicate the functions of a floodplain and wetland complex.*

EPA Response: EPA agrees. As discussed in several comment responses above and in Section C of this document, EPA's vision for the cleanup of OU 2 fully considers the preservation of the floodplain and wetlands in this area. Remedial cleanup activities conducted in the immediate floodplain of the Blackstone River are governed by state and federal regulations which are described in greater detail in this ROD (OU 2 lies predominantly within, or below, the 500-year floodplain (Federal Emergency Management Agency FIRM, 2009)). In providing design flexibility in the ROD, and guided by the floodplain analysis which will be conducted during design and other site-specific factors, options to minimize the loss of flood storage and maximize riparian protection/restoration for the Blackstone River can be realized. While it is necessary to meet floodplain protection standards up to a 500-year storm event, preference would be given to restoring and stabilizing the riparian buffer to limit scour and erosion through the use of native plantings, soil bioengineering, and structural systems. Ecological functions and values along riverbank, through the combination of hard (riprap revetment) and soft (vegetation) engineering practices, will be considered in design that will provide the function and aesthetic qualities defined by users of the Blackstone River Corridor. Such measures for erosion control and bank stabilization methods (including bioengineering solutions) are outlined in the Rhode Island Soil Erosion and Sediment Control Handbook (Revised August 2014), and otherwise further specified in the Rhode Island Stormwater Design and Installation Standards Manual (December 2010), among other guidance documents.

45. Comment Summary: *In an email, a commenter suggested that EPA consider technology offered by DeWind, based in West Michigan. DeWind One-Pass Trenching specializes in the installation of groundwater collection, containment and remedial systems using custom built Deep One-Pass Trenchers (for in-situ mixed soil-bentonite/cement-bentonite walls, Permeable Reactive Barrier (PRB) walls, groundwater/product recovery trenches).*

EPA Response: The selected remedy for OU 2 does not identify the specific use of a vertical trencher such as is described. Nonetheless, the information provided is retained in the record for potential future design/construction considerations.

46. Comment Summary: *One Commenter said that it appears the RCRA Subtitle C landfill cap has been selected without conducting a geotechnical evaluation of Site and subsurface conditions (e.g., current landfill grades, soil cover thickness, waste constituents, and thickness, etc.) associated with the J. M. Mills Landfill and Nunes Parcel. In addition, a significant amount of additional site investigation and engineering analyses needs to be completed before the final landfill cap conceptual engineering design can be completed. We saw no indication that the edges of the landfill/limits of waste have been fully delineated on either waste cell, and the topographic data for the landfill is almost 10 years old.*

EPA Response: EPA acknowledges that these are all important considerations for developing a protective remedy for OU 2. For the J. M. Mills Landfill and the Nunes Parcel, EPA followed a presumptive containment approach to address the large volumes of wastes, including hazardous waste, disposed of in these landfills and the associated debris fields within the boundary of OU 2. As discussed in the nature and extent of contamination section in the FS (see Section 2.4.3) initial geotechnical soil samples were collected to provide a baseline for general geotechnical characteristics. During the RI, slope stability field testing[21] which included cone penetration tests (CPTs) performed at various locations around the J. M. Mills Landfill. The primary purpose of this testing was to establish strength and lithologic characteristics of native (including alluvial and/or fill materials in and near the landfill) and waste materials found in this vicinity. In addition, soil investigations including test pits and soil borings (that also included the Nunes Parcel), with the collection of both surface and subsurface soil samples, were conducted. Electromagnetic induction surveys were also completed to map out potential subsurface sources. Lastly, topographic data used in the RI compares well with Rhode Island's most current LiDAR topographic mapping.[22] Therefore, enough data were collected during the RI/FS to support EPA's selected remedy in the ROD. As indicated in Part 2, Section L of this ROD, more detail-oriented investigations for design purposes are required to further delineate the waste cells, outlying waste deposits, and assess floodplain requirements for the J. M. Mills Landfill and Nunes Parcel to support a final design.

[21] Shield, 2004. Peterson/Puritan OU 2 Slope Stability Analysis, Cumberland Rhode Island; January 2004.
[22] RIGIS, 2011. Rhode Island Geographic Information System, Rhode Island Digital Atlas, University of Rhode Island Environmental Data Center.

B. Natural Resource Trustees Comments

In their capacity as Federal Natural Resource Trustees, comments were received from the U.S. Fish and Wildlife Service (USFWS) and from the National Oceanic and Atmospheric Administration of the Department of Commerce (NOAA). Below is EPA's summation of the comments received from USFWS and NOAA and EPA's response to those comments.

1. ***Comment Summary:*** *The USFWS states that the current proposal serves to provide reasonably conservative protection of the environment, control future sources of release, provide short- and long-term effectiveness, and substantially reduce the toxicity, potential mobility and volume of waste. Additionally, it will meet ARARs, should be fully implementable, and is reasonably budgeted, considering the level of work necessary.*

EPA Response: EPA agrees with this summation.

2. ***Comment Summary:*** *The USFWS supports comprehensive excavation, consolidation and full RCRA Subtitle C capping due to the less than fully characterized hazardous content of the existing landfill and various debris fields that exist in the floodplain and proximal to the Blackstone River.*

EPA Response: EPA agrees with this comment.

3. ***Comment Summary:*** *The USFWS strongly advocates for designing the landfill to maximize the amount of wildlife habitat retained along the narrow floodplain corridor. These actions will better insure long-term protectiveness and capacity to the River, floodplains and fish and wildlife resources utilizing them.*

EPA Response: EPA agrees with the USFWS and, as discussed in more detail above and in this ROD. As defined by Section 404(b) of the Clean Water Act and regulations promulgated under the Act at 40 C.F.R. Parts 230, 231 and 33 C.F.R. Parts 320-323 the Regional Administrator finds that the selected remedial action is the LEDPA for protecting federal jurisdictional wetlands and aquatic ecosystems at OU 2 under these standards. In compliance with standards within the relevant and appropriate Wetland Protection and Floodplain Management regulations (44 C.F.R. Part 9), EPA solicited public comment on its LEDPA finding within the Proposed Plan and responses are included in this Responsiveness Summary. A floodplain analysis will be included as part of the design and the ROD acknowledges the potential need for floodplain compensation. As part of the remedial design process, it may be determined that some landfill material can be recycled and/or may be disposed of off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) to shape and resize the landfills, to address riparian protection/restoration concerns and, to minimize the loss of flood storage for the Blackstone River in the construction of the landfill caps. Riparian habitat will be restored, as practicable, and a vegetated cap consisting of native vegetation will be installed to maintain habitat biodiversity. Institutional controls (in the form of deed restrictions) and access restrictions would be used to prevent residential development and disturbance to the landfill infrastructures. There will be no CERCLA restrictions on recreational access to areas of restored riparian habitat along the river,

although public access to these areas is at the discretion of the property owner[s] within OU 2.

*4. **Comment Summary**: The USFWS supports in-situ capping for residual contamination post-removal, but suggests increasing removal depths to 2-3 feet with backfill and capping in areas prone to erosion, scour or consistent flooding.*

EPA Response: EPA's interpretation of this comment is that it applies to the Unnamed Island. EPA will consider this comment during design and at the time when the required sediment profiling is complete. As pointed out in the Proposed Plan, and in this ROD, if the additional sediment profiling (conducted during design) shows that the difference in contaminated dredged material volume requiring removal is relatively small, consideration for additional dredging may reduce or potentially eliminate the need for a subaqueous cover and future maintenance of any applied cover. Thus, EPA will consider increasing the removal depth as a component of the design to ensure long term protectiveness for the aquatic system, including improvements for aquatic life support and also the remedy's resilience (against erosion or scour).

*5. **Comment Summary:** The USFWS maintains that it is important that well-planned habitat restoration is conducted for all areas impacted during remedial actions along the River corridor and on the Unnamed Island. Restoration goals should be especially robust, with consideration of the National Heritage status of the Blackstone River, high public use and visibility along the River, and the area's importance as fish and wildlife habitat.*

EPA Response: EPA agrees with the USFWS. EPA's remedy establishes cleanup standards which are protective of recreational use activities and the environment and the selected remedy will establish protective caps/covers on the landfills, and on pond sediments (as may be necessary). The remedy will also include additional investigations, riparian restoration (including the potential off-site disposal of some landfill material and the use of bio-engineering technologies as part of capping/flood control of the landfills), long-term monitoring, and maintenance of the remedy, including conducting five-year reviews. Construction operations will be carried out in such a manner that erosion will be controlled, water and air pollution minimized, and work zones managed so as to control any potential disturbances to adjacent riparian areas and the floodplain, to the extent practical. As stated above, restoration of the river corridor (including using bio-engineered technologies) that will allow native trees and other vegetation to be established on the flood control features of the landfill slopes and other measures to provide appropriate habitat (including support of aquatic life) and aesthetic qualities commensurate with the Heritage Corridor will be addressed to the extent practical as a part of the comprehensive remedy through the remedial design process. As stated in Comment Response A6 above, during the design phase EPA intends to host design charrettes as an additional planning tool to inform stakeholders and is also willing to consider and lead other community planning activities should a number of stakeholders, including the TAG, the Towns, Corridor Commission, and/or others, be interested in participating in such a process.

*6. **Comment Summary:** The USFWS states that long-term monitoring of the remedy and restoration actions is an integral part of insuring sustainability of the system. Comprehensive remedial efforts and full habitat restoration for impacted areas will also promote a reduced natural resource damage assessment and restoration (NRDAR) claim. The federal Trustees*

(consisting of the USFWS, and NOAA) and the State of Rhode Island (as a Trustee for groundwater) will work with the Responsible Parties, once remediation and restoration are completed, to compensate the public for past, present, and future injury to natural resources, as determined through the NRDAR process.

EPA Response: EPA concurs with the USFWS in that the remedy includes implementation of a long-term monitoring component for groundwater, surface water, landfill gas, and leachate, coupled with operation and maintenance tasks (e.g., cap repairs, mowing) and institutional controls to ensure long-term protectiveness. Wetland and floodplain habitats will be restored after the contamination is addressed, to the extent practicable. EPA defers to the Natural Resource Trustees to evaluate mitigation for any losses to ponds or wetlands.

7. ***Comment Summary:*** *NOAA's principal concern is the site impact to migratory fish, as such NOAA's review principally comments on the sediment within in the ponds at the Unnamed Island (Alternative SE-3). NOAA agrees with EPA's concern of this locale given that the contamination within the sediment is, as shown in the BERA, a clear ecological risk. Hence, such sediment could move downstream to NOAA trust natural resources when: 1) common Blackstone River flooding occurs, or 2) directly impact spawning migratory fish when fish passage is completed at the three downstream dams below the passable Pratt Dam located within OU 2.*

EPA Response: EPA agrees with NOAA's statement.

8. ***Comment Summary:*** *While remaining in agreement with Alternative SE-3, NOAA questions if 1 foot of sediment removal is enough since EPA's alternative states that if contamination still exists below this one foot, EPA plans to cover this with "one foot of sediment/substrate engineered with amendments". NOAA believes that more than one foot will need removal if EPA plans to place any combination of sediment/substrate/amendments. Hence, NOAA agrees with Bullet #3 on Page 27 [of the Plan] where further sediment profiling is necessary to determine the final dredging depth.*

EPA Response: EPA agrees with NOAA's statement herein, and as commented on by USFWS above. See Comment Response B4.

9. ***Comment Summary:*** *NOAA raises concern about Pond I that is shown as removed on Figure 7 (and in the text on Page 4) [of the Plan] as part of the Nunes Parcel remedial construction. NOAA could not find any mention [in the Plan] of mitigation to account for the lost pond although the text states that riparian habitats will be restored. NOAA requests further explanation.*

EPA Response: EPA agrees with NOAA that the design should also address the mitigation of any pond habitat loss due to construction. While not clearly stated in the Proposed Plan, EPA's selected remedy includes restoration of the floodplain, to the extent practical, for habitat enrichment. The removal of the wastes at the Unnamed Island for consolidation under the protective cap(s) that are currently observed to be above mean water was considered as a potential flood compensation solution and would also mitigate for the loss of Pond I by appreciably increasing the width of Pond A (or widening Pond D) thus providing similar aquatic habitat. As a

point of clarification, Pond I, also known as the Nunes Inlet, is located inside the narrow strip of land in the Blackstone River off the Nunes Parcel. Pond I is connected to the Blackstone River only at higher water levels and it exists as a discrete pond only when the Blackstone River water level is lower.

C. Potentially Responsible Parties (PRPs) and their Representatives' Comments

In summary, EPA received comments from the PRPs on a wide variety of topics. These comments, and other items, are discussed further below with EPA responses following each comment summary.

1. Comment Summary: *Comments made regarding information presented in the Proposed Plan included:*

- *Applicability of hazardous waste closure standards on J. M. Mills Landfill*
- *Hybrid (partial) cap versus full RCRA Subtitle C cap*
  - *Cap protectiveness*
  - *Infiltration reduction*
  - *Landfill gas management*
- *EPA's Least Environmentally Damaging Practicable Alternative (LEDPA) determination*

EPA Response:

a. Applicability of Hazardous Waste Closure Standards

With respect to the applicability of hazardous waste closure standards on the J. M. Mills Landfill, as stated in Section 2.2.2 of the FS and this ROD, and supported by documents located in the Administrative Record, solid waste and industrial wastes, including assorted hazardous wastes and hazardous substances, as defined in Section 101(14) of CERCLA, were disposed of at the Facility, which includes the J. M. Mills Landfill, and have come to be located at OU 2 from approximately 1954 to 1986.[23] Since hazardous wastes were transported and disposed of at OU 2,

[23] *See also,* Unilever Bestfoods and CCL Custom Manufacturing, Inc. v. American Steel & Aluminum Corp. et al C.A. No. 01-496L, 2001 Complaint and 2002 First Amended Complaint which provides a detailed list of waste disposed of at OU 2 of the Site and presented to the U.S. District Court of Rhode Island by members of the potentially responsible party group. More specifically, see Paragraph 16 of this document which states ""Hazardous substances," as defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), were disposed of at the J.M. Mills Landfill in OU-2 and have come to be located at the Site. These hazardous substances include, without limitation, 1,1,1 trichloroethane, trichloroethylene, methylene chloride, toluene, solvent mixtures, ink, metals, waste oils, absorbents (Speedy-Dry),chlorinated solvents, methyl ethyl ketone, solvents, solid chemical waste (ignitable dust), cyanide, drums, solids and sludges, fly ash, RCRA metals, loose ink, glue waste, hydraulic and lubricating oils, acetone, tetrachloroethene, xylenes, chemical waste, copper hydroxide, plating waste, PCBs, creosote telephone poles, laboratory waste chemicals, formaldehyde, bag house waste, latex sludges, mercury batteries, recycled oils and solvents, plating cyanide solution, hazardous lime sludge with copper and nickel, automotive waste, batteries, assorted hazardous wastes, drums with labels removed, powdered metals, sulfuric acid, caustics, machine oils, waste water treatment sludge, inorganics, heavy metals, hydroxide sludge, still bottoms, filters, leather trimmings and wax plant wastes." This document can be found in the Administrative Record.

Section 3.2.2.3 of the FS focuses on the different RCRA Subtitle C requirements and whether they are "applicable" or "relevant and appropriate." As further discussed in the FS, the difference between these requirements is based on the date of disposal of hazardous waste at the Facility (whether disposal occurred on or after November 19, 1980 for the requirements to be "applicable"). While the record shows that hazardous wastes were disposed of at OU 2, it is not clear whether RCRA hazardous wastes were delivered after November 19, 1980 or prior to this date. Therefore, RCRA Subtitle C requirements have been determined to be, for purposes of this remedy decision, relevant and appropriate and not applicable. Consequently, any landfill closure design for OU 2 must comply with RCRA Subtitle C requirements as relevant and appropriate standards.

As discussed in the FS, the Proposed Plan and ROD, OU 2 waste disposal areas include the J. M. Mills Landfill, the Nunes Parcel, and the Unnamed Island (all of which operated for a time as a single landfill and disposal Facility) where contamination from the landfill operations came to be located within the floodplain of the Blackstone River. As such, these disposal areas are identified as contributing to historical and current groundwater contamination and leading to the continued release and further migration of hazardous substances to the floodplain soils and pond sediments within the OU 2 boundary. EPA, therefore, has concluded that RCRA Subtitle C requirements are relevant and appropriate standards for both the J. M. Mills and Nunes Parcel landfill closures.

b. Hybrid (partial) Cap (JM-SO-3) verses Full RCRA Subtitle C Cap (JM-SO-2)

As documented in the comparative analysis of alternatives in the FS and this ROD for the J. M. Mills Landfill, only EPA's selected remedy, JM-SO-2, currently meets the RCRA Subtitle C performance standards and ensures a long-term, protective remedy. In addition, JM-SO-2 is the only alternative that will address risks associated with hazardous waste, hazardous substances, and PCBs disposed of within OU 2 by installation of a full RCRA Subtitle C cap, versus the partial cap and soil cover presented in JM-SO-3. Furthermore, Alternative JM-SO-2 will be protective of the environment by containing the contaminant mass and eliminating potential exposure pathways while also ensuring that contamination is not released from the J. M. Mills Landfill during a flood, up to a 500-year storm event. Both Alternatives JM-SO-2 and JM-SO-3 require the implementation of deed restrictions to control land use and further protect the integrity of the cap.

Alternative JM-SO-3 (a combination of a cap and soil cover), as proposed in the FS, does not have an impermeable barrier on the side slopes of the landfill that incorporates flood protection components to prevent the migration of contamination from the landfill in the event of flooding, up to a 500-year flood event, or through continued erosion of the side slope soil cover (if not properly maintained) over the long term. A soil cover on the side slopes would allow water to infiltrate into the landfill waste and then, while receding, transport dissolved contaminants out of the landfill. In contrast, a fully compliant RCRA Subtitle C cap (JM-SO-2), with a geomembrane (impermeable top liner) incorporated into the design, would be more protective in limiting this transport process. This performance standard (with respect to cleanup vulnerabilities and

resilience) is also consistent with EPA's climate adaptation policies[24] and President Obama's Climate Change Action Plan.[25]

With respect to controlling landfill gas, Alternative JM-SO-3 does not appear to be able to meet landfill gas management requirements (40 C.F.R. Part 60) within the area of the soil cover on the side slopes. With respect to landfill gas management, the FS did not determine the specific engineering requirements for a landfill gas management system (i.e., passive or active). However, landfill gas was determined to be present and, therefore, any landfill design needs to incorporate landfill gas management. Under a presumptive containment approach for landfills, the need for landfill gas management will be determined in design consistent with the requirements found in 40 C.F.R. Part 60, whereby a landfill cap must be constructed to allow for the collection and treatment of landfill gases. The cap to be built under JM-SO-2 can be designed to incorporate either passive or active landfill gas management.

c. Least Environmentally Damaging Practicable Alternative (LEDPA)

EPA solicited public comment on its LEDPA finding within the Proposed Plan and received comments disagreeing with EPA's determining that JM-SO-2 is the LEDPA and that JM-SO-3 is the LEDPA instead. Alternative JM-SO-2, RCRA Subtitle C cap, was determined by EPA to best meet federal Clean Water Act standards and was, therefore, determined to be the LEDPA. The determination was based on JM-SO-2 providing the best balance of addressing contaminated soil/debris within and adjacent to wetlands and waterways with minimizing both temporary and permanent alteration of wetlands and aquatic habitats within OU 2. EPA is balancing the need to address the contamination that poses an ecological risk to the wetlands and waterways and its ability to restore any (temporarily or permanently) altered wetland resources and aquatic habitats impacted by the remediation. In addition, as mentioned above JM-SO-3 allows for greater infiltration of contaminants to be released from the soil cover portion of the landfill than does EPA's selected remedy. In contrast, EPA's selected remedy, JM-SO-2, will be protective of the environment by containing the contaminant mass and eliminating potential exposure pathways while also ensuring that contamination is not released from the J. M. Mills Landfill during a flood, up to a 500-year storm event. Therefore, alternatives JM-SO-2 and NP-SO-3 (both alternatives constructed meeting RCRA Subtitle C performance standards and State hazardous waste regulation requirements), are the LEDPA under the federal Clean Water Act because they provide the best balance of addressing contaminated soil/debris within and adjacent to wetlands and waterways while minimizing both temporary and permanent alteration of wetlands and aquatic habitats on OU 2.

2. Comment Summary: *Comments were made presenting another alternative, an Evapotranspiration Cover or ET Cover, which was not identified as a potential viable alternative by EPA in the FS. Information was included on relevant background information regarding ET*

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[24] See "Climate Change Adaptation" on EPA's website at: http://www.epa.gov/superfund/climatechange/; especially "Climate Change Adaptation Technical Fact Sheet: Landfills and Containment as an Element of Site Remediation" EPA 542-F-14-001, May 2014.

[25] "The President's Climate Action Plan," Executive Office of the President; June 2013.

covers, a conceptual ET cover design (with preliminary supporting data) for the J. M. Mills Landfill, and a preliminary cover equivalency determination for the conceptual ET cover design.

EPA Response: While EPA agrees that an ET (soil and vegetation) cover system can be appropriate for certain waste site closure scenarios where waste characterization and soil structure, both above and beneath the waste, is well known, based on the information provided by the commenter, it does not appear the ET Cover is appropriate for the landfills in OU 2. Climate, precipitation, facility siting considerations (particularly regarding floodplain issues), and engineering control considerations related to OU 2 are not favorable for an ET Cover meeting all required ARARs.

RCRA Subtitle C performance standards are triggered because hazardous wastes, as well as PCBs (regulated under TSCA), were disposed of at OU 2. OU 2 is also located predominantly within the 500-year floodplain (Federal Emergency Management Agency FIRM, 2009), with much of the area below the 500-foot flood elevation, thereby making it necessary to design a cap that can withstand a 500-year flood (consistent with federal floodplain standards at 44 C.F.R. Part 9 and as described in greater detail below). Finally, OU 2 resides in a climate that is not conducive to ET cover construction for the standards of cap performance required for OU 2.

Based on information provided by one of the commenters (a more detailed response to the PRP commenter's ET cover is located in Comment Response C3 below) and forwarded by the Town in its comments, an ET cover system is designed such that the thickness and/or nature of the soil cover layer allows for precipitation to be absorbed and stored and then either evaporated and/or transpired through vegetation. More appropriate use of the ET cover system has been in arid and semi-arid regions of the country where precipitation and/or the length of the growing season are conducive to these cover design features. Four examples of ET covers from the PRP commenter were identified in the Town of Cumberland's written comments. A review of the conditions associated with each ET cover system presented reveals that the examples provided and the conditions at OU 2 are remarkably different. The ET cover systems described in the examples are installed in a semi–arid climate (e.g., Rocky Mountain Arsenal) or in climates with longer growing seasons (such as Missouri or Georgia), or where the waste to be covered met solid waste regulations but no hazardous waste was known or described in the examples provided. No description was given as to whether any of these example sites were located such that hazardous waste was disposed within a significant river floodway. These differences are significant because the closure requirements for the example sites forwarded by the Town are different to those of OU 2.

EPA has considered the water balance (precipitation and infiltration) provided for a conceptual ET cover by the PRP commenter and concluded that many assumptions made by the commenters are not appropriate in relation to what has actually occurred during more recent winter months in the New England region (i.e., there has been more precipitation/infiltration) when the planted species would be dormant. While EPA acknowledges that some deficiencies in the conceptual design provided by the commenters could be adjusted (e.g., construction soil types, increase in applied volumes relating to cover thickness), many of these adjustments would then make an ET cover impractical. ET cover systems, as described in comments discussed here and in Section C of this Responsiveness Summary, have not been designed and constructed for hazardous waste

containment in the New England region. As a result, both short and long term performance uncertainties remain unresolved, especially for the OU 2 Landfills, which are located within a floodplain. In addition, design requirements for an existing or planned containment system must focus on: (1) evaluating the system's vulnerability to climate change; and (2) implementing adaptation measures, when warranted, to ensure the remedy continues to prevent human or environmental exposure to contaminants of concern.[26] Since there is significant performance uncertainty regarding ET cover systems in the OU 2 circumstance, it would be necessary, if an ET cover were used, to also design and potentially implement a contingent remedy, thus adding the cost of the contingent remedy to the overall response costs (see further discussion of this issue in Comment Response C3, particularly in relation to one of the commenter's examples, the Welsh Road Landfill Superfund Site).

EPA did not select the ET cover (as presented at the public hearing and again in written comments), because the technology would not appear to comply with all ARAR requirements that pertain to OU 2. These include, but not are not limited to: RCRA (Subtitle C regulations at 40 C.F.R. Part 264); Wetland Protection and Floodplain Management regulations (44 C.F.R. Part 9); TSCA and regulations promulgated under it (15 U.S.C. 2601 *et seq.*; 40 C.F.R. Part 761); RI Rules and Regulations for Hazardous Waste Management (R.I.G.L. 23-9.1 *et seq.*; CRIR 12-030-003) and RI Remediation Regulations (C.R.I.R.12-180-001). One potential compliance issue is that an ET cover on the landfills without an impermeable barrier, even with rooted plant material, would allow water to infiltrate through the cover and into the landfill waste (particularly in the winter when the vegetation would be dormant). The water that percolates through the cover, has the potential to pick up and transport dissolved contaminants out of the landfill through various hydrologic mechanisms (such as leaching). This amount of potential infiltration would not meet requirements under 40 C.F.R. Section 264.300 to prevent contaminant migration. In comparison, EPA's selected alternative, JM-SO-02, can be designed and implemented to achieve these standards.

Under EPA's selected remedy for OU 2, the riparian habitat will be restored, as practicable, and a vegetated cap consisting of native vegetation will be installed to maintain habitat biodiversity. An important consideration when selecting plants for a site is Executive Order 13148, which promotes use of native species on re-vegetated sites.[27] Preference will be given to reducing or controlling the construction footprint to the extent practical, and restoring and stabilizing the riparian buffer to limit scour and erosion through the use of native plantings, soil bioengineering, and structural systems. Ecological functions and values along the riverbank, through the combination of hard (riprap revetment) and soft (vegetation) engineering practices, are anticipated that will also function to provide the aesthetic qualities defined by users of the Blackstone River Corridor. Such measures for erosion control and bank stabilization methods (including bioengineering solutions) are outlined in the Rhode Island Soil Erosion and Sediment Control Handbook (Revised August 2014), and otherwise further specified in the Rhode Island

[26] See "Climate Change Adaptation Technical Fact Sheet: Landfills and Containment as an Element of Site Remediation" EPA 542-F-14-001, May 2014.
[27] See: Vegetating Landfills and Waste Containment Areas Fact Sheet, Office of Superfund Remediation and Technology Innovation" EPA 542F-06-001, October 2006.

Stormwater Design and Installation Standards Manual (December 2010), among other guidance documents that will be used to develop the remedial design for the selected remedy.

While the ET soil cover system was not presented or discussed in the FS, a brief evaluation/comparative analysis discussing the ET soil cover system relative to several of the CERCLA criteria is presented below. This additional analysis does not include any cost evaluation since no cost information, detailed construction materials, or volumes were provided by commenter. It is important to note that the brief evaluation/comparative analysis below is based on information provided by the commenter.

Overall Protection of Human Health and the Environment

The ET Cover, as presented, is not protective because it does not appear to fully reduce the infiltration and the potential for leaching of contaminants in soil to groundwater (see next paragraph), does not appear to fully address potential landfill gas releases, and does not appear to ensure that contamination is not eroded or washed out of the landfills during any flood, up to a 500-year event.

EPA has considered the water balance provided for the conceptual ET Cover and concluded that many assumptions provided in the comment package were not appropriate in relation to what has actually occurred during more recent winter months in the New England region (i.e., there has been more precipitation/infiltration) when the planted species would be dormant. Climate change vulnerability and adaptation planning leading to increased remedy resilience also need to be considered. While EPA acknowledges that some deficiencies in the conceptual design can be adjusted (e.g., construction soil types, applied volumes relating to cover thickness), many of these adjustments would likely make the cover impractical. For example, if the 2-foot-thick soil layer is made much thicker to provide for additional moisture storage capacity during winter months, the thickness may then be too great to support the proposed poplar tree root zone in order to efficiently wick moisture (only during the region's growing season) throughout the full soil cover/moisture storage zone. The additional thickness necessary for the moisture storage would then also create a soil cover thickness which is much greater than the proposed RCRA Subtitle C cap and which may also cause stability issues on steepened side slopes or create a larger, more extended overall cover footprint than is necessary to meet the RCRA Subtitle C performance standards.

Compliance with Applicable or Relevant and Appropriate Requirements

The ET Cover, as presented, does not appear to fully meet chemical-specific, location-specific, or action-specific ARARs, because the cover would not prevent the release of contaminants in the event of a flood, up to a 500-year storm event that would alter areas of floodplains and state and federal jurisdictional wetlands. Further, the current ET Cover does not comply with RCRA Subtitle C standards as required for landfills containing hazardous waste (e.g., closure requirements specified in 40 C.F.R. Section 264.310 to ensure that the migration of any hazardous constituents through the closed landfill and into the groundwater or surface water at any future time is prevented). The ET Cover also will not allow for landfill gas control standards to be achieved.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence may not be achieved by the ET Cover, as presented, as it does not appear to meet RCRA Subtitle C performance standards, and may not prevent the release of contaminants in the event of a flood, up to a 500-year storm event.

Reduction of Toxicity, Mobility, or Volume Through Treatment

The ET Cover does not involve any treatment processes.

Short-Term Effectiveness

The soil removal activities are the same for all active remedial alternatives (which would include the ET Cover if utilized); therefore, the short-term risks to workers, the community, or the environment from soil removal are equal for these alternatives. The soil removal activities will be managed through engineering controls and worker training.

All capping alternatives (including the ET Cover) will require clearing and grubbing of the vegetation and extensive regrading of the J. M. Mills and Nunes Landfills (with the potential need to dispose of some of the material off-site) prior to construction. During implementation, engineering measures will be used to restrict access, control potential air emissions, fugitive dust, or surface water runoff. Comparatively, it is unclear whether the RCRA Subtitle C cap would require a higher volume of materials to be brought onsite versus an ET Cover (see discussion of soil cover thickness in Overall Protection of Human Health and the Environment discussed in Part 2, Section K, of this ROD). In either case, use of the active railroad system may also reduce traffic impacts for whatever alternative is implemented.

Implementability

For all landfill closure alternatives, the location and protection of the caps/covers along the riverbank will present a significant technical challenge. Each alternative requires phased design/construction planning elements, large quantities of material handling, and there are known space and access limitations that may interfere with construction of the cap or cover. The landfill closure options are equal in that each includes the removal, clearing and grubbing of the vegetation, and regrading of the landfills (prior to construction of the cap or cover) and the areas of the riverbank and floodplain where soil removal will occur. When comparing the RCRA Subtitle C cap to an ET Cover, it is unclear which may be more difficult to implement, as the thickness of an ET Cover that will be reliable for long-term performance in the New England region has not been documented at this time (see discussion above). The number of trees necessary for the ET Cover to provide the density for adequate zone coverage for reasonable water uptake will be quite large and spacing of these plants over the entire area of containment may be highly restrictive to some recreational activities (see discussion of the landfill examples presented by the PRPs' consultant, below in Comment Response C3).

Furthermore, similar to the Welsh Road Landfill Superfund Site example provided by the commenter and discussed in more detail below in Comment Response C3, if an installed ET Cover is found to be under performing, a contingent remedy would need to be implemented. Thus, returning to the RCRA Subtitle C cap design to meet performance standards would thereby

result in additional short-term impacts to the community and environment, a significant potential increase in cleanup time, and increased costs. Moreover, a critical evaluation for providing assurances that performance standards are met would be delayed at least five years (or even longer as with the example of the Welsh site) which would only lengthen the process for determining protectiveness at OU 2.

*3. **Comment Summary**: Comments were provided to EPA identifying specific sites as ET Cover examples for consideration.*

EPA Response: EPA has reviewed the examples provided by the commenter and disagrees that the specified examples presented in written comments and at the hearing, are reasonable surrogates for this Site.

EPA's findings are briefly summarized below:

Welsh Road Landfill Superfund Site in Honeybrook Township, Pennsylvania: This site consists of approximately 7 acres located along the side slope near the top of Walsh Mountain. In 1990, a remedy was selected to require the construction of a multi-media cap that meets the requirements of the Pennsylvania Municipal Solid Waste Regulations. Later, in 1996, as an outcome of RD/RA negotiations, an amendment to the ROD allowed for the design and installation of an ET cover. The State's solid waste regulation was found to be applicable to the ET cover remedy, however, EPA's Region 3 Office waived certain State requirements because it was agreed that the remedy must undergo a required functional equivalency evaluation measured against State Solid Waste Regulatory performance standards. At the time of this Responsiveness Summary and ROD for OU 2, this equivalency determination had not been performed. If found to be under performing, the amended ROD provides for a contingent remedy to be implemented, thus removing the ET cover system and returning to the prior decision of a multi-media landfill cap that was called for in the 1990 ROD. The ET cover system consists of a three to four foot thick soil rooting layer and a vegetative layer consisting primarily of hybrid canopy producing trees. In total, approximately 4,090 trees were planted as part of this ET cover system. The trees were installed at a frequency of 705 hybrid poplar/willow trees and 75 (or less than 10 percent) inter-planted native tree species per acre. This ET Cover system has been designed to be maintained in place for an indefinite period and the trees are an integral part of the remedy. Therefore, the potential for any plausible recreational reuse of the site is extremely limited. The perimeter of the site is fenced by a six-foot high steel wire mesh fence. Landfill gas mitigation measures were also required to reduce site perimeter and off-site methane migration at concentrations above health-based levels.

In contrast, the area of the J. M. Mills Landfill (and not including the Nunes Parcel) is approximately 5 times larger or 36 acres. Using the planting specifications applied to the Welsh site, a similar ET cover on the J.M. Mills Landfill would require the installation and maintenance of nearly 28,100 trees to accomplish the similar per acre tree density. Commonly, hybrid (rather than native) poplars and willows were the tree species used for the Welsh site because of the quick growth and deep root structure. The literature provided by the commenter indicates that the hybrid poplar can grow 6 feet in one year, ultimately reaching heights of over 70 feet. The lifespan of this tree is 30 to 50 years. However, hybrid trees (which would not provide the native characteristics or traits indicative of a New England woodland) that are installed as a mono-

cultured planting across the 36+/- acre landfill may not be of exceptionally useful value for supporting a locally-diverse, native riverine habitat along the Blackstone River. This would be in contrast to several other commenters who requested that native species be used during the restoration activities following installation of the cap.

At the Welsh site more than several growing seasons were required for the described ET cover system to become established and to be considered functional at reducing infiltration. Maintenance requirements for the ET cover system were noted to be intensive during the initial several years following installation. For the Welsh site, an initial evaluation was conducted in 2010 to measure the cover performance in reducing infiltration. At best, the data indicated that the cover may have achieved approximately 81% reduction. This reduction was near the high end of the range of average percolation reduction predicted by modeling (i.e., a predicted range of 46% to 86% reduction in infiltration) over the course of the year. However, this is still well below the expected performance of a RCRA Subtitle C cap, which is equivalent to or higher than 98.99% infiltration reduction if properly installed and maintained, as called for under the JM-SO-2 component of EPA's selected remedy. Lastly, long term performance and protection equivalency evaluations, while planned, have not as yet been performed at the Welsh site. A contingency remedy for reverting back to a traditional, multi-media cap is still in place for the Welsh site should performance of the ET cover not meet landfill closure performance equivalency. It would be important to point out that having a contingent capping remedy in place for OU 2 likely would also be necessary and this would greatly add to the potential remedy impacts and costs.

Lower Darby Creek Area Superfund Site (Clearview Landfill), Philadelphia, Pennsylvania: Similar to the Welch Road site discussed above, the selected remedy is for an ET cover system proposed on a 50 acre landfill. The site is located in the vicinity of a creek and the remedy calls for collecting leachate in a trench before the creek bank, with treatment of leachate contaminants planned to be performed in a wetland. At the time of this review, the design and construction of this cover system has not been completed. It is important to point out that hazardous waste disposal was not identified as a concern for this site, which is in sharp contrast to the documentation and concerns identified at OU 2. As such, a multi-layer impermeable cap was not carried through the detailed analysis of alternatives at Clearview. Again, a waiver of the State Solid Waste Regulations (an ARAR) was necessary and performance standards for the cover are less stringent. Thus, site comparisons to OU 2 are very dissimilar in this regard.

Oil Terminal, East Providence, RI: Cleanup of this site is managed by the RIDEM Office Waste Management. Upon EPA's review with RIDEM, it is noted that there is no ET cover constructed for the specific management of landfill wastes at this facility. Rather, among other remedial measures undertaken, a multi-layer cap was constructed over the landfill wastes following State closure standards (an impermeable cap installed) and a phytostabilization technology was applied to areas off the cap using the installation of 15,000 trees over an estimated 40 acres that provide passive hydraulic control of shallow groundwater via evapotranspiration mechanisms. Therefore, in regards to comparisons of this RIDEM site to OU 2, no ET cover was installed and the application of phytoremediation was in response to the management of migration of shallow groundwater and not utilized as a source control measure.

Bridgeport Rental and Oil Services (or BROS) site, Logan Township, New Jersey: As with the description of the site above, no ET cover was constructed for the management of landfill wastes. This site is a 30-acre parcel of land, formerly used as a waste oil storage and recovery facility with a 13-acre waste oil and wastewater lagoon. Remediation of the site primarily included the on-site incineration of 172,000 tons of contaminated materials (oil, sediments/sludges, soils and debris) and the treatment of 200 million gallons of lagoon waste water and the removal of waste oils. Also, as indicated above, implementation of other groundwater hydraulic control measures including, but not limited to, planting of over 12,000 hybrid poplar trees were also incorporated as a phytoremediation technology. Again, in regards to comparisons for the use of an ET cover as a source control applied to a landfill, the application of phytoremediation as a groundwater response action is not relevant here.

Two additional New York sites cited: Regarding the two NY sites cited, each is managed under the State of New York (RCRA sites) and less information is readily available for comparison purposes herein. However, for each site it was apparent that design objectives for the phytoremediation component are to provide a barrier (relevant to the risk of human contact) and to reduce infiltration, but only to retard the lateral migration of shallow groundwater, and to reduce seep water into a functional native ecosystem. There was no indication found that the covers installed provided an equivalency in performance to a RCRA Subtitle C, or equivalent cap, as found to be relevant and appropriate for OU 2.

In summary, the examples presented by the PRPs' consultant for an ET Cover system do not provide clear comparisons to the performance requirements established for OU 2. Furthermore, a review of the EPA literature indicated that there is no NPL site within approximately 200 miles of OU 2 where an ET Cover is constructed to meet engineering requirements involving known hazardous waste disposal, performance requirements to limit infiltration, and/or providing protection against floods.

4. Comment Summary: *In a comment letter to EPA, a commenter revised EPA's RAO as presented in the FS and the Proposed Plan from "Prevent infiltration and washout during flooding, up to a 500-year flood event" to "Preventing Future Damage to the Cap."*

EPA Response: As mentioned in the Site Description of this ROD, OU 2 lies predominantly within (or below) the 500-year floodplain (Federal Emergency Management Agency FIRM, 2009). RAOs were developed to aid in the development and screening of alternatives. These RAOs, including the one mentioned in this comment, were developed to mitigate, restore, and/or prevent existing and future potential threats to human health and the environment and to attain state and federal ARARs. Discussion about the ROD's RAOs is presented in Part 2, Section L, of this ROD. Further discussion can also be found in Comment Response A9 above as well as in response provided below.

The commenter's proposed RAO language fails to address all of the flood protectiveness criteria that need to be addressed within the RAO, based on ARARs for floodplain management identified in Table I-4 of the ROD and in the FS. The protectiveness requirements are not limited to preventing damage to the cap, but also require that contamination not be discharged from the landfill in the event of flooding and inundation (inundation of the landfill side slope during a

flood may allow for potential contaminant migration to flow through the side slope even through the cap itself is not physically damaged).

5. Comment Summary: *Recommendations were made by some commenters to modify EPA's preferred capping approach (JM-SO-2) by selecting the hybrid cap/cover (Alternative JM-SO-3) for the J. M. Mills Landfill, selecting the RCRA Subtitle D cap (Alternative NP-SO-2) for Nunes Parcel, and revising the PRGs. In addition, comments were made regarding protectiveness of the hybrid cap/cover (Alternative JM-SO-3) at the J. M. Mills Landfill versus the EPA-recommended full RCRA Subtitle C cap (JM-SO-2). Specific subjects mentioned in the comments included:*

- *Flood protection*
- *Infiltration reduction and hazardous waste closure standards*
- *Landfill gas management*
- *LEDPA*
- *Groundwater and long-term minimization of liquids*
- *PRGs*
- *Quinnville Wellfield*

EPA Response: Please see Part 2, Section K, of this ROD, as this comment is addressed in this Section. See also EPA's Comment Response C1 as to why the selected remedy better achieves the standards listed in the comment, above, than the PRPs' preferred alternatives.

a. Flood Protection

While engineered and protective measures would need to be implemented to limit floodwaters from contacting the "hybrid" (soil only side slopes) cap, based on historical evidence of the area during flooding, it is unlikely that floodwaters would be prevented from contacting the cap/cover without engineering an obstructive wall/berm, which would then be both aesthetically unpleasing and limit access to the site for future reuse. A soil cover on the side slopes would allow water to infiltrate into the landfill waste and then, while receding, transport dissolved contaminants out of the landfill. A fully compliant RCRA Subtitle C cap, with a geomembrane (impermeable top liner) incorporated into the design, would be more protective in limiting this transport process.

b. Infiltration Reduction and Hazardous Waste Closure Standards

Regarding infiltration reduction and hazardous waste closure standards, the waste will be addressed through the presumptive approach as described in Section D of the ROD. Waste disposal activities took place as part of Facility operations conducted throughout OU 2, including the J. M. Mills Landfill, which included the disposal of hazardous waste (see Comment Response C1 for more information). Therefore, relevant and appropriate RCRA Subtitle C landfill closure regulations (pursuant to the Rhode Island Rules and Regulations for Hazardous Waste Management § 8.2(A) that incorporate the requirements of RCRA Subtitle C performance standards at 40 C.F.R. Section 264.310) apply to the design of the cap for entire former Facility, including the J. M. Mills Landfill and Nunes Parcel, where contamination from the landfill operations within OU 2 came to be located within the floodplain of the Blackstone River.

EPA disagrees with the commenter's characterization that JM-SO-3 (the hybrid/cap cover alternative) provides enough infiltration protection. It should be noted that there have been elevated levels of groundwater above risk based standards within the compliance boundary, and the RAO for this remedy is to ensure that there is no migration of contamination beyond the compliance boundary encircling the waste management areas. Therefore, a RCRA Subtitle C cap, JM-SO-2, which reduces contaminant infiltration by 99% is more protective. Furthermore, JM-SO-3, as presented in the FS, does not meet the performance standards for controlling infiltration as required under the Rhode Island Rules and Regulations for Hazardous Waste Management § 8.2(A) that incorporate the requirements of RCRA Subtitle C performance standards at 40 C.F.R. Section 264.310. We agree with the commenter that the full RCRA Subtitle C Cap reduces infiltration by 99% thus providing more protection in the control of the migration of liquids through the closed landfill.

The commenter also said that a RCRA Subtitle D Cap with a single membrane liner, as proposed in NP-SO-2, would be sufficiently protective for landfill closure for this portion of OU 2. In support of this position the commenter cited the Inactive Landfill Closure Policy and presented examples of Rhode Island solid waste landfills closed under this policy. EPA has reviewed this Policy and it does not apply to CERCLA sites, such as OU 2 because it is under federal jurisdiction.

c. Landfill Gas Management

EPA's analysis in the FS identified significant concerns about the ability to design and construct a landfill gas control system under the hybrid cap/cover alternative (JM-SO-3) due to the inability to collect gas generated under the soil cover portion of the proposed hybrid alternative. The RI Report identified the presence of landfill gas emanating from the existing five landfill gas vents located at the top of the J. M. Mills Landfill. Most vents exhibited low levels of certain VOCs, carbon dioxide, and methane with the exception of one vent having more significant levels of these constituents including a concentration of 59% by weight of methane. Additional analysis discussing landfill gas control systems is found in Comment Responses A1, A11, A43, and C1.

d. LEDPA

EPA solicited public comment on its LEDPA finding within the Proposed Plan and received comments (see Comment Responses A15, B3, and C1 above).

e. Groundwater and Long-Term Minimization of Liquids

With respect to groundwater, the commenter concluded that RCRA Subtitle C closure requirements will not make any appreciable difference on the migration of liquids because groundwater detections at OU 2 are primarily arsenic resulting from anaerobic conditions located near the J. M. Mills Landfill. This statement is not entirely true. As identified in RI Report, and reported in this ROD, VOCs have also been detected during the RI. VOCs detected in groundwater in the vicinity of the J. M. Mills Landfill most frequently above screening criteria consist of benzene, chlorobenzene, chloroform, and 1,4-dichlorobenzene. During the RI, benzene was present (at the toe of the J. M. Mills Landfill, and also within EPA's established groundwater compliance boundary) above the federal Maximum Contaminant Level (MCL) and was a risk

driver for the human health risk assessment. The majority of the other VOC screening level exceedances were marginally above their corresponding PALs during the RI.

Due to a lack of data collected by the PRP Group during the RI, EPA disagrees with the commenter's ability to draw a conclusion that higher groundwater concentrations of metals along the toe of slope of the J. M. Mills Landfill (as well as the Nunes Parcel) likely are indicative of redox conditions which may exacerbate any groundwater impacts (i.e., mobilization of naturally occurring metals). Historically, leachate samples taken at the base of the J. M. Mills Landfill as part of previous whole-Site investigations (1987-1990) exhibited elevated concentrations of chlorinated solvents, semi-volatile organic compounds, and inorganics (C-E Environmental, Inc., 1990).[28] While seeps were reported by EPA at the time of the RI planning, the PRP Group's field crews reported that these seeps were not present when field work was conducted during the OU 2 RI. Therefore, seeps could not be sampled by the field crews during the scheduled RI field investigations. However, the TAG in its comments [29] to EPA's National Remedy Review Board raised a concern about leachate migration from areas of buried waste to the Blackstone River as documented in photos supplied as an attachment. As a part of the Conceptual Site Model for this OU, and consistent with a presumptive approach for containment, leachate production remains plausible for all capping alternatives (JM-SO-2 and JM-SO-3). Consistent with the components of the presumptive containment approach, the remedy includes source area leachate control and treatment, as may be necessary, for protectiveness. Long-term monitoring of groundwater, surface water, sediment, and leachate, coupled with operation and maintenance (e.g., cap repairs, mowing) and ICs are included under the selected remedy that will further address the issues raised by the commenter.

EPA's risk assessment also evaluated future potential risks to groundwater throughout the entirety of OU 2 since waste disposal operations were conducted at the J. M. Mills Landfill, the Nunes Parcel, and the Unnamed Island (all of which operated for a time as a single landfill and disposal Facility) where contamination from the landfill operations came to be located within the floodplain of the Blackstone River. These disposal areas are identified as contributing to historic and current groundwater contamination. As described in the RI Report, groundwater affected by these compounds is shallow and, based on predominant shallow groundwater flow directions, likely discharges to the Blackstone River. Equally important, the federal groundwater classification within OU 2 is Class 2B (a future drinking water resource). As defined in the 1986 Draft Guidelines for Ground Water Classification, Class II ground waters were described as current and potential sources of drinking water, and water having other beneficial uses. Rhode Island does not have an EPA-approved Comprehensive State Ground Water Protection Program, thus the federal classification for groundwater applies to the federal CERCLA remedial action.[30] Tables G-10 through G-11 in Appendix C of this ROD depict the carcinogenic and non-

[28] C-E Environmental, Inc. 1990. Remedial Investigation Report for the Peterson/Puritan Site, Cumberland, Rhode Island. Report prepared for CPC International, Inc.

[29] GeoInsight, 2013. Focused Comments on Two Components of the Proposed Plan, Peterson Puritan Superfund Site Operable Unit 2 (OU 2) Cumberland and Lincoln, Rhode Island May 9, 2013.

[30] The State's classification for the groundwater within OU 2 is GAA (known or presumed to be suitable for drinking without treatment). While it may be seen as functionally equivalent in this case, this classification is not applied to the CERCLA remedial action.

carcinogenic risk summary for the chemicals of concern evaluated to reflect potential future potable water exposure corresponding to the reasonable maximum exposure scenario, under the assumption that groundwater from OU 2 is used as a source of potable water in the future. For the future resident using untreated groundwater as household water, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6} and/or a target organ hazard index of 1 for groundwater. The exceedances were due primarily to the presence of arsenic, carcinogenic polyaromatic hydrocarbons (PAHs), 1,4-dioxane, 4-chloroaniline, atrazine, bis(2-ethylhexyl)phthalate, naphthalene, 1,4-dichlorobenzene, chloroform, ethylbenzene, methyl tert-butyl ether, trichloroethene, vinyl chloride, aldrin, dieldrin, PCBs, benzene, aluminum, cadmium, cobalt, iron, manganese, and thallium in OU 2 groundwater. It should also be noted that tetrachloroethene was originally a primary groundwater risk driver in the baseline human health risk assessment. However, based on changes to toxicity values, risk refinements performed in the FS resulted in the removal of tetrachloroethene as contributing to risks in OU 2 groundwater. Similarly, trichloroethene was originally not a primary groundwater risk driver in the baseline human health risk assessment, but based on recent changes to toxicity values, risk refinements performed in the FS resulted in the addition of trichloroethene as contributing to risks in OU 2 groundwater.

EPA's selected remedy does not include any treatment of the groundwater because there is currently no groundwater above the performance standards beyond the compliance boundary. As part of EPA's selected remedy, one of the RAOs presented in the ROD states that, if necessary, the remedy will collect and treat leachate to prevent further contaminant migration to the Blackstone River, based on federal and State water quality standards and RCRA Subtitle C landfill closure standards. As stated in more detail in Comment A9, one of the RAOs for groundwater seeks to prevent contaminant migration from the source areas to the Blackstone River via groundwater. Thus, controlling landfill leachate (beyond the installation of the protective caps), or groundwater, with contaminant concentrations above the established performance standards which may migrate beyond the compliance boundary, can be implemented as a component of the presumptive approach, if required. Long-term monitoring of groundwater will be performed to ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause groundwater outside of the compliance boundary to exceed drinking water standards. Long-term monitoring of the Blackstone River surface water/sediment will also ensure groundwater contamination is not migrating into the River at levels above performance standards (see Part 2, Section L, of this ROD). Monitoring will include the appropriate sampling strategy to evaluate degradation processes that may decrease contaminant concentrations in groundwater and biogeochemical processes that may increase contaminant concentrations in groundwater (e.g., arsenic) and be performed on a regular schedule so as to provide trend analyses and tracking of contaminant behavior, especially during times of variable wet/dry seasonal events. In addition, there will be periodic reviews no less than every five years as required by statute. For more detail on the groundwater monitoring within the compliance boundary, see Comment Response A20.

f. PRGs

The commenter suggests revising the PRGs to consider local background conditions at OU 2 because the PRGs are more conservative than needed thereby resulting in more excavation than is

necessary. As discussed in Section 3 of the FS, the risk evaluations for human health and ecological risk assessments led to the development of all human health-based and ecological-based PRGs/Performance Standards that were developed, reviewed, and further refined by EPA in consultation with RIDEM. The PRGs are selected by considering the ARARs, risk-based PRGs, and, if present, established background levels.

In the FS, PRGs/Performance Standards were developed for OU 2 to prevent exposure to groundwater, soils, and sediment with site-related contaminant concentrations that may present human health and/or ecological risks (see Tables 3-3 through 3-6 of the FS). If there are established ARARs for chemical-specific concentrations (e.g., federal or state MCLs, or RIDEM DECs) these are often selected as PRGs/Performance Standards. In the absence of established ARARs, risk-based PRGs are developed consistent with EPA's guidance standards unless there are higher background levels established based on EPA guidance standards.

EPA disagrees with the commenter's conclusion that EPA did not review data in development of the PRGs. All available and relevant data sets have been reviewed and considered in the development of PRGs by EPA. In November 2012, additional sediment and soil samples were collected by the PRP Group to supplement the existing RI database. During the same November sampling event, soil and earthworm samples were also collected from near-site and reference locations along the Blackstone River with the objective of re-evaluating potential risks to small omnivorous birds and to reduce uncertainty from previous risk calculations by incorporating site-specific measures of cadmium bioavailability. This data was collected as part of a fast-track investigation and, therefore, a formal Work Plan (which would include, among other information, defined Data Quality Objectives and sampling station locations) was not prepared for EPA's review and approval.

In June 2013, EPA reviewed two white papers prepared by the PRP Group based on this supplemental sampling effort. These white papers are part of the Administrative Record and are included in Appendix E of the FS, along with EPA's evaluation of this information in Appendix D of the FS. EPA's summation resulting from these evaluations[31] indicated the 2012 data sets for all chemicals presented in the PRP Group's Background Screening Levels memorandum showed a high degree of variability and may have been influenced by other confounding factors including, but not limited to, an insufficient data set leading to statistical uncertainties for use in quantitative decision making. Thus, the evaluation of the additional data collected by the PRP Group in 2012 and reviewed by EPA in 2013 did not support making any changes.

After reviewing and considering the PRP Group's white paper, EPA elected to reevaluate risks for small omnivorous birds from cadmium, and further considered refinement of the cadmium PRG. The effect-based toxicity reference value (TRV) that was established in the 2009 BERA for

[31] USEPA, 2013a. Review of technical memorandum titled: Background Screening Levels for Sediment and Soil Supplemental Data Collection Efforts. Memorandum from Bart Hoskins to Dave Newton. June 21, 2013, and USEPA, 2013b. Review of memorandum titled: Peterson Puritan, Inc., Superfund Site Cumberland and Lincoln, Rhode Island, Small Omnivorous Bird Risks at the J. M. Mills Landfill; Supplemental Data Collection Efforts. Memorandum from Bart Hoskins to Dave Newton. November 18, 2013.

cadmium was 3.05 mg/kg body weight (BW)-day. However, as a final review step, the TRVs used in the BERA were compared with BERAs developed by EPA for other sites. EPA found that for another site, an effect-based avian TRV for cadmium had been calculated using the toxicity studies used to develop the Ecological Soil Screening Level for cadmium. The recalculated effect-based TRV was 6.35 mg/kg BW-day, which is about two times higher than the value used in the 2009 revised BERA. This TRV was used to update the model calculations provided by Arcadis using updated site-specific earthworm uptake data (Arcadis, 2013). As a result, an alternative avian effect-based TRV for cadmium of 6.35 ppm was used as a final risk refinement step. This would allow expanding the risk range for consideration in the ROD and remedial design to include an upper bound soil PRG of 3.93 ppm for cadmium (from 1.9 ppm previously reported in the 2009 BERA). The revised PRG recognizes uncertainty in the original risk range, and allows EPA to balance habitat damage against risk in selecting an appropriate degree of remediation. As such, ecological PRGs (which are further described in Section 3.5 of the FS) and contained in the ROD take into account refinements in risk assessment as well as consideration of background concentrations.

The commenter also questioned EPA's identification of RIDEM's residential DEC as an ARAR, of which a number of soil PRGs were derived. The commenter also found no citation in RIDEM's regulations stating that residential DECs must be used for all recreational scenarios thereby impacting the PRGs established for OU 2. EPA disagrees with the commenter because RIDEM Remediation Regulations establish DECs for unrestricted recreational use which apply to OU 2. More specifically, these definitions state:

> 3.34: Industrial/Commercial Activity shall mean any activity related to the commercial production, distribution, manufacture or sale of goods or services, or any other activity which is not a traditional residential activity as defined by this Section including activities related to outdoor recreational areas with restrictions in place to limit potential exposure.
>
> 3.58: Residential Activity shall mean any activity related to a (1) residence or dwelling, including but not limited to a house, apartment, or condominium, or (2) school, hospital, day care center, playground, or unrestricted outdoor recreational area.

Therefore, the current and expected future use of OU 2, which is unrestricted recreational use, must meet RIDEM's residential DECs. See also Part 2, Section L of this ROD for further details about the ROD's Remediation Goals (RGs).

g. Quinnville Wellfield

The commenter also raises a concern regarding contaminant concentrations above established PRGs (e.g., lead concentrations) at the Quinnville Wellfield located across the Blackstone River and upgradient from the OU 2 waste management areas but is within the RI study area for OU 2. The commenter questioned why these concentrations can remain in place but areas with lead concentrations above PRGs located adjacent to the landfills are being remediated.

As the commenter noted, the Quinnville Wellfield is located across the Blackstone River and upgradient from the sources areas and operations that took place at the Facility. Based on the

location of Quinville Wellfield relative to the OU 2 source areas and lack of a clear contaminant migration pathway across and upgradient of the Blackstone River, contamination detected at Quinnville Wellfield is considered to be not significantly site-related. For this reason, no action is necessary in these areas as part of the OU 2 remedial action. The human health and ecological risk refinements performed during the FS (see Sections 3.1.1 to 3.1.3 of the FS) concluded no current exceedance of risk criteria or unacceptable risk from OU 2 contamination which would drive a remedial action at the Quinnville Wellfield.

*6. **Comment Summary:** Comments were made regarding protectiveness of the RCRA Subtitle D cap (Alternative NP-SO-2) at the Nunes Parcel versus the EPA-recommended full RCRA Subtitle C cap (Alternative NP-SO-03). Specific subjects mentioned in the comments included:*

- *Hazardous Waste Protectiveness*
- *LEDPA*

EPA Response: Please see Part 2, Section K, of this ROD which summarizes EPA's detailed analysis of waste alternatives for the Nunes Parcel. The waste will be addressed through the presumptive approach; a protective landfill cap that encompasses the waste in its current placement. As described in Section D of the ROD, waste disposal activities took place as part of Facility operations conducted throughout OU 2, including the Nunes Parcel, which included the disposal of hazardous waste (see Comment Responses A1 and C1). Therefore, relevant and appropriate RCRA Subtitle C landfill closure regulations (pursuant to the Rhode Island Rules and Regulations for Hazardous Waste Management § 8.2(A) that incorporate the requirements of RCRA Subtitle C performance standards at 40 C.F.R. Section 264.310) apply to the design of the cap for the entire former Facility, including the Nunes Parcel, where contamination from the landfill operations within OU 2 came to be located within the floodplain of the Blackstone River.

In response to the footprint of NP-SO-2 and NP-SO-3 and EPA's LEDPA determination, as stated in Comment Responses A1 and C11, while the final shape and footprint of the Nunes Parcel is yet to be been determined, it is expected that both NP-SO-2 and NP-SO-3 would occupy the same aerial extent of wetland impacts. EPA's determination of LEDPA, EPA's selected remedy (Alternative NP-SO-3) meets federal Clean Water Act standards to be the LEDPA. EPA is balancing the need to address the contamination that poses an ecological risk to the wetlands and waterways and its ability to restore any (temporarily or permanently) altered wetland resources and aquatic habitats impacted by the remediation. EPA's selected remedy, NP-SO-3, will be protective of the environment by containing the contaminant mass and eliminating potential exposure pathways while also ensuring that contamination is not released from the Nunes Parcel during a flood, up to a 500-year storm event.

*7. **Comment Summary:** Comments were made regarding PRGs established for soil and sediment and consideration of future uses and background during development, consideration of re-contamination from upstream sources, and use of supplemental data gathered by the PRP Group. Specific subjects mentioned in the comments included:*

- *Background conditions were not taken into consideration during PRG development*
- *Application of RIDEM Residential Direct Exposure Criteria (DEC) to the Site*

EPA Response: For more discussion on PRGs related to background issues, see Comment Response C5. During the FS process, EPA reviewed data collected by the PRP Group during the RI and based on this data, EPA developed site-specific background levels. EPA reviewed the PRP Group's data collected from its November 2012 sampling event and EPA determined that this data was not collected consistent with EPA guidance[32] and standards for developing background levels at Superfund sites. EPA's review of the data is contained a June 21, 2013 memorandum generated by B. Hoskins (June 21, 2013 Hoskins Memo; USEPA, 2013)[33] and is discussed in the FS and this ROD. Revised risk calculations using appropriate site-specific information, as well as the most appropriate background/reference data, were utilized/considered during the risk management and PRG development phases of the FS. See Comment Response C5 above.

As mentioned in more detail in Comment Response A7 and Part 2 Section J of this ROD, consistent with CERCLA and the NCP, EPA must ensure that CERCLA remedies protect human health and the environment and comply with ARARs as a "threshold" matter. Evaluating the protectiveness of a remedy includes an analysis of the underlying assumptions for exposure based on the reasonably anticipated future use at the Site. EPA does not select or establish the future uses for a site, rather these future uses are identified by the site owner, municipality, and/or local stakeholders. In this case, based on the location of the Site in a National Heritage Corridor, and now a National Historical Park, and through working closely with the community, municipalities, local stakeholders and the State, recreational activity is known and anticipated in the future at this Site. This current and future use at the Site triggered more protective cleanup standards under RIDEM regulations than would an industrial use scenario, more typical of a landfill site. RIDEM Remediation Regulations establish DECs which apply to OU 2. See Comment Response C5 for RIDEM DECs.

8. Comment Summary: *Comments were made regarding the Unnamed Island:*

- *Applicability of RCRA Subtitle C closure requirements on the Unnamed Island*
- *PRGs, applicability of RIDEM ARARs, and how they impact LEDPA selection*
- *Potential Recontamination of Excavated Floodplain Soils and Sediments on the Unnamed Island*

EPA Response:

a. Applicability of RCRA Subtitle C Closure Requirements on the Unnamed Island

As described in the FS, ROD, and in Comment Responses A1 and C1, OU 2 waste disposal areas include the J. M. Mills Landfill, the Nunes Parcel, and the Unnamed Island (all of which operated for a time as a single landfill and disposal Facility) where contamination from the landfill

[32] USEPA, 2002. Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites. EPA 540-R-01-003 OSWER 9285.7-41. September 2002.

[33] USEPA, 2013. Review of technical memorandum titled. *Background Screening Levels for Sediment and Soil Supplemental Data Collection Efforts.* Memorandum from Bart Hoskins to Dave Newton. June 21, 2013.

operations came to be located within the floodplain of the Blackstone River. Therefore, RCRA Subtitle C closure requirements apply to the entire Facility, including the Unnamed Island.

b. PRGs, Applicability of RIDEM ARARs, and LEDPA Selection

Since contaminated soil/sediment/debris is present in the Unnamed Island that exceeds RIDEM Remediation Regulation DECs, when these criteria are more stringent than federal risk-based standards, these standards were used to establish the cleanup levels for the Unnamed Island. The development of PRGs in soils and sediments are discussed in more detail in Comment Response C5 and A39.

EPA's selected remedy is considered the LEDPA, because removal of all of the contaminated media that poses a risk or exceeds ARARs standards, as well as removing all of the waste/debris from the Unnamed Island and restore/mitigating for altered wetlands, was determined to be the most permanent and protective response action for the area.

c. Potential Recontamination of Excavated Floodplain Soils and Sediments

A concern was raised that PRGs are not possible to achieve or maintain over the long term in excavated floodplain soils and sediments on the Unnamed Island due to flooding which will result in recontamination. The Unnamed Island partially to completely floods several or more times throughout the year especially at times of seasonal high river flows or during heavy rain events. This same flooding has likely occurred repetitively during the past 50 years. As a result, upstream particulates comprised of metals and organics would be transported downstream and deposited in the floodplain soils and sediment. This type of particulate transport would most likely contribute concentrations of constituents that have higher soil absorption properties, such as metals, PAHs, and PCBs. As stated in Section 8.3.3 of the FS, "All of the alternatives may be impacted to a limited extent from upriver sources of contaminated sediments discussed in the Blackstone River Watershed TMDL report for the foreseeable future. However, it is not expected that contaminant concentrations would reach actionable levels in the future." From what is known of the history of the Facility, wastes containing metals and certain other materials were buried on the Unnamed Island in the early years of landfill operations and the RI studies provided further evidence that waste deposits are contributing to the detection of these same constituents in affected media.

Much has been documented concerning the historic and current water quality of the Blackstone River and EPA has taken this into account in selecting the remedy. It is important to note that the Blackstone River, from the Rhode Island/Massachusetts border to approximately 1.5 miles downstream of OU 2, is classified by RIDEM under the federal Clean Water Act as Class B1 (i.e., suitable for primary and secondary contact recreation and fish and wildlife habitat, recognizing the potential for impacts due to approved wastewater discharges and combined sewer overflows) that has an established goal of "fishable and swimmable." The Blackstone River is listed on the RIDEM 2012 List of Impaired Waters under Section 303(d) of the Clean Water Act based on dissolved oxygen, phosphorus, biodiversity impacts, pathogens, as well as metals, and PCBs in fish tissue. As required under Section 303(d) of the Clean Water Act, RIDEM completed a

twofold, multi-year study[34] to determine the Total Maximum Daily Loads (TMDLs) from point and non-point sources in 2008. Based on these results, in February 2013, RIDEM released its final TMDL[35] analysis for the Blackstone River Watershed which included, among other findings, trace metals impairments for cadmium and lead along the river segment incorporating OU 2. The State of Rhode Island has an overall objective to "restore impaired sections of the Blackstone River and its tributaries," which includes restoring the river segment that flows into and through OU 2. Lastly, the Rhode Island Rivers and Classification Policy is intended to provide guidance for the management and protection of Rhode Island's river and estuarine watershed resources at the state and local levels. Its broad objectives are to protect drinking water supplies and pristine rivers, to encourage recreational use of rivers, to foster the creation of greenways, and to provide for the cleanup of rivers. Under this policy, the Blackstone River within OU 2 is classified as non-contact recreational.

It is clear from these collaborating sources that the overall water quality of the Blackstone River is continually improving over time and surface water mechanisms (e.g., re-suspension/deposition) does not appear to be a significant source for the flux of contaminants at OU 2. Therefore, recontamination of the remediated areas of the Unnamed Island in excess of CECRLA cleanup goals is not expected following implementation of the selected remedy. Furthermore, the ROD requires long-term monitoring that, among other objectives, will continue to track this issue, provide contaminant trend analyses, and will provide an assessment (over time) of whether any potentially observed future contamination is/is not significantly Site related.

9. Comment Summary: *Comments were made regarding PRGs and background/reference consideration for Pond Sediments, as well as recommending targeted removal of hot spots.*

EPA Response: EPA notes that there was a limited number of sediment samples collected in the ponds by the PRP Group which, therefore, resulted in conservative assumptions regarding extent of remediation. Pre-design sampling will be performed to more accurately depict the extent of remediation for the ponds. This sampling could reduce the area requiring cleanup. Furthermore, removal of hot spots alone would not remove the risk to ecological receptors.

10. Comment Summary: *Comments were made regarding excavation of floodplain soils related to PRGs compliance with LEDPA, and the disposal requirements for PCB-contaminated soils.*

EPA Response: EPA's selected remedy relevant to floodplain soils are considered necessary to address risks posed by contaminated floodplain soils. During the FS process, EPA reviewed and revised risk calculations using appropriate site-specific information and confirmed that the remedial actions in wetlands and floodplains were required. EPA's selected remedy is considered the LEDPA because it will permanently remove contaminated soil from floodplains/wetlands and restores/mitigates for any floodplain/wetland alteration caused by the remediation.

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[34] Water Quality – Blackstone River Final Report 1: Existing Data, Vols. 1&2; and Water Quality – Blackstone River Final Report 2: Field Investigations, The Louis Berger Group, Inc., January 2004/February 2008

[35] Total Maximum Daily Load Analysis for Blackstone River Watershed Pathogen and Trace Metals Impairments Final Report, RIDEM, February 2013.

Regarding PCB-contaminated soils, the TSCA finding included in the Proposed Plan and this ROD that addresses the remediation of PCB-contaminated soils identifies that disposing of both known, relatively low levels of PCB contaminated soils, as well as any higher levels of contaminated media that may be identified from OU 2 during additional sampling, would be protective under the OU 2 RCRA Subtitle C caps. EPA notes that it was not stated in the Proposed Plan that the RCRA Subtitle C caps were being selected because of PCB-contaminated soils. The Proposed Plan stated that placing PCB-contaminated soils under the EPA-recommended caps, which were designed to meet TSCA and RCRA Subtitle C performance standards, is protective of human health and the environment. For more detail, see Part 1, Section F; Part 2, Section M, of this ROD, and Comment Response A24.

11. ***Comment Summary:*** *During the public hearing, and again in written comments submitted to EPA during the comment period, renderings were presented of the PRPs' interpretation of what OU 2 might look like after construction of the current Proposed Plan full RCRA Subtitle C cap (Alternative JM-SO-2), as well as what it might look like after construction of the hybrid RCRA Subtitle C cap (Alternative JM-SO-3). The PRPs' renderings and comments presented the hybrid RCRA Subtitle C cap as preferable, with statements made that it safely addresses the potential risks, while minimizing risks to the surrounding area and community. In addition, the hybrid cap was suggested to be substantially less disruptive to the flourishing natural habitat and also preserves options for future site uses and access, including recreation.*

Similarly, a comment was made that alternative capping approaches will result in less filling of the Nunes Parcel. The commenter stated the EPA's proposed remedy is going to potentially cause additional flooding due to the inability to restore some of the flood storage volume.

EPA Response: As already stated in Comment Response A1 above, the PRPs' renderings presented at the meeting were never reviewed by, or shared with, EPA prior to releasing them in a public forum. These renderings left out many important design features that are more appropriately vetted during the remedial design process. For example, any riprap/walls or bio-engineered feature needed to protect the full RCRA Subtitle C cap from erosion are also needed to protect other cap designs, including Alternative JM-SO-3 (combination cap/cover), a design feature omitted from the PRPs' renderings for Alternative JM-SO-3.

To provide more flexibility in the cap design as discussed in Comment Response A1, to address the concerns raised during the comment period, EPA has broaden its approach on the preferred cleanup alternative. EPA is incorporating the opportunity to remove some portion of waste for off-site disposal, after appropriate characterization is completed, as a component of the design of the RCRA Subtitle C caps at the J. M. Mills Landfill and Nunes Parcel. This approach will allow for the possibility to lessen the severity of the slope, or to reduce the height of the consolidated wastes added to the landfills prior to capping. This design option may also provide certain flexibility in increasing the width of the riparian buffer and allow for more flood storage along the Blackstone River while continuing to be protective of human health and the environment.

A recent example of the use of riprap to armor the river bank along the Blackstone River is at the State-regulated cleanup of the Davison Street Landfill along the river in Woonsocket, Rhode Island. Here, following Rhode Island state solid waste landfill closure regulations, a reasonably designed and constructed riprap side slope is in place to protect the cap from erosion and provide

flood protection, thus reducing cap vulnerabilities throughout the life of the cap. After approximately seven years since the cap installation, and, in this case even without active replanting, shoreline vegetation is repopulating the lower portion of the river bank and masking the engineered riprap slope. EPA's remedy for OU 2 includes federal requirements to restore the lower portion of the floodplain, to the extent practical, with adaptation measures aimed at increasing remedy resilience in response to climate change. Such measures will be considered during design and may include, but also may not be limited to, erosion control and bank stabilization methods (including bioengineering solutions) outlined in the Rhode Island Soil Erosion and Sediment Control Handbook (Revised August 2014), or as may otherwise be specified in the Rhode Island Stormwater Design and Installation Standards Manual (December 2010), among other guidance.

The PRPs' renderings for Alternative JM-SO-3 (combination cap/cover) also illustrate the J. M. Mills Landfill as a more aesthetically pleasing and flatter landfill, when, in reality, the difference between the added height of the constructed combination cap/cover (JM-SO-3) and the full RCRA Subtitle C cap (JM-SO-2) would be expected to be insignificant. The finished height of the J. M. Mills Landfill is primarily governed by the amount of existing waste left in place. Furthermore, the construction impacts on the surrounding habitat under both Alternative JM-SO-3 (combination cap/cover) and Alternative JM-SO-3 (RCRA Subtitle C cap) would be similar in that, in either case, the river bank and lower portion of the floodplain must be remediated in order to meet cleanup standards so as to be protective for human health and the environment. This part of the remedy may include, but is may not be limited to, pulling waste back and out of the river shoreline, removing and managing contaminated soils and sediments, consolidating excavated wastes and soils on to the adjacent landfill, and restoring the floodplain as necessary. Under the performance standards that apply to both caps, JM-SO-2 or JM-SO-3, there should be no significant differences in the options available for the future recreational use of the landfills. The outward visual appearance of either cap would be similar.

As also suggested by the PRPs' renderings, and in other comments received, it is possible to reduce the visual footprint and height of the landfill (as illustrated in the combination cap/cover drawings). This could be accomplished (as identified above) by removing waste from edge of the river, or from the landfill itself, and placing it in another location on-site, recycling waste, and/or hauling waste off-site (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440). These options will be evaluated during the design of the cap.

EPA also notes that there are multiple methods which may be used to protect the cap from erosion, or that may also be applied to non-capped areas within the floodplain for aesthetic values (see Innovative Technologies Memo, AECOM 2015). These engineering methods, along with others, will be evaluated during the design to allow for enhanced natural habitat, aesthetic qualities, and/or reasonably anticipated future use potential for the Site while maintaining protectiveness in the long term, first and foremost. Preference would be given to restoring and stabilizing the riparian buffer to limit scour and erosion through the use of plantings, soil bioengineering, and structural systems. Ecological functions and values along riverbank through the combination of hard (riprap revetment) and soft (vegetation) engineering practices are anticipated and will also function to provide the aesthetic qualities defined by others for the Blackstone Valley.

With respect to the Nunes Parcel, alternative capping approaches will be considered during design so long as all RCRA Subtitle C closure requirements (i.e., performance standards) are met. Similar to the J. M. Mills Landfill, it is possible to reduce the visual footprint and height of the designed landfill by utilizing the entire parcel. The PRPs' rendering for the Nunes Parcel omitted a significant area on the property for capping purposes. EPA's remedy, however, calls for the complete dismantling of the concrete, metal, and wood of the former transfer station. This would allow for further lateral expansion of the landfill cap area thereby considerably lowering the height of the Nunes Parcel cap. It also possible to reduce the height and footprint of this landfill through design considerations aimed at removing a portion of the waste from this area for off-site disposal (in accordance with CERCLA Section 121(d)(3) and 40 C.F.R. Section 300.440) or recycling. This option has been incorporated in the ROD and will be evaluated during the design of the Nunes Parcel cap.

Regarding flood storage volume, the design will include an evaluation of floodplain impacts and determine any floodplain compensation needed due to those impacts. As suggested in the public comments, another advantage of removing waste from the banks of the Blackstone River along the edge of the Nunes and J. M. Mills Landfills is that it will increase the volume of flood storage thus increasing the resilience of adjacent infrastructure against extreme weather events such as floods and avoid adverse impacts from climate change.

12. ***Comment Summary:*** *The PRP Group commented on the changes EPA made to the March 2013 FS that that PRP Group had worked on pursuant to the terms of an Administrative Order on Consent to Perform Remedial Investigation and Feasibility Study. These comments include questions as to why EPA finished the FS, submitted the FS on the letterhead of the PRPs consultant, didn't provide a "track changes" version, and an opportunity to discuss the changes.*

EPA Response: This is a comment on an enforcement issue, not a comment on a remedy selection process or a remedial technical issue. As such, it does not necessitate a response herein. These issues have already been explained and discussed with the PRP Group (see EPA's correspondence to the PRP Group in a letter dated February 26, 2015). To avoid any confusion, as stated on page 2 of the FS, and again explained in this ROD, the July 2014 FS is a revision of the version prepared by Arcadis in March 2013.

13. ***Comment Summary:*** *PRPs' commented on the criteria in the NCP used to guide the screening of remedial alternatives and the comparison of remedial measures and that EPA failed to consider cost in selecting JM-SO-2 because EPA's remedy ignored data which indicates that there is no substantive groundwater impacts, is intrusive on the community and environment, results in additional harm through reduction in flood storage capacity, increases negative impacts to wetlands, and increases construction duration.*

EPA Response: Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives. A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a site remedy (see Section 7.0 of the FS). Part 2, Section K of this ROD provides a summary of the comparison of each alternative's strength and weakness with

respect to the nine evaluation criteria. As described in Section K of the ROD, there are two threshold criteria which must be met in order for the alternatives to be eligible for selection in accordance with the NCP which are: 1) overall protection of human health and the environment which addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls; and 2) compliance with ARARs which addresses whether or not a remedy will meet all Federal environmental and more stringent State environmental and facility siting standards, requirements, criteria, or limitations, unless a waiver is invoked. Cost is one of the 5 balancing criteria that EPA considers. The cost information used and relied upon in the FS, Proposed Plan, and ROD (Part 2, Section J) was submitted by the PRP Group in its Draft FS submittal (March, 2013) with no adjustments made by EPA.

The remedial action selected for implementation at OU 2 is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, will comply with ARARs and is cost effective. In contrast, Alternative JM-SO-3 (hybrid cap/cover), as presented in the FS, does not fully meet chemical-specific, location-specific, or action-specific ARARs, because the soil portion of the cap does not meet Rhode Island landfill closure standards and does not comply with RCRA Subtitle C closure standards for landfills that contain hazardous waste throughout the entirety of the landfill. The proposed soil cover component of the hybrid cap/cover also will not allow for landfill gas control standards to be achieved. In addition, the soil cover component would not achieve floodplain protection standards (in compliance with 44 C.F.R. Part 9) because the permeable soil cover, even with physical armoring to prevent direct flood erosion, would not prevent the release of contaminants in the event of flooding, up to a 500-year event. As a result, Alternative JM-SO-2 is the only alternative presented in the FS that presently complies with applicable state and federal ARARs thereby meeting the threshold criteria set forth in the NCP (see Part 2, Section K of this ROD).

With respect to costs associated with groundwater, EPA's selected remedy does not include any treatment of the groundwater because there is no detection of groundwater above the performance standards beyond the compliance boundary (see Comment Response C5 above for more information on groundwater impacts). Long-term monitoring of groundwater will be performed to ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause groundwater outside of the compliance boundary to exceed drinking water standards. Long-term monitoring of the Blackstone River surface water/sediment will also ensure groundwater contamination is not migrating into the River at levels above performance standards (see Section L of this ROD) and the costs associated with monitoring are minimal (see Part 2, Section J of this ROD for a detailed breakdown of costs).

As mentioned in Comment Responses A15, B3, and C1, Alternative JM-SO-2 (constructed meeting RCRA Subtitle C and State hazardous waste regulation requirements), is the LEDPA[36] under the federal Clean Water Act because they provide the best balance of addressing

[36] See Section 404(b) of the Clean Water Act and regulations promulgated under the Act at 40 C.F.R. Parts 230, 231 and 33 C.F.R. Parts 320-323 for protecting federal jurisdictional wetlands and aquatic ecosystems at OU 2 under these standards.

contaminated soil/debris within and adjacent to wetlands and waterways while minimizing both temporary and permanent alteration of wetlands and aquatic habitats at OU 2. EPA's selected remedy will also address many of the design considerations raised by the community in consideration of the Site's location within the Blackstone River Valley National Heritage Corridor, whereby the cap will be designed to address riparian protection concerns, both to prevent the release of contaminants in the event of flooding and to preserve or restore altered riparian habitat with native species to maintain habitat diversity, as practicable.

ATTACHMENT A

PUBLIC HEARING TRANSCRIPTS

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1. **First Public Hearing, August 21, 2014**
2. **Second Public Hearing, October 8, 2014**

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

IN RE: Public Hearing Peterson/Puritan, Inc.
Superfund Site (OU2) Proposed Plan

Date: Thursday, August 21, 2014
Time: 6:30 p.m.
Place: Cumberland Public Library
1464 Diamond Hill Road
Cumberland, Rhode Island

MICHAEL JASINSKI, HEARING OFFICER

Also Present: Sarah White, Dave Newton

RHODE ISLAND COURT REPORTING
10 Dorrance Street, Suite 700
Providence, Rhode Island 02903
(401) 519-3707

(Hearing commenced at 6:36 p.m.)

MR. JASINSKI: Good evening, everyone. Welcome to Cumberland, Rhode Island, home of the New England Little League champs. Sorry they didn't make out any better in the little league. Did pretty well, I guess. We're here this evening to talk about the proposed plan for Operable Unit Two, the Peterson/Puritan, Inc. Superfund Site here in Cumberland and Lincoln, Rhode Island. My name is Mike Jasinski. I'm chief of the New Hampshire and Rhode Island Superfund section in the EPA Boston offices in New England. I'll be serving as your hearing officer for this evening's proceedings.

With me tonight I have Dave Newton, the project manager for the Peterson/Puritan Site. We have Sarah White, our community involvement coordinator, who you probably met on the way in; Paul Kulpa with the Rhode Island Department of Environmental Management. And I understand Tony Simon from Senator Whitehouse's office is also with us. Thank you.

Before we start the formal proceeding where we will actually receive your comments, I'm going to ask Dave to give you a brief presentation on EPA's proposed plan, which is this large, nice, thick

paper document, basically give you an overview of the proposed plan that EPA has for public comment. He presented this two weeks ago during the public information meeting. I just wanted to recap for those who didn't come that night, just to understand what they're proposing. With that, Dave?

MR. NEWTON: Thanks, Mike. As Mike said, my name is Dave Newton. I'm the remedial project manager for the Peterson/Puritan Superfund Site, Operable Units One and Two. Tonight's meeting is for Operable Unit Two. And I wanted to just go over a couple of slides with you regarding the plan. And we just wanted to also make note that the public comment period is extended. It was now, the closing date is November 4, 2014.

I wanted to give you an understanding of where we are in the superfund process for Operable Unit Two, and we're right here at that green star, is where we are proposing the cleanup plan. And tonight is the formal hearing, where we hope to hear from all of you on any comments that you might have verbally about the plan. We will also accept written comments, as well.

To illustrate for you as we did two weeks ago, the Operable Unit Two of the Peterson/Puritan Site

is located is along this red boundary line on the Blackstone River in the towns of Cumberland and Lincoln, Rhode Island. And our area of concern, or our waste areas, if you will, are the J.M. Mills Landfill, which is the largest piece right here, followed by the Unnamed Island, which is sort of in the middle of the river, and then the Nunes Parcel, which sits to the south of the Operable Unit Two.

As you were aware from our discussion a couple of weeks ago, EPA reviews remedial alternatives through the use of EPA's nine criteria, which is defined in the National Contingency Plan. There are threshold criteria for the overall protection of human health, the environment, also the compliance with -- again, ARARs is an acronym. Consider that just federal and state standards, or regulations, if you will. Then there is balancing criteria, where we balance all the alternatives against long-term effectiveness and permanence, reduction of toxicity, mobility and volume, short-term effectiveness, implementability, and also cost.

And then there is modifying criteria. This is where you folks come in. The state and the community acceptance of our preferred alternative, or your comments to such, are evaluated during the

public comment period.

Table 6 of the proposed plan illustrates a number of alternatives that were evaluated and carried through a feasibility study. For the J.M. Mills Landfill, which is those first three columns, the J.M. Mills Landfill is a landfill and a waste area that is part of the three waste areas of both the Nunes, the Unnamed Island, and J.M. Mills, all operate as a single waste disposal area at the time of disposal. The J.M. Mills Landfill portion of the site is the largest portion of the site. It's the most prominent piece. It's located against the Blackstone River. And our first remedial alternative is always the no-action alternative, and that's used to balance the other alternatives against if we did nothing, are what we would do with the other alternatives, and how that all balances together.

J.M. Mills SO-2 is a RCRA Subtitle-C cap, or a hazardous waste cap over the entirety of the landfill. It also has with it institutional controls and consolidation of the neighboring floodplain along the river and the pond, one of the ponds, and sediments and debris fields under the cap. And then we would restore the riparian buffer,

or that floodplain. And I already said institutional controls.

J.M. Mills SO-3 is a modified or a hybrid cap, which would have a Subtitle-C cap on the first one-third or top of the landfill, and then the side slopes would be covered with soil only. Again, that would also require us to consolidate the floodplain, the pond ends sediments and debris fields under the cap, bank restoration and institutional controls.

You will note that in the columns that are in gray, this is our preferred alternative. So, for J.M. Mills, our preferred alternative is JM-SO-2.

For the Nunes Parcel there were three alternatives that are carried through, one being the no-action, as discussed with similarly with J.M. Mills; and then the NP-SO-2, which would be a RCRA Subtitle-D cap, or solid waste cap, following the state regulations. We would also consolidate neighboring soils, and place those under the cap, and we would provide institutional controls.

NP-SO-3, which is our preferred alternative, is to construct a Subtitle-C cap, or hazardous waste cap, mirroring the same cap as J.M. Mills SO-2. We would also, again, consolidate the neighboring soils, the floodplain soils, and we would provide

institutional controls with it.

For the Unnamed Island, there are waste deposits and soil that are contaminated on the island. Again, a no-action alternative for comparison purposes. The UI, or Unnamed Island, SO-2, would be to remove two feet of soil from the island, and then cover it. The UI-SO-3, which is EPA's preferred alternative, would be to remove all the waste and soil that is contaminated, and then -- remove all the waste and all the soil from the waste deposits on the Unnamed Island. Then the pond sediments. These pond sediments which are located on the Unnamed Island also have to be dealt with, and those will also be dealt with similarly in that there is a no-action alternative for the sediments, then there's the full removal of sediments that are contaminated, and then EPA's preferred alternative, which is SE-3, which is to remove one foot of those sediments, and then cover it with a subaqueous cap.

For the groundwater, there is a no-action alternative. And because the groundwater is contaminated within or confined within the Operable Unit, there would be another alternative which we looked at, which is long-term monitoring and institutional controls. And that, the GW-2, if you

will, is our preferred alternative there.

If you look at all of our preferred alternatives with the green underline, and add these up, you will find that EPA's proposed remedy is at a cost of $40.3 million.

So again, EPA's preferred remedy for Operable Unit Two is the JM-SO-2, the NP-SO-3, the UI-SO-3, the sediment three, and the groundwater two. And you can find all of this detail in the proposed plan, and further detail in the feasibility study which is up online.

Mike?

MR. JASINSKI: Thanks, Dave. Okay, we will begin now the formal part of this hearing, where we will accept your public comments. Before I begin that discussion, I want to set some ground rules for all of us, so we can be on the same page. First, we will not be responding to any of your comments tonight. We will receive your comments for the record. We have a stenographer here, she will take all the comments, but we will not respond to those during the formal part of this presentation. All your oral comments will be taken back to EPA, and we will respond to each one of those in writing in what we call our responsiveness summary. The

responsiveness summary will be available in the two repositories in the local area, the Cumberland and Lincoln Public Libraries, and also EPA's Boston offices. That responsiveness summary will be included with we call the record of decision, the ROD, Record of Decision, and that will also be available in the three repositories I just mentioned when the public comment period process is all over with.

If you don't feel comfortable standing up and making comment this evening, Dave and I will accept any of your written comments tonight; or on page 28 of the proposed plan, you will see Dave's mailing address, his e-mail address, and even a fax number, so you can fax your comments to Dave. Those comments, as Dave indicated earlier and as shown here, are accepted now until November 4, 2014. We received a request for a 60-day public comment period extension from our 30-day original comment period, and EPA has granted that extension, so we are providing the public with a 90-day comment period, including this hearing, and starting last Friday, August 8th, and again, running until November 4th. That's 90 days of public comments. And again, you can send your comments to Dave via

mail, e-mail, or fax, and those addresses are on page 28. I want to reiterate again, the comment period does not end in 30 days, it ends on November 4th, after a 90-day public comment period.

With that, is there any questions on the process we're going to go through right now? Yes?

AUDIENCE MEMBER: You mentioned where some of the responsiveness summaries and other documents will be available. They will also be available online.

MR. JASINSKI: They will be available online in our administrative record when the public comment period process is over, yes.

MR. NEWTON: Also at the local repositories, both, the library here in Cumberland, and at the Lincoln Library.

MR. JASINSKI: Okay. We're going to start the formal process. Again, we will not be responding to your comments. You can state for the record how you feel, positive, negative, what sense you feel about our proposal. We'll accept all those comments this evening on the record. I would please ask you to stand up, try to state your name for the record so the stenographer can clearly understand your name, your position, your affiliation with

Peterson/Puritan Superfund Site, so we get it clearly on the record.

With that, when you signed in, I had a list of yeses and no's, and I'm going to go, starting at the top, and then we'll hopefully cover everybody's concerns. After that, anybody wants to raise their hand, we'll go from there. The first commenter was Fred Geary; do I have that correct?

MR. GEARY: Frank Geary.

MR. JASINSKI: Frank Geary. Could you stand up, and spell your name and so on, please, for the record.

MR. GEARY: My name is Frank Geary, and I'm a Cumberland resident. And I do have a prepared statement, because this is not the most comfortable thing for me.

I'm a member and the director of the Blackstone River Watershed Council, Friends of the Blackstone. I am speaking this evening on behalf of myself, as a long-time advocate for the Blackstone, although I do believe I represent the feelings of many citizens who work to protect the habitat that is our river.

I urge the EPA to include in this remediation project the return of the Blackstone to its historic past by redirecting the river flow back to its

original state.

When the Pratt Dam was built, it supplied power to many mills. That era passed in the 1930s, '40s, and '50s, with the advent of the electric motor, and it would never return. By capping the dumping site and leading the flow through the Pratt Dam, I believe that it would still leave a possibility of deadly chemicals leaching back into the river. I urge the EPA to remove the granite blocks that block the original flow of the Blackstone, and fill in the Pratt Channel, which leads to the Pratt Dam.

Also, the Pratt Dam, another reason why I think it's a good idea, we've had several fatalities, people dying going through that Pratt Dam. And I know Senator Whitehouse, somebody is here from Senator Whitehouse's office. He's done that, and it was a pretty frightening experience and pretty exhilarating, according to him.

Anyways, this remediation will open up a 3.5 mile area, creating a much larger habitat for the Fish Ladder Project that has raised over $4.5 million in donations and grants, and it's a priority for the Army Corp of Engineers.

We are fortunate to have great government organizations that serve our citizens and protect

our environment. I am very grateful that the EPA joined in this battle, and that I have had this opportunity to speak on behalf of myself. Thank you.

MR. JASINSKI: Thank you, Mr. Geary. The next person who signed in is Christene Binger.

MS. BINGER: Hi. I'm Christene Binger. I'm with Geo Sites, and we're assisting with the tags (sic). We're the technical assistant grant advisers for the citizens group. So, the Blackstone River watershed Council/Friends of the Blackstone Group, representing local citizens in the area of OU-2 offers the following comments as part of this public hearing. We appreciate being included in the public comment process and having our concerns heard and considered.

BWRC/FOB supports the full implementation of a RCRA C-cap on the J.M. Mills Landfill. We believe that a full cap strategy is necessary, because the landfill has not been characterized, and there is uncertainty regarding its contents, the potential for future erosion to the sides if not fully capped may expose impacted media to the environment. We support the removal of all waste from the Unnamed Island because of the seasonal flooding of this

riparian feature that can cause erosion and relocation of waste materials. The Unnamed Island has a great potential for recreational use by the community.

We support removing at least one foot of sediment from Pond A on the Unnamed Island, and not relying solely on a subaqueous cover, because the longevity of a subaqueous cover is uncertain.

It is our understanding that First Responder access to the Pratt Dam adjacent to the Nunes Parcel will be maintained and included as part of the design, as stated in the Feasibility Study.

The BWRC/FOB would like to highlight our general concerns related to unknown impacts in the historic canal trench, and uncertainty in how impacts below the water table at the Nunes parcel will be addressed.

The area of Nunes Parcel is currently accessible, unlike the J.M. Mills Landfill, therefore, more characterization could be done to ensure that localized areas or hot spots are not present below the water table, and that this be considered further by EPA before the area is used to landfill more waste, and future access is impeded. We expect that USEPA will require further evaluation

of this issue in pre-design.

The BWRC/FOB would like to restate our vision for full restoration of the natural habitat in the areas surrounding the proposed caps, and support the potential re-use of the landfill site for sustainable low impact energy, preferably in the form of low impact solar panels as an option.

MR. JASINSKI: Thank you, Christene. Next person I have written down, Don Martin, Blackstone Valley Outfitters. If you could help the stenographer.

MR. MARTIN: My biggest concerns, I have a livelihood that depends on the river and the quality of the river running guided trips, fishing, and kayak rentals, bike rentals, and so forth. My biggest concern is during the construction and the excavation of the debris, what they're going to do for the safety concerns about not reintroducing anymore contaminants into the river and the surrounding air while people are using either the bike path or using the river.

Today we have a lot of people that go down there, and we fish on the river. There's people that are catching 20-pound Northern Pike out of the Blackstone now. So, those are the concerns that I

have up there during the construction on this. Thank you.

MR. JASINSKI: Thank you, Mr. Martin. I have a Megan DiPrete.

MS. DI PRETE: I'm with the Blackstone River Valley National Heritage Corridor. This was an area established by Congress in 1986, and staffed through the Federal Commission. Since that time the Commission has worked in partnership to regenerate the life of the Blackstone River, and revitalize the water quality, as well as the surrounding economy. I now work with the non-profit agency that is set up under contract with the National Parks Project Federal Commission to continue this work.

I want to note first, I actually printed out the website, because I could not find the Feasibility Study. Maybe we can throw a link up there.

We continue to advocate for the passive and active recreational uses in this area. And I'll reiterate some of what we've previously submitted in formal comments, and hopefully all of you are aware of that. Certainly the plan was to provide an approach that makes the site environmentally safe.

We understand there's a consulting approach to

cap the landfill. This particular landfill is adjacent to and part of the floodplains of one of America's Heritage Rivers, so that introduces a separate set of paramount goals to provide continued access to the Blackstone River and its shores for recreation and tourism. Enhancing public access and enjoyment of the Blackstone River Valley National Heritage Corridor is a critical goal of our congressional mandate.

Thirty years ago we never had expected the Renaissance that we've all seen in the Blackstone River. The progress highlights the stakes involved for making the right decision for the cleanup plan. The final plan must recognize, embrace, and advance the longstanding and continued commitment to steward the resources of the National Heritage Corridor.

The materials reference the Ashton Pratt Corridor Redevelopment Plan adopted by two municipalities. There are a number of recreational activities identified in that plan. That plan was adopted by the town councils in both Lincoln and Cumberland, and we encourage that any cleanup option facilitates and advances those town priorities.

This cleanup effort is one more piece of our efforts to clean up the Blackstone and restore it as

an integral part of our communities. Given our local, regional, and national progress, we ask that you give every consideration to a cleanup plan that keeps the river landscape open and accessible to all. It is our position that scenic paths accessible to the public should be provided. These cleanup areas can and should be vegetated with native grasses and bushes that promote and support local habitats, while functioning to stabilize the slopes and sites. The toes of the landfill slopes should be designed in such a manner as to facilitate river-side access; they should not be steeper than 3:1; and there should be no physical or psychological barriers to accessing the properties. This is important both from an environmental standpoint, and also from an economic one, in that a denuded landscape along this National Heritage Corridor results in a de facto barrier, and a blight on this most valued national resource.

Grading is important to stabilize the site, facilitate public access, and also support the efforts of emergency personnel, who rely on this access point to provide life-saving assistance in and along this portion of the river. Accordingly, access to the river must be designed and constructed

in a manner to support those operations.

I am of two minds with regard to that table in the floodplain. On the one hand, I can see that it creates stability and helps weather storms. On the other hand, vegetative debris becomes problematic down the line. If vegetation within the floodplain is proposed, we would like to see better delineation of that, so that we can understand any concerns that get ahead of them.

It's obviously our goal to achieve a healthy and safe environmental condition in and along the river. No less vitally important, Congress established goals requiring that we promote our heritage landscape, preserve our natural resources, and provide accessible recreational and interpretive opportunities. Depicting this information through illustrative site/concept plans will provide the opportunity for us to determine consistency with those Congressional goals, and to consider whether the proposed solution avoids a significant adverse impact to the resources of our National Heritage Corridor. We look forward to that being made available.

MR. JASINSKI: Next person I have is Peter Nangeroni.

MR. NANGERONI: Thank you. My name is Peter Nangeroni. I am with, the Environmental Consulting from Woodard & Curran, and I'm here representing the PRP, and I have several comments that I would like to share with you.

We believe that EPA's proposed plan is an unnecessary, intrusive, complicated remedy. The proposed plan overstates potential site risks to human health and the environment. One example of that is that the groundwater impacts at the site are actually fairly minimal, making a full Sub-C cap unnecessary. Site conditions dictate a less intrusive, less impactful remedy that would be equally safe but substantially less destructive to the existing ecosystem and community. The current EPA plan will essentially require moving every tree on the site, with minimal options for replanting due to extensive concrete and riprap armoring of the riverbank.

I know there were questions about what the site might look like after construction at the last meeting. We actually brought some renderings of what we think it might look like under the current proposed plan that I can share. We can pass them around the room, or people can look at them as they

like. I'll just set them up up front here.

This particular depiction shows, out of the EPA's proposed plan, the east view from the river, some riprap and armoring of the J.M. Mills Landfill area.

This particular plan is the similar view, if you were canoeing down the river in the future, of what it might look like with the riprap and the armoring that may be required. If you need this as part of the record, we can figure out how to do that for you.

So, those two were of the J.M. Mills Landfill area. I'll talk about the Nunes Parcel in one moment.

I think that the EPA plan eliminates the potential for beneficial re-use of the properties, including the Nunes Parcel. In fact, the Nunes Parcel would be about 25 feet higher than today, based on the approximately 100,000 yards of materials that are scheduled to be relocated to the Nunes Parcel. It will have a distinct mound shape, with numerous protruding pipes on the future design. This particular rendering gives an idea of how a design might develop for the Nunes Parcel, as well, which is shown in here.

We believe that less intrusive, less impactful, but fully protective alternatives were rejected for the site. The less impactful alternatives are typically used to remediate landfills in Rhode Island, in New England, and throughout the U.S. We believe that a Sub-C Hybrid cap alternative is a practical, equally protective, and scientifically sound alternative for the Peterson/Puritan site. The Sub-C Hybrid cap approach safely addresses the potential risks, while minimizing risks to the surrounding area and community. We believe that the Sub-C Hybrid cap approach is substantially less disruptive to the flourishing natural habitat, and it also preserves options for future site use and access, including recreation.

This particular rendering shows, for those that can see the others, what we believe a design for a Hybrid-C approach may look like. The Sub-C Hybrid cap approach would minimize the need to denude for tree clearing, and it minimizes the need for armoring, and it allows for many more replanting options along the bank and the toe slope of the closed landfill. The Sub-C Hybrid cap approach is far less disruptive of the river and the surrounding community during construction due to significantly

less materials that would need to be handled during the construction process.

There are alternative capping approaches that result in less filling of the Nunes Parcel, thereby preserving more options for re-use for that particular property.

In summary, we are confident that a scientifically sound approach that equally addresses the potential human and environmental risks can be achieved, but it can be done with far less impact to the existing habitat and to the benefit of all stakeholders in the community. Thank you.

MR. JASINSKI: Thank you, Mr. Nangeroni. And I think I have one more that signed in and said they wanted to speak, Senator Ryan Pearson. If you could come up here.

SENATOR PEARSON: Good evening. My name is Ryan Pearson. I am the senator who represents the Towns of Cumberland and Lincoln. I want to thank the EPA for all the work that they've done in sort of a probably too long a period of time in really trying to get all the studies done, and the remediation, and also for providing so much information to us this evening and over the last four months.

You heard from some of the Friends of the Blackstone, and this is an area that they've worked very, very hard on for many, many years, and spent lots of money and lots of time working on making the Blackstone a friendly, recreational use area once again. And as we start to take a look at some of those proposed solutions, certainly we have many people who have been very invested in this, very well tuned in to the situation, and have been spending a lot of time on this, but I don't think the community as a whole really understands what's going on at this point, and also has this issue, and understands what's in front of it. And so, what I wanted to do today is, there's a lot of information to receive, and I want to thank the EPA for extending the hearing period, but I also want to ask that in addition to extending it for written comments, that you once again come back in a period of time 30 to 60 days out after the community has had an opportunity to have a public hearing, for them to get a broader representation of the actual community here in Cumberland, and also in Lincoln. I think the ability to participate in the firsthand person, and see some drawings and some of the renderings would really be important for the

community. So, I did want to formally present a letter here requesting that an additional public hearing be held so that the residents can have it. And I do hope that over the next several weeks, and I've asked some of our local press, as well, to begin talking about this issue, and really publicizing what some of the options are.

So, thank you for the information and for your work, and we're really looking forward to getting this done and behind us in a way that ensures that the Blackstone is safe, friendly, but also recreationally friendly for so much of the work that has been done over the last several years. Thank you.

MR. JASINSKI: We have some others that have come in late, and I want to recognize them, too.

REPRESENTATIVE MCLAUGHLIN: One quick question.

MR. JASINSKI: We're taking comments right now, sir, so I'm going through the list of the people who signed in first with their names. If I could get you next, I'll get you next. I have two other names in front of you. I have a Brian Jacavoni.

MR. JACAVONI: For the record, Brian Jacavoni for the Valley Falls Fire District. I want to thank you, of course, for the chance to be here and to

speak quickly about safety concerns that I have of the area, Nunes, J.M. Mills Landfill site, and also the Pratt Dam.

Having some experience over the last almost eight years, being the authority of having jurisdiction over all incidents that occur on the site, I must say that I'm concerned expressly about public safety. And my secondary concern, which is a close follow-up to the safety of the public, is the safety of the first responders who are down there when an incident does occur. It's strictly, my area of expertise is responding to the emergencies, getting the resources in place, and mitigating any type of incident, whether it be rescue, fire, or whatever we may have at the site.

There have been several incidents over the last seven and a half years that have brought the fire department out to the J.M. Mills Landfill. And some of those, the most dangerous ones are involving boaters on the river who access the site, seek portage in location or close relation to the Pratt Dam. We, in fact, had a fatality at that location, followed up by several more incidents of people being stranded in their canoes in and around that area.

So, we put together, along with the Friends of the Blackstone, who have been working with us to look over the site and ensure the public's safety, and the safety of the first responders, we think we have some decent recommendations to make about site access: A road that goes in that could be maintained, readily available for the fire department and EMS to deploy at the scene.

And a few other things we're looking for, which seem simple to me, and I think they go a long way to increase public safety: The access road and a safe area of portage along the easterly shore just north of the Pratt Dam. Some of the things we would be looking for is a cleared area, free of obstructions, where we can take our watercraft down, launch, go north on the river, and also conduct our rescue operations from that location. A simple high anchor that we would be looking for would secure our rope lines that we use during rescue situations at that location on both sides of the river, right there. We've been there several times over the last years, and we're always using a dead tree or whatever we can to anchor our safety systems to. So it's imperative that we get a good, solid, sturdy anchoring system in place, and allow us to deploy

our equipment and keep the personnel that are responding there safe.

I spoke of the access road. And I must say, I'm encouraged to see the use of the river. I think it's a great project going forward. The remediation at the site has certainly been an eyesore, and at times bothersome for the fire departments who respond to multiple fires there over the years. So, I'm looking forward to the remediation, but I want to make sure it's done in a safe and prudent manner to protect the public.

And in closing, I was out before 7:00 this morning, walking my dog along the river. And there are canoeists in the water all hours of the day, going down the river before 7:00 this morning. So, they're out there at all hours. It's our job to provide the public safety aspect of it, and I'm asking for your assistance in helping us do our job as well as we can. Thank you.

REPRESENTATIVE MCLAUGHLIN: First of all, I would like to apologize. My name is State Representative Jim McLaughlin, and I'm here tonight in reference to the hazardous waste site which was formerly owned by Peter Puritan, which was formerly owned by Nabisco Company. It's a worldwide

organization.

What I was concerned about, and I want to go on record saying this as part of the remediation process. We here in Cumberland have two wells that were totally destroyed. One was on Lennon (sic) Street, off of Mendon Road, which is part of the Blackstone. And I know this is not part of the conversation tonight, but I want you people to realize that we're looking at two wells currently we have to replace to the tune of $6 million. Senator Pearson and myself, we had a conversation about a year and a half ago, Ryan, with these people. I want an answer. I want to know where we're at as far as the settlement for Cumberland to the tune of $6 million for the replacement of the wells. Plus, we had to buy Pawtucket water, because we lost our two wells, the difference between our cost and what we've had to pay since 1979 up until now. This money belongs in Cumberland, and I would like a response. And I'll leave my card. I have another meeting I have to go to, so please excuse me. Thank you.

MR. JASINSKI: Anybody else wish to make a statement or a comment on the record this evening before I close the hearing, please raise your hand.

Anybody that hasn't spoken, you're welcome to. No other volunteers to stand up? Again, you don't have to make a comment this evening. We do have a 90-day public comment period that ends November 4th. We have a request this evening for another hearing. If you want to send any comments to Dave, you can do so by mail, e-mail, or fax. As I said, on page 28 is all that information.

Again, does anybody wish to say anything for the record this evening before I close the hearing and end the evening? Seeing none, thank you very much for coming out. I appreciate it. You have a safe trip home, and we'll talk to you soon. Have a good night. Thank you.

(Hearing adjourned at 7:19 p.m.)

C E R T I F I C A T E

I, Jane F. Cormier, do hereby certify that the foregoing contains a true, accurate and complete transcript of my notes taken at the above-entitled proceeding.

IN WITNESS WHEREOF I have hereunto set my hand this 25th day of August 2014.

Jane F. Cormier

JANE F. CORMIER, CSR
NOTARY PUBLIC
MY COMMISSION EXPIRES: 2/7/18

Raymond Boudreau
11/30/14

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In The Matter Of:

Hearing

Peterson/Puritan, Inc. Superfund Site

October 8, 2014

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STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

EPA PUBLIC HEARING

IN RE: PETERSON/PURITAN, INC. SUPERFUND SITE
OPERABLE UNIT 2

DATE: OCTOBER 8, 2014
TIME: 6:30 P.M.
PLACE: CUMBERLAND PUBLIC LIBRARY
1464 DIAMOND HILL ROAD
CUMBERLAND, RHODE ISLAND

HEARING OFFICER:

MICHAEL JASINSKI

(HEARING COMMENCED AT 6:30 P.M.)

MR. JASINSKI: Hopefully, everybody is signed in. As you walk in, pick up a handout, if you need one. If you wish to speak tonight, you sign yes. Good evening, everyone. Thank you for coming out to this public hearing. My name is Mike Jasinski, and I'm the Chief of the New Hampshire/Rhode Island Superfund Section at EPA's offices in Boston. I will be serving as your Hearing Officer this evening.

Before we begin the formal part of tonight's hearing, I'd like to remind all of you that the purpose of our gathering here tonight. We are here tonight to accept your public comments on EPA's proposed plan for the Peterson/Puritan Superfund Site, Operable Unit 2. If you weren't aware of where that is, Operable Unit 2 is this area, generally south of Hope Global, Dean Warehouse along the Blackstone River, and before the railroad.

Two ground rules before we get started. Some of you are already signed in and said you would publicly speak tonight on the record. First, I want to remind everybody that we're not here to comment back to you on your comments this

evening. We are here this evening to accept your public comments on our proposal for the record. We have a court stenographer who will be taking all the meeting minutes for tonight.

We will be responding to your public comments this evening in what we call a Responsiveness Summary. We prepare that Responsiveness Summary after all the public comments are received on our proposal. The Responsiveness Summary will be available in the public information repositories in the Cumberland, the Lincoln public libraries, and at the EPA's Boston offices.

The response this summer will be part of our final decision document that we call a Record of Decision on what EPA believes is the final cleanup plan for the Peterson/Puritan Operable Unit 2. We expect to have the Record of Decision and the Responsiveness Summary to all the public comments available in the early part of 2015, depending on how many public comments we receive and the extensive nature of those public comments.

Following the issuance of our Record of Decision and the Responsiveness Summary, we will

begin a design phase of the cleanup, and that design phase will likely involve additional public information, public meetings, and comments.

Second, after all the oral comments have been recorded tonight, I will close the formal part of this hearing. If you don't feel comfortable standing up and making a speech for the record, I will be here to take your written comments or you can mail them to EPA to the attention of Dave Newton, the EPA project manager. And on page 28 of the proposed plan is Dave's mailing address and his e-mail. We will accept both your written comments and your e-mail comments, as well as the public comments we receive this evening. The comment period ends November 4, 2014. We extended that in September for an additional 60 days or so.

Okay. So let's start the formal proceedings. I'm going to ask that if you could, kindly stand up and hopefully come to the front of the room so that everybody in the audience, including our Court Reporter, can hear your comments and not have to ask you to repeat it again. I'd ask you to also stand up, state your

name, if we need to have it spelled, kindly spell your name, and we will take your comments from there.

As I said, you all signed in and asked to speak or not on our proposed plan, and I'm going to go through that list now starting with the first person and work my way down. And then we will have hands raised. The first person that was interested to speak this evening on our proposed plan for Operable Unit 2 is Duncan McSweeney. If you could kindly come up, state your name, your affiliation with the site, and your comments for the record.

MR. McSWEENEY: I'm Duncan McSweeney, D-U-N-C-A-N M-C-S-W-E-E-N-E-Y, often confused with Dunkin' Donuts. All right. So I wrote a little bit of a statement. Again, my name is Duncan McSweeney. I currently live at 18 Dixon Street along Wetland A, as defined in the EPA Superfund cleanup proposal. For everybody, that's right here. That's Wetland A. I've lived at the address for nearly four years and enjoyed the area, not only for its location along the Blackstone River, an array of local wildlife, but also the history of the site.

For those of us who are familiar with it, Wetland A and B resides on the old side of Moody's Beach. Locals will remember it for its fishing, swimming, and local commute docks. This location, as I understand, ultimately was abandoned following some major flooding and conditions of the water quality associated with the landfill.

There are two major concerns I would like to address with regarding Wetlands A through D, again, as defined in the proposal. My first concern is that these wetlands are in such a state of decay from their originally intended use, that flooding often results as in property damage to residents living in low-lying areas. My second concern is the amount of seemingly industrial and residential garbage located around the site.

Addressing my first concern, according to the information that I've gathered, the Department of Environmental Management built a series of connecting ponds back in the 1950s. Since then, yearly natural rising fall of the Blackstone River and the sediment that flows down the river is diverted into these ponds and have

raised the height of their original depth. Subsequently, year after year, these ponds whose depths are steadily decreasing now tend to flow over their banks flooding my property and lower portions of Lenox, Franklin, and Wildwood Street.

I've contacted the Rhode Island DEM who have told me, as I do not own the land, I cannot make changes that would protect my property from yearly flooding. My hope was that the DEM would cut these ponds, in the 1950s, recognize that 60 years of silt, sediment, and trash buildup has ultimately affected the purpose to which they were originally intended.

As this is the case, I propose excavating the ponds back to their original depth. I contacted Cumberland District Councilman Greg who forwarded my comments to Jean Jeffers, who is in Cumberland Public Works department.

His assessment, and I quote, "I have received Mr. McSweeney's communication regarding the Blackstone River flood plan. I agree with his comments. Unfortunately, from a benefit cost ratio scenario, I doubt very much that the state or federal agencies that have jurisdiction will do anything."

Addressing my second concern, I believe it would be important for representatives of the EPA to tour certain locations around the wetlands to come to scale with the enormous amounts of seemingly industrial and residential waste littering the area. My feeling is that the J.M. Mills landfill location may have unknowingly extended into the wetlands area, as an ocean of tires, industrial cabling, air conditioners, and old bridges, et cetera, currently pollute the site.

In an effort to show this site to others, I've compiled numerous pictures of the wetland area clearly showing the enormity of the pollution. I could share the pictures and send them to you. So my question, obviously, I won't get an answer tonight, but have members of the EPA examined any of these concerns, and if so, is there any plan to rectify it? That's it.

MR. JASINSKI: Thank you, Mr. McSweeney. Next individual who would like to speak tonight is Harry Hickey.

MR. HICKEY: My name is Harry Hickey. I am president of the Berkeley Commons Condominium Association. My concern with this is

that, our association will not be impacted greatly by whatever you design. In other words, you're going to mitigate the rotting waste and put pipes in the ground and come up to vent it, that we're not downwind of it.

Also, it has been brought to my attention that we will be able to view this proposed mountain that I read about on the no-name land because it's going to extend 40 feet above, as I understand it, if that's in the design. So restoring the land to usable recreational use because of the bike path that runs along it would be something that our organization would definitely want to see happen, since we are abutting the land. We have a large piece of wetland between the site that is not part of the site, and we would like to see minimal impact on that area. That's really all I have to say.

MR. JASINSKI: Thank you very much. John Flynn.

MR. FLYNN: Thank you. My name is John Flynn. I'm a Town Council member in Lincoln in the district of Lonsdale, which will be affected by this proposal. The comments I want to make tonight come from two points of view. One is,

I'm a frequent user of the bike trail, both for walking and biking. In fact, I was -- when it was the towpath for the canal; I used to walk down there. During those days, we saw a growing mountain. And, eventually, the mountain stopped growing, and that's when the landfill closed and grass was planted over that and trees grew, and the impact on the visibility to Lincoln lessened, especially during the summer months.

The concern now is, it's a twofold concern. As a user and an elected town official in Lincoln, the bike path draws many, many, many people, not only from outside Lincoln but from outside Rhode Island. So you want to keep that area, and whatever is done in that area, as attractive as possible to continue to draw the people we are drawing, because it has a real good impact on the local economy.

The other reason I'm here, and the main point is, in my District R, Maria Street, Ashley Drive, Riverside Drive, and houses that sit rather high up on River Road, they all will be impacted negatively by the visual impact of what is proposed here. And, especially, by the increase in height of 25 feet on Mills Landfill

that's proposed. That's not there now. That was capped.

And, hopefully, you will consider another plan or you will consider the other plan that has been proposed that will not have an increase in the height of the landfill, and I think that plan is called Sub C Hybrid Cap. So I support that alternative, and I come here to speak in support of that as a representative of that community. And I thank you.

MR. JASINSKI: Thank you, Mr. Flynn. Bruce Ogni.

MR. OGNI: How you doing. My name is Bruce Ogni, O-G-N-I. I'm actually running for Town Council in the Lonsdale District. That's a fine gentleman that just sat down, Mr. Flynn. As he's a very nice man. Some of my concerns are the effects for the residents of Ashley, Maria, and Riverside Drive, and some of the houses on River Road. Are they mainly just aesthetically or are there other environmental effects to the folks in that area? That's one of my comments.

I'm wondering if there should be more signage up and more information up with regard to the folks using the area for fishing, boating, et

cetera, especially the children who may be fishing over there. I don't know if there's that much havoc. Maybe we should be putting more signage up there and complete more information of the use in that area, so they're not going to be keep putting themselves in a precarious position health-wise.

I'm going to say to the residents of those streets, having the design of this project, I know there's a couple of different designs, I'm just curious on how much say they have in the design of the project. I thank you all for your time.

MR. JASINSKI: Thank you, sir. The next gentleman is Peter Nangeroni.

MR. NANGERONI: Hello. My name is Peter Nangeroni, N-A-N-G-E-R-O-N-I. I'm with the firm Woodard & Curran. We're a consulting firm in Providence, Rhode Island. I shared these comments at one of the previous hearings given. I'm going to share my comments tonight, as well.

The first thing I want to mention is that I really believe that EPA's proposed plan is unnecessarily intrusive and more complex than it has to be. We really think that one of the

primary reasons for this is that the plan has some overly conservative assumptions in terms of the effects of the current facility, the current conditions out there. In particular, it overstates the potential site risks to human health and the environment. For example, groundwater impacts on the site are quite minimal, making the Sub C cap unnecessary. The hybrid cap could achieve some of the same results.

I also believe that the site conditions, as I mentioned, dictate a less intrusive, less impactful remedy that will be safe over the longterm, but would be substantively less destructive to the existing ecosystem in the community. One thing in particular from the previous comments tonight, about the existing floods in the area, I believe that the remedy as proposed is going to potentially cause additional flooding due to the inability to restore some of the flood storage volume that will be taken up by this approach. It's a very important issue to consider.

In addition to the current EPA plan, it will essentially require moving every tree on the

site. There's good vegetation at the site, as mentioned by one of the previous commenters. There will really be minimal options for replanting of this vegetation due to the extensive concrete and rip-rap armoring of the riverbank, and also due to the multiple membranes they'll install for the C cap. They don't allow a deep root system, so it's very difficult to reestablish large mature trees, many of which are currently existing at the site.

At the very first public meeting, there were questions about what the site might look like after construction. So I brought some renderings here. I apologize, they're a little difficult to see, but I will spread them across the area. But I just wanted to point out a couple of things. This is an example of what the east view of the J.M. Mills Landfill may look like after construction, with armoring and rip-rap, and you can see the lack of vegetation and some of the pipes that are used to vent gas.

This is a rendering similarly but from above, so you can get a sense of what the J.M. Mills Landfill might look like after the capping.

This is a similar rendering, just a little

closer in terms of if you were canoeing. A lot of people like to use the waterway now. I think most people realize there's quite a bit of vegetation. It will be very difficult, as I mentioned, or virtually impossible to reestablish that vegetation along the riverway.

One of the other things that I think is concerning is that given the proposed approach of the EPA, the plan really eliminates or limits the potential of beneficial reuse of the properties, particularly including the Nunes parcel. I think one of the previous commenters had mentioned that. The Nunes parcel will be about 25 feet higher than it is today. It will really look quite like a mound. It will have a distinct mound shape with numerous protruding pipes. One of the renderings, I believe, shows this, as well.

I believe that a less intrusive and less impactful approach that would be fully protective of the environment and human health in the area, and actually these alternatives were actually rejected, and the less impactful alternatives similar to those that we've talked about for the hybrid cap are typically used to cap landfills in

Rhode Island and elsewhere in New England and across the nation, actually.

I do want to talk for a minute about an approach that we think makes sense. That's the Sub C Hybrid Cap. One of the previous commenters mentioned that, as well. We believe the Sub C Hybrid Cap is an alternative. It's a practical, equally protective and scientifically sound alternative. It has a lesser impact both on the habitat that's out there, and also the community during construction, it will shorten the duration of construction and shorten the amount of materials that will be brought back and forth during construction, as well.

But the most important thing is that, I believe, the Sub C Hybrid Cap approach safely addresses the potential risks that the EPA's plan is really bound to do. We're not looking to reduce or to lessen the improvement of risk for the environment, but what we're really trying to do is minimize the impact to the surrounding area, as I mentioned, and to also reduce the duration of construction.

The Sub C Hybrid Cap, as I mentioned, is substantially less obstructive to the flourishing

natural habitat, and it also preserves options for future site use and access, including recreation. We believe the (inaudible) parcel to be completed in a significantly lower elevation, much flatter, and will give better opportunities for recreational use in the future, and also the use for -- the Hybrid C Cap provides additional opportunities for recreational use at the J.M. Mills Landfill, as well.

One of the benefits of the Sub C Hybrid Cap approach is that it should minimize the need for tree clearing, it minimizes the need for armoring, and it allows for many more replanting options. The Sub C Hybrid Cap approach, we have soil around the perimeter of the J.M. Mills Landfill that allows planting of much larger types of trees that have deeper root systems that should reestablish a much more similar vegetation look as what currently exists today.

In addition, the Sub C Hybrid Cap approach is far less disruptive of the river and the surrounding community during construction. It would be far less materials that would be required to be moved through the river, in that area during construction, and I'm sure there will

be a shorter duration, as well, so a less intense impact on the community. As I mentioned, there are these alternative capping approaches that will result in less (inaudible) in the Nunes parcel preserving numerous options for that property.

So I guess in summary, we're confident and I'm confident that scientifically sound approach that equally addresses potential risk can be achieved, but that it could be done with far less impact to the existing habitat to the benefit of all stakeholders in the community. I will leave these here for you to take a look at them.

MR. JASINSKI: Thank you, Mr. Nangeroni. Next we have Larry McTiernan.

MR. McTIERNAN: Good evening. My name is Larry, M-c-T-I-E-R-N-A-N. I'm with Roux Associates, R-O-U-X. We're an environment consulting company here in New England, also. The reason I'm here tonight is to explain what I believe is a third alternative that is due consideration. I just want to back up for one moment. The two alteratives, just so everybody is clear, they are being evaluated in the (inaudible) study are what are called Full Region

One RCRA Subtitle C Cap, and the second piece is what's called the Sub C Hybrid Cap that Peter spoke of just now.

As an environmental consultant, I see a third alternative that I want to bring on to the floor tonight. That is what we call the Evapotranspiration cap or an ET cap. An ET cap works differently than a RCRA Subtitle C cap. A RCRA Subtitle C cap is basically a giant plastic bag covered with a couple feet of soil and grass, thus you see the mounds in the photographs that you saw here. An Evapotranspiration cap or an ET cap works in absorbing precipitation rather than shedding it off. A RCRA Subtitle C cap will shed all the precipitation off to keep it out of the landfill waste, and it all runs off into the river increasing your runoff in the river.

An Evapotranspiration cap works by infiltrating the precipitation in the upper couple feet of soil, in the cap. And then during the growing season, specifically designed and bred trees consume the water, with the net effect that you have zero infiltration, just like a RCRA Subtitle C cap.

The advantage of an Evapotranspiration cap,

is that it is more flexible, it's a much more flexible remedy. I have a couple of pictures here. I just want to show you what some of these caps look like. My company has experience with these caps.

This is a cap at a site, an industrial wasteland fill in upstate New York. And as you can see, it's kind of hard to see, but you can see -- the upper picture shows the cap as it's constructed, and you will basically see that there's a lot of trees, you will see your walking path is actually an educational center. This is a wildlife habitat counsel certified educational remedy. This is what it looks like today. And as you come up, I will ask you to see if you can find the cap. The point being, you don't see the cap. It's larger than what it looks like today. Sorry. This looks like what the J.M. Mills Landfill looks like today.

Here's another photograph. Let me point out, also, that this is not a rendering. This is an actual photograph of another ET cap that we have at an industrial waste landfill. This one is in Virginia. What we did, the client was faced with capping their landfill, just as we are

at J.M. Mills, and we came in and instead of capping it with a plastic liner, we planted -- sorry -- we laid down soil to absorb the precipitation and we planted trees to take up that precipitation.

And to answer the question about whether the trees can take up enough of it, in the summer, we actually have to spray water on the trees to keep them vibrant. So they create a deficit and take up more water than what actually falls.

I just want to put that this is an actual photograph and not a rendering. It kind of looks like a rendering, but it's because it's very uniform.

At the site of J.M. Mills, we have the flexibility of the using a variety of trees. In this case, this is one tree that consumes an enormous amount of water. We don't need that many trees at a site like J.M. Mills. Instead, we would probably put like these trees in the top, and the sides would be planted more with other species like willows or any other kind of species, species that are designed to attract wildlife and improve the esthetics.

As I said, these are successfully being used

in the northeast. We have one of these in Rhode Island, we have one in upstate New York, and New York is successfully being used to reduce infiltration.

Some of the other benefits: They are breathable. They will not generate methane. The RCRA Subtitle C cap has potential to generate methane, and it is still being generated in ways that it's trapped and it has to be vented out and possibly treated. In this case, the landfill will breathe, so there is no accumulation of methane.

Most importantly, I think it just fits into the river aesthetics. I know a lot of you spoke about your desire to keep that landfill looking like it does so that it's pleasant for people on the bike path or using the river to canoe down the river, so that's what we will do. There's a lot of flexibility that can be built into the design. There's flood-proofing, we do bioengineering where we use a combination of engineering structures and plantings to restore the floodplains, to prevent erosion of what's underneath it, but still to have it attractive looking.

That's really what I want to lay out here as a possible compromise, as it were, between the other two alternatives that have been evaluated. Because I do not believe this type of cap was sufficiently evaluated in terms of the feasibility study. Thank you.

MR. JASINSKI: Thank you, Mr. McTiernan. The next individual who signed in to speak is Kristin Kennedy.

MS. KENNEDY: Kristin Kennedy, 11 Maria Street. Kristin is K-R-I-S-T-I-N. In addition to the audience's concerns, I have concerns about the traditional C cap devaluing of my property. I have concerns in the basic proposal of the C cap that the disassociated wall on the riverfront will potentially limit the ability of the area to absorb water flows that are associated with large rain events that we do see in that area, forcing the water to follow the path of least resistance, which could potentially create more flooding in our neighborhood, which we've been subjected to already during these historic events. That's it.

MR. JASINSKI: Thank you. I haven't run out of names yet. Armand Brunelle.

MR. BRUNELLE: My name is Armand

Brunelle, B-R-U-N-E-L-L-E. I'm a homeowner at Berkeley Commons, and I'm here to voice an objection to the proposed plan. I think it is abusive to our view. It will definitely affect our home values. I think the alternate Sub Cap C is a far more pleasing look from our vantage point and also from the river. I don't understand the thought process with the EPA and why they took the abusive way versus the aesthetic way. But I'm here to say that I think the Sub C or the new proposal that someone brought up earlier should be looked at for this area. Thank you.

MR. JASINSKI: Thank you, sir. Keith Macksoud.

MR. MACKSOUD: My name is Keith Macksoud, M-A-C-K-S-O-U-D. I am the President of the Lincoln Town Council. Monday night, the Lincoln Town Council unanimously passed the resolution in opposition to the proposed cap by the EPA. I can tell you, I served 26 years in the military. I know what the Federal government is like. We like to hit things big; we like to hit things heavy. Will the cap work? Yes. Is it killing a fly with an elephant gun in our

opinion? Absolutely.

The Lincoln Town Council will not take the opinion or decide which of these other two plans would work better. We can see that we have two different plans that will accomplish the needs of what we are trying to do, which is to protect us from the hazardous material that's in the area, as well as protect the wildlife.

In Lincoln, we've noticed that the Blackstone River has seen a renaissance in its health, wildlife, and recreational use; such as, canoeing, kayaking, hiking and bike riding. And it is the desire of the Lincoln Town Council to support the remediation plan that makes the site environmentally safe while preserving the beauty and the recreational access to the Blackstone River.

In that light, it is the unanimous decision of the Lincoln Town Council to support a remediation plan for the Peterson/Puritan Superfund Site and the adjacent parcels that allow for the development of a more scenic path for those who enjoy the river, being on the water, or on the bike trail, that the plan provide a respite for fish, fowl, and wildlife,

and that the plan leaves as much of the existing vegetation in place as is possible. Thank you.

MR. JASINSKI: Thank you, sir. Peter Coffin.

MR. COFFIN: Peter Coffin, C-O-F-F-I-N. I was at the first hearing where we weren't allowed to comment on the aesthetics so much, but we were told that was going to come first and we have to decide on the technique and the extent of protection first, and the design might come later. That really boggled my mind, because I thought, how can you ask us to judge until we know what it looks like and all the different elements. So I'm glad to hear that there's more attention tonight on the esthetics, but I think first and foremost comes the protection. And I wasn't quite sure if that was done to the extent, as much. It seems to me the compromise was, there is this area that's bounded by ownership. And the rest of the river is also impacted, but that's not what we're looking at.

So to what extent -- is there pollution throughout how deep we excavate it to the groundwater. Sounds like the game plan is, you consolidate it, put it under a cap, so then the

question is how extensive the consolidation is; how deep. So I'm resigned that this site needs to be fixed. And you've got to take down the trees and do it and you got to do it right. These are a lot of great ideas.

I would love to see like in New York, but I don't know if there's a river running through that place in New York. And I understand the engineering requirements of flood control in handling a 500-year storm, and you need rip-rap seawalls. I do know though that there is great hope and not -- more than hope but experience with bioengineering.

Now can that withstand -- can the walls withstand the 500-year flood? So are there opportunities that you have the protection of the cap that's needed but on the edges you allow a little more bioengineering? Also, it's a big site. When do you bring the landscape architects? Because, yeah, the grassland plains, there's one in Worcester. That's a prime habitat for some endangered species, because we don't have open grassland. And recreation, that wall could be made attractive for recreation. It is possible, but I don't know the process for

getting those design elements when it sounds to me it was just a first very basic engineering, what led us -- tell us how clean you want it and is this the way you want to go, and they'll come back and add trees and grass around the edges. So just a concern. I'm glad to hear we're more concerned with the looks. But, also, certainly the habitat.

And then this is maybe what it looks like after it gets built. What's it going to like look like in 10, 20 years? So I guess that's the question I have for whatever design comes. Thank you very much.

MR. JASINSKI: I appreciate those comments. I've run out of names, so I will start at the front. State your name for the record and spell your last name.

MS. BINGER: Christene Binger, B-I-N-G-E-R. I'm with Geolnsight and I'm assisting the Blackstone River Watershed Council and Friends of Blackstone as an advisor, and at the public hearing in August, we did make a formal statement and a list of comments. Tonight I just wanted to make one comment to follow up on the gentleman who just spoke. There's been a lot

of focus on the renderings, and I just want to reiterate that the Blackstone River Watershed Council, Friends of the Blackstone, we do support a (inaudible) C cap, and in that, with that, we just want to point out that the PRPs, these are artistic renderings of what it could look like. We are just embarking on the design phase. So the design -- this is not an approved layout that EPA is approving, this is just a rendering of an artist from the PRP.

So will the true cap look something somewhere between the river C cap and the Hybrid? It might. But that will all be worked out during design. So we just want to reiterate that, again, those are artistic renderings and they are not approved design plans by EPA.

Again, we're just about to start the design phase, and we have heard from EPA that we will be able to give some public comments, and it sounds like there are some alternative thoughts out there about how people want it to look, but you can't accept that as the final image that you will see from across the river. There may be some negotiation with the PRP and the EPA to modify what it looks like. Thank you.

MR. JASINSKI: Yes, sir.

MR. GAUVIN: My name is Roland C. Gauvin, G-A-U-V-I-N. I reside at 2208 Mendon Road in Cumberland. I'm looking at these renderings, and I know you're the Environmental Protection Agency, not the environmental construction agency. When I look at this, this reminds me of Alcatraz. This doesn't remind me of anything that would enhance the environment. This does not lend a conducive atmosphere to a wildlife habitat. It is aesthetically unpleasing. I cannot fathom how if I'm coming down here and needed to bring my canoe, and in an emergency, how the hell I could get up that wall.

You are channeling the river, further contributing to future flooding by doing this. There's a better way. There's a better mouse trap. It has been built. It can be continued to be built. And I know the Environmental Protection Agency can find that better way. I have faith in you. I have faith in your decisions over the years in many different circumstances.

To further exacerbate this problem, we have problems at Hope Webbing with flooding. The

flooding is caused by constriction of the river at the Hope -- at the Pratt Dam. The Army Corp of Engineers is proposing to put up another seawall by Hope Webbing, which will further constrict the river, further causing more flooding. When is this going to end? Rip-rap doesn't work. It has never worked. It's a proven fact. It doesn't work. Proper vegetation is the best method, and it will provide more animal habitat and contribute to the restoration; not the destruction of this area. Thank you.

MR. JASINSKI: Thank you, sir. Anybody raise their hand that wants to make a statement for this evening before I close the hearing?

MR. LANG: My name is David Lang. I'm a hydrogeologist. I don't want to speak tonight, but I just thought I would clarify a few things that have been said. I've been working with the PRP group for a number of years now, ten years. We've drilled wells, we've taken water samples throughout the area.

And one thing that you may notice is that the water underneath the landfill is remarkably clean. We meet drinking water standards in all of the wells we have. There's one or two wells,

one of them is the Nunes parcel, that has a trace of gasoline constituent, you have a minor exceedance of benzene. But the fact that this is being -- the justification of Subtitle C is being based on the exceedance and the contamination of the ground water, it's just not true.

There's not a lot of flexibility with a Subtitle C cap. These are permanent structures that remain that way for many, many years. Not 10 years, not 20 years, but forever. So I want to make sure that we're not saying that we can dance around this and make it look pretty. This is what it's really going to look like. Thank you.

MR. JASINSKI: Thank you very much. Yes, ma'am. You can state your name for the record, please.

MS. MARKS: My name is Eugenia Marks. I work for the Audubon Society of Rhode Island. I wanted to ask about the New York site being declared as a wildlife refuge and who had said that that's a wildlife refuge, because in New York state, there is an Audubon Society that certifies golf courses as wildlife refuges.

So the words can be twisted around as many

other words can be twisted around. I know that we don't want to have a site that looks like an industrial site around this beautiful river, but I also am concerned about the pollutants that remain on this site. And there seems to be some leaching that still occurs.

I think the fact that this was a floodplain in the first place is an egregious attack on the way the world should work. We can't fool Mother Nature. The river will continue its dynamic ebb and flow. Constricting it will only push the water somewhere else. So to the extent that this area could be made to replicate the floodplain that it should be, wetlands are a natural area that absorbs excess water when that occurs. And it should function like a natural wetland to the greatest extent possible. Thank you.

MR. JASINSKI: Thank you very much. I had one maybe, so I just want to make sure that maybe does or does not want to speak. Bill Murray. Are you all set? Okay. Anybody else wish to speak? Yes, sir.

MR. YOPAK: My name is David Yopak, Y-O-P-A-K. I represent one of the PRPs, and I just wanted to also add my comments here, as

well. The renderings of what a Superfund site Subtitle C cap looks like are that. That's what it will look like. Again, as David Lang said, that's what it's going to look like permanently. I abhor (sic) you, go look on the EPA's website. That's what you will see. There is no change. There's no option there. That's what it is.

They talk about design of the cap. It's engineering design to prevent erosion. There's nothing you can do for aesthetics on top of a Subtitle C cap.

There's also a comment just made about leaching. If you look through the EPA records, I believe. There is no comment from the EPA about continuing leaching from the site. And as David has said earlier, the groundwater (inaudible) to the wells, the record is clear, there is very little groundwater contamination at that site. It's in the record from EPA. Look at the results. Thank you.

MR. JASINSKI: Thank you, sir. Again, anyone else wish to speak this evening for the record providing EPA with comments on our proposed plan for Peterson/Puritan Superfund Site Operable Unit 2 before I close the hearing? Yes,

ma'am.

MS. McCOY: My name is Linda McCoy. I live in Lincoln right across from this site. This is -- I just heard about this, and so I came to the meeting just to find out what's going on. And I did see that picture, and I thought, that is gross. But, you know, coming and hearing other people talk, I'm wondering, if there's no leaching or if there's very minimal leaching, why are we going through all of this cost to change an area that basically looks like a wildlife area right now? There's deer that live there, and we're going to turn it into this. I mean, how much is that going to cost? I just think it's a huge waste of money. But, again, I don't know, you know, much about the research that's been done or how much pollutants there actually are still there. So I basically want to find out how I can get more information about it. That's it.

MR. JASINSKI: I really appreciate everybody making their public comments this evening. We will take those comments and work with the federal agency at EPA, our folks in Boston, as well as the state agency at Rhode Island Department of Environmental Management.

We will consider all of your public comments before we reach a final decision on the cleanup approach for the site.

Again, I want to reiterate, we have a public comment period that doesn't end tonight; it ends on November 4. So you still have an opportunity to comment. All the information that we have available for the public is in the Cumberland Public Library, the Lincoln Public Library, on EPA's website under Peterson/Puritan Superfund site, including the remedial investigation reports, the feasibility study, and our proposed plan with all the alternatives we evaluated and their costs.

I thank you very much for coming out this evening and spending your time and giving your feedback. I hope to see you soon. Thank you.

(HEARING CLOSED AT 7:21 P.M.)

C E R T I F I C A T E

I, Denise A. Webb, Notary Public, do hereby certify that the foregoing is a true, accurate, and complete transcription of my stenographic notes taken at the time of the aforementioned hearing.

IN WITNESS WHEREOF, I have hereunto set my hand and seal this 22nd day of October, 2014.

Denise A Webb, RPR
Notary Public

DENISE A. WEBB, CSR/RPR/NOTARY PUBLIC
MY COMMISSION EXPIRES APRIL 7, 2018

DATE: October 8, 2014

IN RE: EPA PUBLIC HEARING

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Appendix A:

Rhode Island Department of Environmental Management Letter of Concurrence

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

OFFICE OF THE DIRECTOR
235 Promenade Street, Room 425
Providence, Rhode Island 02908

September 8, 2015

Nancy Barmakian, Acting Director
U.S. EPA – New England Region
Office of Site Remediation and Restoration
5 Post Office Square
Suite 100 (OSRR 07-3)
Boston, MA 02109-3912

RE: Record of Decision for (OU2), Peterson/Puritan, Inc. Superfund Site, RI

Dear Ms. Barmakian:

The Office of Waste Management has conducted a review of the Record of Decision (ROD), dated September 2015, for the Operable Unit 2 of the Peterson/Puritan, Inc. Superfund Site (OU2) located in Cumberland and Lincoln, Rhode Island. The remedy includes the J. M. Mills Landfill, the Nunes Parcel, and the "Unnamed Island." The selected remedial action the United States Environmental Protection Agency (USEPA) has put forth addresses contaminated floodplain soils, sediment, and groundwater within OU2 and also follows a presumptive remedy approach for addressing the large volumes of wastes, including hazardous waste, disposed of in both landfills.

The Department of Environmental Management (the Department) has worked with your Agency, other federal and municipal agencies, and various stakeholders, from the early investigatory stages up through this current important decision milestone. Based upon this Department's review of this ROD and the results of the remedial investigation activities conducted to date, we offer our concurrence on this decision. This concurrence is based upon all aspects of the aforementioned ROD being implemented during design, construction and operation of the remedy in a timely manner.

The Department wishes to emphasize the following aspects of the ROD:

- The Department appreciates the USEPA's clear acknowledgment in this ROD of the fact that OU2 is located in the Blackstone River Valley National Historical Park. The Department looks forward to working with USEPA, and local stakeholders, in implementing a remedy that is both protective and takes into account the aesthetics and re-use potential of this invaluable resource;

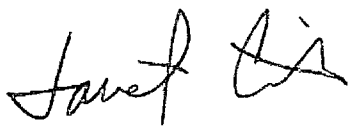
- We agree with the enhanced capping flexibility that was added to this ROD from the as a result of public comments. Specifically, the additional landfill cap design flexibility while still being consistent with the RCRA Subtitle C performance standards and the option of disposing of some amount of landfill material off-site;

- Community participation is extremely important to the Department and we believe it to be critical at this Site. We strongly concur with the inclusion of clear language in the ROD that states EPA intends to hold additional public outreach sessions throughout the Remedial Design and Remedial Action phases to ensure public interests are heard and given careful consideration.

- It is this Department's understanding that the Responsible Parties will implement groundwater use restrictions and a long term monitoring program. The use restrictions would prevent the installation of wells for any consumptive, irrigational, or industrial purpose. Long-term monitoring will evaluate whether OU2 contamination has migrated to sediments, surface water or to groundwater outside of the compliance boundary for the contamination being managed in place; and

The Department also would like to thank you and your staff for coming together and working with us and the stakeholders to make the necessary enhancements to this ROD. We believe these enhancements were vital not only to address public comments but to ensure aesthetics in and around the Blackstone River Valley National Historical Park will be given serious and careful consideration throughout the project. We look forward to continued cooperation between our agencies throughout this project and appreciate the opportunity to review and concur with this important ROD.

Sincerely,



Janet Coit
Director

cc: Eric Beane, RI Governor's Office
Terrence Gray, RIDEM
Leo Hellested, RIDEM
Matthew DeStefano, RIDEM
Gary Jablonski, RIDEM
Bryan Olson, USEPA
Michael Jasinski, USEPA
David Newton, USEPA
Mayor William Murray, Cumberland
T. Joseph Almond, Lincoln

Appendix B:

Figures



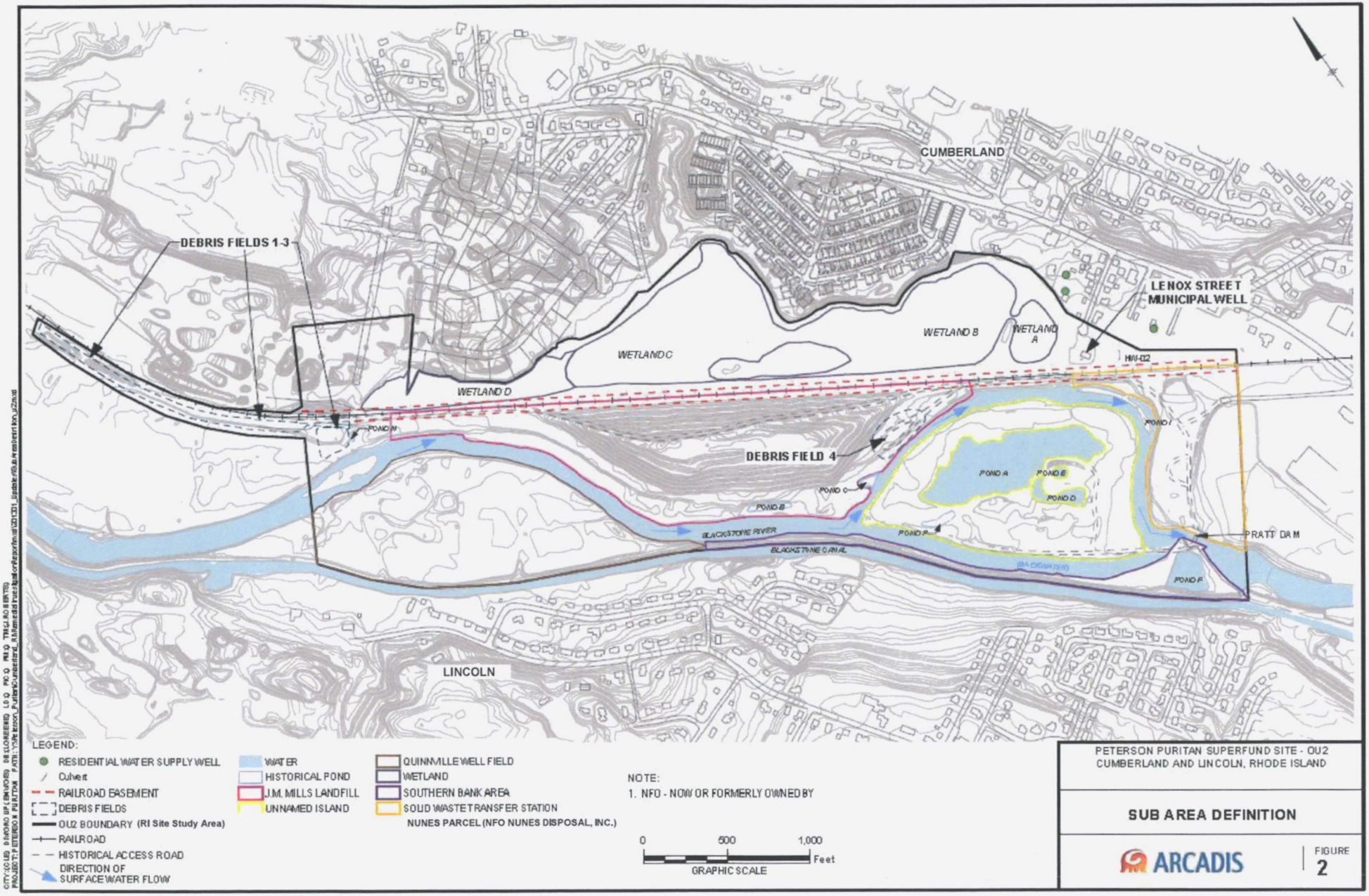
Figure 1

Peterson/Puritan, Inc. Superfund Site
Operable Unit 2 (OU-2)

Cumberland & Lincoln, Rhode Island

EPA

EPA Region 1 GIS Center Map Tracker ID 8590 June 29, 2012 Data Sources: Aerial Photo Base Map - Bing Maps; Municipal Boundary, Railroad - USGS/RIGIS, 1989; River & Flow Direction - National Hydrography Dataset, 2007;

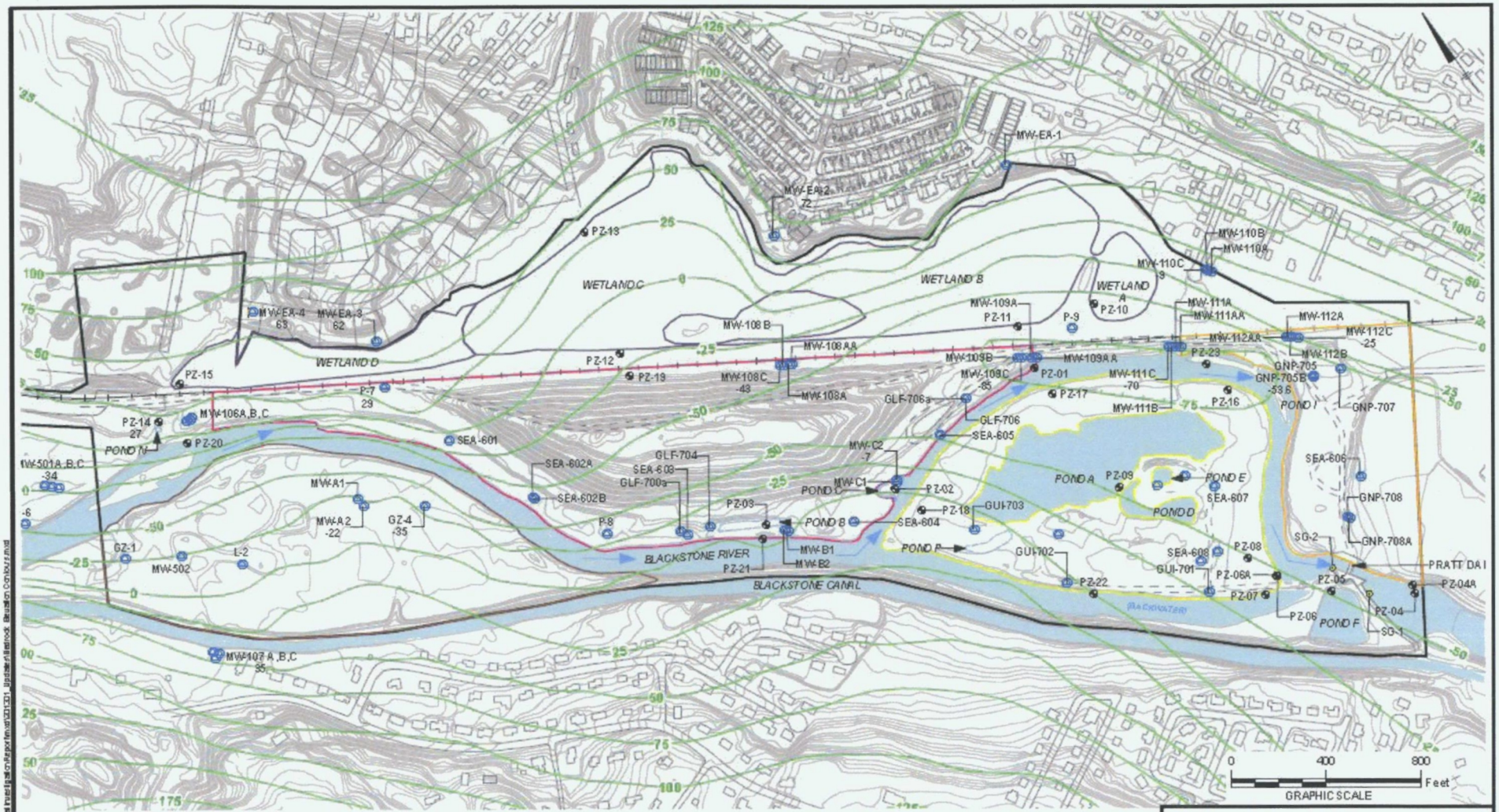


PETERSON PURITAN SUPERFUND SITE - OU2
CUMBERLAND AND LINCOLN, RHODE ISLAND

SUB AREA DEFINITION

ARCADIS

FIGURE 2



LEGEND:

- MONITORING WELL
- PIEZOMETER/STAFF GAUGE
- STAFF GAUGE
- BEDROCK ELEVATION CONTOUR
- 25 ELEVATION ABOVE MEAN SEA LEVEL
- -30 ELEVATION BELOW MEAN SEA LEVEL
- OU2 BOUNDARY (RI Site Study Area)
- RAILROAD
- HISTORICAL ACCESS ROAD
- WATER
- DIRECTION OF SURFACE WATER FLOW
- HISTORICAL POND
- J.M. MILLS LANDFILL
- UNNAMED ISLAND
- QUINNVILLE WELL FIELD
- WETLAND
- SOLID WASTE TRANSFER STATION (NFO NUNES DISPOSAL, INC.)

NOTES:

1. SAMPLE LOCATIONS AND BASEMAPPING ARE IN THE COORDINATE SYSTEM: STATE PLANE RHODE ISLAND NAD 83 FEET. LOCATIONS RECORDED IN THE FIELD USING GPS.
2. NFO - NOW OR FORMERLY OWNED BY

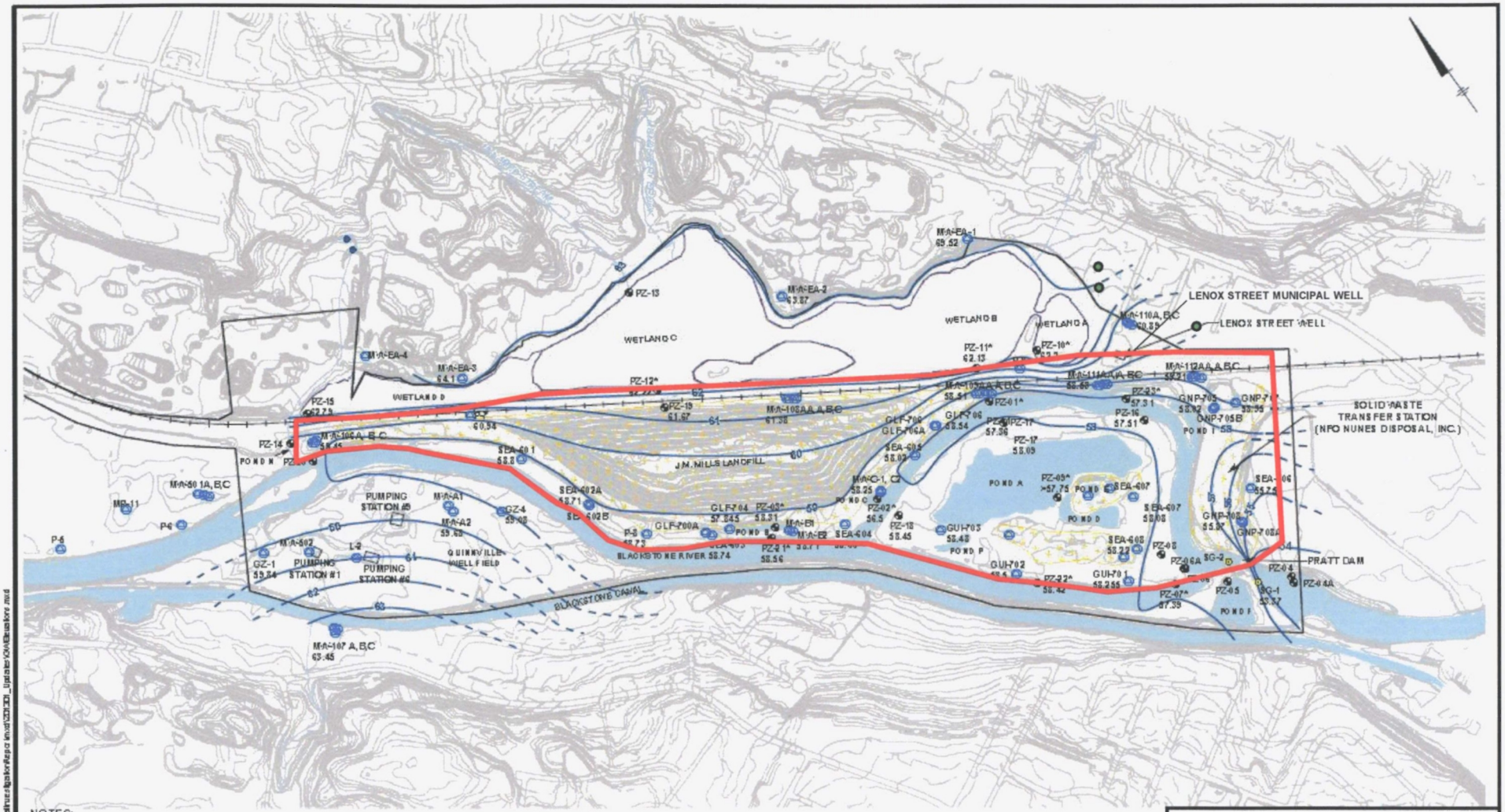
PETERSON PURITAN SUPERFUND SITE - OU2
CUMBERLAND AND LINCOLN, RHODE ISLAND

BEDROCK ELEVATION CONTOUR MAP

ARCADIS

FIGURE 2-8

CITY:(SYR) DIV/GROUP: IT DB: KEB LD: PIC: PM: TM: TR:
Peterson Puritan (EXCEPTED)
G:\Peterson_Puritan\Groundwater_Alternatives_Feasibility_Report\Figures\Figure 2-8 Bedrock Elevation Contour.mxd



NOTES:

1) NFO - NOW OR FORMERLY OWNED BY
2) GROUNDWATER ELEVATIONS OBTAINED ON 11/28/05.
3) * WATER ELEVATION REPRESENTS THE SURFACE WATER ELEVATION. THE MEASURMENTS WERE TAKEN FROM OUTSIDE THE PIEZOMETER CASING.
4) PZ-2 WAS NOT USED IN CONTOURING DUE TO AN ANOMALOUS READING.
5) STANDING WATER AT PZ-15 IS INTERPRETED TO BE PERCHED (67.17'). VALUE SHOWN IS LEVEL INSIDE PIEZOMETER.

LEGEND:

- MONITORING WELL
- PIEZOMETER/STAFF GAUGE
- STAFF GAUGE
- SEEPS
- GROUNDWATER CONTOUR
- INFERRED GROUNDWATER CONTOUR
- OU2 BOUNDARY (RI Site Study Area)
- RESIDENTIAL WATER SUPPLY WELL
- BURIED WASTE
- WETLAND
- SURFACE WATER
- Proposed Groundwater Compliance Boundary

PETERSON PURITAN SUPERFUND SITE - OU2
CUMBERLAND AND LINCOLN, RHODE ISLAND

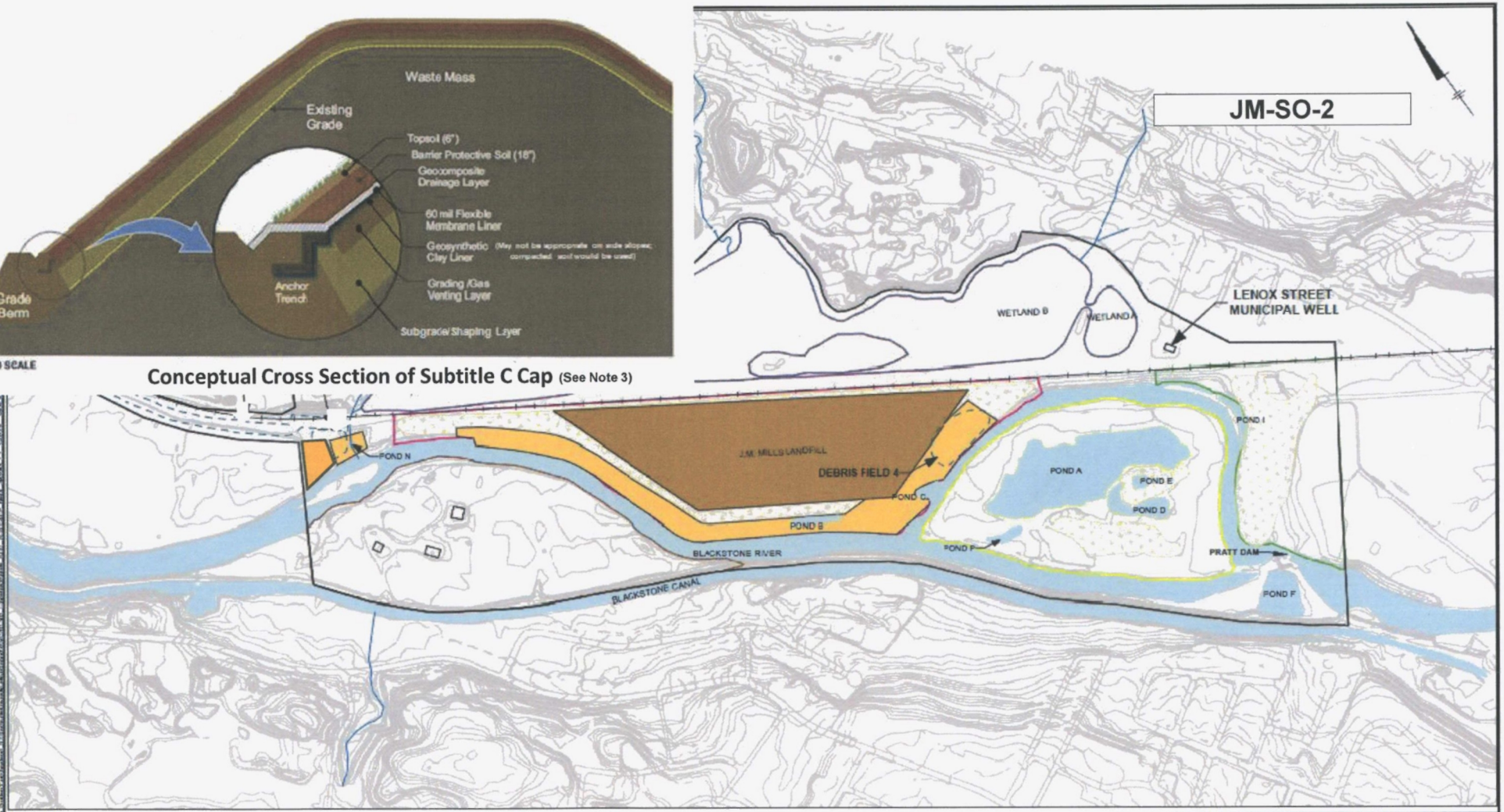
PROPOSED GROUNDWATER COMPLIANCE BOUNDARY

ARCADIS

FIGURE **3-6**

NOT TO SCALE

Conceptual Cross Section of Subtitle C Cap (See Note 3)



Legend

- OU2 BOUNDARY (RI Site Study Area)
- SURFACE WATER
- APPROXIMATE EXTENT OF SOIL EXCAVATION
- APPROXIMATE EXTENT OF RCRA SUBTITLE C CAP
- BURIED WASTE
- RAILROAD
- J.M. MILLS LANDFILL
- UNNAMED ISLAND
- QUINNVILLE WELL FIELD
- WETLAND
- SOLID WASTE TRANSFER STATION (NOW OR FORMERLY OWNED BY NUNES DISPOSAL, INC.)
- SEEP

0 500 1,000
SCALE IN FEET

Soils to be excavated – approximately 10 acres at a depth of 2 ft, resulting in approximately 33,000 cy

NOTES:
1) BURIED WASTE AND DEBRIS FIELDS CURRENTLY OUTSIDE THE BOUNDARY OF THE PROPOSED COVER WILL BE CONSOLIDATED UNDER THE PROPOSED COVER.
2) THE APPROXIMATE AREA OF THE LANDFILL COVER IS 21 ACRES.
3) This is one conceptual solution that is appropriate and acceptable for Region 1 CERCLA sites requiring hazardous waste closure. Other cap construction components, as identified during the design, may also satisfy the hazardous waste landfill closure performance standards.

PETERSON PURITAN SUPERFUND SITE - OU2
CUMBERLAND AND LINCOLN, RHODE ISLAND

J.M. MILLS LANDFILL SOIL REMOVAL and Subtitle C Cap

ARCADIS

FIGURE 4

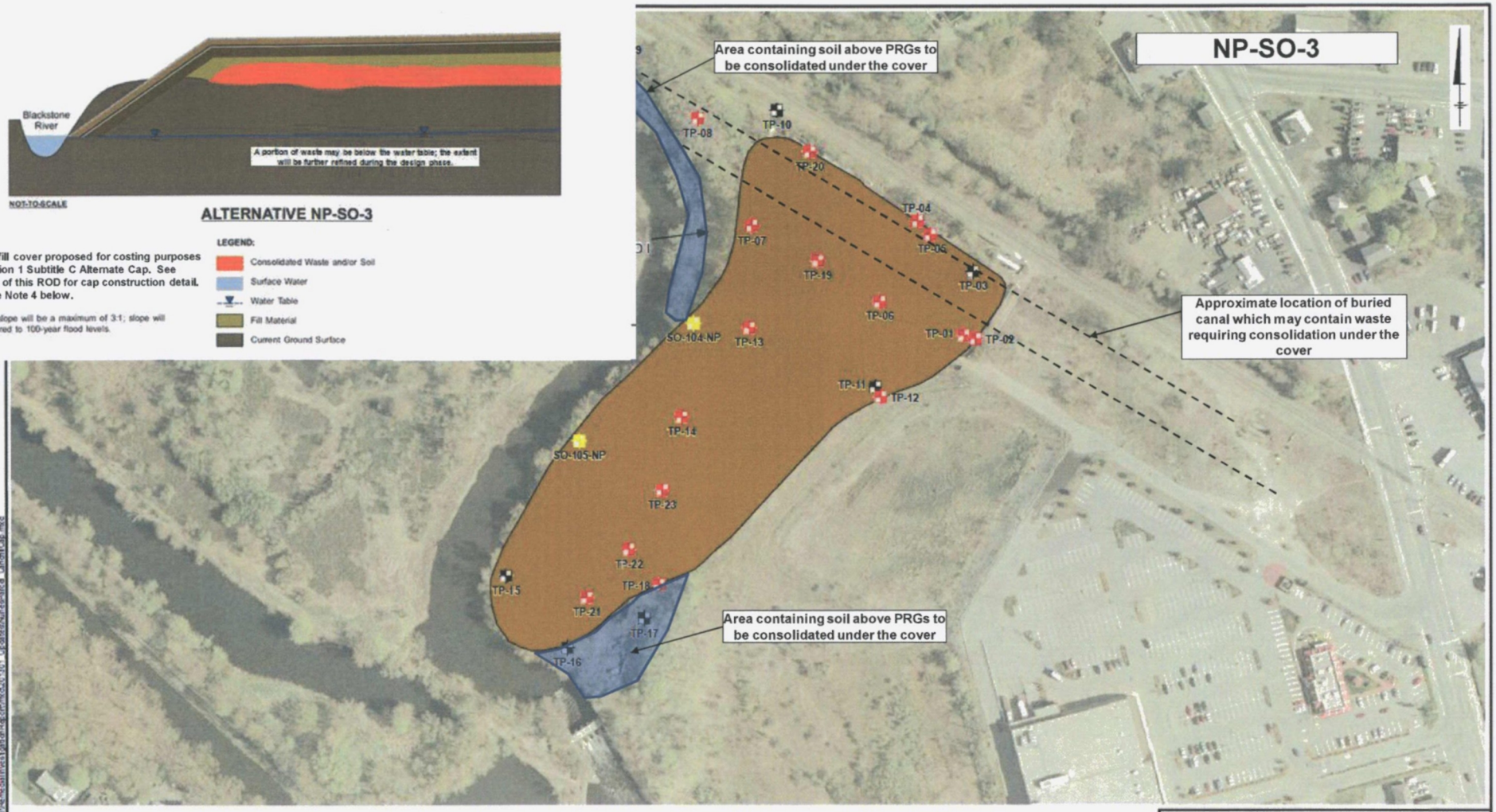
ALTERNATIVE NP-SO-3

NOTES:

1. Landfill cover proposed for costing purposes is a Region 1 Subtitle C Alternate Cap. See Figure 4 of this ROD for cap construction detail. Also see Note 4 below.
2. Landfill slope will be a maximum of 3:1; slope will be armored to 100-year flood levels.

LEGEND:

- Consolidated Waste and/or Soil
- Surface Water
- Water Table
- Fill Material
- Current Ground Surface



LEGEND:

- TEST PIT LOCATION - SAMPLE(S) COLLECTED
- TEST PIT LOCATION - NO SAMPLES COLLECTED
- SOIL BORING LOCATION - HAND AUGERED (UNABLE TO EXCAVATE TEST PIT)
- APPROXIMATE EXTENT OF LANDFILL COVER

Additional soil/sediment to be excavated – approximately 1 acre at a depth of 2 ft, resulting in approximately 3,500 cy

NOTE:
1) 2002 AERIAL PHOTO OBTAINED FROM RHODE ISLAND GEOGRAPHIC INFORMATION SYSTEM: http://www.edc.uri.edu/rigis/
2) THE APPROXIMATE AREA OF THE PROPOSED COVER IS 6.28 ACRES.
3) SEDIMENT FROM POND I MAY BE CONSOLIDATED UNDER THE COVER.

4) This is one conceptual solution that is appropriate and acceptable for Region 1 CERCLA sites requiring hazardous waste closure. Other cap construction components, as identified during the design, may also satisfy the hazardous waste landfill closure performance standards.

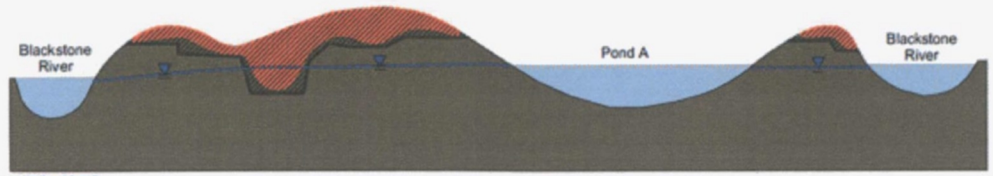
0 150 300 Feet
GRAPHIC SCALE

PETERSON PURITAN SUPERFUND SITE - OU2
CUMBERLAND AND LINCOLN, RHODE ISLAND

NUNES PARCEL LANDFILL CAP LOCATION

ARCADIS

FIGURE 5



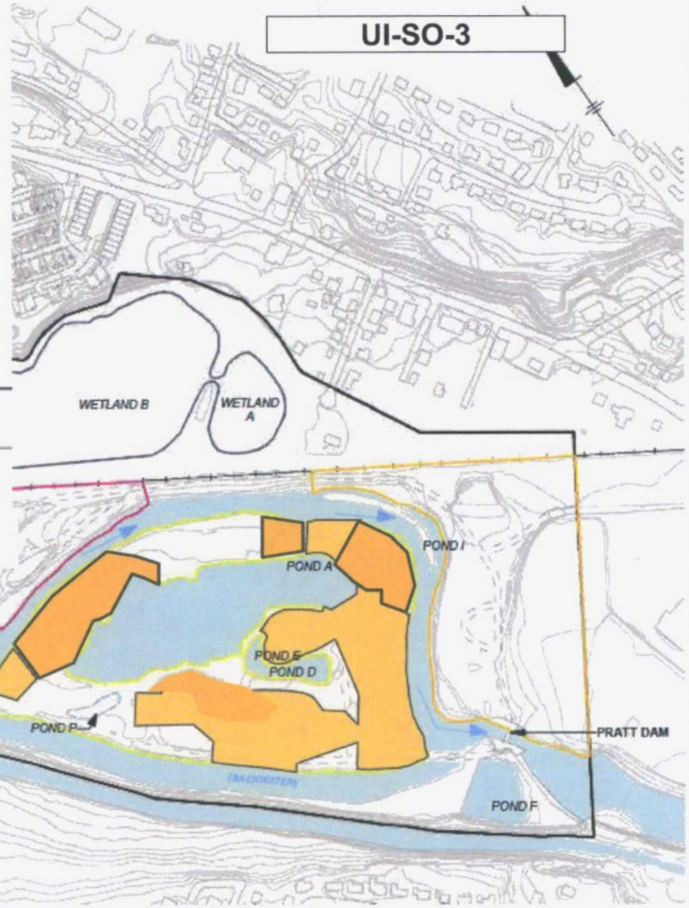
ALTERNATIVE UI-SO-3

NOTES:
1. Waste and/or soil exceeding remedial goals will be excavated and consolidated under the landfill cover at the J.M. Mills Landfill or Nunes Parcel.

LEGEND:
- Waste and/or Soil Exceeding Remedial Goals
- Surface Water
- Water Table
- Area of Excavation
- Ground Surface after Excavation

PETERSON PURITAN SUPERFUND SITE - OU2
CUMBERLAND AND LINCOLN, RHODE ISLAND

CONCEPTUAL CROSS-SECTION ALTERNATIVE UI-SO-3



LEGEND:
- APPROXIMATE EXTENT OF SOIL EXCAVATION AND WASTE REMOVAL
- HISTORICAL POND
- J.M. MILLS LANDFILL
- UNNAMED ISLAND
- QUINNVILLE WELL FIELD
- WETLAND
- SOLID WASTE TRANSFER STATION (INFO NUNES DISPOSAL, INC.)
- RAILROAD
- OU2 BOUNDARY (RI Site Study Area)
- HISTORICAL ACCESS ROAD
- WATER
- BURIED WASTE

0 400 800 Feet
GRAPHIC SCALE

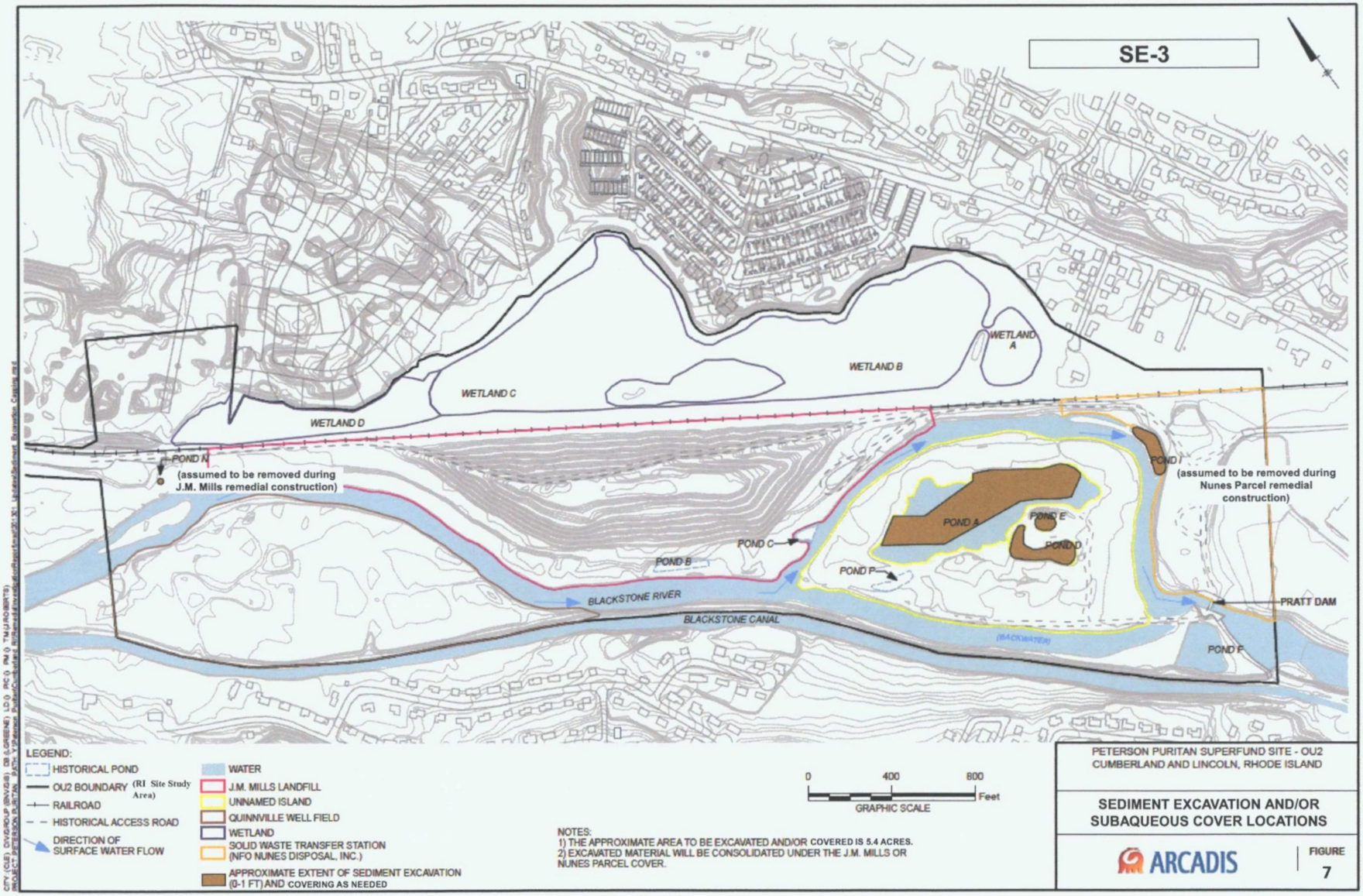
Waste to be excavated – assumed to be approximately 44,000 cy
Soils to be excavated – approximately 13 acres at an average depth of 3 ft, resulting in approximately 62,000 cy

PETERSON PURITAN SUPERFUND SITE - OU2
CUMBERLAND AND LINCOLN, RHODE ISLAND

UNNAMED ISLAND SOIL EXCAVATION AND WASTE REMOVAL LOCATIONS

ARCADIS

FIGURE 6



NOTES:
1) THE APPROXIMATE AREA TO BE EXCAVATED AND/OR COVERED IS 5.4 ACRES.
2) EXCAVATED MATERIAL WILL BE CONSOLIDATED UNDER THE J.M. MILLS OR NUNES PARCEL COVER.

PETERSON PURITAN SUPERFUND SITE - OU2
CUMBERLAND AND LINCOLN, RHODE ISLAND

SEDIMENT EXCAVATION AND/OR SUBAQUEOUS COVER LOCATIONS

ARCADIS

FIGURE 7

FIGURE CSM-1

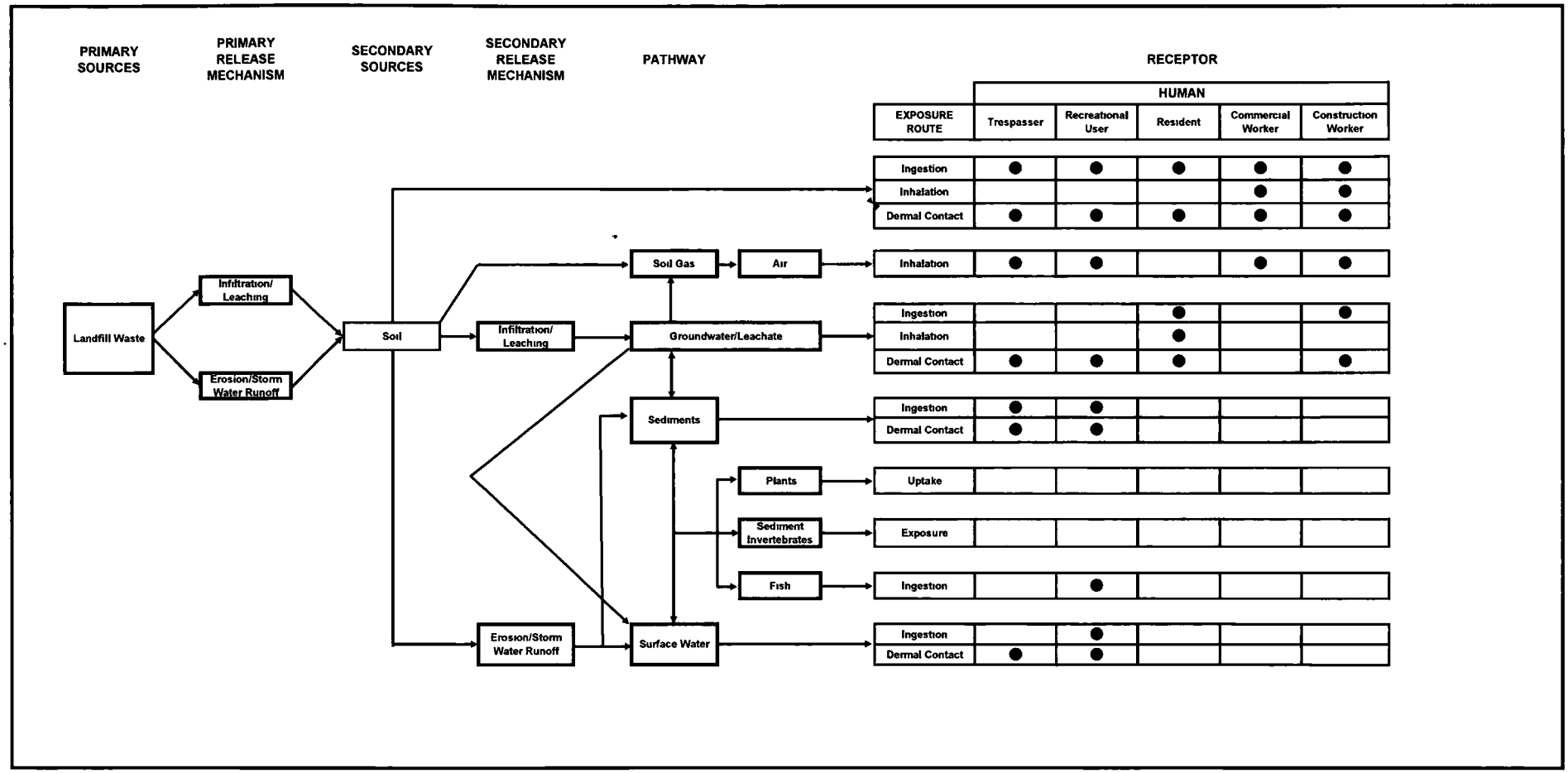

PRIMARY SOURCES
PRIMARY RELEASE MECHANISM
SECONDARY SOURCES
SECONDARY RELEASE MECHANISM
PATHWAY
RECEPTOR
HUMAN
EXPOSURE ROUTE
Trespasser
Recreational User
Resident
Commercial Worker
Construction Worker
Landfill Waste
Infiltration/ Leaching
Erosion/Storm Water Runoff
Soil
Soil Gas
Air
Infiltration/ Leaching
Groundwater/Leachate
Sediments
Plants
Sediment Invertebrates
Fish
Erosion/Storm Water Runoff
Surface Water
Ingestion
Inhalation
Dermal Contact
Inhalation
Ingestion
Inhalation
Dermal Contact
Ingestion
Dermal Contact
Uptake
Exposure
Ingestion
Ingestion
Dermal Contact

FIGURE 7.9. General Exposure Pathways and Routes

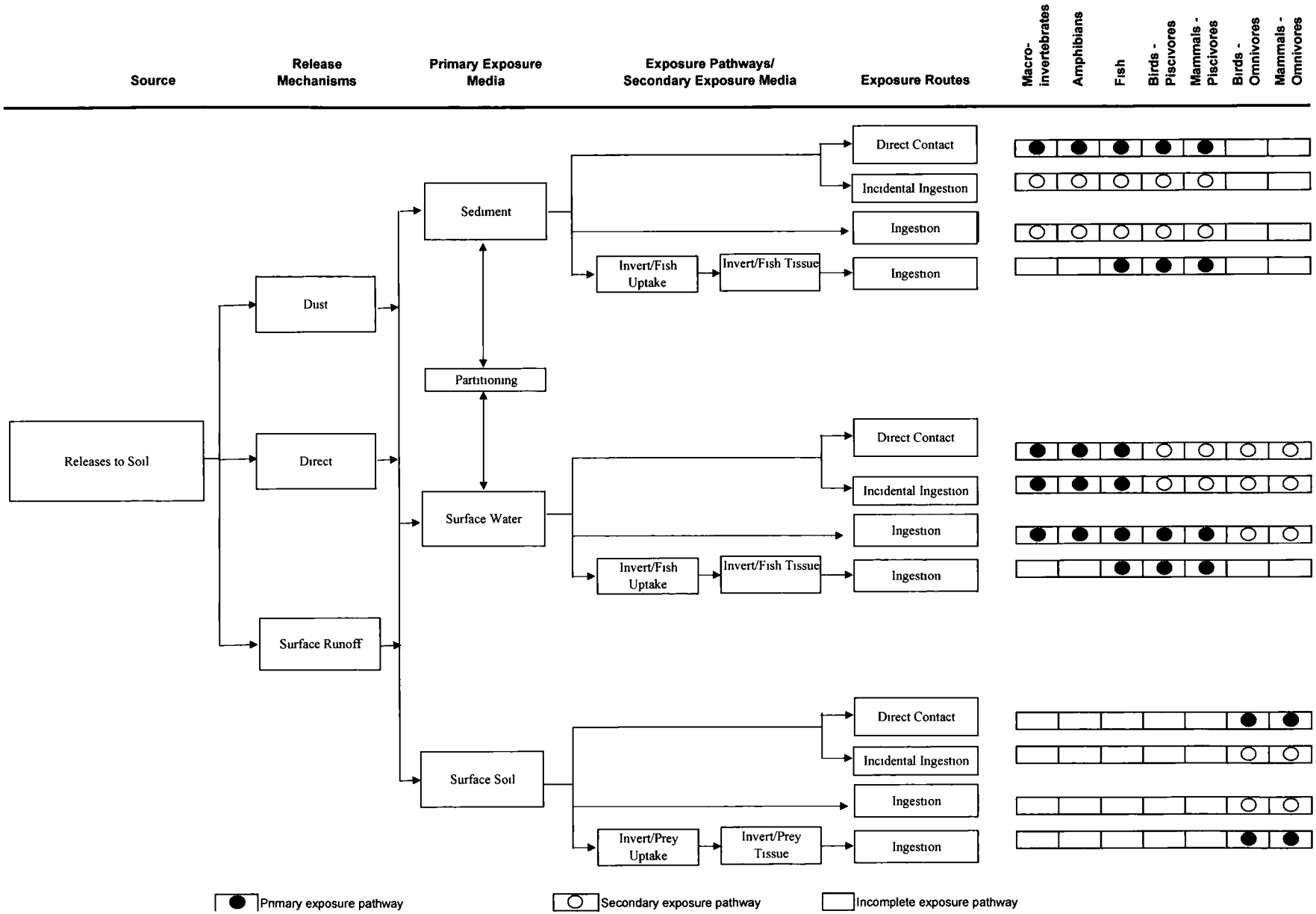




FIGURE L-1.

400-FT WELL BUFFER FOR PROTECTION OF PUBLIC DRINKING WATER

Legend

- Groundwater Compliance Boundary
- 400-ft Buffer

1 inch = 400 feet

0 200 400 800 Feet

AECOM

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Appendix C:

Tables

Table G-1

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe Current/Future
Medium Fish Tissue (Fillet)
Exposure Medium Fish Tissue (Fillet)

Exposure Point	Chemical of Concern	Concentration	Detected	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
OU 2								
	Benzo(a)anthracene	0 0082	0 013	mg/kg	3 / 48	0 0086	mg/kg	95% UCL
	Benzo(a)pyrene	0 0086	0 013	mg/kg	3 / 48	0 009	mg/kg	95% UCL
	Dibenz(a,h)anthracene	0 0084	0 018	mg/kg	5 / 48	0 0094	mg/kg	95% UCL
	Indeno(1,2 3-cd)pyrene	0 0097	0 016	mg/kg	4 / 48	0 0103	mg/kg	95% UCL
	Total PCB Homologs	0 090	2	mg/kg	48 / 48	0 601	mg/kg	95% UCL
	Aldrin	0 00093	0 00093	mg/kg	1 / 48	0 00093	mg/kg	Max
	Dieldrin	0 002	0 043	mg/kg	48 / 48	0 0137	mg/kg	95% UCL
	Arsenic	0 017	0 1	mg/kg	41 / 48	0 04	mg/kg	95% UCL
	Lead	0 016	0 2	mg/kg	3 / 48	0 012	mg/kg	Mean
BR-1								
	Benzo(a)pyrene	0 0086	0 0086	mg/kg	1 / 16	0 0086	mg/kg	95% UCL
	Dibenz(a h)anthracene	0 0098	0 0098	mg/kg	1 / 16	0 0098	mg/kg	95% UCL
	Indeno(1 2,3-cd)pyrene	0 0086	0 0086	mg/kg	1 / 16	0 0086	mg/kg	95% UCL
	Total PCB Homologs	0 070	1 3	mg/kg	16 / 16	0 4619	mg/kg	95% UCL
	Dieldrin	0 0039	0 016	mg/kg	16 / 16	0 009725	mg/kg	95% UCL
	Heptachlor Epoxide	0 00033	0 0029	mg/kg	13 / 16	0 001856	mg/kg	95% UCL
	Arsenic	0 037	0 13	mg/kg	16 / 16	0 0849	mg/kg	95% UCL
	Lead	0 024	0 029	mg/kg	2 / 16	0 013	mg/kg	Mean
BR-2								
	Benzo(a)anthracene	0 029	0 029	mg/kg	1 / 16	0 029	mg/kg	95% UCL
	Benzo(a)pyrene	0 028	0 028	mg/kg	1 / 16	0 028	mg/kg	95% UCL
	Benzo(b)fluoranthene	0 008	0 014	mg/kg	2 / 16	0 009275	mg/kg	95% UCL
	Dibenz(a h)anthracene	0 0076	0 01	mg/kg	2 / 16	0 00811	mg/kg	95% UCL
	Indeno(1 2 3-cd)pyrene	0 012	0 012	mg/kg	1 / 16	0 012	mg/kg	95% UCL
	Total PCB Homologs	0 24	2	mg/kg	16 / 16	1 007	mg/kg	95% UCL
	Dieldrin	0 0079	0 022	mg/kg	16 / 16	0 01608	mg/kg	95% UCL
	Arsenic	0 04	0 1	mg/kg	16 / 16	0 0687	mg/kg	95% UCL
	Lead	0 01	0 01	mg/kg	1 / 16	0 0056	mg/kg	Mean
P-6								
	Total PCB Homologs	0 019	0 11	mg/kg	8 / 8	0 08256	mg/kg	95% UCL
	Mercury	0 23	0 74	mg/kg	8 / 8	0 509	mg/kg	95% UCL

Key
(1) Statistics Maximum Detected Value (Max), 95% UCL (95% UCL) Arithmetic Mean (Mean)

The table represents the current/future chemicals of concern (COCs) and exposure point concentrations (EPCs) for the COCs detected in fish tissue (fillet) (i.e the concentrations that will be used to estimate the exposure and risk for each COC in fish tissue) The table includes the range of concentrations detected for each COC as well as the frequency of detection (i e the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that the carcinogenic PAHs (benzo(a)anthracene benzo(a)pyrene, benzo(b)fluoranthene dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene) total PCB homologs, aldrin dieldrin heptachlor epoxide, lead and arsenic are the only COCs in fish tissue for site-related water bodies (OU 2, BR-1 and BR-2), while total PCB homologs and mercury are COCs in fish tissue for the reference water body (P-6) The 95% UCL on the arithmetic mean was used as the EPC for each COC except for aldrin, for which the maximum detected concentration was used (OU 2), and lead, for which the arithmetic mean concentration was used (OU 2 BR-1 and BR-2)

Source A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U S EPA, 1999)

Table G-2

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface + Subsurface Soil

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
Nunes Parcel/Soil Removal Area								
	Benzo(a)anthracene	0 081	22	mg/kg	33 / 37	5 322	mg/kg	95% UCL
	Benzo(a)pyrene	0 089	21	mg/kg	33 / 37	5 214	mg/kg	95% UCL
	Benzo(b)fluoranthene	0 12	24	mg/kg	34 / 37	6 272	mg/kg	95% UCL
	bis(2-Ethylhexyl)phthalate	0 081	1300	mg/kg	30 / 37	420 768	mg/kg	95% UCL
	Dibenz(a,h)anthracene	0 04	4 4	mg/kg	27 / 37	0 7373	mg/kg	95% UCL
	Indeno(1,2,3-cd)pyrene	0 073	12	mg/kg	31 / 37	3 106	mg/kg	95% UCL
	Aroclor-1248	0 36	0 36	mg/kg	1 / 10	0 36	mg/kg	Max
	Dieldrin	0 0031	0 31	mg/kg	25 / 31	0 173	mg/kg	95% UCL
	Dioxin [2]	0 000026	0 000045	mg/kg	2 / 2	0 000045	mg/kg	Max
	Arsenic	2 8	27 7	mg/kg	37 / 37	13	mg/kg	95% UCL
	Lead	10	5460	mg/kg	37 / 37	531 5	mg/kg	Mean

Key

(1) Statistics Maximum Detected Value (Max), 95% UCL (95% UCL), Arithmetic Mean (Mean)

(2) Dioxin assessed using a total Toxicity Equivalent Quotient (TEQ) WHO 2005 Toxicity Equivalent Factors (TEFs) applied to individual dioxin congeners

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in soil at the Nunes Parcel/Soil Removal Area (i e , the concentrations that will be used to estimate the exposure and risk for each COC in soil) The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i e , the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived This table indicates that the carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene), bis(2-ethylhexyl)phthalate, Aroclor-1248, dieldrin, dioxin, arsenic, and lead are the only COCs in soil at the Nunes Parcel/Soil Removal Area The 95% UCL on the arithmetic mean was used as the EPC for the carcinogenic PAHs, bis(2-ethylhexyl)phthalate, dieldrin, and arsenic The maximum detected concentration was used as the EPC for Aroclor-1248 and dioxin, while the arithmetic mean concentration was used as the EPC for lead

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-3

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Indoor Air

Exposure Point	Chemical of Concern	Soil Concentration Detected		Units	Frequency of Detection	Indoor Air Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
		Minimum	Maximum					
Nunes Parcel/Soil Removal Area								
	Naphthalene	0 049	0 9	mg/kg	22 / 36	1	ug/m^3	95% UCL
	1,4-Dichlorobenzene	0.008	0 008	mg/kg	1 / 36	0 42	ug/m^3	Max
	Benzene	0 001	0 31	mg/kg	3 / 36	150	ug/m^3	95% UCL
	Ethylbenzene	0 02	0 02	mg/kg	1 / 36	6 46	ug/m^3	Max
	Tetrachloroethene	0 0023	0 015	mg/kg	2 / 36	22 6	ug/m^3	Max

Key

(1) Statistics Maximum Detected Value (Max), 95% UCL (95% UCL), Anthmetic Mean (Mean)

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for the COCs for the vapor intrusion (i e , indoor air) pathway resulting from volatile chemicals detected in soil at the Nunes Parcel/Soil Removal Area (i e , the concentration that will be used to estimate the exposure and risk for the COC for the vapor intrusion pathway) The table includes the range of concentrations detected for each COC in soil, as well as the frequency of detection (i e , the number of times the chemical was detected in the soil samples collected at the site), the modeled indoor air EPC, and how the EPC was derived This table indicates that the volatile organic chemicals naphthalene, 1,4-dichlorobenzene, benzene, ethylbenzene, and tetrachloroethene in soil may potentially impact indoor air at the Nunes Parcel/Soil Removal Area The 95% UCL on the anthmetic mean was used to estimate an indoor air concentration that was used as the EPC for naphthalene and benzene The maximum detected concentration was used to estimate an indoor air concentration that was used as the EPC for 1,4-dichlorobenzene, ethylbenzene, and tetrachloroethene

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-4

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Tap Groundwater

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
On-Site Groundwater								
	1,4-Dioxane	0 81	55	ug/L	7/30	55	ug/L	Max
	4-Chloroaniline	1 4	1 4	ug/L	1/95	1 4	ug/L	Max
	Atrazine	2 9	3 4	ug/L	1/96	3 4	ug/L	Max
	Benzo(a)anthracene	0 013	0 36	ug/L	10/98	0 36	ug/L	Max
	Benzo(a)pyrene	0 11	0 26	ug/L	2/98	0 26	ug/L	Max
	Benzo(b)fluoranthene	0 014	0 38	ug/L	4/98	0 38	ug/L	Max
	bis(2-Ethylhexyl)phthalate	0 29	50	ug/L	15/96	50	ug/L	Max
	Indeno(1,2 3-cd)pyrene	0 14	0 14	ug/L	1/98	0 14	ug/L	Max
	Naphthalene	0 012	14	ug/L	16/98	14	ug/L	Max
	1,4-Dichlorobenzene	0 25	8 4	ug/L	28/98	8 4	ug/L	Max
	Benzene	0 39	1100	ug/L	20/98	1100	ug/L	Max
	Chloroform	0 24	3 9	ug/L	9/98	3 9	ug/L	Max
	Ethylbenzene	0 22	17	ug/L	5/98	17	ug/L	Max
	Methyl tert-butyl ether	0 23	21	ug/L	14/98	21	ug/L	Max
	Tetrachloroethene	0 29	2 5	ug/L	4/98	2 5	ug/L	Max
	Trichloroethene	0 55	4 1	ug/L	4/98	4 1	ug/L	Max
	Vinyl Chloride	0 59	1.2	ug/L	3/98	1 2	ug/L	Max
	Aroclor-1242	0 33	0 33	ug/L	1/98	0 33	ug/L	Max
	Aroclor-1248	0 18	0 18	ug/L	1/98	0 18	ug/L	Max
	Aroclor-1254	0 58	0 58	ug/L	1/98	0 58	ug/L	Max
	Aldrin	0 0038	0 006	ug/L	2/98	0 006	ug/L	Max
	Dieldrin	0 0072	0 0083	ug/L	2/98	0 0083	ug/L	Max
	Aluminum	8 4	13200	ug/L	53/98	13200	ug/L	Max
	Arsenic	0 042	120	ug/L	84/98	120	ug/L	Max
	Cadmium	0 1	27	ug/L	29/98	27	ug/L	Max
	Cobalt	0 12	33	ug/L	31/98	33	ug/L	Max
	Iron	116	77000	ug/L	73/98	77000	ug/L	Max
	Lead	0 16	79 3	ug/L	41/98	2 17	ug/L	Mean
	Manganese	7 1	5840	ug/L	82/98	5840	ug/L	Max
	Thallium	0 13	8 9	ug/L	23/98	8 9	ug/L	Max

Key

(1) Statistics Maximum Detected Value (Max), 95% UCL (95% UCL), Arithmetic Mean (Mean)

Multiple results from each on-site monitoring well were treated as discrete samples

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in on-site groundwater (i e , the concentrations that will be used to estimate the exposure and risk for each COC in on-site groundwater) The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i e , the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived This table indicates that the inorganic chemicals, aluminum, arsenic, iron, and manganese, and the organic chemicals, 1,4-dioxane, bis(2-ethylhexyl)phthalate, naphthalene, 1,4-dichlorobenzene, and benzene are the most frequently detected COCs in on-site groundwater The maximum detected concentration identified assuming multiple results from each on-site monitoring well were treated as discrete samples, was used as the EPC for each of the COCs detected in groundwater, except for lead for which the mean was used

Source A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S EPA, 1999)

ROD RISK WORKSHEET

Table G-5

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Indoor Air

Exposure Point	Chemical of Concern	Groundwater Concentration Detected		Units	Frequency of Detection	Indoor Air Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure (1)
		Minimum	Maximum					
Nunes Parcel/Soil Removal Area								
	Benzene	0 42	19	ug/L	3 / 18	1 5	ug/m^3	95% UCL
	Ethylbenzene	17	17	ug/L	1 / 18	2 29	ug/m^3	Max
	Vinyl chlonde	0 59	0 85	ug/L	2 / 18	0 78	ug/m^3	Max

Key

(1) Statistics Maximum Detected Value (Max), 95% UCL (95% UCL), Anthmetic Mean (Mean)

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for the COCs for the vapor intrusion (i e , indoor air) pathway resulting from volatile chemicals detected in groundwater at the Nunes Parcel/Soil Removal Area (i e , the concentration that will be used to estimate the exposure and risk for the COC for the vapor intrusion pathway) The table includes the range of concentrations detected for each COC in groundwater, as well as the frequency of detection (i e , the number of times the chemical was detected in the groundwater samples collected at the site), the modeled indoor air EPC, and how the EPC was derived This table indicates that the volatile organic chemicals benzene, ethylbenzene, and vinyl chloride in groundwater may potentially impact indoor air at the Nunes Parcel/Soil Removal Area The 95% UCL on the arithmetic mean was used to estimate an indoor air concentration that was used as the EPC for benzene The maximum detected concentration was used to estimate an indoor air concentration that was used as the EPC for ethylbenzene and vinyl chlonde

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-6

Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date [1] (MM/DD/YYYY)
1,4-Dioxane	1 0E-01	1 0E-01	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
4-Chloroaniline	2 0E-01	2 0E-01	(mg/kg-day)$^{-1}$	C	PPRTV	07/20/15
Atrazine	2 3E-01	2 3E-01	(mg/kg-day)$^{-1}$	C	CalEPA	07/20/15
Benzo(a)anthracene	7 3E-01	7 3E-01	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
Benzo(a)pyrene	7 3E+00	7 3E+00	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
Benzo(b)fluoranthene	7 3E-01	7 3E-01	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
bis(2-Ethylhexyl)phthalate	1 4E-02	1 4E-02	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
Dibenz(a,h)anthracene	7 3E+00	7 3E+00	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
Indeno(1,2,3-cd)pyrene	7 3E-01	7 3E-01	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
Naphthalene	N/A	N/A	(mg/kg-day)$^{-1}$	C	IRIS	07/20/15
1,4-Dichlorobenzene	5 4E-03	5 4E-03	(mg/kg-day)$^{-1}$	C	CalEPA	07/20/15
Benzene	5 5E-02	5 5E-02	(mg/kg-day)$^{-1}$	A	IRIS	07/20/15
Chloroform	3 1E-02	3 1E-02	(mg/kg-day)$^{-1}$	B2	CalEPA	07/20/15
Ethylbenzene	1 1E-02	1 1E-02	(mg/kg-day)$^{-1}$	B2	CalEPA	07/20/15
Methyl tert-butyl ether	1 8E-03	1 8E-03	(mg/kg-day)$^{-1}$	B2	CalEPA	07/20/15
Trichloroethene	4 6E-02	4 6E-02	(mg/kg-day)$^{-1}$	A	IRIS	07/20/15
Vinyl Chloride	7 2E-01	7 2E-01	(mg/kg-day)$^{-1}$	A	IRIS	07/20/15
Dioxin TEQ	1 56E+05	1 56E+05	(mg/kg-day)$^{-1}$	B2	OHEA	07/20/15
Total PCB Homologs	2 0E+00	2 0E+00	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
Aroclor-1242	2 0E+00	2 0E+00	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
Aroclor-1248	2 0E+00	2 0E+00	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
Aroclor-1254	2 0E+00	2 0E+00	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
Aldrin	1 7E+01	1 7E+01	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
Dieldrin	1 6E+01	1 6E+01	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
Heptachlor Epoxide	9 1E+00	9 1E+00	(mg/kg-day)$^{-1}$	B2	IRIS	07/20/15
Aluminum	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	1 5E+00	1 5E+00	(mg/kg-day)$^{-1}$	A	IRIS	07/20/15
Cadmium	N/A	N/A	N/A	D	IRIS	07/20/15
Cobalt	N/A	N/A	N/A	N/A	N/A	N/A
Iron	N/A	N/A	N/A	N/A	N/A	N/A
Lead	N/A	N/A	N/A	B2	IRIS	07/20/15
Manganese	N/A	N/A	N/A	D	IRIS	07/20/15
Mercury	N/A	N/A	N/A	C	IRIS	07/20/15
Thallium	N/A	N/A	N/A	D	IRIS	07/20/15

Table G-6

Cancer Toxicity Data Summary

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Units	Weight of Evidence/Cancer Guideline Description	Source	Date [1] (MM/DD/YYYY)
1,4-Dioxane	5 0E-06	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Likely to be carcinogenic to humans	IRIS	07/20/15
Benzo(a)anthracene	1 1E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	07/20/15
Benzo(a)pyrene	1 1E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	07/20/15
Benzo(b)fluoranthene	1 1E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	07/20/15
bis(2-Ethylhexyl)phthalate	2 4E-06	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	07/20/15
Dibenz(a,h)anthracene	1 2E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	07/20/15
Naphthalene	3 4E-05	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	C	CalEPA	07/20/15
1,4-Dichlorobenzene	1 1E-05	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	C	CalEPA	07/20/15
Benzene	7 8E-06	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	07/20/15
Chloroform	2 3E-05	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	07/20/15
Ethylbenzene	2 5E-06	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	07/20/15
Methyl tert-butyl ether	2 6E-07	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	07/20/15
Tetrachloroethene	2 6E-07	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	07/20/15
Trichloroethene	4 1E-06	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	07/20/15
Vinyl Chloride	4 4E-06	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	07/20/15
Dioxin TEQ	3 8E+01	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	07/20/15
Aroclor-1242	5 7E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	07/20/15
Aroclor-1248	5 7E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	07/20/15
Aroclor-1254	5 7E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	07/20/15
Aldrin	4 9E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	07/20/15
Dieldrin	4 6E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	07/20/15
Arsenic	4 3E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	07/20/15

Table G-6

Cancer Toxicity Data Summary

Key	EPA Group
N/A Not applicable	A - Human carcinogen
IRIS Integrated Risk Information System, U S EPA	B1 - Probable human carcinogen - Indicates that limited human data are available
PPRTV = Provisional Peer Reviewed Toxicity Value developed by STSC	B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
STSC = Superfund Technical Support Center	C - Possible human carcinogen
CalEPA = California Environmental Protection Agency, Office of Environmental Health Hazard Assessment	D - Not classifiable as a human carcinogen
OHEA = EPA 1985 Health Assessment Document for Polychlorinated Dibenzo-p-Dioxins U S Environmental Protection Agency, Office of Health and Environmental Assessment EPA 600/8-84-014F	E - Evidence of noncarcinogenicity

(1) Date indicates when IRIS was last reviewed for the most current toxicity value

The slope factor presented for benzene is the high end of the range from 0 015 to 0 055 per mg/kg-day

For PCBs, the RME slope factor presented represents the upper-bound slope factor for high risk and persistence situations

The slope factor for benzo(a)pyrene, along with the appropriate relative potency factor (USEPA, 1993), used for the other carcinogenic PAHs

The slope factor for 1,4-dioxane is different than that used in the BHHRA Results presented on Risk Summary tables use the revised slope factor along with site-specific exposure parameters from the baseline HHRA

The slope factor for dioxins is different than that used in the BHHRA Results presented on Risk Summary tables use the revised slope factor along with site-specific exposure parameters from the baseline HHRA Refer to the Appendix C 3 of the FS for a memorandum discussing the dioxin toxicity values as they apply to this site

The slope factor and unit risk for trichloroethene are different than those used in the BHHRA Results presented on Risk Summary tables use the revised toxicity values along with site-specific exposure parameters from the baseline HHRA

The slope factor presented for trichloroethene is the adult-based value For early-life exposures, tumor-specific slope factor values of 9 3E-03 $(mg/kg\text{-}day)^{-1}$ for kidney tumors and 3 7E-02 $(mg/kg\text{-}day)^{-1}$ for combined liver tumors and non-Hodgkins lymphoma (NHL) are used in conjuction with age-dependent adjustment factors, as appropriate

The unit risk presented for trichloroethene is the adult-based value For early-life exposures, tumor-specific unit risk values of 1E-06 $(ug/m^3)^{-1}$ for kidney tumors and 3 1E-06 $(ug/m^3)^{-1}$ for combined liver tumors and non-Hodgkins lymphoma (NHL) are used in conjuction with age-dependent adjustment factors, as appropriate

The unit risk presented for benzene is the high end of the range from 2 2E-06 to 7E-06 per ug/m^3

The unit risk for tetrachloroethene is different than that used in the BHHRA Results presented on Risk Summary tables use the revised unit risk along with site-specific exposure parameters from the baseline HHRA

The unit risk presented for bis(2-ethylhexyl)phthalate was not presented in the BHHRA Particulate inhalation has been included in development of cleanup levels in this ROD Therefore, the unit risk has been presented for use in Section L of this ROD

Age-dependent adjustment factors are used in conjunction with toxicity values, as appropriate, for carcinogenic PAHs and vinyl chloride

This table provides the carcinogenic risk information which is relevant to the contaminants of concern in fish tissue, soil, indoor air, and groundwater At this time, slope factors are not available for the dermal route of exposure Thus, the dermal slope factors used in this assessment have been extrapolated from oral values An adjustment factor is sometimes applied, and is dependent upon how well the chemical is absorbed via the oral route Adjustments are particularly important for chemicals with less than 50% absorption via the ingestion route However, adjustment is not necessary for the chemicals evaluated at this site Therefore, the same values presented above were used as the dermal carcinogenic slope factors for these contaminants Nine of the COCs considered carcinogenic via the inhalation route were determined to be primary risk drivers for at least one exposure pathway evaluated at the site

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

ROD RISK WORKSHEET

Table G-7

Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ [1] (MM/DD/YYYY)
1,4-Dioxane	Chronic	3 0E-02	mg/kg-day	3 0E-02	mg/kg-day	Liver/Kidney	300	IRIS	07/20/15
4-Chloroaniline	Chronic	4 0E-03	mg/kg-day	4 0E-03	mg/kg-day	Spleen	3000	IRIS	07/20/15
Atrazine	Chronic	3 5E-02	mg/kg-day	3 5E-02	mg/kg-day	General Toxicity/ Cardiovascular	100	IRIS	07/20/15
Benzo(a)anthracene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	Chronic	2 0E-02	mg/kg-day	2 0E-02	mg/kg-day	Liver	1000	IRIS	07/20/15
Dibenz(a,h)anthracene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene	Chronic	2 0E-02	mg/kg-day	2 0E-02	mg/kg-day	General Toxicity	3000	IRIS	07/20/15
1,4-Dichlorobenzene	Chronic	7 0E-02	mg/kg-day	7 0E-02	mg/kg-day	Liver	100	ATSDR	07/20/15
Benzene	Chronic	4 0E-03	mg/kg-day	4 0E-03	mg/kg-day	Immune System	300	IRIS	07/20/15
Chloroform	Chronic	1 0E-02	mg/kg-day	1 0E-02	mg/kg-day	Liver	100	IRIS	07/20/15
Ethylbenzene	Chronic	1 0E-01	mg/kg-day	1 0E-01	mg/kg-day	Liver/Kidney	1000	IRIS	07/20/15
Methyl tert-butyl ether	Chronic	3 0E-01	mg/kg-day	3 0E-01	mg/kg-day	Liver	300	ATSDR	07/20/15
Trichloroethene	Chronic	5 0E-04	mg/kg-day	5 0E-04	mg/kg-day	Developmental/ Immune System	10 (Dev) / 100 (Immune System)	IRIS	07/20/15
Vinyl Chloride	Chronic	3 0E-03	mg/kg-day	3 0E-03	mg/kg-day	Liver	30	IRIS	07/20/15
Dioxin TEQ	Chronic	7 0E-10	mg/kg-day	7 0E-10	mg/kg-day	Developmental	100	IRIS	07/20/15
Total PCB Homologs	Chronic	2 0E-05	mg/kg-day	2 0E-05	mg/kg-day	General Toxicity/ Immune System	300	IRIS	07/20/15
Aroclor-1242	Chronic	2 0E-05	mg/kg-day	2 0E-05	mg/kg-day	General Toxicity/ Immune System	300	IRIS	07/20/15
Aroclor-1248	Chronic	2 0E-05	mg/kg-day	2 0E-05	mg/kg-day	General Toxicity/ Immune System	300	IRIS	07/20/15
Aroclor-1254	Chronic	2 0E-05	mg/kg-day	2 0E-05	mg/kg-day	General Toxicity/ Immune System	300	IRIS	07/20/15
Aldrin	Chronic	3 0E-05	mg/kg-day	3 0E-05	mg/kg-day	Liver	1000	IRIS	07/20/15
Dieldrin	Chronic	5 0E-05	mg/kg-day	5 0E-05	mg/kg-day	Liver	100	IRIS	07/20/15
Heptachlor Epoxide	Chronic	1 3E-05	mg/kg-day	1 3E-05	mg/kg-day	Liver	1000	IRIS	07/20/15
Aluminum	Chronic	1 0E+00	mg/kg-day	1 0E-02	mg/kg-day	Developmental	100	PPRTV	07/20/15
Arsenic	Chronic	3 0E-04	mg/kg-day	3 0E-04	mg/kg-day	Skin	3	IRIS	07/20/15
Cadmium	Chronic	5 0E-04	mg/kg-day	2 5E-05	mg/kg-day	Kidney	10	IRIS	07/20/15
Cobalt	Chronic	3 0E-04	mg/kg-day	3 0E-04	mg/kg-day	Endocrine	3000	PPRTV	07/20/15
Iron	Chronic	7 0E-01	mg/kg-day	7 0E-01	mg/kg-day	Liver/GI System	1 5	PPRTV	07/20/15
Lead	Chronic	N/A	N/A	N/A	N/A	CNS	N/A	IRIS	07/20/15
Manganese	Chronic	2 4E-02	mg/kg-day	9 6E-04	mg/kg-day	CNS	9	IRIS	07/20/15
Mercury	Chronic	1 0E-04	mg/kg-day	1 0E-04	mg/kg-day	CNS	10	IRIS	07/20/15
Thallium	Chronic	1 0E-05	mg/kg-day	1 0E-05	mg/kg-day	Blood	3000	PPRTV	07/20/15

Table G-7

Non-Cancer Toxicity Data Summary

Pathway: Inhalation

Chemical of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfC. RfD: Target Organ	Dates (MM/DD/YYYY)
1,4-Dioxane	Chronic	30	ug/m^3	N/A	N/A	Respiratory System	1000	IRIS	07/20/15
Benzo(a)anthracene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dibenz(a,h)anthracene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Naphthalene	Chronic	3	ug/m^3	N/A	N/A	Respiratory	3000	IRIS	07/20/15
1,4-Dichlorobenzene	Chronic	800	ug/m^3	N/A	N/A	Liver	100	IRIS	07/20/15
Benzene	Chronic	30	ug/m^3	N/A	N/A	Immune System	300	IRIS	07/20/15
Chloroform	Chronic	98	ug/m^3	N/A	N/A	Liver	100	ATSDR	07/20/15
Ethylbenzene	Chronic	1000	ug/m^3	N/A	N/A	Developmental	300	IRIS	07/20/15
Methyl tert-butyl ether	Chronic	3000	ug/m^3	N/A	N/A	Liver/Kidney	100	IRIS	07/20/15
Tetrachloroethene	Chronic	40	ug/m^3	N/A	N/A	CNS	100	IRIS	07/20/15
Trichloroethene	Chronic	2	ug/m^3	N/A	N/A	Developmental/ Immune System	10 (Dev) / 100 (Immune System)	IRIS	07/20/15
Vinyl Chloride	Chronic	100	ug/m^3	N/A	N/A	Liver	30	IRIS	07/20/15
Dioxin TEQ	Chronic	0 00004	ug/m^3	N/A	N/A	Liver/Immune System	100	CalEPA	07/20/15
Aroclor-1242	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aroclor-1248	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aroclor-1254	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aldrin	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dieldrin	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	Chronic	0 0015	ug/m^3	N/A	N/A	Developmental	30	CalEPA	07/20/15

Key

N/A - No information available

IRIS Integrated Risk Information System, U S EPA

PPRTV = Provisional Peer Reviewed Toxicity Value developed by STSC

STSC = Superfund Technical Support Center

ATSDR = Agency for Toxic Substances and Disease Registry

(1) Date indicates when IRIS was last reviewed for the most current toxicity value

The RfD for Aroclor 1254 was used as a surrogate for Aroclor 1242, Aroclor 1248, and Aroclor 1260 (High risk and persistence, upper-bound slope factor)

The RfD for thallium is based on thallium, soluble salts and is based on IRIS discussion and Regional Screening Level table (May 2014), this is different than the baseline HHRA Results presented on Risk Summary tabl use the revised RfD along with site-specific exposure parameters from the baseline HHRA

The RfD for 1,4-dioxane is different than that used in the baseline HHRA Results presented on Risk Summary tables use the revised RfD along with site-specific exposure parameters from the baseline HHRA

The RfD for mercury is based on methylmercury

The RfC for chloroform is different from that used in the baseline HHRA (which was rounded)

The RfD and RfC for trichloroethene are different from those used in the baseline HHRA Results presented on Risk Summary tables use the revised RfD/RfC along with site-specific exposure parameters from the baseline HHRA

ROD RISK WORKSHEET

Table G-7

Non-Cancer Toxicity Data Summary

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in fish tissue, soil, indoor air, and groundwater Twenty-eight of the COCs have oral toxicity data indicating their potential for adverse non-carcinogenic health effects in humans Chronic toxicity data available for the twenty-eight COCs for oral exposures have been used to develop chronic oral reference doses (RfDs), provided in this table The available chronic toxicty data indicate that benzene, trichloroethene, and PCBs affect the immune system, 1,4-dioxane, bis(2-ethylhexyl)phthalate, 1,4-dichlorobenzene, chloroform, ethylbenzene, methyl tert-butyl ether, vinyl chloride, iron, and pesticides affect the liver, thallium affects the blood, 1,4-dioxane, ethylbenzene, methyl tert-butyl ether, and cadmium affect the kidney, atrazine, naphthalene, and PCBs are general systemic toxicants, tetrachloroethene, lead, mercury, and manganese affect the central nervous system, trichloroethene, dioxins, ethylbenzene, and aluminum are developmental toxicants, 4-chloroaniline affects the spleen, atrazine affects the cardiovascular system, cobalt affects the endocrine system, iron affects the gastrointestinal system, naphthalene affects the respiratory system, and arsenic affects the skin A reference dose is not available for lead Dermal RfDs are not available for any of the COCs As was the case for the carcinogenic data, dermal RfDs can be extrapolated from oral RfDs by applying an adjustment factor as appropnate Oral RfDs were adjusted for COCs with less than 50% absorption via the ingestion route (aluminum, cadmium, manganese, and mercury) to derive dermal RfDs for these COCs Inhalation reference concentrations (RfCs) are available for nine volatile COCs evaluated for the inhalation pathway

Source A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-8

Risk Characterization Summary - Carcinogens

Scenario Timeframe Current/Future
Receptor Population Recreational User
Receptor Age Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Fish Tissue (fillet)	Fish Tissue (fillet)	OU 2						
			Benzo(a)anthracene	2E-06	--	--	--	2E-06
			Benzo(a)pyrene	2E-05	--	--	--	2E-05
			Dibenz(a,h)anthracene	2E-05	--	--	--	2E-05
			Indeno(1 2 3-cd)pyrene	2E-06	--	--	--	2E-06
			Total PCB Homologs	1E-04	--	--	--	1E-04
			Aldrin	2E-06	--	--	--	2E-06
			Dieldrin	2E-05	--	--	--	2E-05
			Arsenic	6E-06	--	--	--	6E-06
							Fish Tissue Risk Total =	2E-04
							Total Risk =	2E-04
Fish Tissue (fillet)	Fish Tissue (fillet)	BR-1						
			Benzo(a)pyrene	2E-05	--	--	--	2E-05
			Dibenz(a h)anthracene	2E-05	--	--	--	2E-05
			Indeno(1 2 3-cd)pyrene	2E-06	--	--	--	2E-06
			Total PCB Homologs	1E-04	--	--	--	1E-04
			Dieldrin	2E-05	--	--	--	2E-05
			Heptachlor Epoxide	2E-06	--	--	--	2E-06
			Arsenic	1E-05	--	--	--	1E-05
							Fish Tissue Risk Total =	2E-04
							Total Risk =	2E-04
Fish Tissue (fillet)	Fish Tissue (fillet)	BR-2						
			Benzo(a)anthracene	5E-06	--	--	--	5E-06
			Benzo(a)pyrene	5E-05	--	--	--	5E-05
			Benzo(b)fluoranthene	2E-06	--	--	--	2E-06
			Dibenz(a h)anthracene	2E-05	--	--	--	2E-05
			Indeno(1 2 3-cd)pyrene	2E-06	--	--	--	2E-06
			Total PCB Homologs	2E-04	--	--	--	2E-04
			Dieldrin	3E-05	--	--	--	3E-05
			Arsenic	1E-05	--	--	--	1E-05
							Fish Tissue Risk Total =	3E-04
							Total Risk =	3E-04

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure

-- Route of exposure is not applicable to this medium

This table provides risk estimates for the significant routes of exposure for the current/future young child and adult recreational users ingesting fish tissue from water bodies near the site These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the ingestion of fish tissue by a young child and adult, as well as the toxicity of the COCs (benzo(a)anthracene benzo(a)pyrene, benzo(b)fluoranthene dibenz(a h)anthracene, indeno(1,2 3-cd)pyrene PCBs aldrin, dieldrin, heptachlor epoxide and arsenic) The total risk from ingestion of fish tissue to a current/future recreational user is estimated to be 2×10^{-4} (OU 2 and BR-1) and 3×10^{-4} (BR-2) The COCs contributing most to this risk level are PCBs This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 2 in 10,000 (OU 2 and BR-1) or 3 in 10 000 (BR-2) of developing cancer as a result of site-related exposure to the COCs in fish tissue Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U S EPA, 1999)

Table G-9

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Fish Tissue (fillet)	Fish Tissue (fillet)	OU 2	Total PCB Homologs	General Toxicity/Immune System	1E+01	--	--	1E+01
							Fish Tissue Hazard Index Total =	1E+01
							Immune System Hazard Index =	1E+01
							General Toxicity Hazard Index =	1E+01
Fish Tissue (fillet)	Fish Tissue (fillet)	BR-1	Total PCB Homologs	General Toxicity/Immune System	9E+00	--	--	9E+00
							Fish Tissue Hazard Index Total =	9E+00
							Immune System Hazard Index =	9E+00
							General Toxicity Hazard Index =	9E+00
Fish Tissue (fillet)	Fish Tissue (fillet)	BR-2	Total PCB Homologs	General Toxicity/Immune System	2E+01	--	--	2E+01
							Fish Tissue Hazard Index Total =	2E+01
							Immune System Hazard Index =	2E+01
							General Toxicity Hazard Index =	2E+01
Fish Tissue (fillet)	Fish Tissue (fillet)	P-6	Total PCB Homologs	General Toxicity/Immune System	2E+00	--	--	2E+00
			Mercury	CNS	2E+00	--	--	2E+00
							Fish Tissue Hazard Index Total =	4E+00
							CNS Hazard Index =	2E+00
							Immune System Hazard Index =	2E+00
							General Toxicity Hazard Index =	2E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure

-- Route of exposure is not applicable to this medium

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for the current/future recreational user ingesting fish tissue from water bodies near the site The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects The estimated target organ HIs between 2 and 20 indicate that the potential for adverse effects could occur from exposure to fish tissue containing PCBs and mercury Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA

Source. A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-10

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Groundwater	On-site Monitoring Wells						
			1,4-Dioxane	1E-04	N/A	N/A	--	1E-04
			4-Chloroaniline	5E-06	N/A	N/A	--	5E-06
			Atrazine	1E-05	N/A	9E-07	--	1E-05
			Benzo(a)anthracene	1E-05	N/A	N/A	--	1E-05
			Benzo(a)pyrene	1E-04	N/A	N/A	--	1E-04
			Benzo(b)fluoranthene	1E-05	N/A	N/A	--	1E-05
			bis(2-Ethylhexyl)phthalate	1E-05	N/A	2E-05	--	3E-05
			Indeno(1,2,3-cd)pyrene	5E-06	N/A	N/A	--	5E-06
			Naphthalene	N/A	1E-04	N/A	--	1E-04
			1,4-Dichlorobenzene	8E-07	2E-05	4E-07	--	2E-05
			Benzene	1E-03	2E-03	9E-05	--	3E-03
			Chloroform	2E-06	2E-05	N/A	--	2E-05
			Ethylbenzene	3E-06	9E-06	2E-06	--	1E-05
			Methyl tert-butyl ether	7E-07	1E-06	N/A	--	2E-06
			Trichloroethene	5E-06	5E-06	6E-07	--	1E-05
			Vinyl Chloride	1E-04	1E-06	N/A	--	1E-04
			Aroclor-1242	1E-05	N/A	N/A	--	1E-05
			Aroclor-1248	6E-06	N/A	N/A	--	6E-06
			Aroclor-1254	2E-05	N/A	N/A	--	2E-05
			Aldrin	2E-06	N/A	N/A	--	2E-06
			Dieldrin	2E-06	N/A	1E-06	--	4E-06
			Arsenic	3E-03	N/A	N/A	--	3E-03
							Groundwater Risk Total =	7E-03
							Total Risk =	7E-03

Key

-- Route of exposure is not applicable to this medium

N/A - Toxicity criteria are not available to quantitatively address this route of exposure

This table provides risk estimates for the significant routes of exposure for the future young child and adult resident exposed to on-site groundwater used as household water These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a young child's and adult's exposure to groundwater, as well as the toxicity of the COCs (1,4-dioxane, 4-chloroaniline, atrazine, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, indeno(1,2,3-cd)pyrene, naphthalene, 1,4-dichlorobenzene, benzene, chloroform, ethylbenzene, methyl tert-butyl ether, trichloroethene, vinyl chloride PCBs, aldrin, dieldrin, and arsenic) The total risk from direct exposure to contaminated on-site groundwater to a future resident, in the event that groundwater is used as a potable source, is estimated to be 7×10^{-3} The COCs contributing most to this risk level are 1,4-dioxane, benzo(a)pyrene, naphthalene, benzene, vinyl chloride, and arsenic in groundwater This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 7 in 1,000 of developing cancer as a result of site-related exposure to the COCs in groundwater Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA It should be noted that tetrachloroethene was originally a cancer COC in the baseline HHRA, but, due to changes in toxicity values, is no longer included

Source A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-11

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	On-site Monitoring Wells						
			Naphthalene	General Toxicity	7E-02	2E+00	3E-02	2E+00
			Benzene	Immune System	3E+01	2E+01	N/A	4E+01
			Trichloroethene	Developmental/Immune System	8E-01	1E+00	8E-02	2E+00
			Aroclor-1242	General Toxicity/Immune System	2E+00	N/A	N/A	2E+00
			Aroclor-1254	General Toxicity/Immune System	3E+00	N/A	N/A	3E+00
			Aluminum	Developmental	1E+00	N/A	6E-01	2E+00
			Arsenic	Skin	4E+01	N/A	N/A	4E+01
			Cadmium	Kidney	5E+00	N/A	5E-01	6E+00
			Cobalt	Endocrine	1E+01	N/A	N/A	1E+01
			Iron	Liver/GI System	1E+01	N/A	N/A	1E+01
			Manganese	CNS	2E+01	N/A	N/A	2E+01
			Thallium	Blood	9E+01	N/A	N/A	9E+01
							Groundwater Hazard Index Total =	2E+02
							Skin Hazard Index =	4E+01
							Immune System Hazard Index =	5E+01
							Kidney Hazard Index =	6E+00
							Developmental Hazard Index =	4E+00
							Endocrine Hazard Index =	1E+01
							Liver Hazard Index =	1E+01
							GI System Hazard Index =	1E+01
							CNS Hazard Index =	2E+01
							Blood Hazard Index =	9E+01
							General Toxicity Hazard Index =	7E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure

-- Route of exposure is not applicable to this medium

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for the future resident exposed to on-site groundwater used as household water The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects The estimated target organ HIs between 4 and 90 indicate that the potential for adverse effects could occur from exposure to contaminated groundwater containing naphthalene, benzene trichloroethene, PCBs, aluminum, arsenic, cadmium, cobalt, iron, manganese, and thallium Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA It should be noted that trichloroethene was not originally a non-cancer COC in the baseline HHRA, but, due to changes in toxicity values, is now included

Source A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

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Table G-12

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Commercial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil	Surface + Subsurface Soil	Nunes Parcel/Soil Removal Area						
			Benzo(a)anthracene	1E-06	--	1E-06	--	3E-06
			Benzo(a)pyrene	1E-05	--	1E-05	--	2E-05
			Benzo(b)fluoranthene	2E-06	--	1E-06	--	3E-06
			bis(2-Ethylhexyl)phthalate	2E-06	--	1E-06	--	3E-06
			Dibenz(a,h)anthracene	2E-06	--	2E-06	--	3E-06
			Dieldrin	1E-06	--	6E-07	--	2E-06
			Dioxin TEQ	2E-06	--	5E-07	--	3E-06
			Arsenic	7E-06	--	1E-06	--	8E-06
							Surface + Subsurface Soil Risk Total =	5E-05
Soil	Indoor Air	Nunes Parcel/Soil Removal Area						
			Naphthalene	--	3E-06	--	--	3E-06
			Benzene	--	1E-04	--	--	1E-04
							Soil-to-Indoor Air Risk Total =	1E-04
							Total Risk =	1E-04

Key

-- Route of exposure is not applicable to this medium

N/A - Toxicity criteria are not available to quantitatively address this route of exposure

This table provides risk estimates for the significant routes of exposure for the future adult commercial worker at the Nunes Parcel/Soil Removal Area These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of an adult worker's exposure to soil and indoor air, as well as the toxicity of the COCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, dibenz(a,h)anthracene, dieldrin, dioxins, arsenic, naphthalene, and benzene) The total risk from direct exposure to contaminated soil and indoor air at this site to a future adult commercial worker at the Nunes Parcel/Soil Removal Area is estimated to be 1×10^{-4} The COCs contributing most to this risk level are benzo(a)pyrene in soil and benzene in indoor air This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 1 in 10,000 of developing cancer as a result of site-related exposure to the COCs Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA It should be noted that tetrachloroethene was originally a cancer COC for indoor air in the baseline HHRA, but, due to changes in toxicity values, is no longer included

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-13

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil	Surface + Subsurface Soil	Nunes Parcel/Soil Removal Area						
			Benzo(a)anthracene	2E-05	--	9E-06	--	3E-05
			Benzo(a)pyrene	2E-04	--	9E-05	--	3E-04
			Benzo(b)fluoranthene	3E-05	--	1E-05	--	4E-05
			bis(2-Ethylhexyl)phthalate	9E-06	--	3E-06	--	1E-05
			Dibenz(a,h)anthracene	3E-05	--	1E-05	--	5E-05
			Indeno(1,2,3-cd)pyrene	1E-05	--	5E-06	--	2E-05
			Aroclor-1248	1E-06	--	5E-07	--	2E-06
			Dieldrin	4E-06	--	1E-06	--	6E-06
			Dioxin TEQ	1E-05	--	1E-06	--	1E-05
			Arsenic	3E-05	--	3E-06	--	3E-05
							Surface + Subsurface Soil Risk Total =	5E-04
Soil	Indoor Air	Nunes Parcel/Soil Removal Area						
			Naphthalene	--	1E-05	--	--	1E-05
			1,4-Dichlorobenzene	--	2E-06	--	--	2E-06
			Benzene	--	5E-04	--	--	5E-04
			Ethylbenzene	--	7E-06	--	--	7E-06
			Tetrachloroethene	--	2E-06	--	--	2E-06
							Soil-to-Indoor Air Risk Total =	5E-04
Groundwater	Indoor Air	Nunes Parcel/Soil Removal Area						
			Benzene	--	5E-06	--	--	5E-06
			Ethylbenzene	--	2E-06	--	--	2E-06
			Vinyl chloride	--	5E-06	--	--	5E-06
							Groundwater-to-Indoor Air Risk Total =	1E-05
							Total Risk =	1E-03

Key

-- Route of exposure is not applicable to this medium

N/A - Toxicity criteria are not available to quantitatively address this route of exposure

This table provides risk estimates for the significant routes of exposure for a future young child and adult resident exposed to soil and indoor air in the Nunes Parcel/Soil Removal Area These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a young child and adult resident's exposure to soil and indoor air, as well as the toxicity of the COCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, PCBs, dieldrin dioxins, arsenic naphthalene, 1,4-dichlorobenzene benzene, ethylbenzene, tetrachloroethene and vinyl chloride) The total risk from exposure to contaminated soil and indoor air at the Nunes Parcel/Soil Removal Area to future residents is estimated to be 1×10^{-3} The COCs contributing most to this risk level are benzo(a)pyrene in soil and benzene in indoor air This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 1 in 1 000 of developing cancer as a result of site-related exposure to the COCs in soil and indoor air Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-14

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Indoor Air	Nunes Parcel/Soil Removal Area	Benzene	Immune System	--	5E+00	--	5E+00
							Soil-to-Indoor Air Hazard Index Total =	5E+00
							Immune System Hazard Index =	5E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure

-- Route of exposure is not applicable to this medium

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for future young child and adult resident exposed to indoor air in the Nunes Parcel/Soil Removal Area The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects The estimated target organ HI of 5 indicates that the potential for adverse effects could occur from exposure to contaminated indoor air containing benzene Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-15 Receptor Groups, Endpoints, Lines of Evidence, and Exposure Areas Evaluated in the Aquatic Portion of the BERA

Exposure Medium	Sensitive Environment Flag (Y or N)	Aquatic Receptor Group	E&T Species Flag (Y/N)	Assessment Endpoints	Lines of Evidence	Measurement endpoints	Aquatic Exposure Areas										
							Blackstone River	Pond A[a]	Pond B[b]	Pond C[b]	Pond D[a]	Pond E[a]	Pond F[c]	Pond I[b]	Pond N[b]	Pond P[a]	Wetlands A-D
Sediment	N	Aquatic invertebrates	N	maintain a healthy and stable benthic invertebrate community	bulk sediment chemistry	compare chemistry to sediment benchmarks	√	√	√	√	√	√	√	√	√	√	√
					sediment toxicity testing	evaluate responses for statistical significance	√	√	--	--	√	--	√	√	--	--	--
					benthic invertebrate community survey	compare survey results to reference conditions	√	√	--	--	√	--	√	√	--	--	--
Surface water	N	fish	N	maintain a healthy and stable fish community	surface water chemistry	compare chemistry to chronic surface water benchmarks	√	√	--	√	√	√	√	√	--	√	√
					fish community survey[d]	compare survey results to reference conditions	√	√	--	--	--	--	√	--	--	--	--
					measured fish tissue residues[e]	compare fish residues to fish CBRs	√	√	--	--	--	--	√	--	--	--	--
Surface water	N	amphibians	N	maintain stable and healthy amphibian populations	surface water chemistry	compare chemistry to chronic surface water benchmarks	√	√	--	√	√	√	√	--	√	√	√
Surface water, sediment, fish	not applicable	small piscivorous birds (belted kingfisher)[f]	N	protect and maintain populations of small piscivorous birds	FCM using measured fish tissue residues	compare calculated EDIs to mammal TRVs	√	√	--	--	--	--	√	--	--	--	--
Surface water, sediment fish	not applicable	large piscivorous birds (great blue heron)[g]	N	protect and maintain populations of large piscivorous birds	FCM using measured fish tissue residues	compare calculated EDIs to mammal TRVs	√	√	--	--	--	--	√	--	--	--	--
Surface water sediment, fish	not applicable	small piscivorous mammals (mink)[f]	N	protect and maintain populations of small piscivorous mammals	FCM using measured fish tissue residues	compare calculated EDIs to mammal TRVs	√	√	--	--	--	--	√	--	--	--	--
Surface water, sediment, fish	not applicable	large piscivorous mammals (river otter)[g]	N	protect and maintain populations of large piscivorous mammals	FCM using measured fish tissue residues	compare calculated EDIs to mammal TRVs	√	√	--	--	--	--	√	--	--	--	--

[a] located on Unnamed Island

[b] located along the banks of the Blackstone River

[c] located near Pratt Dam

[d] This measurement endpoint was omitted from the BERA risk characterization because the habitat structure of the Blackstone River upstream of the Site and at the Site itself was different enough to affect fish species composition. Also, no suitable fish community data were available from reference pond Pond P-6 to compare against the fisheries data collected from Pond A and Pond F because the reference pond was actively managed as a recreational fishery and as such did not provide natural fish community data.

[e] Six fish species (largemouth bass, white sucker, pumpkinseed, golden shiner, common shiner, and/or bluegill) were collected for whole fish tissue residue analyses.

[f] The EDIs for this receptor were calculated by treating the three target aquatic habitats as separate exposure areas. Fish tissue residues for the FCM were based on data for fish 15 cm or less in length.

[g] The EDIs for this receptor were calculated by combining the three target aquatic habitats into one exposure areas. Fish residues for FCM were based on all fish collected, representing the EA, regardless of size of the individual fish.

BERA = baseline ecological risk assessment

CBR = critical body residues

EA = exposure area

EDI = estimated daily intake

E&T = endangered and threatened

FCM = food chain modeling

TRV = toxicity reference value

Table G-16: Receptor Groups, Endpoints, Lines of Evidence, and Exposure Areas Evaluated in the Terrestrial Portion of the BERA												
							Terrestrial Exposure Areas					
Exposure Medium	Sensitive Environmental Flag (Y or N)	Terrestrial Receptor Group	E&T Species Flag (Y or N)	Assessment Endpoints	Lines of Evidence	Measurement Endpoints	J.M. Mills Landfill	Unnamed Island	Nunes Parcel[a]	Quinnville Well Field	Wetlands A-D	Pratt Dam
surface water, soil, earthworms	not applicable	small omnivorous birds (American robin)[b]	N	protect and maintain populations of small omnivorous birds	FCM using estimated earthworm tissue residues	compare calculated EDIs to bird TRVs	√	√	√	√	√	√
surface water, soil, earthworms	not applicable	small omnivorous mammals (short-tailed shrew)[b]	N	protect and maintain populations of small omnivorous mammals	FCM using estimated earthworm tissue residues	compare calculated EDIs to mammal TRVs	√	√	√	√	√	√
surface water, soil, earthworms	not applicable	large omnivorous birds (American woodcock)[c]	N	protect and maintain populations of large omnivorous birds	FCM using estimated earthworm tissue residues	compare calculated EDIs to bird TRVs	√	√	√	√	√	√
surface water, soil, earthworms	not applicable	large omnivorous mammals (red fox)[d]	N	protect and maintain populations of large omnivorous mammals	FCM using estimated earthworm tissue residues	compare calculated EDIs to mammal TRVs	√	√	√	√	√	√

[a] only the riparian corridor at Nunes Parcel was assessed as a terrestrial EA

[b] The EDIs for this receptor were calculated by treating the six target terrestrial habitats as separate exposure areas

[c] The EDIs for this receptor were calculated by combining the six target terrestrial habitats into one exposure area

[d] The EDIs for this receptor were calculated by combining the six target terrestrial habitats into one exposure area red fox diet was assumed to consist of 100% soil invertebrates

BERA = baseline ecological risk assessment
CBR = critical body residues
EDI = estimated daily intake
EA = exposure area
E&T = endangered and threatened
FCM = food chain modeling
TRV = toxicity reference value

Table G-17 Select Community-Level COPECs Identified in the SLERA for Analytes in Key Aquatic Exposure Areas

Matrix	COPEC	units	Frequency of Detection*	Minimum Detect Conc	Maximum Detect Conc	CTE** EPC	RME*** EPC	Screening Conc.	Screening Benchmark	Benchmark Source	Hazard Quotient	COPEC Flag (Y or N)
Ponds on Unnamed Island												
Pond A												
surface water[a]	aluminum	µg/L	7 / 10	32 4	529	74 1	195	529	87	(3)	6	Y
	lead	µg/L	4 / 10	1 5	15 5	1 8	15 5	15 5	0 47	(3)	33	Y
	manganese	µg/L	10 / 10	267	441	363	397	441	80	(2)	6	Y
	zinc	µg/L	2 / 10	26 5	155	14 5	155	155	33	(3)	5	Y
sediment[b]	cadmium	mg/kg	12 / 12	0 410	25 0	3 4	18 2	25 0	0 99	(1)	25	Y
	chromium	mg/kg	12 / 12	4 8	257	5 7	148	257	43	(1)	6	Y
	copper	mg/kg	11 / 12	16 4	337	63 3	183	337	32	(1)	11	Y
	lead	mg/kg	12 / 12	3 0	318	67 5	176	318	36	(1)	9	Y
	zinc	mg/kg	12 / 12	29 5	972	201	692	972	120	(1)	8	Y
Pond D												
surface water[c]	benzo(a)pyrene	µg/L	1 / 2	0 150	0 150	0 087	0 150	0 150	0 01	(2)	15	Y
	aluminum	µg/L	2 / 2	993	4250	2050	4250	4250	87	(3)	49	Y
	cadmium	µg/L	2 / 2	1 1	4 7	2 3	4 7	4 7	0 086	(3)	55	Y
	lead	µg/L	2 / 2	18 9	82 6	39 5	82 6	82 6	0 47	(3)	176	Y
sediment[d]	cadmium	mg/kg	4 / 4	4 0	15 6	8 1	15 6	15 6	0 99	(1)	16	Y
	chromium	mg/kg	4 / 4	57 3	141	93 4	141	141	43	(1)	3	Y
	copper	mg/kg	4 / 4	67 6	179	108	179	179	32	(1)	6	Y
	lead	mg/kg	4 / 4	77 9	196	122	196	196	36	(1)	5	Y
	zinc	mg/kg	4 / 4	200	590	358	590	590	120	(1)	5	Y
Pond E												
surface water[e]	barium	µg/L	2 / 2	248	275	261	275	275	3 9	(2)	71	Y
	cadmium	µg/L	1 / 2	0 640	0 640	0 250	0 640	0 640	0 086	(3)	7	Y
	lead	µg/L	2 / 2	3 3	14 3	6 9	14 3	14 3	0 47	(3)	30	Y
	zinc	µg/L	2 / 2	32 1	75 1	49 1	75 1	75 1	33	(3)	2	Y
sediment[f]	cadmium	mg/kg	2 / 2	13 2	15 9	14 5	15 9	15 9	0 99	(1)	16	Y
	chromium	mg/kg	2 / 2	204	354	269	354	354	43	(1)	8	Y
	copper	mg/kg	2 / 2	439	653	535	653	653	32	(1)	20	Y
	lead	mg/kg	2 / 2	1290	1760	1510	1760	1760	36	(1)	49	Y
	zinc	mg/kg	2 / 2	1420	1460	1440	1460	1460	120	(1)	12	Y
Pond P												
surface water[g]	manganese	µg/L	1 / 1	1160	1160	1160	1160	1160	80	(2)	15	Y
	silver	µg/L	1 / 1	2 6	2 6	2 6	2 6	2 6	0 36	(4)	7	Y
sediment[h]	pyrene	mg/kg	1 / 1	0 89	0 89	0 89	0 89	0 89	0 195	(1)	5	Y
	cadmium	mg/kg	1 / 1	2 2	2 2	2 2	2 2	2 2	0 99	(1)	2	Y
Ponds adjacent to the Blackstone River												
Pond C												
surface water[i]	aluminum	µg/L	2 / 2	188	20800	1980	20800	20800	87	(3)	239	Y
	barium	µg/L	2 / 2	68 6	598	203	598	598	3 9	(2)	153	Y
	cadmium	µg/L	1 / 2	19 9	19 9	3 01	19 9	19 9	0 086	(3)	231	Y
	copper	µg/L	1 / 2	428	428	48 1	428	428	2 5	(3)	171	Y
	lead	µg/L	2 / 2	3 2	330	32 5	330	330	0 47	(3)	702	Y
sediment[j]	anthracene	mg/kg	2 / 2	0 4	0 67	0 518	0 67	0 67	0 057	(1)	12	Y
	pyrene	mg/kg	2 / 2	2 4	2 5	2 45	2 5	2 5	0 195	(1)	13	Y
	total PCBs	mg/kg	2 / 2	0 23	0 86	0 445	0 86	0 86	0 06	(1)	14	Y
	cadmium	mg/kg	2 / 2	7 2	14 7	10 3	14 7	14 7	0 99	(1)	15	Y
Pond I												
surface water[k]	barium	µg/L	2 / 2	50 9	74 7	62 0	74 7	74 7	3 9	(2)	19	Y
	cadmium	µg/L	1 / 2	0 710	0 710	0 400	0 710	0 710	0 086	(3)	8	Y
	lead	µg/L	2 / 2	6 6	8 7	7 8	8 7	8 7	0 47	(3)	19	Y
	manganese	µg/L	2 / 2	182	418	287	418	418	80	(2)	5	Y
sediment[l]	cadmium	mg/kg	3 / 3	11 4	30 2	14 6	30 2	30 2	0 99	(1)	31	Y
	chromium	mg/kg	3 / 3	106	257	142	257	257	43	(1)	6	Y
	copper	mg/kg	3 / 3	176	355	219	355	355	32	(1)	11	Y
	lead	mg/kg	3 / 3	154	300	188	300	300	36	(1)	8	Y
	zinc	mg/kg	3 / 3	343	666	408	666	666	120	(1)	6	Y
Pond N												
surface water[m]	aluminum	µg/L	1 / 1	2070	2070	2070	2070	2070	87	(3)	24	Y
	cadmium	µg/L	1 / 1	0 470	0 470	0 470	0 470	0 470	0 086	(3)	5	Y
	lead	µg/L	1 / 1	8 6	8 6	8 6	8 6	8 6	0 47	(3)	18	Y
	manganese	µg/L	1 / 1	295	295	295	295	295	80	(2)	4	Y
sediment[n]	cadmium	mg/kg	1 / 1	13 8	13 8	13 8	13 8	13 8	0 99	(1)	14	Y
	chromium	mg/kg	1 / 1	163	163	163	163	163	43	(1)	4	Y
	copper	mg/kg	1 / 1	210	210	210	210	210	32	(1)	7	Y
	lead	mg/kg	1 / 1	185	185	185	185	185	36	(1)	5	Y
	zinc	mg/kg	1 / 1	478	478	478	478	478	120	(1)	4	Y

COPEC = contaminant of potential ecological concern, CTE = central tendency exposure EPC = Exposure Point Concentration RME = reasonable maximum exposure SLERA = screening-level ecological risk assessment

The Frequency of Detections are as reported in the 2007 SLERA report

** In the BERA, the CTE risks to benthic invertebrates from exposure to sediment COPECs were assessed using arithmetic means, whereas all other CTEs were calculated as geometric means This table was simplified by only showing the geometric mean CTE sediment concentrations

*** The RME EPCs for COPECs in surface water sediment, and whole fish were calculated as either the maximum detected value or the 95% Upper Confidence Limit (UCL) of the mean, depending on the structure of the datasets

[a] see Tables 20a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[b] see Tables 5a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[c] see Tables 22a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[d] see Tables 8a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[e] see Tables 23a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[f] see Tables 9a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[g] see Tables 27a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[h] see Tables 13a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[i] see Tables 21a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[j] see Tables 7a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[k] see Tables 25a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[l] see Tables 11a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[m] see Tables 26a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

[n] see Tables 12a-d in the 2007 SLERA and Appendix BB in the May 2009 BERA

(1) MacDonald, D D C G Ingersoll, and T A Berger 2000 Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. Arch Environ Contam Toxicol 39:20-31

(2) US EPA. 1996 ECO Update Ecotox Thresholds US EPA Office of Solid Waste and Emergency Response EPA-540/F-95/038 January 1996

(3) US EPA. 2006 National Recommended Water Quality Criteria. 2006 Office of Water Science and Technology www.epa.gov/waterscience/criteria/nrwqc-2006

(4) Suter G W and C L Tsao 1996 Toxicological benchmarks for screening potential contaminants of concern for effects on aquatic biota, 1996 revision Environmental Sciences Division ORNL ES/ER/TM-96/R2

Table G-18: Key COPECs Identified by the SLERA in Select Terrestrial Exposure Areas														
Matrix	**COPEC**	**units**	**Frequency of Detection***			**Minimum Conc.**	**Maximum Conc.**	**CTE** EPC**	**RME*** EPC**	**Screening Conc.**	**Screening Benchmark**	**Benchmark Source**	**Hazard Quotient**	**COPEC Flag (Y or N)**
All terrestrial habitats combined[a]														
soil[b]	BEHP	mg/kg	55	/	93	0.07	260	0.573	25.5	260	not avail	--	--	Y
	cadmium	mg/kg	85	/	93	0.13	23.5	2.61	7.08	23.5	0.36	(1)	65	Y
	lead	mg/kg	93	/	93	7.2	2380	128	313	2380	11	(1)	216	Y
	zinc	mg/kg	93	/	93	19.0	2560	129	260	2560	50	(2)	51	Y
J.M. Mills Landfill														
soil[c]	BEHP	mg/kg	7	/	16	0.37	5.1	0 659	1.97	5.1	not avail.	--	--	Y
	cadmium	mg/kg	16	/	16	0.95	23.5	6 8	11 5	23 5	0.36	(1)	65	Y
	copper	mg/kg	16	/	16	19.6	377	140	208	377	28	(1)	13	Y
	lead	mg/kg	16	/	16	43.9	714	165	234	714	11	(1)	65	Y
	zinc	mg/kg	16	/	16	97.0	2560	252	442	2560	50	(2)	51	Y
Unnamed Island														
soil[d]	BEHP	mg/kg	9	/	21	0.13	260	1.03	39.5	260	not avail.	--	--	Y
	cadmium	mg/kg	18	/	21	0.31	4.5	2.0	4.61	4.5	0.36	(1)	13	Y
	chromium	mg/kg	21	/	21	21.4	370	71.8	153	370	26	(1)	14	Y
	copper	mg/kg	21	/	21	15.7	1310	89.8	333	1310	28	(1)	47	Y
	lead	mg/kg	21	/	21	19.1	1570	120	1360	1570	11	(1)	143	Y
	zinc	mg/kg	21	/	21	25.9	699	105	1070	699	50	(2)	14	Y

BEHP = bis(2-ethylhexyl)phthalate, COPEC = contaminant of potential ecological concern, CTE = central tendency exposure, EPC = Exposure Point Concentration, SLERA = screening-level ecological risk assessment, RME = reasonable maximum exposure

* The Frequency of Detections are as reported in the 2007 SLERA report, except that the Frequency of Detections for "all terrestrial habitats combined" are as reported in Appendix BB (see footnote b below)

** The CTEs represent geometric means, which were used in the BERA exposure calculations

*** The RME EPCs for COPECs in surface water, soil, and earthworms were calculated as either the maximum detected value or the 95% Upper Confidence Limit (UCL) of the mean, depending on the structure of the datasets

[a] J M Mills Lanfill, Unnamed Island, Nunes Parcel, Wellfield, Wetlands A-D, and Pratt Dam combined

[b] see Appendix BB in the May 2009 BERA (note the 2007 SLERA selected soil COPECs only for individual terrestrial habitats, the "site-wide" soil COPECs shown here were identified in the BERA using wildlife food chain modeling)

[c] see Tables 15a-d in the 2007 SLERA, and Table 7-18b and Appendix BB in the May 2009 BERA

[d] see Tables 18a-d in the 2007 SLERA, and Table 7-18c and Appendix BB in the May 2009 BERA

(1) US EPA 2003 Interim Ecological Soil Screening Levels Available at http //www epa gov/ecotox/ecossl

(2) Efroymson, R A, M E Will, G W Suter, and A C Wooten 1997 Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants 1997 Revision Prepared for the U S Department of Energy ES/ER/TM-85/R3 November 1997

Table G-19: Summary of Ecological Risk by Exposure Area			
Area	**Media**	**Basis**	**Primary COPECs**
Ponds on the Unnamed Island			
Pond A	Sediment	Severe sediment toxicity Cd	Cd
	Surface Water	Adverse effects possible to amphibians	Mn
Pond D	Sediment	Severe sediment toxicity	Cd, pyrene
	Surface Water	Severe risk to fish and amphibians	Al, Ba, Cd, Pb
Pond E	Sediment	Severe risk to benthic invertebrates	Pb
	Surface water	Adverse risk to fish and amphibians	Pb, Ba, Mn
Pond P	Surface Water	Severe risk to fish and amphibians	Mn
Ponds Next to the Blackstone River			
Pond C	Surface Water	Severe risk to fish and amphibians	Al, Cd, Ba, Cu, Pb
Pond I	Sediment	Adverse effects possible	Cd, Cu, PAHs
	Surface Water	Adverse risk to fish and amphibians	Pb
Pond N	Surface Water	Adverse risk to fish and amphibians	Al, Pb
	Sediment	Adverse effects possible	4,4'-DDD, Cd, Cr
Terrestrial Habitats			
Site-wide	Soil	Adverse risks to omnivorous birds	BEHP, Cd, Pb, Zn
J.M. Mills Landfill	Soil	Adverse risks to omnivorous birds	BEHP, Cd, Pb, Zn
		Possible adverse effects to small omnivorous mammals	Al, Zn
Unnamed Island	Soil	Adverse risks to omnivorous birds	BEHP, Pb, Zn

Table G-20: Original and Refined Uptake Factors Used in the Food Chain Models		
COPEC	BSAF (unitless)	
	Original values	Refined values
BEHP	129	0.17[a]
Pb	0.13	no change
Zn	13.7	regression equation[b]

BEHP = bis(ethylhexyl)phthalate, BSAF = biota-soil accumulation factor, COPEC = contaminant of potential ecological concern

[a] BSAF for BEHP based on ratio of BEHP levels in earthworms and soils in a study by Xiao-Yu Hu, Bei Wen, Shuzhen Zhang, and Xiao-Quan Shan 2005 Bioavailability of phthalate congeners to earthworms (Eisenia fetida) in artificially contaminated soils Ecotox Environ Saf 62 26-34)

[b] Regression equation from EPA 2007 Ecological Soil Screening Levels for Zinc Interim Final OWSER Directive 9285 7-73 for zinc fo estimate zinc tissue levels in earthworms based on zinc measured in soil

$$Ln(C_{worm\ dw}) = 0\ 328 * \ln(C_{soil\ dw}) + 4\ 449$$

where $C_{worm\ dw}$ = concentration of Zinc in earthworm tissue (dry weight)

and $C_{soil\ dw}$ = concentration of Zinc in soil (dry weight)

Table G-21: Original and Refined TRVs Used in the Updated Exposure Calculations								
	Bird TRVs (mg/kg-day)				Mammal TRVs (mg/kg-day)			
	Original Values		Refined Values		Original Values		Refined Values	
COPECs	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
BEHP	1.1[a]	3.51[a]	no changes		18.3[b]	183[b]	no changes	
Pb	0.0114[c]	0.114[c]	1.63[d]	44.6[d]	8[e]	80[e]	no changes	
Zn	14.5[f]	131[f]	66.1[g]	171[g]	160[h]	320[h]	74.5[g]	298[g]

BEHP = bis(ethylhexyl)phthalate, COPEC = contaminant of potential ecological concern, LOAEL = lowest obesrved adverse effect level, NOAEL = no observed adverse effect level, TRV = toxicity reference value

[a] BERA Table 7-4a Based on ringed dove; bounded NOAEL & lowest LOAEL Source Sample et al , 1996/ USDON, 2004

[b] BERA Table 7-4b Based on mouse, bounded NOAEL & lowest LOAEL. Source Sample et al , 1996

[c] BERA Table 7-4a Based on American Kestrel, USDON, 2004

[d] USEPA, 2012 Based on Eco-SSL data for lead, USEPA, 2005

[e] BERA Table 7-4b Based on rat; Source Sample et al., 1996 / USEPA, 1999

[f] BERA Table 7-4a. Based on white leghorn hen, Source· Sample et al., 1996/ USDON, 2004

[g] USEPA, 2012 Based on Eco-SSL data for zinc, USEPA, 2007

[h] BERA Table 7-4b Based on rat, Source. Sample et al , 1996

References:

Sample, B.E., D.M Opresko, and G.W. Suter II 1996. Toxicological Benchmarks for Wildlife. 1996 revision ES/ER/TM-86-R3. U S. Department of Energy, Office of Environmental Management.

United States Department of Navy (USDON). 2004. Draft: Step 7 Baseline Ecological Risk Assessment Pearl Harbor Sediment Remedial Investigation. Prepared by Earth Tech, Inc. under Comprehensive Long-Term Environmental Action Navy Contract Number N62742-94-D-0048, CTO 0115.

USEPA. 1999. Appendix E, Toxicity Reference Values. Screening Level Ecological Risk Assessment Protocol, August 1999

USEPA. 2005. Ecological Soil Screening Levels for lead. Interim Final. OSWER Directive 9285.7-70

USEPA. 2007 Ecological Soil Screening Levels for zinc. Interim Final OSWER Directive 9285.7-73

USEPA. 2012. Additional Refinements to Terrestrial Ecological Risk Calculations, Peterson Puritan OU2, memorandum from Bart Hoskins to David Newton. April 12, 2012.

Table G-22: Original Versus Refined HQs for Omnivorous Wildlife Receptors								
	Original HQs				Refined HQs			
	NOAEL HQs		LOAEL HQs		NOAEL HQs		LOAEL HQs	
COPEC	RME	CTE	RME	CTE	RME	CTE	RME	CTE
Site-Wide (large omnivorous birds)								
BEHP	**4291**	**26**	**1345**	**8**	**6**	<1	**2**	<1
lead	**6034**	**628**	**603**	**63**	**42**	**4**	**2**	<1
zinc	**351**	**47**	**39**	**5**	**2**	<1	<1	<1
J.M. Mills Landfill (small omnivorous mammals)								
zinc	**32**	**6**	**16**	**3**	**1**	<1	<1	<1
J.M. Mills Landfill (small omnivorous birds)								
BEHP	**376**	**35**	**118**	**11**	**1**	<1	<1	<1
lead	**5114**	**936**	**511**	**94**	**36**	**7**	**1**	<1
zinc	**677**	**106**	**75**	**12**	**3**	**1**	**1**	<1
Unnamed Island (small omnivorous birds)								
BEHP	**7511**	**54**	**2354**	**17**	**11**	<1	**4**	<1
lead	**29678**	**680**	**2968**	**68**	**208**	**6**	**8**	<1
zinc	**1638**	**44**	**181**	**5**	**4**	<1	**2**	<1

BEHP = bis(ethylhexyl)phthalate, COPEC = contaminant of potential ecological concern, CTE = central tendency exposure, HQ = hazard quotient, LOAEL = lowest obesrved adverse effect level, NOAEL = no observed adverse effect level, RME = reasonable maximum exposure

Table G-23: COC Concentrations Expected to Adequately Protect Ecological Receptors						
Habitat Type/Name	**Exposure Medium**	**COC**	**Protective Level**	**Units**	**Basis**	**Assessment Endpoint**
AQUATIC HABITATS						
Ponds on the Unnamed Island[1]						
Ponds A, D, and E	Sediment	Cadmium (Cd)	9 8	mg/kg	Reference - No Effects[2]	Survival and growth of local populations of benthic invertebrates
		Chromium (Cr)	120	mg/kg	Reference - No Effects	
		Copper (Cu)	160	mg/kg	Reference - No Effects	
		Lead (Pb)	300	mg/kg	Reference - No Effects	
		Zinc (Zn)	490	mg/kg	Reference - No Effects	
		Total PAHs	18	mg/kg	Reference - No Effects	
Ponds next to the Blackstone River						
Pond I	Sediment	Cadmium (Cd)	9 8	mg/kg	Reference - No Effects	Survival and growth of local populations of benthic invertebrates
		Chromium (Cr)	120	mg/kg	Reference - No Effects	
		Copper (Cu)	160	mg/kg	Reference - No Effects	
		Total PAHs	18	mg/kg	Reference - No Effects	
Pond N	Sediment	Cadmium (Cd)	9 8	mg/kg	Reference - No Effects	
TERRESTRIAL HABITATS						
Unnamed Island	Soil, Prey	BEHP	6 2	mg/kg	MATC[3]	survival, growth, and reproduction of local populations of small omnivorous birds
		Lead (Pb)	161	mg/kg	Reference EPC[4]	
J M Mills Landfill	Soil, Prey	Cadmium (Cd)	3 93	mg/kg	LOAEL PRG[5]	survival, growth, and reproduction of local populations of small omnivorous birds

Notes:

1 These ponds on the Unnamed Island are close to both the waste and to each other, the selected PRGs are applied to all of the ponds

2 Reference - No Effects - Review of toxicity testing showed varied results which were not conducive to developing numeric goals based on a comparison of lowest and no observed effects in site samples The concentration of each COC in the reference sample with the highest survival (TO5BL-004) was used to define the numeric cleanup goal (Table 3, FS Appendix D 2)

3 MATC - The PRG is selected as the Maximum Acceptable Toxic Concentration based on the geometric mean of the calculated NOAEL and LOAEL concentrations of BEHP in soil resulting risk to small omnivorous birds in dietary models (Table 7, FS Appendix D 3)

4 Reference EPC - The reference exposure point concentration for lead in soils was selected as the PRG (Table 7, FS Appendix D 3) since the PRG calculated from the Maximum Acceptable Toxic Concentration based on the geometric mean of the calculated NOAEL and LOAEL was below the reference EPC value

5 LOAEL PRG - The PRG represents the upper-bound soil cadmium level calculated from a LOAEL TRV based on small omnivorous birds in dietary models (FS Appendix D 6)

BEHP - bis(2-ethylhexyl)phthalate
COC - Chemical of Concern
EPC - Exposure Point Concentration
LOAEL - Lowest Observed Adverse Effects Level
MATC - Maximum Acceptable Toxic Concentration
NOAEL - No Observed Adverse Effects Level
PRG - Preliminary Remediation Goal
PAHs - Polycyclic Aromatic Hydrocarbons
TRV - Toxicity Reference Value

Table L-1: Groundwater Performance Standards - Residential Scenario

Carcinogenic Chemical of Concern	Cancer Classification	Performance Standard (µg/L)	Basis
1,4-Dichlorobenzene	C	75	MCL
Benzene	A	5	MCL
Chloroform	B2	0 22	risk
Ethylbenzene	B2	700	MCL
Methyl tert-butyl ether	B2	40	GQS
Trichloroethene	A	5	MCL
Vinyl chloride	A	2	MCL
1,4-Dioxane	B2	0 46	risk
4-Chloroaniline	C	0 36	risk
Atrazine	C	3	MCL
Benzo(a)anthracene	B2	0 10	PQL
Benzo(a)pyrene	B2	0 2	MCL
Benzo(b)fluoranthene	B2	0 10	PQL
bis(2-Ethylhexyl)phthalate	B2	6	MCL
Indeno(1,2,3-cd)pyrene	B2	0 10	PQL
Naphthalene	C	20	RIDEM Rem Regs
Aroclor-1242	B2	0 5	MCL
Aroclor-1248	B2	0 5	MCL
Aroclor-1254	B2	0 5	MCL
Aldrin	B2	0 001	PQL
Dieldrin	B2	0 005	PQL
Arsenic	A	10	MCL

Non-Carcinogenic Chemical of Concern	Target Endpoint	Performance Standard (µg/L)	Basis
1,4-Dichlorobenzene	Liver	75	MCL
Benzene	Immune System	5	MCL
Chloroform	Liver	0 22	risk
Ethylbenzene	Liver/Kidney	700	MCL
Methyl tert-butyl ether	Liver	40	GQS
Trichloroethene	Developmental/Immune System	5	MCL
Vinyl chloride	Liver	2	MCL
1,4-Dioxane	Liver/Kidney	0 46	risk
4-Chloroaniline	Spleen	0 36	risk
Atrazine	General Toxicity/Cardiovascular	3	MCL
bis(2-Ethylhexyl)phthalate	Liver	6	MCL
Naphthalene	General Toxicity	20	RIDEM Rem Regs
Aroclor-1242	General Toxicity/Immune System	0 5	MCL
Aroclor-1248	General Toxicity/Immune System	0 5	MCL
Aroclor-1254	General Toxicity/Immune System	0 5	MCL
Aldrin	Liver	0 001	PQL
Dieldrin	Liver	0 005	PQL
Aluminum	Developmental	20,000	HQ
Arsenic	Skin	10	MCL
Cadmium	Kidney	5	MCL
Cobalt	Endocrine	6 0	HQ
Iron	Liver/GI System	14,000	HQ
Lead[1]	CNS	15	Fed Actn Lvl
Manganese	CNS	300	Health Advisory
Thallium	Blood	0 5	non-zero MCLG

Key

GQS - Rhode Island Groundwater Quality Standards, June 2010

Health Advisory - Health Advisory on Manganese (EPA-822-R-04-003, January 2004)

HQ - Hazard Quotient

MCL - Maximum Contaminant Level

MCLG - Maximum Contaminant Level Goal

PQL - Practical Quantitation Limit

NA - Not applicable

RIDEM Rem Regs - RIDEM Remediation Regulations, DEM-DSR-01-93, February 2004, Table 3 (GA Objectives)

RME - Reasonable Maximum Exposure

1 Lead was identified in the HHRA as a risk-driver, however, it was not quantitatively evaluated Lead is regulated by a Treatment Technique that requires systems to control the corrosiveness of their water If more than 10% of tap water samples exceed the action level, water systems must take additional steps to correct that

Cancer Classification

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-2: Soil Cleanup Levels for the Protection of Human Health

Carcinogenic Chemical of Concern[1]	Cancer Classification	Cleanup Level[2] (mg/kg)	Basis[2]
Benzene[3]	A	0 2	Leachability
Benzo(a)anthracene	B2	0 9	Res DEC
Benzo(a)pyrene	B2	0 30	Reference
Benzo(b)fluoranthene	B2	0 9	Res DEC
Benzo(k)fluoranthene	B2	0 9	Res DEC
bis(2-Ethylhexyl)phthalate	B2	46	Res DEC
Chrysene	B2	0 4	Res DEC
Dibenz(a,h)anthracene[4]	B2	0 29 / 0 4	risk / Res DEC
Indeno(1,2,3-cd)pyrene	B2	0 9	Res DEC
Naphthalene[3]	C	0 8	Leachability
Chlordane	B2	0 5	Res DEC
Dioxin TEQ[3]	B2	0 000023	Reference
PCBs	B2	10	Res DEC
Dieldrin	B2	0 04	Res DEC
Arsenic	A	5 1	Reference

Non-Carcinogenic Chemical of Concern[1]	Target Endpoint	Cleanup Level[2] (mg/kg)	Basis[2]
Benzene[3]	Immune System	0 2	Leachability
Benzo(g,h,i)perylene	Kidney	0 8	Res DEC
bis(2-Ethylhexyl)phthalate	Liver	46	Res DEC
Fluoranthene	Kidney	20	Res DEC
Naphthalene[3]	General Toxicity	0 8	Leachability
Pyrene	Kidney	13	Res DEC
Chlordane	Liver	0 5	Res DEC
Dioxin TEQ[3]	Developmental	0 000023	Reference
PCBs	General Toxicity/Immune System	10	Res DEC
Dieldrin	Liver	0 04	Res DEC
Antimony	General Toxicity	10	Res DEC
Arsenic	Skin	5 1	Reference
Beryllium	GI System	1 5	Res DEC
Lead	CNS	150	Res DEC
Manganese	CNS	390	Res DEC
Thallium	Blood	5 5	Res DEC

Key

ARAR - Applicable or Relevant and Appropriate Requirement

RME - Reasonable Maximum Exposure

1 Cleanup goals were not developed for undetected contaminants where the laboratory detection limits were in excess of ARARs Additional sampling will be performed during the design phase using analytical methods capable of measuring concentrations at levels below the ARARs These data will be evaluated to assess impacts, if any, to the proposed cleanup goals In addition, all numeric criteria included in ARARs identified for the site must also be met by the cleanup regardless of whether or not they are identified above except where reference is an issue

2 See Appendix E 2 of this ROD for cleanup level development and basis

Res DEC - RIDEM Remediation Regulations, DEM-DSR-01-93, February 2004, Table 1 (Residential Direct Exposure Criteria [DEC])

Leachability - RIDEM Remediation Regulations, DEM-DSR-01-93, February 2004, Table 2 (GA Leachability Criteria)

Reference - If RIDEM criteria or risk-based cleanup levels were below reference concentrations for the site, the reference concentration was selected

Risk - risk based cleanup level

3 Cleanup levels developed for benzene, naphthalene, and dioxin are applicable only at Nunes Parcel based on exceedance of risk criteria for a commercial worker

4 The risk-based cleanup level developed for dibenz(a,h)anthracene (0 29 mg/kg) is applicable only at Nunes Parcel based on exceedance of risk criteria for a commercial worker

The Residential DEC (0 4 mg/kg) is applicable to the rest of the site

Cancer Classification

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-3: Soil Cleanup Levels for the Protection of Ecological Receptors						
Habitat Type/Name	**Exposure Medium**	**COC**	**Protective Level**	**Units**	**Basis**	**Assessment Endpoint**
TERRESTRIAL HABITATS						
Unnamed Island	Soil, Prey	BEHP	6.2	mg/kg	MATC[1]	survival, growth, and reproduction of local populations of small omnivorous birds
		Lead (Pb)	161	mg/kg	Reference EPC[2]	
J. M. Mills Landfill	Soil, Prey	Cadmium (Cd)	3.93	mg/kg	LOAEL RG[3]	survival, growth, and reproduction of local populations of small omnivorous birds

Notes:

1 MATC - The cleanup level is selected as the Maximum Acceptable Toxic Concentration based on the geometric mean of the calculated NOAEL and LOAEL concentrations of BEHP in soil resulting risk to small omnivorous birds in dietary models (Table 7, FS Appendix D 3).

2. Reference EPC - The reference exposure point concentration for lead in soils was selected as the cleanup level (Table 7, FS Appendix D 3) since the cleanup level calculated from the Maximum Acceptable Toxic Concentration based on the geometric mean of the calculated NOAEL and LOAEL was below the reference EPC value.

3 LOAEL RG - The cleanup level represents the upper-bound soil cadmium level calculated from a LOAEL TRV based on small omnivorous birds in dietary models (FS Appendix D.6)

BEHP - bis(2-ethylhexyl)phthalate

COC - Chemical of Concern

EPC - Exposure Point Concentration

LOAEL - Lowest Observed Adverse Effects Level

MATC - Maximum Acceptable Toxic Concentration

NOAEL - No Observed Adverse Effects Level

RG - Remediation Goal

TRV - Toxicity Reference Value

Table L-4: Sediment Cleanup Levels for the Protection of Ecological Receptors						
Habitat Type/Name	**Exposure Medium**	**COC**	**Protective Level**	**Units**	**Basis**	**Assessment Endpoint**
AQUATIC HABITATS						
Ponds on the Unnamed Island[1]						
Ponds A, D, and E	Sediment	Cadmium (Cd)	9.8	mg/kg	Reference - No Effects[2]	Survival and growth of local populations of benthic invertebrates
		Chromium (Cr)	120	mg/kg	Reference - No Effects	
		Copper (Cu)	160	mg/kg	Reference - No Effects	
		Lead (Pb)	300	mg/kg	Reference - No Effects	
		Zinc (Zn)	490	mg/kg	Reference - No Effects	
		Total PAHs	18	mg/kg	Reference - No Effects	
Ponds next to the Blackstone River						
Pond I	Sediment	Cadmium (Cd)	9.8	mg/kg	Reference - No Effects	Survival and growth of local populations of benthic invertebrates
		Chromium (Cr)	120	mg/kg	Reference - No Effects	
		Copper (Cu)	160	mg/kg	Reference - No Effects	
		Total PAHs	18	mg/kg	Reference - No Effects	
Pond N	Sediment	Cadmium (Cd)	9.8	mg/kg	Reference - No Effects	

Notes:

1 These ponds on the Unnamed Island are close to both the waste and to each other, the selected cleanup levels are applied to all of the ponds.

2. Reference - No Effects - Review of toxicity testing showed varied results which were not conducive to developing numeric goals based on a comparison of lowest and no observed effects in site samples. The concentration of each COC in the reference sample with the highest survival (TO5BL-004) was used to define the numeric cleanup goal (Table 3, FS Appendix D.2).

COC - Chemical of Concern

PAHs - Polycyclic Aromatic Hydrocarbons

Table L-5 Capital Cost Details - JM-SO-2

J.M. Mills Landfill

JM-SO-2 - RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Task #	Task	QTY	UNIT	RATE	COST	Assumptions
1 0	**Site Preparation**					
1 01	Mobilization/Demobilization (2% of Captial Costs Excluding O&M)	1	Lump Sum	$ 313,000 00	$ 313 000 00	
1 02	Furnish & Install Silt Fence (JM Mills Landfill)	6 000	Linear Feet	$ 3 00	$ 18,000 00	Assumes a 25% Increase to the perimeter and Maintenance
1 03	Clearing and Grubbing (JM Mills Landfill)	19	Acre	$ 6,000 00	$ 111,845 73	
1 04	Clearing and Grubbing (Riverbank and Floodplain)	10	Acre	$ 4,500 00	$ 45,454 55	
1 05	Construction Entrances	1	Each	$ 40,000 00	$ 40,000 00	
1 06	Equipment /Material Staging Areas/Temporary Construction Roads	1	Lump Sum	$ 75,000 00	$ 75,000 00	Costs for Construction Access, Site Logistics, Stockpile Management Areas Etc
1 07	Surveying Services	60	Day	$ 2,500 00	$ 150,000 00	
	SUBTOTAL				**$ 753,300,28**	
2 0	**Floodplain and Riverbank**					
2 01	Furnish & Install Sediment Controls	3 000	Linear Feet	$ 14 00	$ 42,000 00	
2 02	Excavation of Impacted Soils	32 593	Cubic Yards	$ 22 50	$ 733 333 33	Assumes 24-Inches of soil will be removed See Figure 7-1 for extent
2 03	Transport Place and Grade Excavated Soils	32 593	Cubic Yards	$ 15 00	$ 488,888 89	Assumes excavated soils are placed at Nunes Parcel
2 04	Furnish Off-Site Fill Material	32,593	Cubic Yards	$ 28 00	$ 912,592 59	
2 05	Placement - Fill Material	32,593	Cubic Yards	$ 5 50	$ 179 259 26	
2 06	Bank Restoration/Erosion Controls	3,000	Linear Feet	$ 60 00	$ 180 000 00	
2 07	Debris Fields	1	Lump Sum	$ 150,000 00	$ 150,000 00	
	SUBTOTAL				**$ 2,686,074 07**	
3.0	**RCRA Subtitle C - Equivalent Cap Construction (JM Mills Landfill)**					
3 01	Slope Grading (soil/waste excavation for relocation)	82 000	Cubic Yards	$ 10 00	$ 820,000 00	Based on conceptual grading design - maintaining landfill toe outside 100-Yr floodplain
3 02	Waste placement/comapction - JM Mills Landfill	46 000	Cubic Yards	$ 8 00	$ 368,000 00	
3 03	Waste placement/comapction - Nunes Parcel Consolidation	36 000	Cubic Yards	$ 6 00	$ 216,000 00	Assumes on-site consolidation on the Nunes Parcel
3 04	Landfill Toe - Railroad Perimeter Establishment	3 000	Linear Feet	$ 55 00	$ 165,000 00	
3 05	Landfill Toe - Floodplain Perimeter Armoring	25,000	Square Feet	$ 9 00	$ 225,000 00	Based on conceptual grading design - maintaining landfill toe outside 100-Yr floodplain
3 06	Furnish Off-Site Material - Foundation Layer / Intermediate Cover - Base Grade	90 222	Cubic Yards	$ 28 00	$ 2,526 222 22	Costs of materials to establish gas venting layer (if needed) assumed to be included in base grade
3 07	Placement - Foundation Layer / Intermediate Cover - Base Grade	90 222	Cubic Yards	$ 7 50	$ 676 666 67	Costs of placement of gas venting layer (if needed) assumed to be included in base grade
3 08	Furnish & Install GCL Liner (assumed for costing - may not be appropriate for certain slopes)	1,015 000	Square Feet	$ 0 70	$ 710,500 00	Bentomat ST - Costs include material delivery and installation
3 09	Construct Anchor Trench	6 000	Linear Feet	$ 7 50	$ 45,000 00	Assume 25% overage for overlapping and seams
3 10	Furnish & Install 60-mil LLDPE Geomembrane (textured)	1 015 000	Square Feet	$ 0 85	$ 862,750 00	Assume 25% overage for overlapping and seams
3 11	Furnish & Install Geocomposite-Geonet Drainage Layer	1,015,000	Square Feet	$ 0 75	$ 761,250 00	Assume 25% overage for overlapping and seams
3 12	Furnish Off-Site Material - Protective Soil Cover (18")	56 389	Cubic Yards	$ 35 00	$ 1,973 615 00	Assume 25% overage to support positive drainage
3 13	Placement - Protective Soil Cover	56,389	Cubic Yards	$ 8 00	$ 451,112 00	
3 14	Furnish Off-Site Material - Topsoil (6')	18,800	Cubic Yards	$ 35 00	$ 658 000 00	Assume 25% overage to support positive drainage
3 15	Placement - Topsoil	18,800	Cubic Yards	$ 6 00	$ 112 800 00	
3 16	Gas Vents (Passive system assumed for costing)	1	Lump Sum	$ 60,000 00	$ 60,000 00	Assumed based on similar FS cost estimates
3 17	Clean Fill Samples- General	59	Each	$ 1,250 00	$ 73 305 61	Assume 1 per 2500 cubic yards
3 18	Dust Suppression (2 Treatments)	180 444	Square Yard	$ 2 00	$ 360,888 89	Treesap based sprayed dust suppressant
	SUBTOTAL				**$ 11,066,110.39**	
4 0	**CQA for CAP Construction**					
4 01	CQA Oversight	19	Acre	$ 40 000 00	$ 760,000 00	
4 02	CQA Soils Testing - Capping System	1	Each	$ 30,000 00	$ 30,000 00	
4 03	CQA Geosynthetics - GDC Conformance	1	Each	$ 8,000 00	$ 8,000 00	
4 04	CQA Geosynthetics - Geomembrane Conformance	1	Each	$ 15,000 00	$ 15,000 00	
4 05	CQA Geosynthetics - Geomembrane DT s	250	Each	$ 15 00	$ 3,750 00	
4 06	CQA Geosynthetics - Interface Friction Angle	4	Each	$ 3,500 00	$ 13,048 67	
	SUBTOTAL				**$ 829,798 67**	
5 0	**Stormwater Controls / Drainage Channels**					
5 01	Perimeter Ditches	30 000	Square Feet	$ 2 00	$ 60,000 00	
5 02	Stormwater Channels - Rip Rap Lined w/ Geotextile	15 000	Square Feet	$ 3 00	$ 45,000 00	
5 03	Diversion Berms	3 300	Linear Feet	$ 5 00	$ 16,500 00	
5 04	Downchute (grading, piping erosion control)	2 500	Linear Feet	$ 15 00	$ 37,500 00	
5 05	Erosion Control Mat	30,000	Square Feet	$ 2.00	$ 60,000 00	
	SUBTOTAL				**$ 219,000 00**	
6 0	**Restoration of Construction Areas**					
6 01	Hydro-Seeding/stabilization	29	Acres	$ 6 000 00	$ 172,500 00	
6 02	8-Ft High Chain Link Fence - 9-Gauge 2" Steel Mesh Fabric	6 000	Each	$ 32 00	$ 192,000 00	Assumes a 10% Increase to the perimeter
6 03	Pedestrian Gates	4	Each	$ 400 00	$ 1,600 00	Assumed (2) Pedestrian Gate for Each Perimeter Side
6 04	Vehicle Access Gates	4	Each	$ 800 00	$ 3,200 00	Assumed (4) Vehicle Access Gates
6 05	Identification Signage	20	Each	$ 100 00	$ 2,000 00	Assumed (1) Sign per 300 Liner Ft of Fencing
	SUBTOTAL				**$ 371,300 00**	
7 0	**Professional Services**					
7 01	Landfill Design Permitting Procurement (8% of Capital Costs)	1	Lump Sum	$ 1,275 000 00	$ 1 275,000 00	
7 02	Construction Management (7% of Capital Costs)	1	Lump Sum	$ 1 115 000 00	$ 1 115,000 00	
	SUBTOTAL				**$ 2,390,000 00**	

TOTAL	**$**	**18,315,583 41**
15% Contingency	**$**	**2,747,337 51**
Total Capital Costs =	**$**	**21,063,000 00**
Operation & Maintenance Costs =	$	40,000 00 per year (assumed based on experience)

Table L-5: Capital Cost Details - JM-SO-2

J.M. Mills Landfill

JM-SO-2 - RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Assumptions:				
Landfill Cell	812 000	Square Feet	90 222	Square Yards
	19	Acres		
Landfill Perimeter	4,800	Linear Feet		
Riverbank and Floodplain Soils	440000	Square Feet		6/10/13 - Added small area (30 000 ft2) due to revised cleanup goals
	10	Acres		
	32593	Cubic Yards (2' removal depth)		
	3000	Linear Feet of Riverbank		
Base Grade	30,074	Cubic Yards		
Foundation Layer / Intermediate Cover (36 - Inches)	90,222	Cubic Yards		Includes Gas Venting Layer (if needed)
Geosynthetic Clay Liner (GCL)	1 015,000	Square Feet		
Anchor Trench	6,000	Linear Feet		
60-Mil LLDPE Geomembrance	1,015,000	Square Feet		
Geocomposite Drainage Layer	1,015,000	Square Feet		
Surface Soils/Protective Layer (24-Inches)	75,185	Cubic Yards		
Stormwater Drainage Channels	28,800	Square Feet		
Rip Rap	1,600	Tons		

Notes

Administrative costs associated with performance of 5-Year Reviews, as necessary, are not included, but assumed to be within range of costs

Costs associated with establishing Institutional Controls are presented in the groundwater alternative

While not included above potential off-site disposal of ¼ of the estimated waste/debris/soil volume is expected to be within the range for sensitivity of costs (+50 to -30%) as permitted by EPA guidance

Table L-6. Present Worth Analysis - JM-SO-2

JM-SO-2 - RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Interest rate: 7%

LIFE CYCLE COST

Year	Amount	Present Worth	p/f factor
1	$ 21,063,000	$ 21,063,000	1 00
2	$ 40,000	$ 37,383	0 935
3	$ 40,000	$ 34,938	0 873
4	$ 40,000	$ 32,652	0 816
5	$ 40,000	$ 30,516	0 763
6	$ 40,000	$ 28,519	0 713
7	$ 40,000	$ 26,654	0 666
8	$ 40,000	$ 24,910	0 623
9	$ 40,000	$ 23,280	0 582
10	$ 40,000	$ 21,757	0 544
11	$ 40,000	$ 20,334	0 508
12	$ 40,000	$ 19,004	0 475
13	$ 40,000	$ 17,760	0 444
14	$ 40,000	$ 16,599	0 415
15	$ 40,000	$ 15,513	0 388
16	$ 40,000	$ 14,498	0 362
17	$ 40,000	$ 13,549	0 339
18	$ 40,000	$ 12,663	0 317
19	$ 40,000	$ 11,835	0 296
20	$ 40,000	$ 11,060	0 277
21	$ 40,000	$ 10,337	0 258
22	$ 40,000	$ 9,661	0 242
23	$ 40,000	$ 9,029	0 226
24	$ 40,000	$ 8,438	0 211
25	$ 40,000	$ 7,886	0 197
26	$ 40,000	$ 7,370	0 184
27	$ 40,000	$ 6,888	0 172
28	$ 40,000	$ 6,437	0 161
29	$ 40,000	$ 6,016	0 150
30	$ 40,000	$ 5,623	0 141
31	$ 40,000	$ 5,255	0 131
PRESENT WORTH:		**$ 21,559,362**	

Notes
Capital Cost is Subtitle C Cap Installation + Floodplain Soil Removal
O&M is Cap and Inst Control maintenance for 30 years (annual cost assumed based on experience)
Years 2 through 31 include O&M costs

Table L-7: Capital Cost Details - NP-SO-3

Nunes Parcel

NP-SO-3 - RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Task #	Task	QTY	UNIT	RATE	COST	Assumptions
1.0	**Site Preparation**					
1 01	Mobilization/Demobilization (2% of Capital Costs Excluding O&M)	1	Lump Sum	$ 89 000 00	$ 89,000 00	
1 02	Furnish & Install Silt Fence	6,000	Linear Feet	$ 3 00	$ 18,000 00	Assumes a 25% Increase to the perimeter and Maintenance
1 03	Clearing and Grubbing	6 3	Acre	$ 3,000 00	$ 18,900 00	
1 04	Demolition/Debris Removal/Consolidation	1	Lump Sum	$ 300,000 00	$ 300,000 00	
1 05	Construction Entrances	1	Each	$ 7,500 00	$ 7,500 00	
1 06	Equipment /Material Staging Areas/Temporary Construction Roads	1	Lump Sum	$ 40,000 00	$ 40,000 00	Costs for Construction Access, Site Logistics, Stockpile Management Areas, Etc
1 07	Surveying Services	60	Day	$ 2,500 00	$ 150,000 00	
	SUBTOTAL				**$ 623,400.00**	
2.0	**Riverbankand Additional Soils**					
2 01	Furnish & Install Sediment Controls	1,000	Linear Feet	$ 14 00	$ 14,000 00	
2 02	Excavation of Impacted Soils outside of waste extents (includes Pond I and peninsula)	3,448	Cubic Yards	$ 22 50	$ 77,583 33	Assumes 24-Inches of soil will be removed, See Figure 7-5 for extent
2 03	Transport, Place, and Grade Excavated Soils/Sediments	3,448	Cubic Yards	$ 15 00	$ 51,722 22	
2 04	Furnish Off-Site Fill Material	3,448	Cubic Yards	$ 28 00	$ 96,548 15	
2 05	Placement - Fill Material	3,448	Cubic Yards	$ 5 50	$ 18,964 81	
2 06	Bank Restoration/Erosion Controls	1,000	Linear Feet	$ 60 00	$ 60,000 00	
	SUBTOTAL				**$ 318,818.52**	
3.0	**RCRA Subtitle C - Equivalent Cap Construction Nunes Parcel***					
3 01	Regrading of Parcel	6 3	Acre	$ 35,000 00	$ 220,500 00	
3 02	Furnish Off-Site Material - Foundation Layer / Intermediate Cover - Base Grade	30,492	Cubic Yards	$ 28 00	$ 853,776 00	Costs of materials to establish gas venting layer (if needed) assumed to be included in base grade
3 03	Placement - Foundation Layer / Intermediate Cover - Base Grade	30,492	Cubic Yards	$ 6 00	$ 182,952 00	Costs of placement of gas venting layer (if needed) assumed to be included in base grade
3 04	Furnish & Install GCL Liner	343,035	Square Feet	$ 0 70	$ 240,124 50	Bentomat ST - Costs include material, delivery and installation
3 05	Construct Anchor Trench	6,000	Linear Feet	$ 7 50	$ 45,000 00	Assume 25% overage for overlapping and seams
3 06	Furnish & Install 40-mil LLDPE Geomembrane (textured)	343,035	Square Feet	$ 0 60	$ 205,821 00	Assume 25% overage for overlapping and seams
3 07	Furnish & Install Geocomposite-Geonet Drainage Layer	343,035	Square Feet	$ 0 75	$ 257,276 25	Assume 25% overage for overlapping and seams
3 08	Furnish Off-Site Material - Protective Soil Cover (18")	25,410	Cubic Yards	$ 35 00	$ 889,350 00	Assume 25% overage to support positive drainage
3 09	Placement - Protective Soil Cover	25,410	Cubic Yards	$ 7 00	$ 177,870 00	
3 10	Gas Vents (Passive system assumed for costing)	1	Lump Sum	$ 15,000 00	$ 15,000 00	Assumed based on similar FS cost estimates
3 11	Dust Suppression (2 Treatments)	60,984	Square Yard	$ 2 00	$ 121,968 00	Treesap based sprayed dust suppressant
	SUBTOTAL				**$ 3,209,637.75**	
4.0	**CQA for CAP Construction**					
4 01	CQA Oversight	6 3	Acre	$ 24,000 00	$ 151,200 00	
4 02	CQA Soils Testing - Capping System	1	Each	$ 30 000 00	$ 30,000 00	
4 03	CQA Geosynthetics - GDC Conformance	1	Each	$ 8,000 00	$ 8,000 00	
4 04	CQA Geosynthetics - Geomembrane Conformance	1	Each	$ 15,000 00	$ 15,000 00	
4 05	CQA Geosynthetics - Geomembrane DT's	250	Each	$ 15 00	$ 3,750 00	
4 06	CQA Geosynthetics - Interface Friction Angle	1	Each	$ 3,500 00	$ 4,410 00	
	SUBTOTAL				**$ 212,360.00**	
5.0	**Stormwater Controls / Drainage Channels**					
5 01	Diversion Berms	1,000	Linear Feet	$ 5 00	$ 5,000 00	Assumes - 2 Soil Diversion Berms - 2-500 Linear Ft
5 02	Stormwater Channels - Rip Rap Lined w/ Geotextile	9,600	Square Feet	$ 2 50	$ 24,000 00	Assumes - 3 Channels - 200 Linear Ft Each
	SUBTOTAL				**$ 29,000.00**	
6 0	**Restoration of Construction Areas**					
6 01	Hydro-Seeding/stabilization	7 4	Acres	$ 6,000 00	$ 44,200 00	
6 02	8-Ft High Chain Link Fence - 9-Gauge, 2" Steel Mesh Fabric	1,900	Each	$ 32 00	$ 60,800 00	Assumes a 10% Increase to the perimeter
6 03	Pedestrian Gates	3	Each	$ 400 00	$ 1,200 00	Assumed (2) Pedestrian Gate for Each Perimeter Side
6 04	Vehicle Access Gates	2	Each	$ 800 00	$ 1,600 00	Assumed (4) Vehicle Access Gates
6 05	Identification Signage	7	Each	$ 100 00	$ 700 00	Assumed (1) Sign per 300 Liner Ft of Fencing
	SUBTOTAL				**$ 108,500.00**	
7.0	**Professional Services**					
7 01	Landfill Design, Permitting, Procurement (8% of Capital Costs)	1	Lump Sum	$ 361,000 00	$ 361,000 00	
7 02	Construction Management (7% of Capital Costs)	1	Lump Sum	$ 316,000 00	$ 316,000 00	
	SUBTOTAL				**$ 677,000.00**	

* Costs for floodplain armoring assumed to be within range of FS cost estimate

TOTAL	**$ 5,178,716.27**	
15% Contingency	**$ 776,807.44**	
Total Capital Costs =	**$ 5,956,000.00**	
Operation & Maintenance Costs =	$ 10 000 00	per year (assumed based on expenence)

Table L-7 Capital Cost Details - NP-SO-3

Nunes Parcel

NP-SO-3 - RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Assumptions				
Landfill Cell	274,428	Square Feet	30,492	Square Yards
	6 3	Acres		9/10/13 - Increased landfill area based on existing waste extent
Landfill Perimeter	4,800	Linear Feet		Source unclear, appears to be conservative
Riverbank and Floodplain Soils	46550	Square Feet		6/10/13 - Added area outside waste, Pond I peninsula and Pond I sediments
	1	Acres		
	3448	Cubic Yards (2' removal depth)		
	1000	Linear Feet of Riverbank		
Base Grade	10,164	Cubic Yards		
Foundation Layer / Intermediate Cover (36 - Inches)	30,492	Cubic Yards		
Geosynthetic Clay Liner (GCL)	343 035	Square Feet		
Anchor Trench	6,000	Linear Feet		
40-Mil PVC Geomembrance	343,035	Square Feet		
Geocomposite Drainage Layer	343,035	Square Feet		
Surface Soils/Protective Layer (24-Inches)	25,410	Cubic Yards		
Gravel - Surface Cover	6,353	Cubic Yards		
Stormwater Drainage Channels	9,600	Square Feet		
Rip Rap	533	Tons		

Notes

Administrative costs associated with performance of 5-Year Reviews as necessary are not included but assumed to be within range of costs

Costs associated with establishing Institutional Controls are presented in the groundwater alternative

While not included above, potential off-site disposal of ¼ of the estimated waste/debris/soil volume is expected to be within the range for sensitivity of costs (+50 to -30%), as permitted by EPA guidance

Table L-8. Present Worth Analysis - NP-SO-3

NP-SO-3 - RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Interest rate: 7%

LIFE CYCLE COST

Year	Amount	Present Worth	p/f factor
1	$ 5,956,000	$ 5,956,000	1 00
2	$ 10,000	$ 9,346	0 935
3	$ 10,000	$ 8,734	0 873
4	$ 10,000	$ 8,163	0 816
5	$ 10,000	$ 7,629	0 763
6	$ 10,000	$ 7,130	0 713
7	$ 10,000	$ 6,663	0 666
8	$ 10,000	$ 6,227	0 623
9	$ 10,000	$ 5,820	0 582
10	$ 10,000	$ 5,439	0 544
11	$ 10,000	$ 5,083	0 508
12	$ 10,000	$ 4,751	0 475
13	$ 10,000	$ 4,440	0 444
14	$ 10,000	$ 4,150	0 415
15	$ 10,000	$ 3,878	0 388
16	$ 10,000	$ 3,624	0 362
17	$ 10,000	$ 3,387	0 339
18	$ 10,000	$ 3,166	0 317
19	$ 10,000	$ 2,959	0 296
20	$ 10,000	$ 2,765	0 277
21	$ 10,000	$ 2,584	0 258
22	$ 10,000	$ 2,415	0 242
23	$ 10,000	$ 2,257	0 226
24	$ 10,000	$ 2,109	0 211
25	$ 10,000	$ 1,971	0 197
26	$ 10,000	$ 1,842	0 184
27	$ 10,000	$ 1,722	0 172
28	$ 10,000	$ 1,609	0 161
29	$ 10,000	$ 1,504	0 150
30	$ 10,000	$ 1,406	0 141
31	$ 10,000	$ 1,314	0 131
PRESENT WORTH:		**$ 6,080,090**	

Notes
Capital Cost is Subtitle C Cap Installation + Soil/Sediment Removal
O&M is Cap and Inst Control maintenance for 30 years (annual cost assumed based on expenence)
Years 2 through 31 include O&M costs

Table L-9 Capital Cost Details - UI-SO-3

Unnamed Island

UI-SO-3 - Remove/Consolidate All Waste/Soil Exceeding RGs

Task #	Task	QTY	UNIT	RATE	COST	Assumptions
1.0	**Site Preparation**					
1 01	Mobilization/Demobilization (2% of Capital Costs Excluding O&M)	1	Lump Sum	$ 91,000 00	$ 91,000 00	
1 02	Furnish & Install Silt Fence	5,000	Linear Feet	$ 3 00	$ 15,000 00	Assumes a 25% Increase to the perimeter and Maintenance
1 03	Clearing and Grubbing	13	Acre	$ 5,000 00	$ 64,279 16	
1 04	Bridge Installation	1	Each	$ 15,000 00	$ 15,000 00	
1 05	Bridge Rental	2	Months	$ 42,500 00	$ 85,000 00	
1 06	Equipment /Material Staging Areas/Temporary Construction Roads	1	Lump Sum	$ 40,000 00	$ 40,000 00	Costs for Construction Access, Site Logistics, Stockpile Management Areas, Etc
1 07	Surveying Services	10	Day	$ 2,500 00	$ 25,000 00	
	SUBTOTAL				**$ 335,279 16**	
2 0	**Surface Soil and Waste Removal Action**					
2 01	Furnish & Install Sediment Controls	6,800	Linear Feet	$ 14 00	$ 95 200 00	Controls needed on all sides due to surrounding water bodies
2 02	Excavation of Impacted Soils	62,222	Cubic Yards	$ 22 50	$ 1 400 000 00	Assumes average depth of 3 ft required to meet PRGs over entire area
2 03	Excavation of Waste	40,000	Cubic Yards	$ 30 00	$ 1 200,000 00	Volume estimate from RI - bulk of waste present below water table
2 04	Temporary Water Treatment Setup and Operation	1	Months	$ 75,000	$ 75,000 00	Intial setup and procurement prorated over the length of operation
2 05	Transport, Place, and Grade Excavated Soils	62,222	Cubic Yards	$ 15 00	$ 933,333 33	Assumes excavated soils are placed at Nunes Parcel
2 06	Transport, Place, and Grade Excavated Waste	40 000	Cubic Yards	$ 15 00	$ 600,000 00	Assumes excavated waste is placed at Nunes Parcel
	SUBTOTAL				**$ 4,303,533.33**	
3 0	**Professional Services**					
3 01	Landfill Design, Permitting, Procurement (8% of Capital Costs)	1	Lump Sum	$ 372,000 00	$ 372,000 00	
3 02	Construction Management (7% of Capital Costs)	1	Lump Sum	$ 325,000 00	$ 325,000 00	
	SUBTOTAL				**$ 697,000.00**	

TOTAL	**$ 5,335,812 49**
15% Contingency	**$ 800,371 87**
Total Capital Costs =	**$ 6,136,184.36**
Operation & Maintenance Costs =	**$ - per year (all waste/soil above cleanup levels removed)**

Assumptions

Surface Soil Area	560000	Square Feet	6/10/13 - Added area based on recreational user remediation goal exceedances
	13	Acres	
	62222	Cubic Yards (3' removal depth)	
	3400	Linear Feet of Riverbank	6/10/13 - Added estimated length based on recreational user remediation goal exceedances
Surface Soil Perimeter	6,800	Linear Feet	6/10/13 - Added estimated length based on recreational user remediation goal exceedances

Notes

Costs associated with establishing Institutional Controls are presented in the groundwater alternative

While not included above, potential off-site disposal of ¼ of the estimated waste/debris/soil volume is expected to be within the range for sensitivity of costs (+50 to -30%) as permitted by EPA guidance

Table L-10: Capital Cost Details - SE-3

Sediment Removal

SE-3 - Remove/Consolidate Sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls

Task #	Task	QTY	UNIT	RATE	COST	Assumptions
1.0	**Site Preparation**					
1 01	Mobilization/Demobilization (2% of Captial Costs Excluding O&M)	1	Lump Sum	$ 76,000 00	$ 76,000 00	
1 02	Temporary Dock Structure	1	Each	$ 50,000 00	$ 50,000 00	
1 03	Bridge Installation	0	Each	$ 15,000 00	$ -	Bridge setup cost included in Unnamed Island Soil Remedy
1 04	Bridge Rental	1	Months	$ 42,500 00	$ 42,500 00	
1 05	Equipment /Material Staging Areas/Temporary Construction Roads	40,000	Square Feet	$ 4 00	$ 160,000 00	Costs for Construction Access, Site Logistics, Stockpile Management Areas, Etc
	SUBTOTAL				**$ 328,500.00**	
2.0	**Pond Dredging and Subaqueous Cover**					
2 01	Sediment Dredging	8,657	Cubic Yards	$ 290 00	$ 2,510,848 15	
2 02	Sediment Management	17,315	Cubic Yards	$ 5 00	$ 86,574 07	Assumes 24-inches cover w/ additional material to support positive drainage
2 03	Temporary Water Treatment Setup and Operation	2	Months	$ 75,000	$ 150,000 00	Intial setup and procurement prorated over the length of operation
2 04	Transport, Place, and Grade Dredged Sediments	8,657	Cubic Yards	$ 25 00	$ 216,435 19	Assumes dredged sediments will be placed and stabilized at Nunes Parcel
2 05	Geotextile Installation	70,125	Square Feet	$ 2 50	$ 175,312 50	
2 06	Supply and Place Sand Cover	2,597	Cubic Yards	$ 150 00	$ 389,583 33	
	SUBTOTAL				**$ 3,528,553 24**	
3 0	**Restoration of Construction Areas**					
3 01	Identification Signage	6	Each	$ 100 00	$ 600 00	Assumed placed around ponds
	SUBTOTAL				**$ 600.00**	
4.0	**Professional Services**					
4 01	Dredging Design, Permitting, Procurement (8% of Capital Costs)*	1	Lump Sum	$ 309,000 00	$ 309,000 00	
4 02	Construction Management (7% of Capital Costs)	1	Lump Sum	$ 271,000 00	$ 271,000 00	
	SUBTOTAL				**$ 580,000.00**	

* Includes pre-design extent sampling

TOTAL	**$ 4,437,653.24**	
15% Contingency	**$ 665,647.99**	
Total Capital Costs =	**$ 5,103,301 23**	
Operation & Maintenance Costs =	$ 50,000 00	per year (assumed based on expenence)

Assumptions

Pond A	205000	Square Feet
Pond D	18750	
Pond E	10000	
Ponds I & N managed during Source Area remedies		
Total	233750	
	5 37	Acres
	8657	Cubic Yards (1' removal depth)
	70125	Square feet of Sediment Cover (assumes 30% coverage)
	2,597	Cubic Yards of sediment Cover (assumes 30% coverage)

Operations and Maintenance

Cover Monitoring Event (during first 5-yr review)	$ 105,000	Assumed
Periodic Replenishment	$50,000/yr	Annual maintenance unlikely to be required, but episodic repleneshment may be needed following heavy storms Current observations of pond do not indicate scouring is occurring within ponds

Notes

Administrative costs associated with performance of 5-Year Reviews, as necessary, are not included, but assumed to be within range of costs

Costs associated with establishing Institutional Controls are presented in the groundwater alternative

Restoration costs for Unnamed Island pond shorelines are included in the UI-SO-3 alternative

Long-term monitoring (e g , surface water and sediment) associated with any cover has not been included but is expected to be within the range of costs presented

Table L-11. Present Worth Analysis - SE-3

SE-3 - Remove/Consolidate Sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls

Interest rate 7%

LIFE CYCLE COST

Year	Amount	Present Worth	p/f factor
1	$ 5,103,301	$ 5,103,301	1 00
2	$ 50,000	$ 46,729	0 935
3	$ 50,000	$ 43,672	0 873
4	$ 50,000	$ 40,815	0 816
5	$ 155,000	$ 118,249	0 763
6	$ 50,000	$ 35,649	0 713
7	$ 50,000	$ 33,317	0 666
8	$ 50,000	$ 31,137	0 623
9	$ 50,000	$ 29,100	0 582
10	$ 50,000	$ 27,197	0 544
11	$ 50,000	$ 25,417	0 508
12	$ 50,000	$ 23,755	0 475
13	$ 50,000	$ 22,201	0 444
14	$ 50,000	$ 20,748	0 415
15	$ 50,000	$ 19,391	0 388
16	$ 50,000	$ 18,122	0 362
17	$ 50,000	$ 16,937	0 339
18	$ 50,000	$ 15,829	0 317
19	$ 50,000	$ 14,793	0 296
20	$ 50,000	$ 13,825	0 277
21	$ 50,000	$ 12,921	0 258
22	$ 50,000	$ 12,076	0 242
23	$ 50,000	$ 11,286	0 226
24	$ 50,000	$ 10,547	0 211
25	$ 50,000	$ 9,857	0 197
26	$ 50,000	$ 9,212	0 184
27	$ 50,000	$ 8,610	0 172
28	$ 50,000	$ 8,047	0 161
29	$ 50,000	$ 7,520	0 150
30	$ 50,000	$ 7,028	0 141
31	$ 50,000	$ 6,568	0 131
PRESENT WORTH:		**$ 5,803,857**	

Notes

Capital Cost is Removal Action and Subaqueous Cover

O&M is Cover and Inst Control maintenance for 30 years

Years 2 through 31 include O&M costs

Year 5 includes an additional cover evaluation study

Table L-12: Capital Cost Details - GW-2

INSTITUTIONAL CONTROLS

Design Assumptions:
Institutional Control will be implemented as part of the groundwater remedy.

	Quantity	Unit	Labor - D	Equipment	Materials	Cost Per Unit	Total	rounded to $1000	Reference
Institutional Control Implementation									
Institutional Control Implementation	1	LUMP SUM					$20,000	$20,000	Estimate
Capital Cost Subtotal:							$20,000	$20,000	
Total Indirect Cost:							$0	$0	
Capital and Indirect Cost Subtotal:							$20,000	$20,000	
Contingency (15%):							$3,000	$3,000	
Capital and Indirect Cost Total:							$23,000	$23,000	

Table L-12: Capital Cost Details - GW-2

LONG-TERM MONITORING

Design Assumptions

Monitoring Well Installation			**Monitoring Program**		
Number of New Shallow Monitoring Wells	5		Number of Shallow Sampling Well	12	
Number of New Deep Monitoring Wells	5		Number of Deep Sampling Well	14	Assumes inclusion of 2 Resid. Wells
Depth of Shallow Monitoring Well	30	ft	Number of Monitoring Event per Year	2	
Depth of Deep Monitoring Well	45	ft	Sampling Schedule	3	wells per day
Monitoring Well Screen Length	10	ft	Groundwater Analysis Parameters:	VOCs, total and dissolved iron, dissolved manganese, sulfate, nitrate, TOC	
Diameter of Monitoring Wells	2	inch			
Monitoring Well Drilling Schedule	3	wells/day			
Depth to water	5	ft bgs	Surface Water Monitoring:	Assume labor covered by groundwater monitoring and analysis costs similar	
Soil and Water Disposal			Number of Locations	8	Assumed
Soil from Well Drilling			Number of Monitoring Event per Year	2	
Industrial Waste (assume 100% of excavated soil)	0.45	tons			
Hazardous Waste (assume 0% of excavated soil)	0.00	tons			
Volume of Development/Purge Water from Shallow Wells	12	gal (assumes 3 well volumes)			
Volume of Development/Purge Water from Deep Wells	20	gal (assumes 3 well volumes)			

	Quantity	Unit	Labor / Equipment	Total	Rounded to $1000	Reference
Capital Costs						
Site Preparation						
Mobilization/Demobilization	1	LUMP SUM	$5,000	$5,000	$5,000	
Monitoring Well Installation						
Drill Rig + Service Vehicle	1	LUMP SUM	$1,500	$1,500	$2,000	
Utility Clearance	1	LUMP SUM	$500	$500	$1,000	
Drilling	375	foot	$25	$9,375	$9,000	
Well Screen (2" PSSS)	100	foot	$75	$7,500	$8,000	
Well Riser (2" Black Steel)	275	foot	$25	$6,875	$7,000	
Surface Completions (Concrete Pad)	10	Each	$1,000	$10,000	$10,000	
Well Installation Oversight	27	Hour	$95	$2,533	$3,000	
Well Development	10	Each	$3,500	$35,000	$35,000	
Treatment and Disposal						
Soil Cutting Disposal (Industrial Waste)	0.45	ton	$40	$18	$0	
Soil Cutting Disposal (Hazardous Waste)	0.00	ton	$241	$0	$0	
Development Water Disposal	159	GAL	$1.00	$159	$0	
			Total Capital Cost:		$80,000	
Indirect Costs						
Engineering Design/MNA Modeling	30	% Capital Cost		$0	$24,000	
Engineering and Construction Oversight	10	% Capital Cost		$0	$8,000	
Project Management	10	% Capital Cost		$0	$8,000	
Implementation of H&S Measures	5	% Capital Cost		$0	$4,000	
			Total Indirect Cost:		$44,000	
			Direct Plus Indirect Cost:		$124,000	
			Contingency (15%):		$19,000	
			Total Installation Cost:		$143,000	
	Quantity	**Unit**	**Labor / Equipment**		**Total**	**Reference**
Annual Costs						
Monitoring Labor	104	Hour	$95	$9,880	$10,000	
Monitoring Analytical (GW + SW)	68	Each	$250	$17,000	$17,000	
Purge Water Disposal	842	GAL	$1.00	$842	$1,000	
Field Supplies for Monitoring	2	Each	$1,000	$2,000	$2,000	
System Reporting	1	LUMP SUM	$4,000	$4,000	$4,000	
Well Replacement/ Redevelopment	1	LUMP SUM	$2,000	$2,000	$2,000	
			Subtotal Annual Costs:		$36,000	
			Contingency (15%):		$5,000	
			Total Annual Costs:		$41,000	

NOTE:
All costs assume that site work can be performed in Level D
Costs subject to inflationary and energy fluctuations

Table L-14. Present Worth Analysis - GW-2

Alternative GW-2 - Long-Term Monitoring and Institutional Controls

interest rate: 7%

LIFE CYCLE COST

Year	Amount	PW at Year 1	p/f factor
1	$ 166,000	$ 166,000	1.00
2	$ 41,000	$ 38,318	0 935
3	$ 41,000	$ 35,811	0 873
4	$ 41,000	$ 33,468	0 816
5	$ 41,000	$ 31,279	0 763
6	$ 41,000	$ 29,232	0.713
7	$ 41,000	$ 27,320	0 666
8	$ 41,000	$ 25,533	0.623
9	$ 41,000	$ 23,862	0 582
10	$ 41,000	$ 22,301	0.544
11	$ 41,000	$ 20,842	0.508
12	$ 41,000	$ 19,479	0.475
13	$ 41,000	$ 18,204	0.444
14	$ 41,000	$ 17,014	0 415
15	$ 41,000	$ 15,901	0.388
16	$ 41,000	$ 14,860	0.362
17	$ 41,000	$ 13,888	0.339
18	$ 41,000	$ 12,980	0.317
19	$ 41,000	$ 12,130	0.296
20	$ 41,000	$ 11,337	0.277
21	$ 41,000	$ 10,595	0.258
22	$ 41,000	$ 9,902	0.242
23	$ 41,000	$ 9,254	0.226
24	$ 41,000	$ 8,649	0.211
25	$ 41,000	$ 8,083	0.197
26	$ 41,000	$ 7,554	0 184
27	$ 41,000	$ 7,060	0 172
28	$ 41,000	$ 6,598	0 161
29	$ 41,000	$ 6,166	0.150
30	$ 56,000	$ 7,872	0 141
31		$ -	0 131
PRESENT WORTH:		**$671,493**	

Notes: Years 2 through 30 include Monitoring costs
Year 30 includes Decomissioning cost of $15,000

Table 8-1
Summary of Detailed and Comparative Analysis of Groundwater Remedial Action Alternatives

Feasibility Study
Peterson/Puritan, Inc. Superfund Site - Operable Unit 2
Cumberland and Lincoln, Rhode Island

Evaluation Criteria		Alternative GW-1 No Action		Alternative GW-2 Limited Action Institutional Controls and Long-Term Monitoring	
Threshold Criteria					
1)	Overall protection of human health and the environment	0	Does not provide overall protection of human health. Does not minimize, reduce, or control contaminant impacts in groundwater or associated exposure risks. Groundwater RAOs would not be met	4	Protective of human health by eliminating potential exposure to contaminants in groundwater Institutional controls eliminate exposure pathways Groundwater RAOs would be met
2)	Compliance with ARARs	0	Does not comply with chemical-specific ARARs. No action- or location-specific ARARs.	4	Complies with ARARs
Balancing Criteria					
3)	Long-term effectiveness and permanence	0	Not effective or permanent. Potential exposure risks associated with contaminants in groundwater would remain with no controls or long-term management plan.	4	Institutional controls are effective at limiting potential exposure inside a compliance boundary Long-term monitoring is effective at documenting if migration of contaminants beyond the compliance boundary is occurring.
4)	Reduction of mobility, toxicity, or volume through treatment	0	No treatment processes involved.	0	No treatment processes involved
5)	Short-term effectiveness	0	No activities would be implemented that would present potential short-term exposure risks to human health or the environment	5	Limited activities (well installation/monitoring) result in minimal short-term exposure risks and impacts to workers, adjacent populations, or the environment that would be managed through engineering controls Potential risks would be limited to onsite populations.

Table 8-1
Summary of Detailed and Comparative Analysis of Groundwater Remedial Action Alternatives

Feasibility Study
Peterson/Puritan, Inc. Superfund Site - Operable Unit 2
Cumberland and Lincoln, Rhode Island

Evaluation Criteria		Alternative GW-1 No Action		Alternative GW-2 Limited Action Institutional Controls and Long-Term Monitoring	
6)	Implementability	3	Technically feasible due to lack of technical components.	5	Simple to implement. Administratively feasible Involves long-term O&M
7)	Cost	5	Capital Costs $0 Total O&M and Periodic Costs $0 Total Present Value Cost $0	5	Capital Costs $166,000 Total O&M and Periodic Costs $505,000 Total Present Value Cost: $671,000
Modifying Criteria					
8)	State Acceptance	0	Assessed in the ROD following comment of the FS.	0	Assessed in the ROD following comment of the FS
9)	Community Acceptance	0	Assessed in the ROD following comment of the FS.	0	Assessed in the ROD following comment of the FS
Screening Totals					
		8		27	

Notes:

All costs are estimated to an accuracy of +50% to -30% (USEPA, 2000).
ARAR = applicable or relevant and appropriate requirement
FS = Feasibility Study
MNA = monitored natural attenuation
O&M = operation and maintenance
RAO = remedial action objective
ROD = Record of Decision
USEPA = United States Environmental Protection Agency
VOC = volatile organic compound

Ratings categories for Threshold and Balancing Criteria (Excluding Cost)
(0) None
(1) Low
(2) Low to moderate
(3) Moderate
(4) Moderate to high
(5) High

Table 8-2
Summary of Detailed and Comparative Analysis of Source Area Remedial Action Alternatives - J M Mills Landfill

Feasibility Study
Peterson/Puntan, Inc. Superfund Site - Operable Unit 2
Cumberland and Lincoln, Rhode Island

	Evaluation Criteria	Alternative JM-SO-1 No Action		Alternative JM-SO-2 RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls		Alternative JM-SO-3 Combination RCRA Subtitle C Cap (top)/Perimeter Soil Cover (side slopes) of Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls	
Threshold Criteria							
1)	Overall protection of human health and the environment	0	Does not provide overall protection of human health or the environment Does not minimize, reduce, or control contaminant impacts in waste and soil or associated exposure risks Soil RAOs would not be met.	5	Protective of human health and the environment by eliminating potential exposure to contaminants in waste and soil There are no offsite impacts, and institutional controls eliminate exposure pathways RAOs would be met	0	Does not establish a completely protective physical barrier between potential receptors and contaminated materials in soil and waste Does not fully reduce the infiltration and the potential for leaching of contaminants in soil to groundwater Does not fully address potential landfill gas releases and does not ensure that contamination is not eroded or washed out of the landfill during any flood, up to a 500-year event.
2)	Compliance with ARARs	0	Does not comply with chemical-specific ARARs No action- or location-specific ARARs	5	Complies with ARARs	0	Complies with ARARs for impacted soils Does not comply with hazardous waste landfill closure requirements, landfill gas emission requirements, and floodplains management requirements
Balancing Criteria							
3)	Long-term effectiveness and permanence	0	Not effective or permanent Potential exposure risks associated with contaminants in soil and waste would remain with no controls or long-term management plan	5	Effective and permanent for removal of impacted soil Effective and permanent for soil and waste below landfill cap	4	Effective and permanent for removal of impacted soil Effective and permanent for eliminating direct contact with soil and waste below landfill cap Not as effective as whole RCRA Subtitle C cap for minimizing infiltration or protecting against flooding
4)	Reduction of mobility, toxicity, or volume through treatment	0	No treatment processes involved	0	No treatment processes involved	0	No treatment processes involved
5)	Short-term effectiveness	0	No activities would be implemented that would present potential short-term exposure risks to human health or the environment	3	Meets RAOs in short period of time at relatively low risk to community and site workers Construction activities will have a significant impact on the environment, through both removal of mature trees on riverbank and floodplain and through erosion controls along the riverbank Greater impacts to the community due to the additional volume of cap materials which need to be brought on site	4	Meets RAOs in short period of time at relatively low risk to community and site workers Construction activities will have a significant impact on the environment, through both removal of mature trees on riverbank and floodplain and through erosion controls along the riverbank
6)	Implementability	3	Technically feasible due to lack of technical components However, not administratively feasible due to a lack of monitoring or protection of human health or the environment	2	Landfill boundaries on the northeast (railroad) and southwest (floodplain) will interfere with construction of the cap Space and access limitations (specifically on the northeast slope) for geosynthetic deployment and installation will be major constraints Large volume of cover material increases truck traffic on local roads	3	Landfill boundaries on the northeast (railroad) and southwest (floodplain) will interfere with regrading of the cap and may require consolidation of waste
7)	Cost	5	Capital Costs $0 Total O&M and Periodic Costs $0 Total Present Value Cost $0	2	Capital Costs $21,063,000 Total O&M and Periodic Costs $496,000 Total Present Value Cost $21,559,000	4	Capital Costs $13,225,000 Total O&M and Periodic Costs $496,000 Total Present Value Cost $13,721,000

Table 8-2
Summary of Detailed and Comparative Analysis of Source Area Remedial Action Alternatives - J.M. Mills Landfill

Feasibility Study
Peterson/Puntan, Inc. Superfund Site - Operable Unit 2
Cumberland and Lincoln, Rhode Island

Evaluation Criteria		Alternative JM-SO-1 No Action		Alternative JM-SO-2 RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls		Alternative JM-SO-3 Combination RCRA Subtitle C Cap (top)/Perimeter Soil Cover (side slopes) of Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls	
Modifying Criteria							
8)	State Acceptance	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS
9)	Community Acceptance	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS
Screening Totals							
		8		22		15	

Notes

All costs are estimated to an accuracy of +50% to -30% (USEPA, 2000)
ARAR = applicable or relevant and appropriate requirement
FS = Feasibility Study
O&M = operation and maintenance
RG = Remediation Goal
RAO = remedial action objective
RCRA = Resource Conservation and Recovery Act

Ratings categories for Threshold and Balancing Criteria (Excluding Cost)
(0) None
(1) Low
(2) Low to moderate
(3) Moderate
(4) Moderate to high
(5) High

Table 8-3

Summary of Detailed and Comparative Analysis of Source Area Remedial Action Alternatives - Nunes Parcel

Feasibility Study

Peterson/Puntan, Inc Superfund Site - Operable Unit 2

Cumberland and Lincoln, Rhode Island

	Evaluation Criteria	Alternative NP-SO-1 No Action		Alternative NP-SO-2 RCRA Subtitle D Cap (meeting State Solid Waste ARARs) of Landfill, Consolidation, and Institutional Controls		Alternative NP-SO-3 RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls	
Threshold Criteria							
1)	Overall protection of human health and the environment	0	Does not provide overall protection of human health or the environment Does not minimize, reduce, or control contaminant impacts in waste and soil or associated exposure risks Soil RAOs would not be met	0	While partially protective of human health and the environment by reducing potential exposure to contaminants in waste and soil, not fully protective because it will not meet protectiveness standards for the landfilling of hazardous waste	5	Protective of human health and the environment by eliminating potential exposure to contaminants in waste and soil, and meets the protectiveness standards for the landfilling of hazardous waste There are no offsite impacts, and institutional controls eliminate exposure pathways RAOs would be met
2)	Compliance with ARARs	0	Does not comply with chemical-specific ARARs No action- or location-specific ARARs	0	Does not comply with RCRA Subtitle C closure standards	5	Complies with ARARs for municipal and hazardous waste landfills
Balancing Criteria							
3)	Long-term effectiveness and permanence	0	Not effective or permanent Potential exposure risks associated with contaminants in soil and waste would remain with no controls or long-term management plan	4	Generally effective and permanent for soil and waste below landfill cap, although long-term protectiveness in question based on waste in landfill Allows more infiltration to occur than the Subtitle C cap	5	Effective and permanent for soil and waste below landfill cap
4)	Reduction of mobility, toxicity, or volume through treatment	0	No treatment processes involved	0	No treatment processes involved	0	No treatment processes involved
5)	Short-term effectiveness	0	No activities would be implemented that would present potential short-term exposure risks to human health or the environment	4	Meets RAOs in short period of time at relatively low risk to community and site workers Construction activities will have a significant impact on the environment, through both removal of mature trees on riverbank and floodplain and through erosion controls along the riverbank	3	Meets RAOs in short period of time at relatively low risk to community and site workers Construction activities will have a significant impact on the environment, through both removal of mature trees on riverbank and floodplain and through erosion controls along the riverbank Greater impacts to the community due to the additional volume of cap materials which need to brought on site
6)	Implementability	3	Technically feasible due to lack of technical components However, not administratively feasible due to a lack of monitoring or protection of human health or the environment	4	Landfill boundaries on the west and south (Blackstone River) will interfere with completion of the cover and will require armor to prevent washout	4	Landfill boundaries on the west and south (Blackstone River) will interfere with completion of the cover and anchoring of liner and will require armor to prevent washout
7)	Cost	5	Capital Costs $0 Total O&M and Periodic Costs $0 Total Present Value Cost $0	4	Capital Costs $4,808,000 Total O&M and Periodic Costs $124,000 Total Present Value Cost $4,932,000	3	Capital Costs $5,956,000 Total O&M and Periodic Costs $124,000 Total Present Value Cost $6,080,000

Table 8-3
Summary of Detailed and Comparative Analysis of Source Area Remedial Action Alternatives - Nunes Parcel

Feasibility Study
Peterson/Puntan, Inc. Superfund Site - Operable Unit 2
Cumberland and Lincoln, Rhode Island

Evaluation Criteria		Alternative NP-SO-1 No Action		Alternative NP-SO-2 RCRA Subtitle D Cap (meeting State Solid Waste ARARs) of Landfill, Consolidation, and Institutional Controls		Alternative NP-SO-3 RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls	
Modifying Criteria							
8)	State Acceptance	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS
9)	Community Acceptance	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS
Screening Totals							
		8		16		25	

Notes

All costs are estimated to an accuracy of +50% to -30% (USEPA, 2000)
AOC = area of concern
ARAR = applicable or relevant and appropriate requirement
FS = Feasibility Study
O&M = operation and maintenance
RAO = remedial action objective
RCRA = Resource Conservation and Recovery Act
ROD = Record of Decision
USEPA = United States Environmental Protection Agency

Ratings categories for Threshold and Balancing Criteria (Excluding Cost)
(0) None
(1) Low
(2) Low to moderate
(3) Moderate
(4) Moderate to high
(5) High

Table 8-4
Summary of Detailed and Comparative Analysis of Source Area Remedial Action Alternatives - Unnamed Island

Feasibility Study
Peterson/Puntan, Inc Superfund Site - Operable Unit 2
Cumberland and Lincoln, Rhode Island

	Evaluation Criteria	Alternative UI-SO-1 No Action		Alternative UI-SO-2 Remove/consolidate surface waste/soil (0-2 ft) exceeding RGs, Geotextile with Riprap where RG Exceedances Remain, and Institutional Controls		Alternative UI-SO-3 Remove/consolidate all waste/soil exceeding RGs	
Threshold Criteria							
1)	Overall protection of human health and the environment	0	Does not provide overall protection of human health or the environment Does not minimize, reduce, or control contaminant impacts in waste and soil or associated exposure risks Soil RAOs would not be met	0	While partially protective of human health and the environment by eliminating potential exposure to waste and contaminants in soil, not fully protective because it will not meet protectiveness standards for the landfilling of hazardous waste	5	Protective of human health and the environment by eliminating potential exposure to waste and contaminants in soil RAOs would be met
2)	Compliance with ARARs	0	Does not comply with chemical-specific ARARs No action- or location-specific ARARs	0	Any remaining contaminants below 2 feet would not meet chemical- and location-specific ARARs, as the cover design does not protect against the release of contaminants through continued leaching or during a flood event, because there is no impermeable barrier layer in the cover Does not comply with RCRA C closure standards	5	Complies with ARARs
Balancing Criteria							
3)	Long-term effectiveness and permanence	0	Not effective or permanent Potential exposure risks associated with contaminants in soil would remain with no controls or long-term management plan	3	Effective and permanent for removal of waste and impacted soil May not achieve long-term effectiveness and permanence, because there is no impermeable barrier layer in the cover making it likely that a release from continued leaching, further erosion over time, and/or during a 100-year or 500-year storm event would occur	5	Effective and permanent due to removal of waste and impacted soil
4)	Reduction of mobility, toxicity, or volume through treatment	0	No treatment processes involved	0	No treatment processes involved	0	No treatment processes involved, except to the extent that water generated from the remedial action (i e, from dewatering processes) may be treated
5)	Short-term effectiveness	0	No activities would be implemented that would present potential short-term exposure risks to human health or the environment	4	Meets RAOs in short period of time at relatively low risk to community and site workers Construction activities will have a significant impact on the environment, through both removal of mature trees and through erosion controls/capping established as part of the remedy	3	Meets RAOs in short period of time at relatively low risk to community and site workers Construction activities will have a significant impact on the environment, through both removal of mature trees and through erosion controls along the riverbank Increased risks due to larger and deeper excavation area and increased volume for transportation off of the island
6)	Implementability	4	Technically feasible due to lack of technical components	3	Activities will require temporary bridge to move heavy equipment and haul trucks across river Flooding has potential to disrupt work and damage equipment	2	Activities will require temporary bridge to move heavy equipment and haul trucks across river Flooding has potential to disrupt work and damage equipment. Portions of the waste are located as much as 12 ft below the water table
7)	Cost	5	Capital Costs $0 Total O&M and Periodic Costs $0 Total Present Value Cost $0	4	Capital Costs $4,312,000 Total O&M and Periodic Costs $62,000 Total Present Value Cost $4,374,000	2	Capital Costs $6,136,000 Total O&M and Periodic Costs $0 Total Present Value Cost $6 136,000

Table 8-4
Summary of Detailed and Comparative Analysis of Source Area Remedial Action Alternatives - Unnamed Island

Feasibility Study
Peterson/Puritan, Inc. Superfund Site - Operable Unit 2
Cumberland and Lincoln, Rhode Island

Evaluation Criteria		Alternative UI-SO-1 No Action		Alternative UI-SO-2 Remove/consolidate surface waste/soil (0-2 ft) exceeding RGs, Geotextile with Riprap where RG Exceedances Remain, and Institutional Controls		Alternative UI-SO-3 Remove/consolidate all waste/soil exceeding RGs	
Modifying Criteria							
8)	State Acceptance	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS
9)	Community Acceptance	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS
Screening Totals							
		9		14		22	

Notes

All costs are estimated to an accuracy of +50% to -30% (USEPA, 2000)
ARAR = applicable or relevant and appropriate requirement
FS = Feasibility Study
ft = feet
O&M = operation and maintenance
RG = Remediation Goal
RAO = remedial action objective
ROD = Record of Decision
USEPA = United States Environmental Protection Agency

Ratings categories for Threshold and Balancing Criteria (Excluding Cost)
(0) None
(1) Low
(2) Low to moderate
(3) Moderate
(4) Moderate to high
(5) High

Table 8-5
Summary of Detailed and Comparative Analysis of Pond Sediment Remedial Action Alternatives

Feasibility Study
Peterson/Puritan, Inc Superfund Site - Operable Unit 2
Cumberland and Lincoln, Rhode Island

	Evaluation Criteria		Alternative SE-1 No Action		Alternative SE-2 Remove/Consolidate Sediment Exceeding RGs		Alternative SE-3 Remove/Consolidate Sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls		Alternative SE-4 Subaqueous Cover (No Sediment Removal) with Institutional Controls
Threshold Criteria									
1)	Overall protection of human health and the environment	0	Does not provide overall protection of human health and the environment Does not minimize, reduce, or control contaminant impacts in sediments or associated exposure risks RAOs would not be met	5	Protective of human health and the environment by eliminating potential exposure to contaminants in sediment RAOs would be met	5	Protective of human health and the environment by eliminating potential exposure to contaminants in sediment by removal and/or covering There are no offsite impacts and institutional controls would assist in maintaining the remedy RAOs would be met	4	Protective of human health and the environment by covering potential exposure to contaminants in sediments There are no offsite impacts and institutional controls would assist in maintaining the remedy RAOs would be met Contaminants not removed at all
2)	Compliance with ARARs	0	Does not comply with chemical-specific ARARs No action- or location-specific ARARs	5	Complies with ARARs	5	Complies with ARARs	5	Complies with ARARs
Balancing Criteria									
3)	Long-term effectiveness and permanence	0	Not effective or permanent Potential exposure risks associated with contaminants in sediment would remain with no controls or long-term management plan	5	Effective and permanent for removal of impacted sediment	5	Effective and permanent for removal of impacted sediment Effective and permanent for sediment below cover	4	Effective and permanent for sediment below cover Not as effective as alternatives which remove impacted sediment
4)	Reduction of mobility, toxicity, or volume through treatment	0	No treatment processes involved	0	No treatment processes involved, except for the potential treatment of water generated by dewatering prior to discharge and any potential addition of bulking agents to the sediments prior to consolidation under the landfill cap(s)	0	No treatment processes involved, except for the potential treatment of water generated by dewatering prior to discharge and any potential addition of bulking agents to the sediments prior to consolidation under the landfill cap(s)	0	No treatment processes involved
5)	Short-term effectiveness	0	No activities would be implemented that would present potential short-term exposure risks to human health or the environment	3	Meets RAOs in short period of time at relatively low risk to community and site workers, although the highest short-term exposure risks to the environment and community due to the largest volume of sediment to be transported off of Unnamed Island	4	Meets RAOs in short period of time at relatively low risk to community and site workers, although increased short-term exposure risks compared to covering only, due to sediments being excavated and transported off of Unnamed Island	4	Meets RAOs in short period of time at relatively low risk to community and site workers However potential loss of habitat in shallower zones when placing cover with no excavation
6)	Implementability	3	Technically feasible due to lack of technical components	2	Activities will require temporary bridge to move heavy equipment and haul trucks across river Flooding has potential to disrupt work and damage equipment Total volume of sediment requiring removal unknown	3	Activities will require temporary bridge to move heavy equipment and haul trucks across river Flooding has potential to disrupt work and damage equipment Total volume of sediment requiring removal unknown	3	Activities will require temporary bridge to move heavy equipment and haul trucks across river Flooding has potential to disrupt work and damage equipment
7)	Cost	5	Capital Costs $0 Total O&M and Periodic Costs $0 Total Present Value Cost $0	2	Capital Costs $8,120,000 Total O&M and Periodic Costs $0 Total Present Value Cost $8,120,000	3	Capital Costs $5,103,000 Total O&M and Periodic Costs $701,000 Total Present Value Cost $5,804,000	4	Capital Costs $2,883,000 Total O&M and Periodic Costs $701,000 Total Present Value Cost $3,584,000

Table 8-5
Summary of Detailed and Comparative Analysis of Pond Sediment Remedial Action Alternatives

Feasibility Study
Peterson/Puritan, Inc. Superfund Site - Operable Unit 2
Cumberland and Lincoln, Rhode Island

Evaluation Criteria		Alternative SE-1 No Action		Alternative SE-2 Remove/Consolidate Sediment Exceeding RGs		Alternative SE-3 Remove/Consolidate Sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls		Alternative SE-4 Subaqueous Cover (No Sediment Removal) with Institutional Controls	
Modifying Criteria									
8)	State Acceptance	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS
9)	Community Acceptance	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS	0	Assessed in the ROD following comment of the FS
Screening Totals									
		8		22		25		24	

Notes

All costs are estimated to an accuracy of +50% to -30% (USEPA, 2000)

ARAR = applicable or relevant and appropriate requirement
ft = feet
FS = Feasibility Study
O&M = Operation and Maintenance
RG = Remediation Goal
RAO = remedial action objective
ROD = Record of Decision
USEPA = United States Environmental Protection Agency

Ratings categories for Threshold and Balancing Criteria (Excluding Cost)
(0) None
(1) Low
(2) Low to moderate
(3) Moderate
(4) Moderate to high
(5) High

Appendix D:

ARAR Tables

Table I-2a
Chemical-Specific ARARs and TBCs for Groundwater
Alternative GW-2: Long Term Monitoring and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Guidelines for Carcinogenic Risk Assessment, EPA/630/P-03/001F	TBC	These guidelines provide guidance on conducting risk assessments involving carcinogens.	Used to calculate potential carcinogenic risks caused by exposure to contaminants in groundwater.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens, EPA/630/R-03/003F	TBC	This provides guidance on assessing risk to children from carcinogens.	Used to calculate potential carcinogenic risks to children caused by exposure to contaminants.
Federal Requirements	EPA Risk Reference Doses (RfDs)	TBC	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media. RfDs are considered to be the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Used to compute the individual incremental cancer risk resulting from exposure to non-carcinogenic contaminants in groundwater.
Federal Requirements	Human Health Assessment Cancer Slope Factors (CSFs)	TBC	CSFs are estimates of the upper-bound probability of an individual developing cancer as a result of a lifetime exposure to a particular concentration of a potential carcinogen.	Used to compute the individual incremental cancer risk resulting from exposure to carcinogenic contaminants in groundwater.

Key:
ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
EPA = U.S. Environmental Protection Agency
RIDEM = Rhode Island Department of Environmental Protection
TBC = To Be Considered

Table I-2b
Location-Specific ARARs and TBCs for Groundwater
Alternative GW-2: Long Term Monitoring and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Floodplains Management (Executive Order 11988), 44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11988), federal agencies are required to avoid long- and short-term adverse impacts associated with the occupancy and modification of federally-designated 100-year and 500-year floodplain wherever there is a practicable alternative.	Available practicable means will be used to reduce the risk of flood loss, to minimize the impact of floods, and to restore and preserve the floodplains disturbed by well installation, maintenance, and monitoring.
Federal Requirements	Protection of Wetlands (Executive Order 11990), 44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11990), federal agencies are required to avoid adversely impacting federal jurisdictional wetlands unless there is no practicable alternative with lesser effects and the proposed action includes all practicable measures to minimize harm to federal jurisdictional wetlands that may result from such use	Action to be taken will minimize alterations to protected resource areas due to well installation, maintenance, and monitoring. Mitigation measures, as required, will be taken to compensate for the resource areas altered by this alternative.
State Regulatory Requirements	Fresh Water Wetlands Act, RIGL 2-1, Sections 2-1-18 through 2-1-20.2; RIDEM Rules And Regulations Governing the Administration and Enforcement of the Fresh Water	Applicable	Defines and establishes provisions for the protection of swamps, marshes and other fresh water wetlands resource areas in the state. Actions are required to prevent the undesirable drainage, excavation, filling, alteration, encroachment or any other form of disturbance or destruction of a wetland.	Action taken under this alternative will be done in compliance with this requirement.

Table I-2b
Location-Specific ARARs and TBCs for Groundwater
Alternative GW-2: Long Term Monitoring and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	Wetlands Act (Dec 2010), Rules 4.00-6.00, 10.00, 11.00 and 13.00.			

Key:
ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
EPA = U.S. Environmental Protection Agency
RIDEM = Rhode Island Department of Environmental Protection

Table I-2c
Action-Specific ARARs and TBCs for Groundwater
Alternative GW-2: Long Term Monitoring and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Safe Drinking Water Act Maximum Contaminant Levels (MCLs), 40 CFR Part 141, Subparts B and G	Relevant and Appropriate	Establishes MCLs for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate standards for aquifers and surface water bodies that are potential drinking water sources.	MCLs will be used to develop performance standards for monitoring the compliance boundary for the waste management area established where contamination is left in place. Monitoring will ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause adjacent groundwater not to meet drinking water standards.
Federal Requirements	Safe Drinking Water Act Maximum Contaminant Goals (MCLGs), 40 CFR Part 141, Subpart F	Relevant and Appropriate	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	Non-zero MCLGs will be used to develop performance standards for monitoring the compliance boundary for the waste management area established where contamination is left in place. Monitoring will ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause adjacent groundwater not to meet drinking water standards.
Federal Requirements	EPA Health Advisories	TBC	EPA publishes contaminant-specific health advisories that indicate the non-carcinogenic risks associated with consuming contaminated drinking water.	The Health Advisories will be used to develop performance standards for monitoring the compliance boundary for the waste management area

Table I-2c
Action-Specific ARARs and TBCs for Groundwater
Alternative GW-2: Long Term Monitoring and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
				established where contamination is left in place. Monitoring will ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause adjacent groundwater not to meet drinking water standards.
Federal Requirements	EPA Groundwater Protection Strategy	TBC	The Groundwater Protection Strategy provides a common reference for preserving clean groundwater and protecting the public health against the effects of past contamination. Guidelines for consistency in groundwater protection programs focus on the highest beneficial use of a groundwater aquifer and defines three classes of groundwater.	In accordance with federal guidance, groundwater within the compliance boundary for the waste management area that comprises the entire area of the OU will be subject to groundwater use restrictions for as long as contamination remains in place.
State Requirements	RI Rules and Regulations for Groundwater Quality, RIDEM (6-2010), Appendix 1	Applicable	Establishes construction standards for permanent monitoring wells and abandonment procedures.	Monitoring wells will be installed and abandoned in accordance with these standards.
State Requirements	RI Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases , CRIR12-180-001; DEM-DSR-01-93, sections 8.01, 8.03	Applicable	These regulations set remediation standards for groundwater at NPL sites within the state based on groundwater classification.	State standards that are more stringent than federal standards will be used to develop performance standards for monitoring the compliance boundary for the waste management area established where contamination is left in place.

Table I-2c
Action-Specific ARARs and TBCs for Groundwater
Alternative GW-2: Long Term Monitoring and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Requirements	Rules and Regulations for Hazardous Waste Management, Hazardous Waste Determination OWM-HW 01-14 Rule 5.3	Applicable	Defines the listed and characteristic hazardous wastes.	These regulations would apply when determining whether or not a waste generated from either installing, sampling, or maintaining monitoring wells is hazardous, either by being listed or by exhibiting a hazardous characteristic.
State Requirements	Rules and Regulations for Hazardous Waste Management, Generator Standards, OWM-HW-01-04 Rule 5	Applicable	Establishes handling and pre-transport requirements for hazardous waste.	These regulations would apply to any waste generated from either installing, sampling, or maintaining monitoring wells, if hazardous.
State Requirements	Rules and Regulations for Hazardous Waste Management, Incorporation of Federal Regulations Regarding Treatment, Storage and Disposal Facilities, OWM-HW 01-14 Rule 8.2	Applicable	Contains requirements for monitoring wells.	The substantive requirements of this section of the regulations will be met by maintaining monitoring wells for groundwater conditions at the site where hazardous waste in managed 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.

Key:

ARAR	=	Applicable or Relevant and Appropriate Requirement
CFR	=	Code of Federal Regulations
CRIR	=	Code of Rhode Island Rules
EPA	=	U.S. Environmental Protection Agency
RIDEM	=	Rhode Island Department of Environmental Protection
TBC	=	To Be Considered

Table I-4a

Chemical-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Guidelines for Carcinogenic Risk Assessment, EPA/630/P-03/001F	TBC	These guidelines provide guidance on conducting risk assessments involving carcinogens.	Capping of the landfill, with consolidation of all contaminated material under the cap, will prevent exposure to soil/debris contaminants which contribute to a calculated carcinogenic risk, developed using this guidance. ICs will prevent activities that will disturb the capped material.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens, EPA/630/R-03/003F	TBC	This provides guidance on assessing risk to children from carcinogens.	Capping of the landfill, with consolidation of all contaminated material under the cap, will prevent exposure to soil/debris contaminants which contribute to a calculated carcinogenic risk to children developed using this guidance. ICs will prevent activities that will disturb the capped material.
Federal Requirements	EPA Risk Reference Doses (RfDs)	TBC	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media. RfDs are considered to be the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Capping of the landfill, with consolidation of all contaminated material under the cap, will prevent exposure to soil/debris contaminants which contribute to a calculated non-carcinogenic risk, developed using this guidance. ICs will prevent activities that will disturb the capped material.

Table I-4a

Chemical-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Human Health Assessment Cancer Slope Factors (CSFs)	TBC	CSFs are estimates of the upper-bound probability of an individual developing cancer as a result of a lifetime exposure to a particular concentration of a potential carcinogen.	Capping of the landfill, with consolidation of all contaminated material under the cap, will prevent exposure to soil/debris contaminants which contribute to a calculated carcinogenic risk, developed using this guidance. ICs will prevent activities that will disturb the capped material.
Federal Requirements	EPA Carcinogenic Assessment Group Potency Factors	TBC	These factors are used to evaluate an acceptable risk from a carcinogen.	Capping of the landfill, with consolidation of all contaminated material under the cap, will prevent exposure to soil/debris contaminants which contribute to a calculated carcinogenic risk, developed using this guidance. ICs will prevent activities that will disturb the capped material.
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an approach to Assessing Risks Associated with Adult Exposure to Lead In Soil, EPA-540-R-03-001 (January 2003)	TBC	EPA Guidance for evaluating risks posed by lead in soil.	Capping of the landfill, with consolidation of all contaminated material under the cap, will prevent exposure to soil/debris contaminants which contribute to a calculated carcinogenic risk, developed using this guidance. ICs will prevent activities that will disturb the capped material.

Table I-4a

Chemical-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	USEPA Interim Ecological Soil Screening Levels (SSLs) (USEPA, 2003)	TBC	SSLs were established to provide screening toxicity thresholds.	Consolidation of all contaminated material under the cap will prevent ecological exposure to contaminated soils which contribute to a calculated risk, developed using this guidance.
Federal Requirements	ORNL Toxicological Benchmarks for Wildlife (Sample *et al.*, 1996)	TBC	These benchmarks were established to provide screening toxicity thresholds.	Consolidation of all contaminated material under the cap will prevent ecological exposure to contaminated soils which contribute to a calculated risk, developed using this guidance.
Federal Requirements	ORNL Toxicological Benchmarks for Screening Contaminants of Concern for Effects of Soil and Litter Invertebrates and Heterotrophic Process (Efroymson *et al.*, 1997)	TBC	These benchmarks were established to provide screening toxicity thresholds.	Consolidation of all contaminated material under the cap will prevent ecological exposure to contaminated soils which contribute to a calculated risk, developed using this guidance.
Federal Requirements	U.S. DOE, Office of Environmental Management, Secondary Chronic Values (SCVs) (Jones et al., 1997)	TBC	The SCVs are toxicological benchmarks for screening contaminants of potential concern for effects on sediment-associated biota.	This alternative would prevent exposure to sediment contaminants in Pond N which contribute to a calculated ecological risk, by removing all contaminated sediments that exceed RGs.

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Chemical-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	U.S. EPA Sediment Quality Criterion (SQC) and Sediment Quality Benchmarks (SQBs) (USEPA, 1996)	TBC	SQCs and SQBs were established to provide screening toxicity thresholds.	This alternative would prevent exposure to sediment contaminants in Pond N which contribute to a calculated ecological risk, by removing all contaminated sediments that exceed RGs.
Federal Requirements	Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Probable Effects Concentrations (PECs) (MacDonald *et al.*, 2000)	TBC	PECs represent the concentration above which the adverse effects on sediment-dwelling organisms are likely to occur.	This alternative would prevent exposure to sediment contaminants in Pond N which contribute to a calculated ecological risk, by removing all contaminated sediments that exceed RGs.
State Requirements	RI Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases (i.e., Remediation Regulations), CRIR12-180-001; DEM-DSR-01-93, section 8.02	Applicable	These regulations set remediation standards for soil at NPL sites when they are more stringent than federal standards.	The action to be taken under this alternative will meet the remediation standards for soil, as required.

Key:

ARAR	=	Applicable or Relevant and Appropriate Requirement
CFR	=	Code of Federal Regulations
CRIR	=	Code of Rhode Island Rules
EPA	=	U.S. Environmental Protection Agency
ICs	=	Institutional Controls
RGs	=	Remediation Goals
RIDEM	=	Rhode Island Department of Environmental Protection
TBC	=	To Be Considered

Table I-4b

Location-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Floodplains Management (Executive Order 11988), 44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11988), federal agencies are required to avoid long- and short-term adverse impacts associated with the occupancy and modification of federally-designated 100-year and 500-year floodplain wherever there is a practicable alternative.	Available practicable means will be used to reduce the risk of flood loss, to minimize the impact of floods, and to restore and preserve the floodplains disturbed by soil excavation and cap construction.
Federal Requirements	Protection of Wetlands (Executive Order 11990), 44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11990), federal agencies are required to avoid adversely impacting federal jurisdictional wetlands unless there is no practicable alternative with lesser effects and the proposed action includes all practicable measures to minimize harm to federal jurisdictional wetlands that may result from such use.	Action to be taken will minimize alterations to protected resource areas due to soil excavation and cap construction. Mitigation measures, as required, will be taken to compensate for the resource areas altered by this alternative.
Federal Requirements	Clean Water Act, Section 404; Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material, 33 U.S.C. § 1344; 40 CFR Parts 230, 231 and 33 CFR Parts 320-323	Applicable	Outlines requirements for the discharge of dredged or fill materials into surface waters, including wetlands. Such discharges are not allowed if there are practicable alternatives with less adverse impact. Sets standards for restoration and mitigation required as a result of unavoidable impacts to aquatic resources.	The cap will be constructed in a manner that will minimize the area of wetlands altered, to the extent possible.
Federal Requirements	Resource Conservation and Recovery Act	Relevant and Appropriate	Seismic and floodplain standards that apply to all hazardous waste facilities.	The cap remedy will be implemented to meet substantive seismic and floodplain standards.

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Location-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	(RCRA), 42 U.S.C, §§ 6901 *et seq.*, General Facility Standards, Location Standards; 40 CFR § 264.18			
Federal Requirements	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 other federal waters for any purpose to take action to protect fish and wildlife resources that may be affected by the action.	Measures to mitigate or compensate adverse project related impacts to fish and wildlife resources will be taken, if determined necessary.
Federal Requirements	National Historical Preservation Act, 16 U.S.C. 469 *et seq.*; 36 CFR Part 65	Applicable	When a federal agency finds, or is notified, that its activities in connection with a federal construction project may cause irreparable loss or destruction of significant scientific, pre-historical, historical, or archeological data, the substantive standards under the Act will be met.	If, during the remedial design or remedial action, it is determined that this alternative may cause irreparable loss or destruction of significant scientific, pre-historical, historical, or archaeological data, the substantive standards under the Act will be met.
State Requirements	RI Rules and Regulations for Hazardous Waste Management - Section 8.2 (20): Location Standards for Hazardous Waste Facilities	Applicable for Treatment and Storage Facilities; Relevant and Appropriate for Landfills	Rhode Island is delegated to administer the federal RCRA statute through its state regulations. The standards of 40 CFR 264.18(b), with some exceptions, are incorporated by reference. Treatment and storage facilities located within the 100-year floodplain must be designed, constructed, operated and maintained to prevent washout of any hazardous waste by 100-year	Treatment, and/or storage of hazardous materials may take place at the Site, which is partially located within the 100-year floodplain as long as the contamination would not be subject to washout in a 100-year flooding event.

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Location-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
			flood, unless it can be demonstrated that no adverse effects on human health or environment will result from washout.	
State Requirements	Rhode Island Fresh Water Wetlands Act, RIGL 2-1, Sections 2-1-18 through 2-1-20.2; DEM Rules And Regulations Governing the Administration And Enforcement of the Fresh Water Wetlands Act (December 2010), Rules 4.00 and 5.00	Applicable	Defines and establishes provisions for the protection of swamps, marshes, 100-year floodplain and other fresh water wetland resource areas in the state. Actions are required to prevent the undesirable drainage, excavation, filling, alteration, encroachment or any other form of disturbance or destruction of a wetland.	Mitigation measures, as required, will be taken to compensate for the resource areas altered by the cap.
State Requirements	Rhode Island Historic 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.	Features with potential historical/cultural significance will be evaluated during the remedial design phase and activities will be coordinated with the State Agency as required.

Key:

ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
EPA = U.S. Environmental Protection Agency
FEMA = Federal Emergency Management Agency
RGs = Remediation Goals
RIDEM = Rhode Island Department of Environmental Protection
RIGL = Rhode Island General Laws
TBC = To Be Considered

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Action-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Clean Water Act Federal Water Quality Criteria, Section 304(a) ; 40 CFR 131.11	Applicable	National Recommended Water Quality Criteria (NRWQC) are provided by EPA for chemicals for both the protection of human health and the protection of aquatic life.	Excavation/backfill and capping must be conducted so that there are no exceedances of NRWQC. Water quality standards used to develop monitoring standards both during the active remedial period and for long-term monitoring of the protectiveness of the waste management area that will be established under this alternative.
Federal Requirements	Clean Water Act – National Pollutant Discharge Elimination System (NPDES), 40 CFR Parts 122 and 125	Applicable	Includes stormwater standards for activities disturbing more than one acre.	Best management practices will be used to meet stormwater standards during the remedial action.
Federal Requirements	Toxic Substances Control Act (TSCA) 15 U.S.C. 2601 *et seq.*; PCB Remediation Waste, 40 CFR 761.61(c)	Applicable	This section of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, EPA Region 1.	All soil exceeding identified PCB cleanup levels will be removed, dewatered (if required) and disposed of under the cap system that meets TSCA protectiveness standards or disposed of off-site at a licensed facility. The excavation, transportation/ dewatering, and management of PCB contaminated media will be performed in a manner to comply with TSCA. The ROD includes a finding by the Director, Office of Site Remediation and

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Action-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
				Restoration, EPA Region 1, that the remedy's soil PCB cleanup levels, along with the excavation, dewatering, management and disposal of the of the PCB-contaminated media under a cap will not pose an unreasonable risk to human health or the environment.
Federal Requirements	RCRA, Air Emission Standards for Process Vents, 40 CFR 264, Subpart AA	Applicable	This section of RCRA has not been delegated to the State of Rhode Island. Air emission standards for process vents apply to process vents that manage hazardous wastes with organic concentrations of at least 10 parts per million by weight (ppmw).	If operations (e.g., leachate or landfill gas collection) manage hazardous wastes with organic concentrations of at least 10 ppm by weight, system vents will comply with these requirements.
Federal Requirements	RCRA , Air Emission Standards for Equipment Leaks, 40 CFR 264, Subpart BB	Applicable	This section of RCRA has not been delegated to the State of Rhode Island. Air emission standards for equipment leaks apply to equipment that contains or contacts hazardous wastes with organic concentrations of at least 10% by weight.	If equipment contains or comes into contact with hazardous wastes (e.g., during leachate or landfill gas collection) containing organic concentrations of at least 10% by weight, then these regulations will be followed.
Federal Requirements	RCRA, Air Emission Standards for Tanks, Surface Impoundments, and Containers, 40 CFR 264, Subpart CC	Applicable	This section of RCRA has not been delegated to the State of Rhode Island. Air emissions standards for tanks, surface impoundments, and containers used to manage hazardous waste. Emission controls required if tanks, surface impoundments, and containers used to manage hazardous waste have more than 500 ppmw of volatile organics.	If tanks, surface impoundments, and containers used to manage hazardous waste (e.g., during leachate or landfill gas collection) have more than 500 ppmw of volatile organics, then these requirements will be met.

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Action-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Clean Air Act (CAA), 42 U.S.C. §§ 7401 *et seq.*, Standards of Performance for Municipal Solid Waste Landfills, 40 CFR Part 60, Subpart WWW	Relevant and Appropriate	Air emission standards for landfills greater than 2.5 Mg in design capacity and emitting 50 Mg/year or more of non-methane organic compounds	The landfill cap will be designed and constructed to allow for the collection and treatment, if required under these standards, of landfill gases.
Federal Requirements	Clean Air Act (CAA), Hazardous Air Pollutants, 42.U.S.C. § 112(b)(1), National Emission Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust and other release sources.	If the excavation of contaminated soil, installation and maintenance of the RCRA C cap, and the control of landfill gasses generate regulated air pollutants, then measures will be implemented to meet these standards.
Federal Requirements	Framework for Investigating Asbestos-Contaminated Superfund Sites, OSWER Directive #9200.0-68 (Sept. 2008)	TBC	Guidance on investigating and characterizing the potential human exposure from asbestos contamination in outdoor soil at Superfund sites.	Any areas that were subject to previous asbestos removal actions will be investigated under these guidance standards if they are not to be located under the RCRA C cap. Areas of asbestos contamination outside of the capped area will be excavated and consolidated under the cap.
Federal Requirements	Clean Air Act (CAA), National Emission Standards	Relevant and Appropriate	NESHAPS standards for preventing air releases from inactive asbestos disposal sites, including	Any areas of asbestos contaminated soil will be consolidated under the RCRA C

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Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	for Hazardous Air Pollutants (NESHAPS), Standards tor Inactive waste disposal sites for asbestos mills and manufacturing and fabricating Operations, 40 CFR § 61.151		cover standards, dust suppression, and land use controls.	cap, which meets the substantive requirements of these standards. ICs will be established to maintain the cap and to address any potential asbestos exposure in case the cap is disturbed.
Federal Requirements	Safe Drinking Water Act Maximum Contaminant Levels (MCLs), 40 CFR Part 141, Subparts B and G	Relevant and Appropriate	Establishes MCLs for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate standards for aquifers and surface water bodies that are potential drinking water sources.	MCLs will be used to develop performance standards for monitoring the compliance boundary for the waste management area established where contamination is left in place under the cap. Monitoring will ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause adjacent groundwater not to meet drinking water standards.
Federal Requirements	Safe Drinking Water Act Maximum Contaminant Levels (MCLGs), 40 CFR Part 141, Subpart F	Relevant and Appropriate	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	Non-zero MCLGs will be used to develop performance standards for monitoring the compliance boundary for the waste management area established where contamination is left in place under the RCRA C cap.

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Action-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
				Monitoring will ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause adjacent groundwater not to meet drinking water standards.
Federal Requirements	EPA Health Advisories	TBC	EPA publishes contaminant-specific health advisories that indicate the non-carcinogenic risks associated with consuming contaminated drinking water.	The Health Advisories will be used to develop performance standards for monitoring the compliance boundary for the waste management area established where contamination is left in place under the RCRA C cap. Monitoring will ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause adjacent groundwater not to meet drinking water standards.
Federal Requirements	EPA Technical Guidance: Revised Alternative Cap Design Guidance Proposed for Unlined, Hazardous Waste Landfills in the EPA Region 1 (February 5, 2001)	TBC	Guidance for landfill covers in EPA Region 1. Presents recommended technical specifications for multilayer landfill cover design.	Cap construction will be protective in accordance with the guidance.

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Action-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	EPA Technical Guidance: Final Covers on Hazardous Waste Landfills and Surface Impoundments (July 1989)	TBC	Guidance for landfill covers recommending technical specifications for multilayer landfill cover designs.	Cap construction will be protective in accordance with the guidance.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Hazardous Waste Determination, OWM-HW-01-04, Rule 5.3	Applicable	Requires a determination be made as to whether waste meets the definition of hazardous waste, including "Rhode Island Hazardous Wastes" as defined in Rule 3.	These regulations would apply when determining whether or not a waste generated during the remedial action is hazardous.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Generator Standards, OWM-HW-01-04 Rule 5	Applicable	Sets generator standards for handling and disposal of hazardous waste. Incorporates provisions of 40 CFR Part 262.	Any hazardous waste identified will be handled and disposed according to these standards.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Facility Standards, OWM-HW-01-04, Rule 7(B)	Relevant and Appropriate	Relevant and appropriate facility standards regarding: restrictions for landfills (Rule 7.(B)(13)(a) and (Rule 7(B)(13)(c); inspections 7(B)(23).	The cap will be designed, constructed and maintained in a manner that will protect groundwater beyond the compliance boundary for the landfill and control discharges of surface or subsurface contamination in violation of any federal or state standard.

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Action-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Operational Requirements for Treatment, Storage, and Disposal Facilities, OWM-HW-01-04, Rule 8	Relevant and Appropriate	Outlines operational requirements for all hazardous waste treatment, storage, and disposal facilities.	Management and treatment of on-site treatment residues and waste derived from the construction and maintenance of the RCRA C cap; from leachate or landfill gas collection; or from any investigation-derived waste will comply with these regulations.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, , Land Disposal Facilities, OWM-HW-01-04 Rule 8.2(A)	Relevant and Appropriate	Federal performance standards for closure/post closure of landfills at 40 CFR 264.310 are incorporated fully by reference.	Design, construction, maintenance, closure, and post-closure of the cap will meet the relevant and appropriate standards.
State Requirements	RI Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases (i.e., Remediation Regulations), CRIR12-180-001; DEM-DSR-01-93, section 8.04	Applicable	These regulations set remediation standards for groundwater at NPL sites when they are more stringent than federal standards.	These regulations will be used to develop performance standards for monitoring the compliance boundary for the waste management area established where contamination is left in place under the RCRA C cap. Monitoring will ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause adjacent groundwater not to meet these standards.

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Action-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Requirements	Water Pollution Control, Water Quality Regulations, RIGL 42-16 *et seq.*; CRIR 12-190-001	Applicable	Provides water classification for surface waters in Rhode Island and sets ambient water quality criteria for toxic substances and governs water quality impacts associated with Site activities.	Excavation and capping must be conducted so that there are no exceedances of water quality standards. Leachate from the site cannot cause a violation of standards or adversely affect the sediments.
State Requirements	Water Pollution Control - Pollution Discharge Elimination Systems, RIGL 42-16 *et seq.*; CRIR 12-190-003 Rule 31	Applicable	Includes storm water requirements for construction projects that disturb over one acre.	Best management practices will be used to meet stormwater standards during the remedial action.
State Requirements	RI Air Pollution Control Regulation No. 1: Visible Emissions, RIGL 23-23 *et seq.*; CRIR 12-31-01	Applicable	Establishes opacity limitations for contaminant emissions.	Remediation activities could potentially result in visible emissions. If these standards are exceeded, emissions would need to be managed through engineering controls.
State Requirements	RI Air Pollution Control Regulation No. 5: Fugitive Dust, RIGL 23-23 *et seq.*; CRIR 12-31-05	Applicable	Requires that reasonable measures be taken to prevent particulate matter from becoming airborne.	Remediation activities could potentially result in fugitive dust. Appropriate measures would need to be taken to prevent particulate matter from becoming airborne.
State Requirements	RI Air Pollution Control Regulation No. 7: Emissions of Air Detrimental to Persons or Property,	Applicable	Prohibits emissions of contaminants that may be injurious to human, plant, or animal life or cause damage to property or which unreasonably interfere with the enjoyment of life and property.	Remediation activities may result in emissions. Appropriate measure would need to be taken to comply with these regulations.

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Action-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	RIGL 23-23 *et seq.*; CRIR 12-31-07			
State Requirements	RI Air Pollution Control Regulation No. 16: Operation of Air Pollution Control Equipment, RIGL 23-23 *et seq* ; CRIR 12-31-16	Applicable	Any air pollution control system shall be operated according to its design specifications whenever the source on which it is installed is in operation or is emitting air contaminants.	If active treatment of landfill gas emissions is required, the system will be operated in accordance with these standards.
State Requirements	Rhode Island Air Pollution Control Regulation 17 - Odors. 7/19/07	Applicable	Prohibits the release of objectionable odors across property lines.	Results of the Predesign Study and/or monitoring after completion of the cap will be used to determine the applicability of these regulations.
State Requirements	RI Air Pollution Control Regulation No. 22: Air Toxics Guidelines and Air Modeling Guidelines, RIGL 23-23 *et seq.*; CRIR 12-31-22	Applicable	Prohibits emissions of specified contaminants that result in ground level concentrations greater than ambient level concentrations.	Remediation activities may result in emissions of toxics to the atmosphere if these contaminants are present in soil. Appropriate measure would need to be taken to comply with these regulations.
State Requirements	Drilling of Drinking Water Wells; Rules and Regulations Governing the Enforcement of Chapter 46-13.2 Relating to the	Applicable	Prohibits installing drinking water wells in contaminated aquifers. Establishes standards for decommissioning monitoring wells (Rule 9.03).	Under these standards drinking water wells are prohibited within the waste management area that will be established under this alternative and monitoring wells used will be properly decommissioned when no longer needed.

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Action-Specific ARARs and TBCs for J.M. Mills Landfill

Alternative JM-SO-2: RCRA Subtitle C Cap of Whole Landfill, Removal of Soil Exceeding RGs from Riverbank and Floodplain, Bank Restoration, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	Drilling of Drinking Water Wells, RIGL 46-13.2 *et seq.*			
State Requirements	Rules and Regulations for Groundwater Quality RIGL Ch. 46-12, Section 46-12-2; Ch. 46-13.1, Ch. 23-18.9, Sec. 23-18-9.1; DEM Rules and Regulations for Groundwater Quality (Mar 2005), Appendix 1	Applicable	Identifies the standards and specifications that must be followed for installation or abandonment of monitoring wells.	Under this alternative, wells installed for monitoring the waste management area will be installed and abandoned according to these standards.
State Requirements	Rhode Island Solid Waste Regulations, DEM OWM-SW0401, 2.1.08(c)	Relevant and Appropriate	Contains requirements for monitoring environmental conditions around the capped landfill.	In addition to the requirements in the Rhode Island Hazardous Waste regulations, groundwater monitoring and surface water monitoring will be conducted in accordance with the substantive requirements of this regulation for the purpose of monitoring environmental conditions around the capped landfill.
State Requirements	Rhode Island Solid Waste Regulations, DEM OWM-SW0401, 2.3.08	Relevant and Appropriate	Standards for landfill gas control.	In additional to the requirements in the Rhode Island Hazardous Waste regulations, a landfill gas management system will be designed to meet the substantive requirements of this regulation.

Key:

ARAR	=	Applicable or Relevant and Appropriate Requirement
CFR	=	Code of Federal Regulations
CRIR	=	Code of Rhode Island Rules
EPA	=	U.S. Environmental Protection Agency
RGs	=	Remediation Goals
RIDEM	=	Rhode Island Department of Environmental Protection
RIGL	=	Rhode Island General Law
TBC	=	To Be Considered

Table I-8a

Chemical-Specific ARARs and TBCs for Nunes Parcel

Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Guidelines for Carcinogenic Risk Assessment, EPA/630/P-03/001F	TBC	These guidelines provide guidance on conducting risk assessments involving carcinogens.	Capping of the landfill, with consolidation of all contaminated material under the cap, will prevent exposure to soil/debris contaminants which contribute to a calculated carcinogenic risk, developed using this guidance. ICs will prevent activities that will disturb the capped material.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens, EPA/630/R-03/003F	TBC	This provides guidance on assessing risk to children from carcinogens.	Capping of the landfill, with consolidation of all contaminated material under the cap, will prevent exposure to soil/debris contaminants which contribute to a calculated carcinogenic risk to children developed using this guidance. ICs will prevent activities that will disturb the capped material.
Federal Requirements	EPA Risk Reference Doses (RfDs)	TBC	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media. RfDs are estimates of a daily exposure concentration that is likely to be without appreciable risk of deleterious effects during a lifetime exposure.	Capping of the landfill, with consolidation of all contaminated material under the cap, will prevent exposure to soil/debris contaminants which contribute to a calculated non-carcinogenic risk, developed using this guidance. ICs will prevent activities that will disturb the capped material.

Table I-8a
Chemical-Specific ARARs and TBCs for Nunes Parcel
Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Human Health Assessment Cancer Slope Factors (CSFs)	TBC	CSFs are estimates of the upper-bound probability of an individual developing cancer as a result of a lifetime exposure to a particular concentration of a potential carcinogen.	Capping of the landfill, with consolidation of all contaminated material under the cap, will prevent exposure to soil/debris contaminants which contribute to a calculated carcinogenic risk, developed using this guidance. ICs will prevent activities that will disturb the capped material.
Federal Requirements	EPA Carcinogenic Assessment Group Potency Factors	TBC	These factors are used to evaluate an accept risk from a carcinogen.	Capping of the landfill, with consolidation of all contaminated material under the cap, will prevent exposure to soil/debris contaminants which contribute to a calculated carcinogenic risk, developed using this guidance. ICs will prevent activities that will disturb the capped material.
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an approach to Assessing Risks Associated with Adult Exposure to Lead In Soil, EPA-540-R-03-001 (January 2003)	TBC	EPA guidance for evaluating risks posed by lead in soil.	Capping of the landfill, with consolidation of all contaminated material under the cap, will prevent exposure to soil/debris contaminants which contribute to a calculated carcinogenic risk, developed using this guidance. ICs will prevent activities that will disturb the capped material.

Table I-8a
Chemical-Specific ARARs and TBCs for Nunes Parcel
Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	U.S. DOE, Office of Environmental Management, Secondary Chronic Values (SCVs) (Jones *et al.*, 1997)	TBC	The SCVs are toxicological benchmarks for screening contaminants of potential concern for effects on sediment-associated biota.	This alternative would prevent exposure to sediment contaminants in Pond I which contribute to a calculated ecological risk, by removing all contaminated sediments that exceed RGs.
Federal Requirements	U.S. EPA Sediment Quality Criterion (SQC) and Sediment Quality Benchmarks (SQBs) (USEPA, 1996)	TBC	SQCs and SQBs were established to provide screening toxicity thresholds.	This alternative would prevent exposure to sediment contaminants in Pond I which contribute to a calculated ecological risk, by removing all contaminated sediments that exceed RGs.
Federal Requirements	Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems. Probable Effects Concentrations (PECs) (MacDonald *et al.*, 2000)	TBC	PECs represent the concentration above which the adverse effects on sediment-dwelling organisms are likely to occur.	This alternative would prevent exposure to sediment contaminants in Pond I which contribute to a calculated ecological risk, by removing all contaminated sediments that exceed RGs.
State Requirements	RI Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases (i.e., Remediation Regulations), CRIR12-180-001;	Applicable	These regulations set remediation standards for soil at NPL sites when they are more stringent than federal standards.	The action to be taken under this alternative will meet the remediation standards for soil, as required.

Table I-8a
Chemical-Specific ARARs and TBCs for Nunes Parcel
Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	DEM-DSR-01-93, section 8.02			

Key:

ARAR	=	Applicable or Relevant and Appropriate Requirement
CFR	=	Code of Federal Regulations
CRIR	=	Code of Rhode Island Rules
EPA	=	U.S. Environmental Protection Agency
ICs	=	Institutional Controls
RGs	=	Remediation Goals
RIDEM	=	Rhode Island Department of Environmental Protection
TBC	=	To Be Considered

Table I-8b

Location-Specific ARARs and TBCs for Nunes Parcel

Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Floodplains Management (Executive Order 11988), 44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11988), federal agencies are required to avoid long- and short-term adverse impacts associated with the occupancy and modification of federally-designated 100-year and 500-year floodplain wherever there is a practicable alternative.	Available practicable means will be used to reduce the risk of flood loss, to minimize the impact of floods, and to restore and preserve the floodplains disturbed by soil excavation and cap construction.
Federal Requirements	Protection of Wetlands (Executive Order 11990), 44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11990), federal agencies are required to avoid adversely impacting federal jurisdictional wetlands unless there is no practicable alternative with lesser effects and the proposed action includes all practicable measures to minimize harm to federal jurisdictional wetlands that may result from such use.	Action to be taken will minimize alterations to protected resource areas due to soil excavation and cap construction. Mitigation measures, as required, will be taken to compensate for the resource areas altered by this alternative.
Federal Requirements	Clean Water Act, Section 404; Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material, 33 U.S.C. § 1344; 40 CFR Parts 230, 231 and 33 CFR Parts 320-323	Applicable	Outlines requirements for the discharge of dredged or fill materials into surface waters, including wetlands. Such discharges are not allowed if there are practicable alternatives with less adverse impact. Sets standards for restoration and mitigation required as a result of unavoidable impacts to aquatic resources.	The cap will be constructed in a manner that will minimize the area of wetlands altered, to the extent possible.
Federal Requirements	Resource Conservation and Recovery Act (RCRA), 42 U.S.C, §§ 6901 *et seq.*,	Relevant and Appropriate	Seismic and floodplain standards that apply to all hazardous waste facilities.	The remedy will be implemented to meet substantive seismic and floodplain standards.

Table I-8b
Location-Specific ARARs and TBCs for Nunes Parcel
Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	General Facility Standards, Location Standards; 40 CFR § 264.18			
Federal Requirements	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 other federal waters for any purpose to take action to protect fish and wildlife resources that may be affected by the action.	Measures to mitigate or compensate adverse project related impacts to fish and wildlife resources will be taken, if determined necessary.
Federal Requirements	National Historical Preservation Act, 16 U.S.C. 469 *et seq.*; 36 CFR Part 65	Applicable	When a federal agency finds, or is notified, that its activities in connection with a federal construction project may cause irreparable loss or destruction of significant scientific, pre-historical, historical, or archeological data, the substantive standards under the Act will be met.	If, during the remedial design or remedial action, it is determined that this alternative may cause irreparable loss or destruction of significant scientific, pre-historical, historical, or archaeological data, the substantive standards under the Act will be met.
State Requirements	RI Rules and Regulations for Hazardous Waste Management - Section 8.2 (20): Location Standards for Hazardous Waste Facilities	Applicable for Treatment and Storage Facilities; Relevant and Appropriate for Landfills	Rhode Island is delegated to administer the federal RCRA statute through its state regulations. The standards of 40 CFR 264.18(b), with some exceptions, are incorporated by reference. Treatment and storage facilities located within the 100-year floodplain must be designed, constructed, operated and maintained to prevent washout of any hazardous waste by 100-year flood, unless it can be demonstrated that no adverse effects on human health or environment will result from washout.	Treatment, and/or storage of hazardous materials may take place at the Site, which is partially located within the 100-year floodplain as long as the contamination would not be subject to washout in a 100-year flooding event.

Table I-8b
Location-Specific ARARs and TBCs for Nunes Parcel
Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Requirements	Rhode Island Fresh Water Wetlands Act, RIGL 2-1, Sections 2-1-18 through 2-1-20.2; DEM Rules And Regulations Governing the Administration And Enforcement of the Fresh Water Wetlands Act (December 2010), Rules 4.00 and 5.00	Applicable	Defines and establishes provisions for the protection of swamps, marshes, 100-year floodplain and other fresh water wetland resource areas in the state. Actions are required to prevent the undesirable drainage, excavation, filling, alteration, encroachment or any other form of disturbance or destruction of a wetland.	Mitigation measures, as required, will be taken to compensate for the resource areas altered by the cap.
State Requirements	Rhode Island Historic 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.	Features with potential historical/cultural significance will be evaluated during the remedial design phase and activities will be coordinated with the State Agency as required.

Key:
ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
EPA = U.S. Environmental Protection Agency
FEMA = Federal Emergency Management Agency
RIDEM = Rhode Island Department of Environmental Protection
RIGL = Rhode Island General Laws
TBC = To Be Considered

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Action-Specific ARARs and TBCs for Nunes Parcel

Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Clean Water Act Federal Water Quality Criteria, Section 304(a) ; 40 CFR 131.11	Applicable	National Recommended Water Quality Criteria (NRWQC) are provided by EPA for chemicals for both the protection of human health and the protection of aquatic life.	Excavation/backfill and capping must be conducted so that there are no exceedances of NRWQC. Water quality standards will be used to develop monitoring standards both during the active remedial period and for long-term monitoring of the protectiveness of the waste management area that will be established under this alternative.
Federal Requirements	Clean Water Act – National Pollutant Discharge Elimination System (NPDES), 40 CFR Parts 122 and 125	Applicable	Includes stormwater standards for activities disturbing more than one acre.	Best management practices will be used to meet stormwater standards during the remedial action.
Federal Requirements	Toxic Substances Control Act (TSCA) 15 U.S.C. 2601 *et seq.*; PCB Remediation Waste, 40 CFR 761.61(c)	Applicable	This section of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, EPA Region 1.	All soil exceeding identified PCB cleanup levels will be removed, dewatered (if required) and disposed of under the RCRA C cap system that meets TSCA protectiveness standards or disposed of off-site at a licensed facility. The excavation, transportation/ dewatering, and management of PCB contaminated media will be performed in a manner to comply with TSCA. The ROD includes a finding by the Director, Office of Site Remediation and Restoration, EPA Region 1, that the remedy's soil PCB cleanup

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Action-Specific ARARs and TBCs for Nunes Parcel
Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
				levels, along with the excavation, dewatering, management and disposal of the of the PCB-contaminated media under a RCRA C cap will not pose an unreasonable risk to human health or the environment.
Federal Requirements	RCRA, Air Emission Standards for Process Vents, 40 CFR 264, Subpart AA	Applicable	This section of RCRA has not been delegated to the State of Rhode Island. Air emission standards for process vents apply to process vents that manage hazardous wastes with organic concentrations of at least 10 parts per million by weight (ppmw).	If operations (e.g., leachate or landfill gas collection) manage hazardous wastes with organic concentrations of at least 10 ppm by weight, system vents will comply with these requirements.
Federal Requirements	RCRA, Air Emission Standards for Equipment Leaks, 40 CFR 264, Subpart BB	Applicable	This section of RCRA has not been delegated to the State of Rhode Island. Air emission standards for equipment leaks apply to equipment that contains or contacts hazardous wastes with organic concentrations of at least 10% by weight.	If equipment contains or comes into contact with hazardous wastes (e.g., during leachate or landfill gas collection) containing organic concentrations of at least 10% by weight, then these regulations will be followed.
Federal Requirements	RCRA, Air Emission Standards for Tanks, Surface Impoundments, and Containers, 40 CFR 264, Subpart CC	Applicable	This section of RCRA has not been delegated to the State of Rhode Island. Air emissions standards for tanks, surface impoundments, and containers used to manage hazardous waste. Emission controls required if tanks, surface impoundments, and containers used to manage hazardous waste have more than 500 ppmw of volatile organics.	If tanks, surface impoundments, and containers used to manage hazardous waste (e.g., during leachate or landfill gas collection) have more than 500 ppmw of volatile organics, then these requirements will be met.

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Action-Specific ARARs and TBCs for Nunes Parcel

Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Clean Air Act (CAA), 42 U.S.C. §§ 7401 *et seq.*, Standards of Performance for Municipal Solid Waste Landfills, 40 CFR Part 60, Subpart WWW	Relevant and Appropriate	Air emission standards for landfills greater than 2.5 Mg in design capacity and emitting 50 Mg/year or more of non-methane organic compounds.	The landfill cap will be designed and constructed to allow for the collection and treatment, if required under these standards, of landfill gases.
Federal Requirements	Clean Air Act (CAA), Hazardous Air Pollutants, 42.U.S.C. § 112(b)(1), National Emission Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust and other release sources.	If the excavation of contaminated soil, installation and maintenance of the RCRA C cap, and the control of landfill gasses generate regulated air pollutants, then measures will be implemented to meet these standards.
Federal Requirements	CAA, National Emission Standards for Hazardous Air Pollutants (NESHAPS), Standards tor Inactive waste disposal sites for asbestos mills and manufacturing and fabricating Operations, 40 CFR § 61.151	Relevant and Appropriate	NESHAPS standards for preventing air releases from inactive asbestos disposal sites, including cover standards, dust suppression, and land use controls.	Any areas of asbestos contaminated soil will be consolidated under the RCRA C cap, which meets the substantive requirements of these standards. ICs will be established to maintain the cap and to address any potential asbestos exposure in case the cap is disturbed.

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Action-Specific ARARs and TBCs for Nunes Parcel

Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Framework for Investigating Asbestos-Contaminated Superfund Sites, OSWER Directive #9200.0-68 (Sept. 2008)	TBC	Guidance on investigating and characterizing the potential human exposure from asbestos contamination in outdoor soil at Superfund sites.	Any areas that were subject to previous asbestos removal actions will be investigated under these guidance standards if they are not to be located under the RCRA C cap. Areas of asbestos contamination outside of the capped area will be excavated and consolidated under the cap.
Federal Requirements	Safe Drinking Water Act Maximum Contaminant Levels (MCLs), 40 CFR Part 141, Subparts B and G	Relevant and Appropriate	Establishes MCLs for common organic and inorganic contaminants applicable to public drinking water supplies. Used as relevant and appropriate standards for aquifers and surface water bodies that are potential drinking water sources.	MCLs will be used to develop performance standards for monitoring the compliance boundary for the waste management area established where contamination is left in place under the RCRA C cap. Monitoring will ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause adjacent groundwater not to meet drinking water standards.

Table I-8c

Action-Specific ARARs and TBCs for Nunes Parcel

Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Safe Drinking Water Act Maximum Contaminant Levels (MCLGs), 40 CFR Part 141, Subpart F	Relevant and Appropriate	Establishes maximum contaminant level goals (MCLGs) for public water supplies. MCLGs are health goals for drinking water sources. These unenforceable health goals are available for a number of organic and inorganic compounds.	Non-zero MCLGs will be used to develop performance standards for monitoring the compliance boundary for the waste management area established where contamination is left in place under the RCRA C cap. Monitoring will ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause adjacent groundwater not to meet drinking water standards.
Federal Requirements	EPA Health Advisories	TBC	EPA publishes contaminant-specific health advisories that indicate the non-carcinogenic risks associated with consuming contaminated drinking water.	The Health Advisories will be used to develop performance standards for monitoring the compliance boundary for the waste management area established where contamination is left in place under the RCRA C cap. Monitoring will ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause adjacent groundwater not to meet drinking water standards.

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Action-Specific ARARs and TBCs for Nunes Parcel

Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	EPA Technical Guidance: Revised Alternative Cap Design Guidance Proposed for Unlined, Hazardous Waste Landfills in the EPA Region 1 (February 5, 2001)	TBC	Guidance for landfill covers in EPA Region 1. Presents recommended technical specifications for multilayer landfill cover design.	Cap construction will be protective in accordance with the guidance.
Federal Requirements	EPA Technical Guidance: Final Covers on Hazardous Waste Landfills and Surface Impoundments (July 1989)	TBC	Guidance for landfill covers recommending technical specifications for multilayer landfill cover designs.	Cap construction will be protective in accordance with the guidance.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Hazardous Waste Determination, OWM-HW-01-04 Rule 5.3	Applicable	Requires a determination be made as to whether waste meets the definition of hazardous waste, including "Rhode Island Hazardous Wastes" as defined in Rule 3.	These regulations would apply when determining whether or not a waste generated during the remedial action is hazardous.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Generator Standards, OWM-HW-01-04 Rule 5	Applicable	Sets generator standards for handling and disposal of hazardous waste. Incorporates provisions of 40 CFR Part 262.	Any hazardous waste identified will be handled and disposed according to these standards.

Table I-8c

Action-Specific ARARs and TBCs for Nunes Parcel

Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Facility Standards, OWM-HW-01-04, Rule 7(B)	Relevant and Appropriate	Relevant and appropriate facility standards regarding: restrictions for landfills (Rule (B)(13)(a) and Rule 7(B)(13)(c)); inspections 7(B)(23).	The cap will be designed, constructed and maintained in a manner that will protect groundwater beyond the compliance boundary for the landfill and control discharges of surface or subsurface contamination in violation of any federal or state standard.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Operational Requirements for Treatment, Storage, and Disposal Facilities, OWM-HW-01-04, Rule 8	Relevant and Appropriate	Outlines operational requirements for all hazardous waste treatment, storage, and disposal facilities.	Management and treatment of on-site treatment residues and waste derived from the construction and maintenance of the RCRA C cap; from leachate or landfill gas collection; or from any investigation-derived waste will comply with these regulations.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Land Disposal Facilities, OWM-HW-01-04 Rule 8.2(A)	Relevant and Appropriate	Federal performance standards for closure/post closure of landfills at 40 CFR 264.310 are incorporated fully by reference.	Design, construction, maintenance, closure, and post-closure of the cap will meet the relevant and appropriate standards.
State Requirements	RI Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases (i.e., Remediation	Applicable	These regulations set remediation standards for groundwater at NPL sites when they are more stringent than federal standards.	These regulations will be used to develop performance standards for monitoring the compliance boundary for the waste management area established where contamination is left in place under the RCRA C cap.

Table I-8c
Action-Specific ARARs and TBCs for Nunes Parcel
Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	Regulations), CRIR12-180-001; DEM-DSR-01-93, section 8.04			Monitoring will ensure that groundwater contamination within the compliance boundary does not migrate beyond the boundary and cause adjacent groundwater not to meet these standards.
State Requirements	Water Pollution Control, Water Quality Regulations, RIGL 42-16 *et seq* ; CRIR 12-190-001	Applicable	Provides water classification for surface waters in Rhode Island and sets ambient water quality criteria for toxic substances and governs water quality impacts associated with site activities.	Excavation and capping must be conducted so that there are no exceedances of water quality standards. Leachate from the site cannot cause a violation of standards or adversely affect the sediments.
State Requirements	Water Pollution Control - Pollution Discharge Elimination Systems, RIGL 42-16 *et seq.*; CRIR 12-190-003 Rule 31	Applicable	Includes storm water requirements for construction projects that disturb over one acre.	Best management practices will be used to meet stormwater standards during the remedial action.
State Requirements	RI Air Pollution Control Regulation No. 1: Visible Emissions, RIGL 23-23 *et seq.*; CRIR 12-31-01	Applicable	Establishes opacity limitations for contaminate emissions.	Remediation activities could potentially result in visible emissions. If these standards are exceeded, emissions would need to be managed through engineering controls.
State Requirements	RI Air Pollution Control Regulation No. 5: Fugitive Dust, RIGL 23-23 *et seq.*; CRIR 12-31-05	Applicable	Requires that reasonable measures be taken to prevent particulate matter from becoming airborne.	Remediation activities could potentially result in fugitive dust. Appropriate measures would need to be taken to prevent particulate matter from becoming airborne.

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Action-Specific ARARs and TBCs for Nunes Parcel
Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Requirements	RI Air Pollution Control Regulation No. 7: Emissions of Air Detrimental to Persons or Property, RIGL 23-23 *et seq.*; CRIR 12-31-07	Applicable	Prohibits emissions of contaminants that may be injurious to human, plant, or animal life or cause damage to property or which unreasonably interfere with the enjoyment of life and property.	Remediation activities may result in emissions. Appropriate measure would need to be taken to comply with these regulations.
State Requirements	RI Air Pollution Control Regulation No. 16: Operation of Air Pollution Control Equipment, RIGL 23-23 *et seq.*; CRIR 12-31-16	Applicable	Any air pollution control system shall be operated according to its design specifications whenever the source on which it is installed is in operation or is emitting air contaminants.	If active treatment of landfill gas emissions is required, the system will be operated in accordance with these standards.
State Requirements	Rhode Island Air Pollution Control Regulation 17 - Odors. 7/19/07	Applicable	Prohibits the release of objectionable odors across property lines.	Results of the Predesign Study and/or monitoring after completion of the cap will be used to determine the applicability of these regulations.
State Requirements	RI Air Pollution Control Regulation No. 22: Air Toxics Guidelines and Air Modeling Guidelines, RIGL 23-23 *et seq.*; CRIR 12-31-22	Applicable	Prohibits emissions of specified contaminants that result in ground level concentrations greater than ambient level concentrations.	Remediation activities may result in emissions of toxics to the atmosphere if these contaminants are present in soil. Appropriate measure would need to be taken to comply with these regulations.
State Requirements	Drilling of Drinking Water Wells; Rules and Regulations Governing the	Applicable	Prohibits installing drinking water wells in contaminated aquifers. Establishes standards for decommissioning monitoring wells (Rule 9.03).	Under these standards drinking water wells are prohibited within the waste management area that will be established under this alternative and monitoring wells used will be properly

Table I-8c
Action-Specific ARARs and TBCs for Nunes Parcel
Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	Enforcement of Chapter 46-13.2 Relating to the Drilling of Drinking Water Wells, RIGL 46-13.2 *et seq.*			decommissioned when no longer needed.
State Requirements	Rules and Regulations for Groundwater Quality RIGL Ch. 46-12, Section 46-12-2; Ch. 46-13.1, Ch. 23-18.9, Sec. 23-18-9.1; DEM Rules and Regulations for Groundwater Quality (Mar 2005), Appendix 1	Applicable	Identifies the standards and specifications that must be followed for installation or abandonment of monitoring wells.	Under this alternative, wells installed for monitoring the waste management area will be installed and abandoned according to these standards.
State Requirements	Rhode Island Solid Waste Regulations, DEM OWM-SW0401, 2.1.08(c)	Relevant and Appropriate	Contains requirements for monitoring environmental conditions around the capped landfill.	In addition to the requirements in the Rhode Island Hazardous Waste regulations, groundwater monitoring and surface water monitoring will be conducted in accordance with the substantive requirements of this regulation for the purpose of monitoring environmental conditions around the capped landfill.
State Requirements	Rhode Island Solid Waste Regulations, DEM OWM-SW0401, 2.3.08	Relevant and Appropriate	Standards for landfill gas control.	In additional to the requirements in the Rhode Island Hazardous Waste regulations, a landfill gas management system will be

Table I-8c
Action-Specific ARARs and TBCs for Nunes Parcel
Alternative NP-SO-3: RCRA Subtitle C Cap of Landfill, Consolidation, and Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
				designed to meet the substantive requirements of this regulation.

Key:

ARAR	=	Applicable or Relevant and Appropriate Requirement
CFR	=	Code of Federal Regulations
CRIR	=	Code of Rhode Island Rules
EPA	=	U.S. Environmental Protection Agency
RIDEM	=	Rhode Island Department of Environmental Protection
RIGL	=	Rhode Island General Laws
TBC	=	To Be Considered

Table I-11a
Chemical-Specific ARARs and TBCs for Unnamed Island
Alternative UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Guidelines for Carcinogenic Risk Assessment, EPA/630/P-03/001F	TBC	These guidelines provide guidance on conducting risk assessments involving carcinogens.	Used to calculate potential carcinogenic risks caused by exposure to contaminants in soil/debris.
Federal Requirements	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens, EPA/630/R-03/003F	TBC	This provides guidance on assessing risk to children from carcinogens.	Used to calculate potential carcinogenic risks to children caused by exposure to contaminants in soil/debris.
Federal Requirements	EPA Risk Reference Doses (RfDs)	TBC	Guidance used to compute human health hazard resulting from exposure to non-carcinogens in site media. RfDs are considered to be the levels unlikely to cause significant adverse health effects associated with a threshold mechanism of action in human exposure for a lifetime.	Used to calculate potential non-carcinogenic risks caused by exposure to contaminants in soil/debris.
Federal Requirements	Human Health Assessment Cancer Slope Factors (CSFs)	TBC	CSFs are estimates of the upper-bound probability of an individual developing cancer as a result of a lifetime exposure to a particular concentration of a potential carcinogen.	Used to calculate potential carcinogenic risks caused by exposure to contaminants in soil/debris.
Federal Requirements	EPA Carcinogenic Assessment Group Potency Factors	TBC	These factors are used to evaluate an acceptable risk from a carcinogen.	Used to calculate potential carcinogenic risks caused by exposure to contaminants in soil/debris.

Table I-11a
Chemical-Specific ARARs and TBCs for Unnamed Island
Alternative UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Recommendations of the Technical Review Workgroup for Lead for an approach to Assessing Risks Associated with Adult Exposure to Lead In Soil, EPA-540-R-03-001 (January 2003)	TBC	EPA Guidance for evaluating risks posed by lead in soil.	Used to calculate potential risks caused by exposure to lead in soil/debris.
Federal Requirements	USEPA Interim Ecological Soil Screening Levels (SSLs) (USEPA, 2003)	TBC	SSLs were established to provide screening toxicity thresholds.	Removal of all contaminated material will prevent ecological exposure to contaminated soils which contribute to a calculated risk, developed using this guidance.
Federal Requirements	ORNL Toxicological Benchmarks for Wildlife (Sample *et al.*, 1996)	TBC	These benchmarks were established to provide screening toxicity thresholds.	Removal of all contaminated material will prevent ecological exposure to contaminated soils which contribute to a calculated risk, developed using this guidance.

Table I-11a
Chemical-Specific ARARs and TBCs for Unnamed Island
Alternative UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	ORNL Toxicological Benchmarks for Screening Contaminants of Concern for Effects of Soil and Litter Invertebrates and Heterotrophic Process (Efroymson *et al.*, 1997)	TBC	These benchmarks were established to provide screening toxicity thresholds.	Removal of all contaminated material will prevent ecological exposure to contaminated soils which contribute to a calculated risk, developed using this guidance.
State Requirements	RI Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases (i.e., Remediation Regulations), CRIR12-180-001; DEM-DSR-01-93, section 8.02	Applicable	These regulations set direct contact and leachability remediation standards for soil at NPL sites when they are more stringent than federal standards.	The action to be taken under this alternative will meet the remediation standards for soil, as required.

Key:
ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
CRIR = Code of Rhode Island Rules
EPA = U.S. Environmental Protection Agency
RGs = Remediation Goals
RIDEM = Rhode Island Department of Environmental Protection
TBC = To Be Considered

Table I-11b
Location-Specific ARARs and TBCs for Unnamed Island
Alternative UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Floodplains Management (Executive Order 11988), 44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11988), federal agencies are required to avoid long- and short-term adverse impacts associated with the occupancy and modification of federally-designated 100-year and 500-year floodplain wherever there is a practicable alternative.	Available practicable means will be used to reduce the risk of flood loss, to minimize the impact of floods, and to restore and preserve the floodplains disturbed by soil/waste excavation activities.
Federal Requirements	Protection of Wetlands (Executive Order 11990), 44 CFR Part 9	Relevant and Appropriate	Per the FEMA regulations (44 CFR Part 9; incorporating requirements under Executive Order 11990), federal agencies are required to avoid adversely impacting federal jurisdictional wetlands unless there is no practicable alternative with lesser effects and the proposed action includes all practicable measures to minimize harm to federal jurisdictional wetlands that may result from such use.	Action to be taken will minimize alterations to protected resource areas due to soil/waste excavation activities. Mitigation measures, as required, will be taken to compensate for the resource areas altered by this alternative.
Federal Requirements	Clean Water Act, Section 404; Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material, 33 U.S.C. § 1344; 40 CFR Part 230, 231 and 33 CFR Parts 320-323	Applicable	Outlines requirements for the discharge of dredged or fill materials into surface waters, including wetlands. Such discharges are not allowed if there are practicable alternatives with less adverse impact. Sets standards for restoration and mitigation required as a result of unavoidable impacts to aquatic resources.	Excavation and disposal work in the floodplain and in any areas of federal jurisdiction wetland will be conducted to minimize the area of wetlands altered, to the extent possible. Areas of altered wetlands will be mitigated, as required.

Table I-11b
Location-Specific ARARs and TBCs for Unnamed Island
Alternative UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	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 other federal waters for any purpose to take action to protect fish and wildlife resources that may be affected by the action.	Measures to mitigate or compensate adverse project related impacts to fish and wildlife resources will be taken, if determined necessary.
Federal Requirements	National Historical Preservation Act, U.S.C. 469 *et seq.*; 36 CFR Part 65	Applicable	When a federal agency finds, or is notified, that its activities in connection with a federal construction project may cause irreparable loss or destruction of significant scientific, pre-historical, historical, or archeological data, the substantive standards under the Act will be met.	If, during the remedial design or remedial action, it is determined that this alternative may cause irreparable loss or destruction of significant scientific, pre-historical, historical, or archaeological data, the substantive standards under the Act will be met.
State Requirements	RI Rules and Regulations for Hazardous Waste Management - Section 8.2 (20): Location Standards for Hazardous Waste Facilities	Applicable for Treatment and Storage Facilities;	Rhode Island is delegated to administer the federal RCRA statute through its state regulations. The standards of 40 CFR 264.18(b), with some exceptions, are incorporated by reference. Treatment and storage facilities located within the 100-year floodplain must be designed, constructed, operated and maintained to prevent washout of any hazardous waste by 100-year flood, unless it can be demonstrated that no adverse effects on human health or environment will result from washout.	Treatment, and/or storage of hazardous materials may take place at the Site, which is partially located within the 100-year floodplain as long as the contamination would not be subject to washout in a 100-year flooding event.

Table I-11b
Location-Specific ARARs and TBCs for Unnamed Island
Alternative UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Requirements	Rhode Island Fresh Water Wetlands Act, RIGL 2-1, Sections 2-1-18 through 2-1-20.2; DEM Rules And Regulations Governing the Administration And Enforcement of the Fresh Water Wetlands Act (Dec 2010), Rules 4.00 and 5.00	Applicable	Defines and establishes provisions for the protection of swamps, marshes, 100-year floodplain and other fresh water wetland resource areas in the state. Actions are required to prevent the undesirable drainage, excavation, filling, alteration, encroachment or any other form of disturbance or destruction of a wetland.	Action taken under this alternative will be done in compliance with this requirement.
State Requirements	Rhode Island Historic 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.	Features with potential historical/cultural significance will be evaluated during the remedial design phase and activities will be coordinated with the State Agency as required.

Key:
ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
EPA = U.S. Environmental Protection Agency
RGs = Remediation Goals
RIDEM = Rhode Island Department of Environmental Protection
RIGL + Rhode Island General Laws
TBC = To Be Considered

Table I-11c
Action-Specific ARARs and TBCs for Unnamed Island
Alternative UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Clean Water Act Federal Water Quality Criteria, Section 304(a) ; 40 CFR 131.11	Applicable	National Recommended Water Quality Criteria (NRWQC) are provided by EPA for chemicals for both the protection of human health and the protection of aquatic life.	Action taken under this alternative will be conducted so that there are no exceedances of NRWQC. Water quality standards used to develop monitoring standards during the active remedial period will be established under this alternative.
Federal Requirements	Clean Water Act – National Pollutant Discharge Elimination System (NPDES), 40 CFR Parts 122 and 125	Applicable	Establishes the specifications for discharging pollutants from any point source into the waters of the U.S. Also, includes stormwater standards for activities disturbing more than one acre.	Any water discharged to surface water bodies during remedial activities will comply with this regulation. Best management practices will be used to meet stormwater standards during the remedial action.
Federal Requirements	Toxic Substances Control Act (TSCA) 15 U.S.C. 2601 *et seq.*; PCB Remediation Waste, 40 CFR 761.61(c)	Applicable	This section of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, EPA Region 1.	All soil exceeding identified PCB cleanup levels will be removed, dewatered (if required) and disposed of under the on-site landfill caps that meets TSCA protectiveness standards or disposed of off-site in a licensed facility. The ROD will include a finding by the Director, Office of Site Remediation and Restoration, EPA Region 1, that the remedy's soil PCB cleanup levels, along with the excavation, dewatering, management and disposal of the of the PCB-contaminated media under an on-site landfill cap or an off-site disposal facility will not pose an

Table I-11c
Action-Specific ARARs and TBCs for Unnamed Island
Alternative UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
				unreasonable risk to human health or the environment.
Federal Requirements	Clean Air Act (CAA), Hazardous Air Pollutants, 42.U.S.C. § 112(b)(1), National Emission Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR Part 61	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust and other release sources.	If the excavation of contaminated soil generates regulated air pollutants, then measures will be implemented to meet these standards.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Hazardous Waste Determination, OWM-HW-01-04 Rule 5.3	Applicable	Requires a determination be made as to whether waste meets the definition of hazardous waste, including "Rhode Island Waste" as defined in Rule 3.	These regulations would apply when determining whether or not a waste generated during the remedial action is hazardous.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Generator Standards, OWM-HW-01-04 Rule 5	Applicable	Sets generator standards for handling and disposal of hazardous waste. Incorporates provisions of 40 CFR Part 262.	Any hazardous waste identified will be handled and disposed according to these standards.

Table I-11c
Action-Specific ARARs and TBCs for Unnamed Island
Alternative UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Requirements	Rhode Island Solid Waste Regulations, Regulation 1-General requirements DEM OWM-SW-04-01, Rule 1	Relevant and Appropriate	Regulations for the management of solid waste.	All solid waste will be removed from the Unnamed Island and disposed of at one of the on-site landfills that will be capped as part of this remedial action or disposed of off-site in a licensed facility.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, , Land Disposal Facilities, OWM-HW-01-04 Rule 8.2(A)	Relevant and Appropriate	Federal performance standards for closure/post closure of landfills at 40 CFR 264.310 are incorporated fully by reference.	All wastes will be removed from the Unnamed Island to meet closure/post closure requirements.
State Requirements	Water Pollution Control, Water Quality Regulations, RIGL 42-16 *et seq.*; CRIR 12-190-001	Applicable	Provides water classification for surface waters in Rhode Island and sets ambient water quality criteria for toxic substances and governs water quality impacts associated with Site activities.	Excavation and disposal at the on-site landfills must be conducted so that there are no exceedances of water quality standards.
State Requirements	Water Pollution Control - Pollution Discharge Elimination Systems, RIGL 42-16 *et seq.*; CRIR 12-190-003 Rule 31	Applicable	Includes storm water requirements for construction projects that disturb over one acre.	Best management practices will be used to meet stormwater standards during the remedial action.
State Requirements	RI Air Pollution Control Regulation No. 1: Visible Emissions, RIGL 23-23 *et seq.*; CRIR 12-	Applicable	Establishes opacity limitations for contaminate emissions.	Remediation activities could potentially result in visible emissions. If these standards are exceeded, emissions would need

Table I-11c
Action-Specific ARARs and TBCs for Unnamed Island
Alternative UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	31-01			to be managed through engineering controls.
State Requirements	RI Air Pollution Control Regulation No. 5: Fugitive Dust, RIGL 23-23 *et seq.*; CRIR 12-31-05	Applicable	Requires that reasonable measures be taken to prevent particulate matter from becoming airborne.	Remediation activities could potentially result in fugitive dust. Appropriate measures would need to be taken to prevent particulate matter from becoming airborne.
State Requirements	Rhode Island Air Pollution Control Regulation 17 - Odors. 7/19/07	Applicable	Prohibits the release of objectionable odors across property lines.	Results of the Predesign Study and/or monitoring during removal of buried wastes/soils from the area will be used to determine what compliance measures, if any, will be needed.
State Requirements	RI Air Pollution Control Regulation No. 22: Air Toxics Guidelines and Air Modeling Guidelines, RIGL 23-23 *et seq.*; CRIR 12-31-22	Applicable	Prohibits emissions of specified contaminants that result in ground level concentrations greater than ambient level concentrations.	Remediation activities may result in emissions of toxics to the atmosphere if these contaminants are present in soil. Appropriate measure would need to be taken to comply with these regulations.
State Requirements	Drilling of Drinking Water Wells; Rules and Regulations Governing the Enforcement of Chapter 46-13.2 Relating to the Drilling of Drinking Water Wells, RIGL 46-13.2 *et seq.*	Applicable	Prohibits installing drinking water wells in contaminated aquifers. Establishes standards for decommissioning monitoring wells (Rule 9.03).	Under these standards drinking water wells are prohibited within the waste management area that will be established under this alternative and monitoring wells used will be properly decommissioned when no longer needed.

Table I-11c
Action-Specific ARARs and TBCs for Unnamed Island
Alternative UI-SO-3: Remove/Consolidate All Waste/Soil Exceeding RGs

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Requirements	Rules and Regulations for Groundwater Quality RIGL Ch. 46-12, Section 46-12-2; Ch. 46-13.1, Ch. 23-18.9, Sec. 23-18-9.1; DEM Rules and Regulations for Groundwater Quality (Mar 2005), Appendix 1	Applicable	Identifies the standards and specifications that must be followed for installation or abandonment of monitoring wells.	Under this alternative, wells installed for monitoring the waste management area will be installed and abandoned according to these standards.

Key:

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CFR	=	Code of Federal Regulations
CRIR	=	Code of Rhode Island Rules
EPA	=	U.S. Environmental Protection Agency
RGs	=	Remediation Goals
RIDEM	=	Rhode Island Department of Environmental Protection
RIGL	=	Rhode Island General Law
TBC	=	To Be Considered

Table I-14a

Chemical-Specific ARARs and TBCs for Sediment

Alternative SE-3: Remove/consolidate sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	U.S. DOE, Office of Environmental Management, Secondary Chronic Values (SCVs) (Jones *et al.*, 1997)	TBC	The SCVs are toxicological benchmarks for screening contaminants of potential concern for effects on sediment-associated biota.	This alternative would prevent exposure to sediment contaminants which contribute to a calculated ecological risk by removing the top foot of contaminated sediments that exceed RGs, disposing of the sediment in one of the on-site capped landfills and adding a foot of clean material over remaining deeper contaminated sediments as part of enhanced natural recovery, with monitoring.
Federal Requirements	U.S. EPA Sediment Quality Criterion (SQC) and Sediment Quality Benchmarks (SQBs) (USEPA, 1996)	TBC	SQCs and SQBs were established to provide screening toxicity thresholds.	This alternative would prevent exposure to sediment contaminants which contribute to a calculated ecological risk by removing the top foot of contaminated sediments that exceed RGs, disposing of the sediment in one of the on-site capped landfills and adding a foot of clean material over remaining deeper contaminated sediments as part of enhanced natural recovery, with monitoring.
Federal Requirements	Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater	TBC	PECs represent the concentration above which the adverse effects on sediment-dwelling organisms are likely to occur.	This alternative would prevent exposure to sediment contaminants which contribute to a calculated ecological risk, by removing the top foot of contaminated sediments that

Table I-14a

Chemical-Specific ARARs and TBCs for Sediment

Alternative SE-3: Remove/consolidate sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	Ecosystems. Probable Effects Concentrations (PECs) (MacDonald *et al.*, 2000)			exceed RGs, disposing of the sediment in one of the on-site capped landfills and adding a foot of clean material over remaining deeper contaminated sediments as part of enhanced natural recovery, with monitoring.

Key:

ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
EPA = U.S Environmental Protection Agency
RGs = Remediation Goals
RIDEM = Rhode Island Department of Environmental Protection
TBC = To Be Considered

Table I-14b

Location-Specific ARARs and TBCs for Sediment

Alternative SE-3: Remove/Consolidate Sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Floodplains Management (Executive Order 11988), 44 C.F.R. Part 9	Relevant and Appropriate	Per the FEMA regulations (44 C.F.R. Part 9; incorporating requirements under Executive Order 11988), federal agencies are required to avoid long- and short-term adverse impacts associated with the occupancy and modification of federally-designated 100-year and 500-year floodplain wherever there is a practicable alternative.	Available practicable means will be used to reduce the risk of flood loss, to minimize the impact of floods, and to restore and preserve the floodplains disturbed by sediment excavation/cover installation activities.
Federal Requirements	Protection of Wetlands (Executive Order 11990), 44 C.F.R. Part 9	Relevant and Appropriate	Per the FEMA regulations (44 C.F.R. Part 9; incorporating requirements under Executive Order 11990), federal agencies are required to avoid adversely impacting federal jurisdictional wetlands unless there is no practicable alternative with lesser effects and the proposed action includes all practicable measures to minimize harm to federal jurisdictional wetlands that may result from such use.	Action to be taken will minimize alterations to protected resource areas due to sediment excavation/cover installation activities. Mitigation measures, as required, will be taken to compensate for the resource areas altered by this sediment alternative.
Federal Requirements	Clean Water Act, Section 404 Guidelines for Discharge of Dredged or Fill Material, 33 U.S.C. § 1344; 40 C.F.R. Part 230, 231 and 33 C.F.R. Parts 320-323	Applicable	Outlines requirements for the discharge of dredged or fill materials into surface waters, including wetlands. Such discharges are not allowed if there are practicable alternatives with less adverse impact. Sets standards for restoration and mitigation required as a result of unavoidable impacts to aquatic resources.	Excavation and enhanced natural recovery are subject to these requirements. Activities must be conducted in accordance with these requirements including, but not limited to, mitigation and/or restoration.
Federal Requirements	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 other federal waters for any purpose to take action to protect fish and wildlife resources that may be affected by the action.	Measures to mitigate or compensate adverse project related impacts to fish and wildlife resources will be taken, if determined necessary.

Table I-14b

Location-Specific ARARs and TBCs for Sediment

Alternative SE-3: Remove/Consolidate Sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	National Historical Preservation Act, U.S.C. 469 *et seq* , 36 C.F.R Part 65	Applicable	When a federal agency finds, or is notified, that its activities in connection with a federal construction project may cause irreparable loss or destruction of significant scientific, pre-historical, historical, or archeological data, the substantive standards under the Act will be met.	If, during the remedial design or remedial action, it is determined that this alternative may cause irreparable loss or destruction of significant scientific, pre-historical, historical, or archaeological data, substantive standards under the Act will be met.
State Requirements	Rhode Island Fresh Water Wetlands Act, RIGL 2-1, Sections 2-1-18 through 2-1-20.2; DEM Rules And Regulations Governing the Administration And Enforcement of the Fresh Water Wetlands Act (Dec 2010), Rules 4.00 and 5.00	Applicable	Defines and establishes provisions for the protection of swamps, marshes, 100-year floodplain and other fresh water wetland resource areas in the state. Actions are required to prevent the undesirable drainage, excavation, filling, alteration, encroachment or any other form of disturbance or destruction of a wetland.	Action taken under this alternative will be done in compliance with this requirement.
State Requirements	Rhode Island Historic 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.	Features with potential historical/cultural significance will be evaluated during the remedial design phase and activities will be coordinated with the State Agency as required.

Key:

ARAR	=	Applicable or Relevant and Appropriate Requirement
CFR	=	Code of Federal Regulations
EPA	=	U.S. Environmental Protection Agency
RGs	=	Remediation Goals
RIDEM	=	Rhode Island Department of Environmental Protection
RIGL	=	Rhode Island General Laws
TBC	=	To Be Considered

Table I-14c

Action-Specific ARARs and TBCs for Sediment

Alternative SE-3: Remove/Consolidate Sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
Federal Requirements	Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, EPA-540-R-05-012 OSWER 9355.0-85 (December 2005)	TBC	Guidance for making remedy decisions for contaminated sediment sites. Some of the relevant sections of the guidance address Remedial Investigations (Ch. 2), FS Considerations (Ch. 3), Enhanced Natural Recovery (Ch. 4.5), Dredging.and Excavation (Ch.6), Remedy Selection Considerations (Ch. 7), and Remedial Action and Long-Term Monitoring.	Action taken under this alternative will meet guidance standards for addressing contaminated sediments in the wetlands/ waterway.
Federal Requirements	Clean Water Act Federal Water Quality Criteria, Section 304(a) , 40 CFR 131.11	Applicable	NRWQC are provided by EPA for chemicals for both the protection of human health and the protection of aquatic life.	Action taken under this alternative will be conducted so that there are no exceedances of NRWQC. Water quality standards will be used to develop monitoring standards during the active remedial period under this alternative.
Federal Requirements	Clean Water Act – National Pollutant Discharge Elimination System (NPDES), 40 C.F.R. Parts 122 and 125	Applicable	Establishes the specifications for discharging pollutants from any point source into the waters of the U.S. Also, includes stormwater standards for activities disturbing more than one acre.	Any water discharged to surface water bodies during remedial activities such as sediment dewatering will comply with this regulation Best management practices will be used to meet stormwater standards during the remedial action.
Federal Requirements	Clean Air Act (CAA), Hazardous Air Pollutants, 42.U.S.C. § 112(b)(1), National Emission Standards for Hazardous Air	Applicable	The regulations establish emissions standards for 189 hazardous air pollutants. Standards set for dust and other release sources.	If the excavation of the top foot of contaminated sediment, enhanced natural recovery (placement of a one foot cover layer over any remaining subsurface contaminated sediments), and on-site disposal

Table I-14c

Action-Specific ARARs and TBCs for Sediment

Alternative SE-3: Remove/Consolidate Sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	Pollutants (NESHAPS), 40 C.F.R. Part 61			actions generates regulated air pollutants, then measures will be implemented to meet these standards.
State Requirements	Rules and Regulations for Dredging and Management of Dredge Materials, DEM-OWR-DR-0203	Applicable	Addresses dredging activities and disposal of dredge spoils.	Any dredging/excavation of sediment, dewatering, and on-site disposal of dredged sediments, as well as placement of the one foot thick enhanced natural recovery cover layer, will comply with the requirements of these standards.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Hazardous Waste Determination, OWM-HW-01-04 Rule 5.3	Applicable	Requires a determination be made as to whether waste meets the definition of hazardous waste, including "Rhode Island Hazardous Wastes" as defined in Rule 3.	These regulations would apply when determining whether or not a waste generated during the remedial action is hazardous.
State Requirements	RI Rules and Regulations for Hazardous Waste Management, Generator Standards, OWM-HW-01-04, Rule 5	Applicable	Sets generator standards for handling and disposal of hazardous waste. Incorporates provisions of 40 C.F.R. Part 262.	Any hazardous waste identified will be handled and disposed of according to these standards.
State Requirements	Rhode Island Solid Waste Regulations, General Standards DEM OWM-SW-04-01 Rule 1	Applicable	Regulations for the management of solid waste.	Any solid waste that is excavated/dredged as part of the remedial action will be disposed of at one of the on-site landfills that will be capped as part of this remedial action.

Table I-14c

Action-Specific ARARs and TBCs for Sediment

Alternative SE-3: Remove/Consolidate Sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Requirements	Water Pollution Control, Water Quality Regulations RIGL 42-16 *et seq.*; CRIR 12-190-001	Applicable	Provides water classification for surface waters in Rhode Island and sets ambient water quality criteria for toxic substances and governs water quality impacts associated with Site activities.	The actions to be taken under this alternative must be conducted so that there are no exceedances of water quality standards.
State Requirements	Water Pollution Control - Pollution Discharge Elimination Systems, RIGL 42-16 *et seq.*; CRIR 12-190-003 Rule 31	Applicable	Sets requirements for discharges to surface waters and to protect waters from discharges of pollutants. Includes storm water requirements for construction projects that disturb over one acre.	Any water discharged to surface water bodies during remedial activities such as sediment dewatering will comply with this regulation. Best management practices will be used to meet stormwater standards during the remedial action.
State Requirements	Water Pollution Control, Water Quality Regulations RIGL 42-16 *et seq.*; CRIR 12-190-001	Applicable	Sets requirements for dredging.	Dredging will conform to the requirements of these regulations.
State Requirements	RI Air Pollution Control Regulation No. 5: Fugitive Dust, RIGL 23-23 *et seq* , CRIR 12-31-05	Applicable	Requires that reasonable measures be taken to prevent particulate matter from becoming airborne.	Remediation activities could potentially result in fugitive dust. Appropriate measures would need to be taken to prevent particulate matter from becoming airborne.
State Requirements	RI Air Pollution Control Regulation No. 7: Emissions of Air Detrimental to Persons or Property, RIGL 23-23 *et seq.*; CRIR 12-31-07	Applicable	Prohibits emissions of contaminants that may be injurious to human, plant, or animal life or cause damage to property or which unreasonably interfere with the enjoyment of life and property.	Remediation activities may result in emissions. Appropriate measure would need to be taken to comply with these regulations.

Table I-14c

Action-Specific ARARs and TBCs for Sediment

Alternative SE-3: Remove/Consolidate Sediment (1 foot) with Subaqueous Cover where RG Exceedances Remain, Institutional Controls

Peterson/Puritan, Inc. Superfund Site, Operable Unit Two

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
State Requirements	Rhode Island Air Pollution Control Regulation 17 - Odors. 7/19/07	Applicable	Prohibits the release of objectionable odors across property lines.	Results of the Predesign Study and/or monitoring during removal of sediments from the area will be used to determine what compliance measures, if any, will be needed.
State Requirements	RI Air Pollution Control Regulation No. 22: Air Toxics Guidelines and Air Modeling Guidelines, RIGL 23-23 *et seq.*; CRIR 12-31-22	Applicable	Prohibits emissions of specified contaminants that result in ground level concentrations greater than ambient level concentrations.	Remediation activities may result in emissions of toxics to the atmosphere if these contaminants are present in soil. Appropriate measures would need to be taken to comply with these regulations.

Key:

ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
CRIR = Code of Rhode Island Rules
EPA = U.S. Environmental Protection Agency
RGs = Remediation Goals
RIDEM = Rhode Island Department of Environmental Protection
RIGL = Rhode Island General Laws
TBC = To Be Considered

Appendix E:

Cleanup Level/Performance Standard Development

APPENDIX E.1

GROUNDWATER PERFORMANCE STANDARD DEVELOPMENT

TABLE 1

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

PETERSON PURITAN SUPERFUND SITE - OPERABLE UNIT 2

Scenario Timeframe	Future
Receptor Population	Resident
Receptor Age	Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	On-site Monitoring Wells		-									
			1,4-Dioxane	1E-05	N/A	N/A	--	1E-05					
			4-Chloroaniline	5E-06	N/A	N/A	--	5E-06					
			Atrazine	1E-05	N/A	9E-07	--	1E-05					
			Benzo(a)anthracene	1E-05	N/A	N/A	--	1E-05					
			Benzo(a)pyrene	1E-04	N/A	N/A	--	1E-04					
			Benzo(b)fluoranthene	1E-05	N/A	N/A	--	1E-05					
			bis(2-Ethylhexyl)phthalate	1E-05	N/A	2E-05	--	3E-05					
			Indeno(1,2 3-cd)pyrene	5E-06	N/A	N/A	--	5E-06					
			Naphthalene	N/A	1E-04	N/A	--	1E-04	General Toxicity	7E-02	2E+00	3E-02	2E+00
			1,4-Dichlorobenzene	8E-07	2E-05	4E-07	--	2E-05					
			Benzene	1E-03	2E-03	9E-05	--	3E-03	Immune System	3E+01	2E+01	N/A	4E+01
			Chloroform	2E-06	2E-05	N/A	--	2E-05					
			Ethylbenzene	3E-06	9E-06	2E-06	--	1E-05					
			Methyl tert-butyl ether	7E-07	1E-06	N/A	--	2E-06					
			Trichloroethene	9E-07	2E-06	8E-08	--	3E-06					
			Vinyl Chloride	1E-04	1E-06	N/A	--	1E-04					
			Aroclor-1242	1E-05	N/A	N/A	--	1E-05	General Toxicity/Immune System	2E+00	N/A	N/A	2E+00
			Aroclor-1248	6E-06	N/A	N/A	--	6E-06					
			Aroclor-1254	2E-05	N/A	N/A	--	2E-05	General Toxicity/Immune System	3E+00	N/A	N/A	3E+00
			Aldrin	2E-06	N/A	N/A	--	2E-06					
			Dieldrin	2E-06	N/A	1E-06	--	4E-06					
			Aluminum						Developmental	1E+00	N/A	6E-01	2E+00
			Arsenic	3E-03	N/A	N/A	--	3E-03	Skin	4E+01	N/A	N/A	4E+01
			Cadmium (drinking water)						Kidney	5E+00	N/A	5E-01	6E+00
			Cobalt						Endocrine	1E+01	N/A	N/A	1E+01
			Iron						Liver/GI System	1E+01	N/A	N/A	1E+01
			Manganese (drinking water)						CNS	2E+01	N/A	N/A	2E+01
			Thallium						Blood	1E+01	N/A	N/A	1E+01
			Chemical Total	5E-03	2E-03	1E-04	--	7E-03		1E+02	2E+01	1E+00	2E+02
			Radionuclide Total										
		Exposure Point Total						7E-03					2E+02
	Exposure Medium Total							7E-03					2E+02
Medium Total								7E-03					2E+02
Receptor Total								7E-03					2E+02

TABLE 1

RISK SUMMARY

REASONABLE MAXIMUM EXPOSURE

PETERSON PURITAN SUPERFUND SITE - OPERABLE UNIT 2

Scenario Timeframe	Future
Receptor Population	Resident
Receptor Age	Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk Young Child + Adult					Non-Carcinogenic Hazard Quotient Young Child				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total

-- = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 7E-03

Total Hazard Across All Media: 2E+02

Total Blood HI =	1E+01
Total Cardiovascular HI =	N/A
Total Reproductive HI =	N/A
Total General Toxicity HI =	7E+00
Total GI System HI =	1E+01
Total Immune System HI =	5E+01
Total Kidney HI =	6E+00
Total Liver HI =	1E+01
Total CNS HI =	2E+01
Total Skin HI =	4E+01
Total Spleen HI =	N/A
Total Respiratory HI =	N/A
Total Developmental HI =	2E+00
Total Endocrine HI =	1E+01

TABLE 2

VALUES USED FOR DAILY INTAKE CALCULATIONS

REASONABLE MAXIMUM EXPOSURE

PETERSON PURITAN SUPERFUND SITE - OPERABLE UNIT 2

Scenario Timeframe Future
Medium Groundwater
Exposure Medium Groundwater

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion/Dermal/ Inhalation	Resident	Adult/Young Child						
			IR_A	Ingestion Rate of Water - adult	2 5	liters/day	USEPA, 2014	See attached
			EF	Exposure Frequency	350	days/year	USEPA, 2004	
			ED_A	Exposure Duration - adult	20	years	USEPA, 2014	
			BW_A	Body Weight - adult	80	kg	USEPA, 2014	
			AT-C	Averaging Time (Cancer)	25550	days	USEPA, 1989	
			AT-N	Averaging Time (Non-Cancer)	2190	days	USEPA, 1989	
			CF1	Conversion Factor 1	0 001	mg/ug	--	
			BW_C	Body Weight - child	15	kg	USEPA 2004	
			IR_C	Ingestion Rate of Water - child	0 78	liters/day	USEPA, 2014	
			RfD_o	Oral Reference Dose	see Table G-7	mg/kg-day	--	
			RfD_d	Dermal Reference Dose	see Table G-7	mg/kg-day	--	
			RfC	Inhalation Reference Concentration	see Table G-7	ug/m^3	--	
			CF2	Conversion Factor 2	0 001	cm^3/mg	--	
			CF3	Conversion Factor 3	0 001	$liters/cm^3$	--	
			K	Volatilization Factor	0 5	L/m^3	USEPA, 1991	
			EV	Event Frequency	1	events/day	USEPA, 2004	
			THQ	Target Hazard Quotient	1	--	--	
			ED_C	Exposure Duration - child	6	years	USEPA, 2004	
			SF_o	Oral Slope Factor	see Table G-6	$(mg/kg-day)^{-1}$	--	
			TR	Target ILCR	10^{-6} to 10^{-4}	--	--	
			SF_d	Dermal Slope Factor	see Table G-6	$(mg/kg-day)^{-1}$	--	
			UR	Unit Risk	see Table G-6	$(ug/m^3)^{-1}$	--	
			DA_{event}	Dose Absorbed per Unit Area per Event	see Table 4	mg/cm^2-event	USEPA, 2004	
			ET_C	Exposure Time - child	0 54	hr/event	USEPA, 2014	
			ET_A	Exposure Time - adult	0 71	hr/event	USEPA, 2014	
			GIABS	Gastrointestinal absorption	see Table 4	--	USEPA, 2015	
			FA	Fraction Absorbed Water	see Table 4	--	USEPA, 2015	
			MW	Molecular Weight	see Table 4	g/mol	--	
			SA_A	Skin Surface Area Available for Contact - adult	20900	cm^2	USEPA, 2014	
			SA_C	Skin Surface Area Available for Contact - child	6378	cm^2	USEPA, 2014	

USEPA 1989 Risk Assessment Guidance for Superfund, Part A, Interim Final EPA/540/1-89/002 December 1989

USEPA 1991 Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual, Part B - Interim Final

USEPA 1997 Exposure Factors Handbook EPA/600/P-95/002Fa August 1997

USEPA 2004 Risk Assessment Guidance for Superfund, Part E, Supplemental Guidance for Dermal Risk Assessment EPA/540/R/99/005 July 2004

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

(located online at http //www epa gov/oswer/riskassessment/superfund_hh_exposure htm, items # 22 and #23 [as updated in February 2015] of this web link)

USEPA 2015 Regional Screening Level tables (June 2015) and associated online calculator - http://www epa gov/reg3hwmd/risk/human/rb-concentration_table/index htm

Highlighted cells are changes from that presented in Appendix C 7 of the FS

Intake Equation/
Model Name

Preliminary Remediation Goal (PRG) non-cancer

Ingestion

$$PRG_{nc\ ing}\ (ug/L) = \frac{THQ \times AT\text{-}N \times RfD_o \times BW_c}{EF \times CF1 \times ED_C \times IR_C}$$

Dermal - inorganics

$$PRG_{nc\text{-}derm}\ (ug/L) = \frac{DA_{event}}{Kp \times ET_C \times CF3}$$

where

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{THQ \times AT\text{-}N \times RfD_o \times GIABS \times BW_c}{EV \times CF1 \times ED_C \times EF \times SA_C}$$

Dermal - organics

if $ET_C <= t^*$

$$PRG_{nc\text{-}derm}\ (ug/L) = \frac{DA_{event}}{2 \times FA \times Kp \times (6 \times tau \times ET_C / \pi)^{0.5} \times CF3}$$

if $ET_C > t^*$

$$PRG_{nc\text{-}derm}\ (ug/L) = \frac{DA_{event}}{FA \times Kp \times [ET_C / (1 + B) + 2 \times tau \times (1 + 3B + 3B^2)/(1 + B)^2] \times CF3}$$

where

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{THQ \times AT\text{-}N \times RfD_o \times GIABS \times BW_c}{EV \times CF1 \times ED_C \times EF \times SA_C}$$

$$B = \frac{Kp \times MW^{0.5}}{2\ 6}$$

$$tau = \frac{l_{SC}^2}{6 \times D_{SC}}$$

l_{SC} = Skin Thickness (cm, assumed)
1 00E-03

$D_{SC} = l_{SC} \times 10^{(-2\ 8 - 0\ 0056 \times MW)}$

$t^* =$ If B <= 0 6
2 4 x tau

If B > 0 6
$6 \times tau \times (b - (b^2 - c^2)^{0.5})$

$$b = \frac{2 \times (1 + B)^2}{\pi} - c$$

$$c = \frac{1 + 3 \times B + 3 \times B^2}{3 \times (1 + B)}$$

Inhalation

$$PRG_{nc\ inh}\ (ug/L) = \frac{THQ \times AT\text{-}N \times RfC}{EF \times ED_C \times K}$$

Total

$$PRG_{nc\ tot}\ (ug/L) = \frac{1}{1/PRG_{nc\text{-}ing} + 1/PRG_{nc\text{-}derm} + 1/PRG_{nc\text{-}inh}}$$

Preliminary Remediation Goal (PRG) cancer,

Ingestion

$$PRG_{ca\ ing}\ (ug/L) = \frac{TR \times AT\text{-}C}{EF \times CF1 \times SF_o \times IFW_{adj}}$$

$$IFW_{adj} = \frac{ED_C \times IR_C}{BW_C} + \frac{ED_A \times IR_A}{BW_A}$$

Dermal - inorganics

$$PRG_{ca\text{-}derm}\ (ug/L) = \frac{DA_{event}}{Kp \times ET_{adj} \times CF3}$$

where

$$ET_{adj} = ET_C \times ED_C/26 + ET_A \times ED_A/26$$

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{TR \times AT\text{-}C \times GIABS}{SF_o \times CF1 \times EF \times DFW_{adj}}$$

$$DFW_{adj} = \frac{EV \times ED_C \times SA_C}{BW_C} + \frac{EV \times ED_A \times SA_A}{BW_A}$$

Dermal - organics

if $ET_{adj} <= t^*$

$$PRG_{ca\text{-}derm}\ (ug/L) = \frac{DA_{event}}{2 \times FA \times Kp \times [6 \times tau \times ET_{adj} / \pi]^{0.5} \times CF3}$$

if $ET_{adj} > t^*$

$$PRG_{ca\text{-}derm}\ (ug/L) = \frac{DA_{event}}{FA \times Kp \times [ET_{adj} / (1 + B) + 2 \times tau \times (1 + 3B + 3B^2)/(1 + B)^2] \times CF3}$$

where

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{TR \times AT\text{-}C \times GIABS}{SF_o \times CF1 \times EF \times DFW_{adj}}$$

$$B = \frac{Kp \times MW^{0.5}}{2\,6}$$

$$tau = \frac{l_{SC}^2}{6 \times D_{SC}}$$

$$l_{SC} = \frac{\text{Skin Thickness (cm assumed)}}{1\ 00E\text{-}03}$$

$$D_{SC} = l_{SC} \times 10\text{^}(-2\ 8 - 0\ 0056 \times MW)$$

$$t^* = \begin{cases} \text{If } B <= 0\ 6 \\ 2\ 4 \times tau \\ \\ \text{If } B > 0\ 6 \\ 6 \times tau \times (b - (b^2 - c^2)^{0.5}) \end{cases}$$

$$b = \frac{2 \times (1 + B)^2 - c}{\pi}$$

$$c = \frac{1 + 3 \times B + 3 \times B^2}{3 \times (1 + B)}$$

Inhalation

$$PRG_{ca\ inh}\ (ug/L) = \frac{TR \times AT\text{-}C}{EF \times (ED_C + ED_A) \times UR \times K}$$

Total

$$PRG_{ca\ tot}\ (ug/L) = \frac{1}{1/PRG_{ca\ ing} + 1/PRG_{ca\text{-}derm} + 1/PRG_{ca\ inh}}$$

Preliminary Remediation Goal (PRG) mutagenic

Ingestion

$$PRG_{mu\text{-}ing}\ (ug/L) = \frac{TR \times AT\text{-}C}{EF \times CF1 \times SF_o \times IFWM_{adj}}$$

$$IFWM_{adj} = \frac{ED_{0\text{-}2} \times IR_C \times 10}{BW_C} + \frac{ED_{2\text{-}6} \times IR_C \times 3}{BW_C} + \frac{ED_{6\text{-}16} \times IR_A \times 3}{BW_A} + \frac{ED_{16\text{-}26} \times IR_A}{BW_A}$$

Dermal - inorganics

$$PRG_{mu\text{-}derm}\ (ug/L) = \frac{DA_{event}}{Kp \times ET_{madj} \times CF3}$$

where

$$ET_{madj} = \frac{ET_C \times ED_{0\text{-}2} + ET_C \times ED_{2\text{-}6} + ET_A \times ED_{6\text{-}16} + ET_A \times ED_{16\text{-}26}}{ED_{0\text{-}2} + ED_{2\text{-}6} + ED_{6\text{-}16} + ED_{16\text{-}26}}$$

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{TR \times AT\text{-}C \times GIABS}{SF_o \times CF1 \times EF \times DFWM_{adj}}$$

$$DFWM_{adj} = \frac{ED_{0\text{-}2} \times SA_C \times 10}{BW_C} + \frac{ED_{2\text{-}6} \times SA_C \times 3}{BW_C} + \frac{ED_{6\text{-}16} \times SA_A \times 3}{BW_A} + \frac{ED_{16\text{-}26} \times SA_A}{BW_A}$$

Dermal - organics

If $ET_{madj} <= t^*$

$$PRG_{mu\text{-}derm}\ (ug/L) = \frac{DA_{event}}{2 \times FA \times Kp \times [6 \times tau \times ET_{madj} / \pi]^{0.5} \times CF3}$$

If $ET_{madj} > t^*$

$$PRG_{mu\text{-}derm}\ (ug/L) = \frac{DA_{event}}{FA \times Kp \times [ET_{madj} / (1 + B) + 2 \times tau \times (1 + 3B + 3B^2)/(1 + B)^2] \times CF3}$$

where

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{TR \times AT\text{-}C \times GIABS}{SF_o \times CF1 \times EF \times DFWM_{adj}}$$

$$B = \frac{Kp \times MW^{0.5}}{2\,6}$$

$$tau = \frac{l_{SC}^2}{6 \times D_{SC}}$$

l_{SC} = Skin Thickness (cm, assumed) = 1 00E-03

$D_{SC} = l_{SC} \times 10^{(-2\,8 - 0\,0056 \times MW)}$

t^* = If B <= 0 6: $2\,4 \times tau$

If B > 0 6: $6 \times tau \times (b - (b^2 - c^3)^{0.5})$

$$b = \frac{2 \times (1 + B)^2}{\pi} - c$$

$$c = \frac{1 + 3 \times B + 3 \times B^2}{3 \times (1 + B)}$$

Inhalation

$$PRG_{mu\text{-}inh}\ (ug/L) = \frac{TR \times AT\text{-}C}{EF \times K \times INFM_{adj}}$$

$$INFM_{adj} = ED_{0\text{-}2} \times UR \times 10 + ED_{2\text{-}6} \times UR \times 3 + ED_{6\text{-}16} \times UR \times 3 + ED_{16\,26} \times UR$$

Total

$$PRG_{mu\text{-}tot}\ (ug/L) = \frac{1}{1/PRG_{mu\text{-}ing} + 1/PRG_{mu\text{-}derm} + 1/PRG_{mu\text{-}inh}}$$

Preliminary Remediation Goal (PRG) vinyl chloride

Ingestion

$$PRG_{vc\text{-}ing}\ (ug/L) = \frac{TR}{CF1 \times SF_o \times ((EF \times IFW_{adj}) / AT\text{-}C + (IR_C / BW_C))}$$

$$IFW_{adj} = \frac{ED_C \times IR_C}{BW_C} + \frac{ED_A \times IR_A}{BW_A}$$

Dermal - organics

$$ET_{adj} = ET_C \times ED_C/26 + ET_A \times ED_A/26$$

$$DFW_{adj} = \frac{EV \times ED_C \times SA_C}{BW_C} + \frac{EV \times ED_A \times SA_A}{BW_A}$$

if ET_{adj} <= t*

$$PRG_{vc\text{-}derm}\ (ug/L) = \frac{DA_{event}}{2 \times FA \times Kp \times [6 \times tau \times ET_{madj} / \pi]^{0.5} \times CF3}$$

if ET_{adj} > t*

$$PRG_{vc\text{-}derm}\ (ug/L) = \frac{DA_{event}}{FA \times Kp \times [ET_{adj} / (1 + B) + 2 \times tau \times (1 + 3B + 3B^2)/(1 + B)^2] \times CF3}$$

where

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{TR \times GIABS}{SF_o \times CF1 \times ((EF \times DFW_{adj}) / AT\text{-}C + SA_C / BW_C)}$$

$$B = \frac{Kp \times MW^{0.5}}{2\ 6}$$

$$tau = \frac{l_{SC}^2}{6 \times D_{SC}}$$

l_{SC} = Skin Thickness (cm, assumed)

1 00E-03

$D_{SC} = l_{SC} \times 10\text{^}(-2\ 8 - 0\ 0056 \times MW)$

$t^* =$ If B <= 0 6

2 4 x tau

If B > 0 6

$6 \times tau \times (b - (b^2 - c^2)^{0.5})$

$$b = \frac{2 \times (1 + B)^2 - c}{\pi}$$

$$c = \frac{1 + 3 \times B + 3 \times B^2}{3 \times (1 + B)}$$

Inhalation

$$PRG_{vc\text{-}inh}\ (ug/L) = \frac{TR}{UR \times K \times (EF \times (ED_C + ED_A))/AT\text{-}C + 1)}$$

Total

$$PRG_{vc\ tot}\ (ug/L) = \frac{1}{1/PRG_{vc\ ing} + 1/PRG_{vc\text{-}derm} + 1/PRG_{vc\ inh}}$$

TABLE 3. INTERMEDIATE GROUNDWATER PERFORMANCE STANDARD CALCULATIONS - INGESTION

Chemical	Mutagenic?	EF days	ED_C yrs	ED_A yrs	BW_C kg	BW_A kg	IR_C L/day	IR_A L/day	AT-N days	AT-C days	CF1 mg/ug	SF_o $(mg/kg\text{-}day)^{-1}$	RfD_o mg/kg-day	THQ	TR	IFW_{adj} (L-yr/kg-day)	$IFWM_{adj}$ (L-yr/kg-day)	$PRG_{ca\text{-}ing}$ ug/L	$PRG_{nc\text{-}ing}$ ug/L
1,4-Dioxane		350	6	20	15	80	0 78	2 5	2190	25550	0 001	1 0E-01	3E-02	1	1E-06	0 937	2 914	**7.8E-01**	**6.0E+02**
4-Chloroaniline		350	6	20	15	80	0 78	2 5	2190	25550	0 001	2 0E-01	4E-03	1	1E-06	0 937	2 914	**3.9E-01**	**8.0E+01**
Atrazine		350	6	20	15	80	0 78	2 5	2190	25550	0 001	2 3E-01	3 5E-02	1	1E-06	0 937	2 914	**3.4E-01**	**7.0E+02**
Benzo(a)anthracene	Y	350	6	20	15	80	0 78	2 5	2190	25550	0 001	7 3E-01	N/A	1	1E-06	0 937	2 914	**3.4E-02**	**N/A**
Benzo(a)pyrene	Y	350	6	20	15	80	0 78	2 5	2190	25550	0 001	7 3E+00	N/A	1	1E-06	0 937	2 914	**3.4E-03**	**N/A**
Benzo(b)fluoranthene	Y	350	6	20	15	80	0 78	2 5	2190	25550	0 001	7 3E-01	N/A	1	1E-06	0 937	2 914	**3.4E-02**	**N/A**
bis(2-Ethylhexyl)phthalate		350	6	20	15	80	0 78	2 5	2190	25550	0 001	1 4E-02	2E-02	1	1E-06	0 937	2 914	**5.6E+00**	**4.0E+02**
Indeno(1,2,3-cd)pyrene	Y	350	6	20	15	80	0 78	2 5	2190	25550	0 001	7 3E-01	N/A	1	1E-06	0 937	2 914	**3.4E-02**	**N/A**
Naphthalene		350	6	20	15	80	0 78	2 5	2190	25550	0 001	N/A	2E-02	1	1E-06	0 937	2 914	**N/A**	**4.0E+02**
1,4-Dichlorobenzene		350	6	20	15	80	0 78	2 5	2190	25550	0 001	5 4E-03	7E-02	1	1E-06	0 937	2 914	**1.4E+01**	**1.4E+03**
Benzene		350	6	20	15	80	0 78	2 5	2190	25550	0 001	5 5E-02	4E-03	1	1E-06	0 937	2 914	**1.4E+00**	**8.0E+01**
Chloroform		350	6	20	15	80	0 78	2 5	2190	25550	0 001	3 1E-02	1E-02	1	1E-06	0 937	2 914	**2.5E+00**	**2.0E+02**
Ethylbenzene		350	6	20	15	80	0 78	2 5	2190	25550	0 001	1 1E-02	1E-01	1	1E-06	0 937	2 914	**7.1E+00**	**2.0E+03**
Methyl tert-butyl ether		350	6	20	15	80	0 78	2 5	2190	25550	0 001	1 8E-03	3E-01	1	1E-06	0 937	2 914	**4.3E+01**	**6.0E+03**
Trichloroethene	Y	350	6	20	15	80	0 78	2 5	2190	25550	0 001	4 6E-02	5E-04	1	1E-06	0 937	2 914	**1.2E+00**	**1.0E+01**
kidney	Y	350	6	20	15	80	0 78	2 5	2190	25550	0 001	9 3E-03	N/A	1	1E-06	0 937	2 914	**2.7E+00**	
non-kidney		350	6	20	15	80	0 78	2 5	2190	25550	0 001	3 7E-02	N/A	1	1E-06	0 937	2 914	**2.1E+00**	
Vinyl Chloride	Y	350	6	20	15	80	0 78	2 5	2190	25550	0 001	7 2E-01	3E-03	1	1E-06	0 937	2 914	**2.1E-02**	**6.0E+01**
Aroclor-1242		350	6	20	15	80	0 78	2 5	2190	25550	0 001	2E+00	2E-05	1	1E-06	0 937	2 914	**3.9E-02**	**4.0E-01**
Aroclor-1248		350	6	20	15	80	0 78	2 5	2190	25550	0 001	2E+00	2E-05	1	1E-06	0 937	2 914	**3.9E-02**	**4.0E-01**
Aroclor-1254		350	6	20	15	80	0 78	2 5	2190	25550	0 001	2E+00	2E-05	1	1E-06	0 937	2 914	**3.9E-02**	**4.0E-01**
Aldrin		350	6	20	15	80	0 78	2 5	2190	25550	0 001	1 7E+01	3E-05	1	1E-06	0 937	2 914	**4.6E-03**	**6.0E-01**
Dieldrin		350	6	20	15	80	0 78	2 5	2190	25550	0 001	1 6E+01	5E-05	1	1E-06	0 937	2 914	**4.9E-03**	**1.0E+00**
Aluminum		350	6	20	15	80	0 78	2 5	2190	25550	0 001	N/A	1E+00	1	1E-06	0 937	2 914	**N/A**	**2.0E+04**
Arsenic		350	6	20	15	80	0 78	2 5	2190	25550	0 001	1 5E+00	3E-04	1	1E-06	0 937	2 914	**5.2E-02**	**6.0E+00**
Cadmium (drinking water)		350	6	20	15	80	0 78	2 5	2190	25550	0 001	N/A	5E-04	1	1E-06	0 937	2 914	**N/A**	**1.0E+01**
Cobalt		350	6	20	15	80	0 78	2 5	2190	25550	0 001	N/A	3E-04	1	1E-06	0 937	2 914	**N/A**	**6.0E+00**
Iron		350	6	20	15	80	0 78	2 5	2190	25550	0 001	N/A	7E-01	1	1E-06	0 937	2 914	**N/A**	**1.4E+04**
Manganese (drinking water)		350	6	20	15	80	0 78	2 5	2190	25550	0 001	N/A	2 4E-02	1	1E-06	0 937	2 914	**N/A**	**4.8E+02**
Thallium		350	6	20	15	80	0 78	2 5	2190	25550	0 001	N/A	1E-05	1	1E-06	0 937	2 914	**N/A**	**2.0E-01**

Notes

See Table 2 for input parameters and equations

While these spreadsheets are used to calculate PSs related to the site, the term "PRG" is used in the calculations as this is the variable presented in equations

Trichloroethene calculated to account for mutagenic contributions during early life Slope factors for kidney and non-kidney (liver and non-Hodgkin lymphoma) presented in spreadsheet
(source - http //www epa gov/reg3hwmd/risk/human/rb-concentration_table/faq htm#FAQ19)
Final TCE cancer PRG shown calculated by 1/(1/kidney conc + 1/non-kidney conc)

TABLE 4 INTERMEDIATE GROUNDWATER PERFORMANCE STANDARD CALCULATIONS - DERMAL

Chemical	MWT g/mol	logKow	kp (cm/hr) predicted	B	tsc cm	Dsc cm /hr	tau (hr)	c	b	t_star1 B<0.6	t_star3 B<=0.6	t_star (hr)	GIABS	Mutagene?	FA for tau<3	ET_C hr/event	ET_A hr event	ET_{adj} hr/event	ET_{mod} hr/event	FA event/day	EF days	ED_C yrs	ED_A yrs	BW_C kg	BW_A kg	SA_C cm^2	SA_A cm^2	AT-N days	AT-C days	CF1 mg/ug	CF3 L/cm^3	SF_o $(mg\ kg\text{-}day)^{-1}$	RfD_o mg kg-day	THQ	TR	DFW_{adj} cm^2-evt-day/kg	$DFWM_{adj}$ evt-cm /kg	DA_{event} - ca ug/cm -evt	DA_{event} - nc ug/cm^2-evt	$PRG_{cardnog}$ ug/L	$PRG_{nondnog}$ ug/L
1,4-Dioxane	88.1	-0.27	3.3E-04	0.001	1.0E-03	5.09E-07	0.33	3.3E-01	3.0E-01	N/A	0.79	0.79	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	1.0E-01	3E-02	1	1E-06	7776	24056	9.4E-05	7.4E-02	2.2E+02	1.9E+05
4-Chloroaniline	127.6	1.83	5.0E-03	0.022	1.0E-03	3.06E-07	0.55	3.5E-01	3.2E-01	N/A	1.11	1.11	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	2.0E-01	4E-03	1	1E-06	7776	24056	4.7E-05	9.8E-03	4.7E+00	1.3E+03
Atrazine	215.7	2.61	5.2E-03	0.030	1.0E-03	9.82E-08	1.70	3.5E-01	3.2E-01	N/A	4.07	4.07	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	2.2E-01	3.5E-02	1	1E-06	7776	24056	4.1E-05	8.6E-02	2.6E+00	6.2E+03
Benzo(a)anthracene	228.3	5.76	NA	N/A	1.0E-03	8.35E-08	2.00	N/A	N/A	N/A	4.79	N/A	1	Y	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	7.3E-01	N/A	1	1E-06	7776	24056	N/A	N/A	N/A	N/A
Benzo(a)pyrene	250.0	6.13	N/A	N/A	1.0E-03	6.31E-08	2.64	N/A	N/A	N/A	6.34	N/A	1	Y	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	7.3E+00	N/A	1	1E-06	7776	24056	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	252.3	5.78	NA	N/A	1.0E-03	6.13E-08	2.72	N/A	N/A	N/A	6.53	N/A	1	Y	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	7.3E-01	N/A	1	1E-06	7776	24056	N/A	N/A	N/A	N/A
bis(2-Ethylhexyl)phthalate	391.0	7.60	NA	N/A	1.0E-03	1.02E-08	16.27	N/A	N/A	N/A	39.05	N/A	1		0.8	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	1.4E-02	2E-02	1	1E-06	7776	24056	N/A	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	276.3	6.70	NA	N/A	1.0E-03	4.49E-08	3.71	N/A	N/A	N/A	8.90	N/A	1	Y	0.6	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	7.3E-01	N/A	1	1E-06	7776	24056	N/A	N/A	N/A	N/A
Naphthalene	128.2	3.30	4.7E-02	0.203	1.0E-03	3.03E-07	0.55	4.8E-01	4.4E-01	N/A	1.32	1.32	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	2E-02	1	1E-06	7776	24056	N/A	4.9E-02	N/A	7.0E+02
1,4-Dichlorobenzene	147.0	3.44	4.5E-02	0.211	1.0E-03	2.38E-07	0.70	4.9E-01	4.5E-01	N/A	1.68	1.68	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	5.4E-03	7E-02	1	1E-06	7776	24056	1.7E-03	1.7E-01	2.0E+01	2.2E+03
Benzene	78.1	2.13	1.5E-02	0.051	1.0E-03	5.79E-07	0.29	3.7E-01	3.3E-01	N/A	0.69	0.69	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	5.5E-02	4E-03	1	1E-06	7776	24056	1.7E-04	9.8E-03	9.4E+00	6.0E+02
Chloroform	119.4	1.97	6.8E-03	0.029	1.0E-03	3.40E-07	0.49	3.5E-01	3.2E-01	N/A	1.18	1.18	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	9.1E-02	1E-02	1	1E-06	7776	24056	9.0E-04	2.5E-02	2.8E+01	2.5E+03
Ethylbenzene	106.2	3.15	4.9E-02	0.195	1.0E-03	4.03E-07	0.41	4.7E-01	4.4E-01	N/A	0.99	0.99	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	1.1E-02	1E-01	1	1E-06	7776	24056	8.5E-04	2.5E-01	1.2E+01	3.8E+03
Methyl tert-butyl ether	88.1	0.94	2.1E-03	0.008	1.0E-03	5.09E-07	0.33	3.4E-01	3.1E-01	N/A	0.79	0.79	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	1.8E-03	3E-01	1	1E-06	7776	24056	5.2E-03	7.4E-01	1.9E+03	3.8E+05
Trichloroethene	131.4	2.42	1.2E-02	0.051	1.0E-03	2.91E-07	0.57	3.7E-01	3.4E-01	N/A	1.37	1.37	1	\	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	4.6E-02	5E-04	1	1E-06	7776	24056	6.6E-05	1.2E-03	7.2E+00	6.9E+01
kidney	131.4	2.42	1.2E-02	0.051	1.0E-03	2.91E-07	0.57	3.7E-01	3.4E-01	N/A	1.37	1.37	1	\	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	9.3E-03	N/A	1	1E-06	7776	24056	3.3E-04	N/A	1.6E+01	
non-kidney	131.4	2.42	1.2E-02	0.051	1.0E-03	2.91E-07	0.57	3.7E-01	3.4E-01	N/A	1.37	1.37	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	3.7E-02	N/A	1	1E-06	7776	24056	2.5E-04	N/A	1.3E+01	
Vinyl Chloride	62.5	1.62	8.4E-03	0.025	1.0E-03	7.08E-07	0.24	3.5E-01	3.2E-01	N/A	0.57	0.57	1	\	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	7.2E-01	3E-03	1	1E-06	7776	24056	2.6E-06	7.4E-03	2.7E-01	8.9E+02
Aroclor-1242	327.0	6.29	NA	N/A	1.0E-03	2.14E-08	7.13	N/A	N/A	N/A	17.11	N/A	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	2E+00	2E-05	1	1E-06	7776	24056	N/A	N/A	N/A	N/A
Aroclor-1248	327.0	6.20	NA	N/A	1.0E-03	2.14E-08	7.13	N/A	N/A	N/A	17.11	N/A	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	2E+00	2E-05	1	1E-06	7776	24056	N/A	N/A	N/A	N/A
Aroclor-1254	327.0	6.50	NA	N/A	1.0E-03	2.34E-08	7.13	N/A	N/A	N/A	17.11	N/A	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	2E+00	2E-05	1	1E-06	7776	24056	N/A	N/A	N/A	N/A
Aldrin	365.0	6.50	NA	N/A	1.0E-03	1.43E-08	11.64	N/A	N/A	N/A	27.93	N/A	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	1.7E+01	3E-05	1	1E-06	7776	24056	N/A	N/A	N/A	N/A
Dieldrin	381.0	5.40	3.3E-02	0.245	1.0E-03	1.17E-08	14.90	5.1E-01	4.7E-01	N/A	34.33	34.33	1		0.8	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	1.6E+01	5E-05	1	1E-06	7776	24056	5.9E-07	1.2E-04	2.6E-03	6.1E-01
Aluminum	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	1E+00	1	1E-06	7776	24056	N/A	2.5E+00	N/A	4.5E+06
Arsenic	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	1.5E+00	3E-04	1	1E-06	7776	24056	6.3E-06	7.4E-04	9.3E+00	1.4E+03
Cadmium (drinking water)	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	0.05	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	5E-04	1	1E-06	7776	24056	N/A	6.1E-05	N/A	1.1E+02
Cobalt	--	--	4.0E-04	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	3E-04	1	1E-06	7776	24056	N/A	7.4E-04	N/A	3.4E+03
Iron	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	7E-01	1	1E-06	7776	24056	N/A	1.7E+00	N/A	3.2E+06
Manganese (drinking water)	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	0.04	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	2.4E-02	1	1E-06	7776	24056	N/A	2.4E-03	N/A	4.4E+03
Thallium	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	1E-05	1	1E-06	7776	24056	N/A	2.5E-05	N/A	4.5E+01

Notes:

See Table 2 for input parameters and equations

While these spreadsheets are used to calculate PSAs related to the rule the term "PRG" is used in the calculations as this is the variable presented in equations

log Kow GIABS and FA From Regional Screening Level (June 2015) tables

kp predicted values utilize formula from RAGs part E Eq 3.8 log kp = -2.805603 + 0.6645865 log Kow - 0.0056118 MW (Equation more accurate in spreadsheet than in report) (Final EPA/540/R/99/005 July 2004)

NA Outside of Effective Predictive Domain (EPD). Calculated based on RAGS Part E criteria for MW and log Kow

Inorganics Rags Part E, Exhibit 3-1 Final - EPA/540/R/99/005 July 2004

Dieldrin Kp from online RSL calculator as log Kow from RSL tables does not result in concentration matching screening level on RSL table

Trichloroethene calculated to account for mutagenic contributions during early life Slope factors for kidney and non-kidney (liver and non-Hodgkin lymphoma) presented in spreadsheet

(source - http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/faq.htm#F-1Q19)

Final TCE cancer PRG shown calculated by 1/(1/kidney conc + 1/non-kidney conc)

TABLE 5. INTERMEDIATE GROUNDWATER PERFORMANCE STANDARD CALCULATIONS - INHALATION

Chemical	Mutagenic?	Volatile?	EF days	ED_C yrs	ED_A yrs	K L/m^3	AT-N days	AT-C days	UR $(ug/m^3)^{-1}$	RfC ug/m^3	THQ	TR	$INWM_{adj}$ yr-ug/m^3	PRG_{ca-inh} ug/L	PRG_{nc-inh} ug/L
1,4-Dioxane	N	Y	350	6	20	0 5	2190	25550	5 0E-06	3E+01	1	1E-06	3 6E-04	**1.1E+00**	**6.3E+01**
4-Chloroaniline	N	N	350	6	20	0 5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**
Atrazine	N	N	350	6	20	0 5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**
Benzo(a)anthracene	Y	Y	350	6	20	0 5	2190	25550	1 1E-04	N/A	1	1E-06	7 9E-03	**1.8E-02**	**N/A**
Benzo(a)pyrene	Y	N	350	6	20	0 5	2190	25550	1 1E-03	N/A	1	1E-06	7 9E-02	**N/A**	**N/A**
Benzo(b)fluoranthene	Y	N	350	6	20	0 5	2190	25550	1 1E-04	N/A	1	1E-06	7 9E-03	**N/A**	**N/A**
bis(2-Ethylhexyl)phthalate	N	N	350	6	20	0 5	2190	25550	NA	N/A	1	1E-06	N/A	**N/A**	**N/A**
Indeno(1,2,3-cd)pyrene	Y	N	350	6	20	0 5	2190	25550	1 1E-04	N/A	1	1E-06	7 9E-03	**N/A**	**N/A**
Naphthalene	N	Y	350	6	20	0 5	2190	25550	3 4E-05	3E+00	1	1E-06	2 4E-03	**1.7E-01**	**6.3E+00**
1,4-Dichlorobenzene	N	Y	350	6	20	0 5	2190	25550	1 1E-05	8E+02	1	1E-06	7 9E-04	**5.1E-01**	**1.7E+03**
Benzene	N	Y	350	6	20	0 5	2190	25550	7 8E-06	3E+01	1	1E-06	5 6E-04	**7.2E-01**	**6.3E+01**
Chloroform	N	Y	350	6	20	0 5	2190	25550	2 3E-05	1E+02	1	1E-06	1 7E-03	**2.4E-01**	**2.0E+02**
Ethylbenzene	N	Y	350	6	20	0 5	2190	25550	2 5E-06	1E+03	1	1E-06	1 8E-04	**2.2E+00**	**2.1E+03**
Methyl tert-butyl ether	N	Y	350	6	20	0 5	2190	25550	2 6E-07	3E+03	1	1E-06	1 9E-05	**2.2E+01**	**6.3E+03**
Trichloroethene	Y	Y	350	6	20	0 5	2190	25550	4 1E-06	2E+00	1	1E-06	3 0E-04	**9.6E-01**	**4.2E+00**
kidney	Y	Y	350	6	20	0 5	2190	25550	1 0E-06	N/A	1	1E-06	7 2E-05	**2.0E+00**	
non-kidney	N	Y	350	6	20	0 5	2190	25550	3 1E-06	N/A	1	1E-06	2 2E-04	**1.8E+00**	
Vinyl Chloride	Y	Y	350	6	20	0 5	2190	25550	4 4E-06	1E+02	1	1E-06	3 2E-04	**3.4E-01**	**2.1E+02**
Aroclor-1242	N	Y	350	6	20	0 5	2190	25550	5 7E-04	N/A	1	1E-06	4 1E-02	**9.8E-03**	**N/A**
Aroclor-1248	N	Y	350	6	20	0 5	2190	25550	5 7E-04	N/A	1	1E-06	4 1E-02	**9.8E-03**	**N/A**
Aroclor-1254	N	Y	350	6	20	0 5	2190	25550	5 7E-04	N/A	1	1E-06	4 1E-02	**9.8E-03**	**N/A**
Aldrin	N	Y	350	6	20	0 5	2190	25550	4 9E-03	N/A	1	1E-06	3 5E-01	**1.1E-03**	**N/A**
Dieldrin	N	N	350	6	20	0 5	2190	25550	4 6E-03	N/A	1	1E-06	3 3E-01	**N/A**	**N/A**
Aluminum	N	N	350	6	20	0 5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**
Arsenic	N	N	350	6	20	0 5	2190	25550	4 3E-03	1 5E-03	1	1E-06	3 1E-01	**N/A**	**N/A**
Cadmium (drinking water)	N	N	350	6	20	0 5	2190	25550	1 8E-03	1E-02	1	1E-06	1 3E-01	**N/A**	**N/A**
Cobalt	N	N	350	6	20	0 5	2190	25550	9 0E-03	6E-03	1	1E-06	6 5E-01	**N/A**	**N/A**
Iron	N	N	350	6	20	0 5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**
Manganese (drinking water)	N	N	350	6	20	0 5	2190	25550	N/A	5E-02	1	1E-06	N/A	**N/A**	**N/A**
Thallium	N	N	350	6	20	0 5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**

Notes

See Table 2 for input parameters and equations

While these spreadsheets are used to calculate PSs related to the site, the term "PRG" is used in the calculations as this is the variable presented in equations

PRGs shown as "N/A" are due to either lack of inhalation toxicity values or because the analyte is non-volatile

Trichloroethene calculated to account for mutagenic contributions during early life Slope factors for kidney and non-kidney (liver and non-Hodgkin lymphoma) presented in spreadsheet
(source - http //www epa gov/reg3hwmd/risk/human/rb-concentration_table/faq htm#FAQ19)
Final TCE cancer PRG shown calculated by 1/(1/kidney conc + 1/non-kidney conc)

TABLE 6. INTERMEDIATE GROUNDWATER PERFORMANCE STANDARD CALCULATIONS - RESULTS

	Carcinogenic Risk Level = 1E-06				Non-Cancer Hazard Quotient = 1			
Chemical	$PRG_{ca\text{-}ing}$ ug/L	$PRG_{ca\text{-}derm}$ ug/L	$PRG_{ca\text{-}inh}$ ug/L	Result ug/L	$PRG_{nc\text{-}ing}$ ug/L	$PRG_{nc\text{-}derm}$ ug/L	$PRG_{nc\text{-}inh}$ ug/L	Result ug/L
1,4-Dioxane	7.8E-01	2.2E+02	1.1E+00	**4.6E-01**	6.0E+02	1.9E+05	6.3E+01	**5.7E+01**
4-Chloroaniline	3.9E-01	5.7E+00	N/A	**3.6E-01**	8.0E+01	1.3E+03	N/A	**7.6E+01**
Atrazine	3.4E-01	2.6E+00	N/A	**3.0E-01**	7.0E+02	6.2E+03	N/A	**6.3E+02**
Benzo(a)anthracene	3.4E-02	N/A	1.8E-02	**1.2E-02**	N/A	N/A	N/A	**N/A**
Benzo(a)pyrene	3.4E-03	N/A	N/A	**3.4E-03**	N/A	N/A	N/A	**N/A**
Benzo(b)fluoranthene	3 4E-02	N/A	N/A	**3.4E-02**	N/A	N/A	N/A	**N/A**
bis(2-Ethylhexyl)phthalate	5.6E+00	N/A	N/A	**5.6E+00**	4.0E+02	N/A	N/A	**4.0E+02**
Indeno(1,2,3-cd)pyrene	3.4E-02	N/A	N/A	**3.4E-02**	N/A	N/A	N/A	**N/A**
Naphthalene	N/A	N/A	1.7E-01	**1.7E-01**	4.0E+02	7.0E+02	6.3E+00	**6.1E+00**
1,4-Dichlorobenzene	1.4E+01	2.0E+01	5.1E-01	**4.8E-01**	1.4E+03	2.2E+03	1.7E+03	**5.7E+02**
Benzene	1.4E+00	9.4E+00	7.2E-01	**4.5E-01**	8.0E+01	6.0E+02	6.3E+01	**3.3E+01**
Chloroform	2.5E+00	2.8E+01	2.4E-01	**2.2E-01**	2.0E+02	2.5E+03	2.0E+02	**9.7E+01**
Ethylbenzene	7.1E+00	1.2E+01	2.2E+00	**1.5E+00**	2.0E+03	3.8E+03	2.1E+03	**8.1E+02**
Methyl tert-butyl ether	4.3E+01	1.9E+03	2.2E+01	**1.4E+01**	6.0E+03	3.0E+05	6.3E+03	**3.0E+03**
Trichloroethene	1.2E+00	7.2E+00	9.6E-01	**4.9E-01**	1.0E+01	6.9E+01	4.2E+00	**2.8E+00**
Vinyl Chloride	2.1E-02	2.7E-01	3.4E-01	**1.9E-02**	6.0E+01	8.9E+02	2.1E+02	**4.4E+01**
Aroclor-1242	3.9E-02	N/A	9.8E-03	**7.9E-03**	4.0E-01	N/A	N/A	**4.0E-01**
Aroclor-1248	3.9E-02	N/A	9.8E-03	**7.9E-03**	4.0E-01	N/A	N/A	**4.0E-01**
Aroclor-1254	3.9E-02	N/A	9.8E-03	**7.9E-03**	4.0E-01	N/A	N/A	**4.0E-01**
Aldrin	4.6E-03	N/A	1.1E-03	**9.2E-04**	6.0E-01	N/A	N/A	**6.0E-01**
Dieldrin	4.9E-03	2.6E-03	N/A	**1.7E-03**	1.0E+00	6.1E-01	N/A	**3.8E-01**
Aluminum	N/A	N/A	N/A	**N/A**	2.0E+04	4.5E+06	N/A	**2.0E+04**
Arsenic	5.2E-02	9.3E+00	N/A	**5.2E-02**	6.0E+00	1.4E+03	N/A	**6.0E+00**
Cadmium (drinking water)	N/A	N/A	N/A	**N/A**	1.0E+01	1.1E+02	N/A	**9.2E+00**
Cobalt	N/A	N/A	N/A	**N/A**	6.0E+00	3.4E+03	N/A	**6.0E+00**
Iron	N/A	N/A	N/A	**N/A**	1.4E+04	3.2E+06	N/A	**1.4E+04**
Manganese (drinking water)	N/A	N/A	N/A	**N/A**	4.8E+02	4.4E+03	N/A	**4.3E+02**
Thallium	N/A	N/A	N/A	**N/A**	2.0E-01	4.5E+01	N/A	**2.0E-01**

Notes

See Table 2 for equations

While these spreadsheets are used to calculate PSs related to the site, the term "PRG" is used in the calculations as this is the variable presented in equations.

TABLE 7. HUMAN HEALTH PERFORMANCE STANDARDS (PSs) FOR GROUNDWATER

Media/ Scenario	Contaminant	Regulatory Criteria			Risk-Based PSs - Ingestion/Dermal/Inhalation				Additional Information					Selected PS	Basis
		Federal MCLs	RIDEM Rem Regs	RI GQS	ILCR 10^{-6}	ILCR 10^{-5}	ILCR 10^{-4}	HQ = 1	Site-specific Range of Background Levels[1]	RI Background[2]	Health Advisory[3]	Non-zero MCLGs	PQL[5]		
Groundwater - ug/L Site-wide (Residential Scenario)															
	1,4-Dichlorobenzene	75	75	75	0 48	4 8	48	568	--	--	--	--	5 0	75	MCL
	Benzene	5	5	5	0 45	4 5	45	33	--	--	--	--	0 50	5	MCL
	Chloroform	--	--	--	0 22	2 2	22	97	--	--	--	--	0 20	0 22	ILCR=10^{-6}
	Ethylbenzene	700	700	700	1 5	15	149	806	--	--	--	700	5 0	700	MCL
	Methyl tert-butyl ether	--	40	40	14	143	1430	3036	--	--	--	--	5 0	40	GQS
	Trichloroethene	5	5	5	0 49	4 9	49	2 8	--	--	--	--	0 50	5	MCL
	Vinyl chloride	2	2	2	0 019	0 19	1 9	44	--	--	--	--	0 50	2	MCL
	1,4-Dioxane	--	--	--	0 46	4 6	46	57	--	--	--	--	0 10	0 46	ILCR=10^{-6}
	4-Chloroaniline	--	--	--	0 36	3 6	36	76	--	--	--	--	0 2	0 36	ILCR=10^{-6}
	Atrazine	3	--	3	0 30	3 0	30	630	--	--	--	3	0 5	3	MCL
	Benzo(a)anthracene	--	--	--	0 012	0 12	1 2	N/A	--	--	--	--	0 10	0 10	PQL
	Benzo(a)pyrene	0 2	0 2	0 2	0 0034	0 034	0 34	N/A	--	--	--	--	0 10	0 2	MCL
	Benzo(b)fluoranthene	--	--	--	0 034	0 34	3 4	N/A	--	--	--	--	0 10	0 10	PQL
	bis(2-Ethylhexyl)phthalate	6	--	6	5 6	56	556	401	--	--	--	--	5 0	6	MCL
	Indeno(1,2,3-cd)pyrene	--	--	--	0 034	0 34	3 4	N/A	--	--	--	--	0 10	0 10	PQL
	Naphthalene	--	20	100	0 17	1 7	17	6 1	--	--	--	--	0 10	20	RIDEM Rem Regs
	Aroclor-1242	0 5	0 5	0 5	0 0079	0 079	0 79	0 40	--	--	--	--	0 2	0 5	MCL
	Aroclor-1248	0 5	0 5	0 5	0 0079	0 079	0 79	0 40	--	--	--	--	0 2	0 5	MCL
	Aroclor-1254	0 5	0 5	0 5	0 0079	0 079	0 79	0 40	--	--	--	--	0 2	0 5	MCL
	Aldrin	--	--	--	0 00092	0 0092	0 092	0 60	--	--	--	--	0 001	0 001	PQL
	Dieldrin	--	--	--	0 0017	0 017	0 17	0 38	--	--	--	--	0 005	0 005	PQL
	Aluminum	--	--	--	N/A	N/A	N/A	19967	--	--	--	--	200	19967	HQ = 1
	Arsenic	10	--	10	0 052	0 52	5 2	6 0	--	--	--	--	1	10	MCL
	Cadmium	5	5	5	N/A	N/A	N/A	9 2	--	--	--	5	1	5	MCL
	Cobalt	--	--	--	N/A	N/A	N/A	6 0	--	--	--	--	1	6 0	HQ = 1
	Iron	--	--	--	N/A	N/A	N/A	13977	--	--	--	--	100	13977	HQ = 1
	Lead[4]	15	15	15	N/A	N/A	N/A	N/A	--	--	--	--	1	15	Fed Actn Lvl
	Manganese	--	--	--	N/A	N/A	N/A	433	--	--	300	--	15	300	Health Adv
	Thallium	2	2	2	N/A	N/A	N/A	0 20	--	--	--	0 5	0 02	0 5	non-zero MCLG

Notes

MCL - Maximum Contaminant Level

MCLG - Maximum Contaminant Level Goal

GQS - Rhode Island Groundwater Quality Standards, June 2010

RIDEM Rem Regs - RIDEM Remediation Regulations, DEM-DSR-01-93, February 2004, Table 3 (GA Objectives)

ILCR - Incremental Lifetime Cancer Risk

HQ - Hazard Quotient

PQL - Practical Quantitation Limit

N/A - Not carcinogenic, or a carcinogen was not evaluated for potential non-carcinogenic effects

1 While there are some wells which may be considered site-specific background in the RI report, the data set covers multiple flow zones and is not robust enough to use as background for Ps development, - - = not applicable

2 No specific background values are currently available from Rhode Island, - - = not applicable

3 Health Advisory on Manganese (EPA-822-R-04-003, January 2004)

4 Lead was identified in the HHRA as a risk-driver, however, it was not quantitatively evaluated Lead is regulated by a Treatment Technique that requires systems to control the corrosiveness of their water If more than 10% of tap water samples exceed the action level, water systems must take additional steps to correct that

5 PQLs presented are based on the contract-required quantitation limits (CRQLs) from the most recent EPA Contract Laboratory Program Statements of Work for organic (SOM02 2) and inorganic (ISM02 2), with the following exceptions

Chloroform The CLP SOW CRQL for trace analysis is 0 5 ug/L Selected ion monitoring should be able to achieve a CRQL of 0 2 ug/L

4-Chloroanline Low Level 8270D (includes other SVOCs) - source ALS Kelso

1,4-Dioxane EPA Method 522 has routinely achieved this PQL

Aroclors and atrazine EPA Methods 525 2 and 508 1

Aldrin & dieldrin GC-MS/MS - source ALS Kelso

Thallium Method 6020A or 200 8 - source ALS Kelso

APPENDIX E.2

SOIL CLEANUP LEVEL DEVELOPMENT

TABLE 1

RISK SUMMARY - COMMERCIAL WORKER

REASONABLE MAXIMUM EXPOSURE

PETERSON PURITAN SUPERFUND SITE - OPERABLE UNIT 2

Scenario Timeframe	Future
Receptor Population	Commercial Worker
Receptor Age	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface + Subsurface Soil	Nunes Parcel											
			Benzo(a)anthracene	1E-06	--	1E-06	--	3E-06					
			Benzo(a)pyrene	1E-05	--	1E-05	--	2E-05					
			Benzo(b)fluoranthene	2E-06	--	1E-06	--	3E-06					
			bis(2-Ethylhexyl)phthalate	2E-06	--	1E-06	--	3E-06					
			Dibenz(a,h)anthracene	2E-06	--	2E-06	--	3E-06					
			Dieldrin	1E-06	--	6E-07	--	2E-06					
			Dioxin TEQ[1]	2E-06	--	5E-07	--	3E-06					
			Arsenic	7E-06	--	1E-06	--	8E-06					
			Chemical Total	3E-05	--	2E-05	--	5E-05		--	--	--	N/A
			Radionuclide Total										
		Exposure Point Total						5E-05					N/A
	Exposure Medium Total							5E-05					N/A
	Indoor Air	Nunes Parcel											
			Naphthalene	--	3E-06	--	--	3E-06					
			Benzene	--	1E-04	--	--	1E-04					
			Chemical Total	--	1E-04	--	--	1E-04		--	--	--	N/A
			Radionuclide Total										
		Exposure Point Total						1E-04					N/A
	Exposure Medium Total							1E-04					N/A
Medium Total								1E-04					N/A
Receptor Total								1E-04					N/A

TABLE 1

RISK SUMMARY - COMMERCIAL WORKER

REASONABLE MAXIMUM EXPOSURE

PETERSON PURITAN SUPERFUND SITE - OPERABLE UNIT 2

Scenario Timeframe	Future
Receptor Population	Commercial Worker
Receptor Age	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Carcinogenic Risk					Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total

-- = Not Evaluated

N/A = Not Applicable

Total Risk Across All Media: 1E-04

Total Hazard Across All Media: N/A

Total Blood HI =	N/A
Total Cardiovascular HI =	N/A
Total Reproductive HI =	N/A
Total General Toxicity HI =	N/A
Total GI System HI =	N/A
Total Immune System HI =	N/A
Total Kidney HI =	N/A
Total Liver HI =	N/A
Total CNS HI =	N/A
Total Skin HI =	N/A
Total Spleen HI =	N/A
Total Respiratory HI =	N/A
Total Developmental HI =	N/A
Total Endocrine HI =	N/A

1 Dioxin values have been revised from what was presented in the BHHRA (2007/Updated 2009) based on changes to toxicity values

Note that tetrachloroethene was previously presented as a primary risk driver in the BHHRA (2007/Updated 2009), but has been removed based on changes to toxicity values

TABLE 2

VALUES USED FOR DAILY INTAKE CALCULATIONS - COMMERCIAL WORKER

REASONABLE MAXIMUM EXPOSURE

PETERSON PURITAN SUPERFUND SITE - OPERABLE UNIT 2

Scenario Timeframe Future
Medium Soil
Exposure Medium Surface + Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion/Dermal/ Inhalation	Commercial Worker	Adult	Nunes Parcel						See attached
				THQ	Target Hazard Quotient	1	--		
				CF	Conversion Factor	0 000001	kg/mg		
				ABS	Dermal Absorption Fraction	see Table 3	unitless	USEPA, 2004	
				$AT\text{-}N_A$	Averaging Time (Non-Cancer) - adult	9,125	days	USEPA, 1989	
				ED_A	Exposure Duration - adult	25	years	USEPA, 2004	
				BW_A	Body Weight - adult	80	kg	USEPA, 2014	
				EF_A	Exposure Frequency - adult	250	days/year	USEPA, 2002	
				IR_A	Ingestion Rate of Soil - adult	100	mg/day	USEPA, 1997, 2002	
				SA_A	Surface Area - adult	3,527	cm^2	Feb 2015 revision of USEPA, 2014	
				AF_A	Adherence Factor - adult	0.12	mg/cm^2-day	USEPA, 2014	
				RBA	Relative Bioavailability	0 6 for Arsenic/1 for all other analytes	--	USEPA, 2012	
				TR	Target ILCR	10^{-6} to 10^{-4}	--		
				AT-C	Averaging Time (Cancer)	25,550	days	USEPA, 1989	
				PEF	Particulate Emission Factor	1 36E+09	m^3/kg		
				VF	Volatilization Factor	see Table 6	m^3/kg	(a)	
				CF2	Conversion Factor 2	1000	ug/mg		
				CF3	Conversion Factor 3	24	hrs/day		
				ET_A	Exposure Time - Adult	8	hrs/day		
				RfD_O	Oral Reference Dose	see Table G-7	mg/kg-day		
				RfD_D	Dermal Reference Dose	see Table G-7	mg/kg-day		
				RfC	Reference Concentration	see Table G-7	ug/m^3		
				SF_O	Oral Slope Factor	see Table G-6	$(mg/kg\text{-}day)^{-1}$		
				SF_D	Dermal Slope Factor	see Table G-6	$(mg/kg\text{-}day)^{-1}$		
				UR	Unit Risk	see Table G-6	$(ug/m^3)^{-1}$		

Notes

(a) - The volatilization factor (VF) applies to those COCs considered volatile The June 2015 update of EPA's Regional Screening Levels (http //www epa gov/reg3hwmd/risk/human/rb-concentration_table/index htm) defines benzene, benzo(a)anthracene, naphthalene, and dioxins as volatile and provides chemical-specific VFs which have been applied during the PRG development process

USEPA 1989 Risk Assessment Guidance for Superfund, Part A, Interim Final EPA/540/1-89/002 December 1989

USEPA 1997 Exposure Factors Handbook EPA/600/P-95/002Fa August 1997

TABLE 2

VALUES USED FOR DAILY INTAKE CALCULATIONS - COMMERCIAL WORKER

REASONABLE MAXIMUM EXPOSURE

PETERSON PURITAN SUPERFUND SITE - OPERABLE UNIT 2

Scenario Timeframe Future
Medium Soil
Exposure Medium Surface + Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name

USEPA 2002 Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites OSWER 9355 4-24 December 2002

USEPA 2004 Risk Assessment Guidance for Superfund, Part E, Supplemental Guidance for Dermal Risk Assessment EPA/540/R/99/005 July 2004

USEPA 2012 Compilation and Review of Data on Relative Bioavailability of Arsenic in Soil and Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil Documents, OSWER Directive 9200 1-113, December 31, 2012

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

(located online at http //www epa gov/oswer/riskassessment/superfund_hh_exposure htm, items # 22 and #23 [as updated in February 2015] of this web link)

Highlighted cells are changes from that presented in Appendix C 6 of the FS

Intake Equation/
Model Name

Preliminary Remediation Goal (PRG) non-cancer

Ingestion - adult

$$PRG_{nc\text{-}ing}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_o \times BW_A}{EF_A \times ED_A \times IR_A \times CF \times RBA}$$

Dermal - adult

$$PRG_{nc\text{-}derm}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_o \times BW_A}{EF_A \times ED_A \times SA_A \times AF_A \times ABS \times CF}$$

Inhalation - adult

$$PRG_{nc\ inh}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfC \times CF3}{EF_A \times (1/PEF + 1/VF) \times ED_A \times ET_A \times CF2}$$

Total - adult

$$PRG_{nc\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{nc\ ing} + 1/PRG_{nc\text{-}derm} + 1/PRG_{nc\ inh}}$$

Preliminary Remediation Goal (PRG) cancer

Ingestion

$$PRG_{ca\ ing}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_o \times IFS_{adj} \times CF \times RBA}$$

$$IFS_{adj}\ (mg/kg) = \frac{ED_A \times EF_A \times IR_A}{BW_A}$$

Dermal

$$PRG_{ca\text{-}derm}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_D \times DFS_{adj} \times ABS \times CF}$$

$$DFS_{adj}\ (mg/kg) = \frac{ED_A \times EF_A \times SA_A \times AF_A}{BW_A}$$

Inhalation

$$PRG_{ca\ inh}\ (mg/kg) = \frac{TR \times AT\text{-}C \times CF3}{UR \times CF2 \times EF_A \times (1/PEF + 1/VF) \times ED_A \times ET_A}$$

Total

$$PRG_{ca\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{ca\text{-}ing} + 1/PRG_{ca\text{-}derm} + 1/PRG_{ca\text{-}inh}}$$

Notes

IFS_{adj} - age-adjusted soil ingestion factor

DFS_{adj} - age-adjusted soil dermal factor

Table 3 Dermal Worksheet
Intermediate Variables for Calculating DA(event)
PETERSON PURITAN SUPERFUND SITE - OPERABLE UNIT 2

Timeframe	Receptor	Exposure Point	Chemical of Potential Concern	Media	Dermal Absorption Fraction (soil)	FA	Kp		T(event)		Tau		T*		B
						Value	Value	Units	Value	Units	Value	Units	Value	Units	Value
All	All	All													
			Benzene	Sediment/Soil	N/A	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
			Benzo(a)anthracene	Sediment/Soil	0 13	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
			Benzo(a)pyrene	Sediment/Soil	0 13	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
			Benzo(b)fluoranthene	Sediment/Soil	0 13	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
			Bis(2-ethylhexyl)phthalate	Sediment/Soil	0 1	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
			Dibenz(a,h)anthracene	Sediment/Soil	0 13	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
			Naphthalene	Sediment/Soil	0 13	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
			Dieldrin	Sediment/Soil	0 1	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
			Dioxin TEQ	Sediment/Soil	0 03	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
			Arsenic	Sediment/Soil	0 03	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data

FA = Fraction Absorbed Water
Kp = Dermal Permeability Coefficient of Compound in Water
N/A = Not Applicable/Available

T(event) = Event Duration
Tau = Lag Time

T* = Time to Reach Steady-State
B = Dimensionless Ratio of the Permeability Coefficient of a Compound Through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis

TABLE 4. INTERMEDIATE COMMERCIAL WORKER SOIL CLEANUP LEVEL CALCULATIONS - INGESTION

Chemical	Mutagenic?	THQ	AT-N_A days	RfD_o mg/kg-day	BW_A kg	EF_A days/yr	ED_A yrs	IR_A mg/day	CF kg/mg	RBA	TR	AT-C days	SF_o $(mg/kg\text{-}day)^{-1}$	IFS_{adj} mg/kg	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{nc\text{-}ing\text{-}adult}$ mg/kg
Benzene		1	9125	4E-03	80	250	25	100	0 000001	1	1E-06	25550	5 5E-02	7812 5	**5.9E+01**	**4.7E+03**
Benzo(a)anthracene	Y	1	9125	N/A	80	250	25	100	0 000001	1	1E-06	25550	7 3E-01	7812 5	**4.5E+00**	**N/A**
Benzo(a)pyrene	Y	1	9125	N/A	80	250	25	100	0 000001	1	1E-06	25550	7 3E+00	7812 5	**4.5E-01**	**N/A**
Benzo(b)fluoranthene	Y	1	9125	N/A	80	250	25	100	0 000001	1	1E-06	25550	7 3E-01	7812 5	**4.5E+00**	**N/A**
Bis(2-ethylhexyl)phthalate		1	9125	2E-02	80	250	25	100	0 000001	1	1E-06	25550	1 4E-02	7812 5	**2.3E+02**	**2.3E+04**
Dibenz(a,h)anthracene	Y	1	9125	N/A	80	250	25	100	0 000001	1	1E-06	25550	7 3E+00	7812 5	**4.5E-01**	**N/A**
Naphthalene	Y	1	9125	2E-02	80	250	25	100	0 000001	1	1E-06	25550	N/A	7812 5	**N/A**	**2.3E+04**
Dieldrin		1	9125	5E-05	80	250	25	100	0 000001	1	1E-06	25550	1 6E+01	7812 5	**2.0E-01**	**5.8E+01**
Dioxin TEQ		1	9125	7E-10	80	250	25	100	0 000001	1	1E-06	25550	1 6E+05	7812 5	**2.1E-05**	**8.2E-04**
Arsenic		1	9125	3E-04	80	250	25	100	0 000001	0 6	1E-06	25550	1 5E+00	7812 5	**3.6E+00**	**5.8E+02**

Notes

See Table 2 for input parameters and equations

N/A - Not applicable or not available

While these spreadsheets are used to calculate cleanup levels related to the site, the term "PRG" is used in the calculations as this is the variable presented in equations

TABLE 5. INTERMEDIATE COMMERCIAL WORKER SOIL CLEANUP LEVEL CALCULATIONS - DERMAL

Chemical	Mutagenic?	THQ	$AT\text{-}N_A$ days	RfD_D mg/kg-day	BW_A kg	EF_A days/yr	ED_A yrs	SA_A cm^2	AF_A mg/cm^2-day	ABS	CF kg/mg	TR	AT-C days	SF_D $(mg/kg\text{-}day)^{-1}$	DFS_{adj} mg/kg	$PRG_{cs\text{-}derm}$ mg/kg	$PRG_{nc\text{-}derm\text{-}adult}$ mg/kg
Benzene		1	9125	4E-03	80	250	25	3527	0 12	N/A	0 000001	1E-06	25550	5 5E-02	33066	**N/A**	**N/A**
Benzo(a)anthracene	Y	1	9125	N/A	80	250	25	3527	0 12	0 13	0 000001	1E-06	25550	7 3E-01	33066	**8.1E+00**	**N/A**
Benzo(a)pyrene	Y	1	9125	N/A	80	250	25	3527	0 12	0 13	0 000001	1E-06	25550	7 3E+00	33066	**8 1E-01**	**N/A**
Benzo(b)fluoranthene	Y	1	9125	N/A	80	250	25	3527	0 12	0 13	0 000001	1E-06	25550	7 3E-01	33066	**8.1E+00**	**N/A**
Bis(2-ethylhexyl)phthalate		1	9125	2E-02	80	250	25	3527	0 12	0 1	0 000001	1E-06	25550	1 4E-02	33066	**5.5E+02**	**5.5E+04**
Dibenz(a,h)anthracene	Y	1	9125	N/A	80	250	25	3527	0 12	0 13	0 000001	1E-06	25550	7 3E+00	33066	**8.1E-01**	**N/A**
Naphthalene	Y	1	9125	2E-02	80	250	25	3527	0 12	0 13	0 000001	1E-06	25550	N/A	33066	**N/A**	**4 2E+04**
Dieldrin		1	9125	5E-05	80	250	25	3527	0 12	0 1	0 000001	1E-06	25550	1 6E+01	33066	**4 8E-01**	**1 4E+02**
Dioxin TEQ		1	9125	7E-10	80	250	25	3527	0 12	0 03	0 000001	1E-06	25550	1 6E+05	33066	**1 7E-04**	**6.4E-03**
Arsenic		1	9125	3E-04	80	250	25	3527	0 12	0 03	0 000001	1E-06	25550	1 5E+00	33066	**1 7E+01**	**2.8E+03**

Notes

See Table 2 for input parameters and equations

N/A - Not applicable or not available

While these spreadsheets are used to calculate cleanup levels related to the site, the term "PRG" is used in the calculations as this is the variable presented in equations

TABLE 6. INTERMEDIATE COMMERCIAL WORKER SOIL CLEANUP LEVEL CALCULATIONS - PARTICULATE INHALATION

Chemical	Mutagenic?	EF_A days/yr	ET_A hrs/day	ED_A yrs	PEF m^3/kg	VF m^3/kg	AT-N_A days	AT-C days	UR $(ug/m^3)^{-1}$	RfC ug/m^3	CF2 ug/mg	CF3 hrs/day	THQ	TR	$PRG_{ca\text{-}inh}$ mg/kg	$PRG_{nc\text{-}inh\text{-}adult}$ mg/kg
Benzene		250	8	25	1 36E+09	3 54E+03	9125	25550	7 8E-06	3E+01	1E+03	24	1	1E-06	**5.6E+00**	**4.7E+02**
Benzo(a)anthracene	Y	250	8	25	1 36E+09	4 41E+06	9125	25550	1 1E-04	N/A	1E+03	24	1	1E-06	**4.9E+02**	**N/A**
Benzo(a)pyrene	Y	250	8	25	1 36E+09	N/A	9125	25550	1 1E-03	N/A	1E+03	24	1	1E-06	**1.5E+04**	**N/A**
Benzo(b)fluoranthene	Y	250	8	25	1 36E+09	N/A	9125	25550	1 1E-04	N/A	1E+03	24	1	1E-06	**1.5E+05**	**N/A**
Bis(2-ethylhexyl)phthalate		250	8	25	1 36E+09	N/A	9125	25550	2 4E-06	N/A	1E+03	24	1	1E-06	**6.9E+06**	**N/A**
Dibenz(a,h)anthracene	Y	250	8	25	1 36E+09	N/A	9125	25550	1 2E-03	N/A	1E+03	24	1	1E-06	**1.4E+04**	**N/A**
Naphthalene	Y	250	8	25	1 36E+09	4 63E+04	9125	25550	3 4E-05	3E+00	1E+03	24	1	1E-06	**1.7E+01**	**6.1E+02**
Dieldrin		250	8	25	1 36E+09	N/A	9125	25550	4 6E-03	N/A	1E+03	24	1	1E-06	**3.6E+03**	**N/A**
Dioxin TEQ		250	8	25	1 36E+09	1 96E+06	9125	25550	3 8E+01	4E-05	1E+03	24	1	1E-06	**6.3E-04**	**3.4E-01**
Arsenic		250	8	25	1 36E+09	N/A	9125	25550	4 3E-03	2E-02	1E+03	24	1	1E-06	**3.9E+03**	**8.9E+04**

Notes

See Table 2 for input parameters and equations N/A - Not applicable or not available

While these spreadsheets are used to calculate cleanup levels related to the site, the term "PRG" is used in the calculations as this is the variable presented in equations

PRGs shown as "N/A" are due to either lack of inhalation toxicity values or because the analyte is non-volatile

VF applied to volatile chemicals benzene, benzo(a)anthracene, naphthalene, and dioxins

TABLE 7. INTERMEDIATE COMMERCIAL WORKER SOIL CLEANUP LEVEL CALCULATIONS - RESULTS

	Carcinogenic Risk Level = 1E-06				Non-Cancer HQ = 1 - Adult			
Chemical	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	$PRG_{ca\text{-}inh}$ mg/kg	Result mg/kg	$PRG_{nc\text{-}ing}$ mg/kg	$PRG_{nc\text{-}derm}$ mg/kg	$PRG_{nc\text{-}inh}$ mg/kg	Result mg/kg
Benzene	5.9E+01	N/A	5.6E+00	**5.1E+00**	4.7E+03	N/A	4.7E+02	**4.2E+02**
Benzo(a)anthracene	4.5E+00	8.1E+00	4.9E+02	**2.9E+00**	N/A	N/A	N/A	**N/A**
Benzo(a)pyrene	4.5E-01	8.1E-01	1.5E+04	**2.9E-01**	N/A	N/A	N/A	**N/A**
Benzo(b)fluoranthene	4.5E+00	8.1E+00	1.5E+05	**2.9E+00**	N/A	N/A	N/A	**N/A**
Bis(2-ethylhexyl)phthalate	2.3E+02	5.5E+02	6.9E+06	**1.6E+02**	2.3E+04	5.5E+04	N/A	**1.6E+04**
Dibenz(a,h)anthracene	4.5E-01	8.1E-01	1.4E+04	**2.9E-01**	N/A	N/A	N/A	**N/A**
Naphthalene	N/A	N/A	1.7E+01	**1.7E+01**	2.3E+04	4.2E+04	6.1E+02	**5.9E+02**
Dieldrin	2.0E-01	4.8E-01	3.6E+03	**1.4E-01**	5.8E+01	1.4E+02	N/A	**4.1E+01**
Dioxin TEQ	2.1E-05	1 7E-04	6.3E-04	**1.8E-05**	8.2E-04	6.4E-03	3.4E-01	**7.2E-04**
Arsenic	3.6E+00	1.7E+01	3.9E+03	**3.0E+00**	5.8E+02	2.8E+03	8.9E+04	**4.8E+02**

Notes

See Table 2 for equations

HQ = Hazard Quotient

N/A - Not applicable or not available.

TABLE 8. HUMAN HEALTH CLEANUP LEVELS FOR SOIL

Media/ Scenario	Contaminant	Regulatory Criteria			Risk-Based Cleanup Levels[2]					Additional Information		Selected Cleanup Level	Basis
		RIDEM Rem Regs [1]			ILCR					Site-specific Range of Reference Levels[3]	RI Background[4]		
		Leachability	I/C DEC	Res DEC	10^{-6}	10^{-5}	10^{-4}	HQ = 1	Lead[5]				
Site-wide Soil - mg/kg (Recreational User Scenario)													
	Benzene[6]	0 2	NA	2 5	NA	NA	NA	NA	NA	- -	- -	0 2	Leachability
	Benzo(a)anthracene[6]	--	NA	0 9	NA	NA	NA	NA	NA	0 28	- -	0 9	Res DEC
	Benzo(a)pyrene[6]	240	NA	0 4	NA	NA	NA	NA	NA	0 30	- -	0 4	Res DEC
	Benzo(b)fluoranthene[6]	--	NA	0 9	NA	NA	NA	NA	NA	0 42	- -	0 9	Res DEC
	Benzo(g,h,i)perylene[6]	--	NA	0 8	NA	NA	NA	NA	NA	0 23	- -	0 8	Res DEC
	Benzo(k)fluoranthene[6]	--	NA	0 9	NA	NA	NA	NA	NA	0 15	- -	0 9	Res DEC
	bis(2-Ethylhexyl)phthalate[6]	120	NA	46	NA	NA	NA	NA	NA	0 17	- -	46	Res DEC
	Chrysene[6]	--	NA	0 4	NA	NA	NA	NA	NA	0 30	- -	0 4	Res DEC
	Dibenz(a,h)anthracene[6]	--	NA	0 4	NA	NA	NA	NA	NA	0 051		0 4	Res DEC
	Fluoranthene[6]	--	NA	20	NA	NA	NA	NA	NA	0 44	- -	20	Res DEC
	Indeno(1,2,3-cd)pyrene[6]	--	NA	0 9	NA	NA	NA	NA	NA	0 20	- -	0 9	Res DEC
	Naphthalene[6]	0 8	NA	54	NA	NA	NA	NA	NA	0 050	- -	0 8	Leachability
	Pyrene[6]	--	NA	13	NA	NA	NA	NA	NA	0 60	- -	13	Res DEC
	Chlordane[6]	1 4	NA	0 5	NA	NA	NA	NA	NA	0 002	- -	0 5	Res DEC
	Dieldrin[6]	--	NA	0 04	NA	NA	NA	NA	NA	0 030	- -	0 04	Res DEC
	PCBs[6]	10	NA	10	NA	NA	NA	NA	NA	0 089	- -	10	Res DEC
	Antimony[6]	--	NA	10	NA	NA	NA	NA	NA	1 1	- -	10	Res DEC
	Arsenic[6]	--	NA	7	NA	NA	NA	NA	NA	5 1	1 7	7	Res DEC
	Beryllium[6]	--	NA	1 5	NA	NA	NA	NA	NA	0 27	- -	1 5	Res DEC
	Lead[6]	--	NA	150	NA	NA	NA	NA	NA	58	- -	150	Res DEC
	Manganese[6]	--	NA	390	NA	NA	NA	NA	NA	191	- -	390	Res DEC
	Thallium[6]	--	NA	5 5	NA	NA	NA	NA	NA	0 20	- -	5 5	Res DEC

TABLE 8. HUMAN HEALTH CLEANUP LEVELS FOR SOIL

Media/ Scenario	Contaminant	Regulatory Criteria: RIDEM Rem Regs [1] Leachability	RIDEM Rem Regs [1] I/C DEC	RIDEM Rem Regs [1] Res DEC	Risk-Based Cleanup Levels [2]: ILCR 10^{-6}	ILCR 10^{-5}	ILCR 10^{-4}	HQ = 1	Lead [5]	Additional Information: Site-specific Range of Reference Levels [3]	RI Background [4]	Selected Cleanup Level	Basis
Nunes Parcel/RIDEM Removal Area Soil - mg/kg (Commercial Worker Scenario)													
	Benzene	0 2	200	NA	5 1	51	509	423	NA	- -	- -	0 2	Leachability
	Benzo(a)anthracene	--	7 8	NA	2 9	29	287	NA	NA	0 28	- -	2 9	ILCR = 10^{-6}
	Benzo(a)pyrene	240	0 8	NA	0 29	2 9	29	NA	NA	0 30	- -	0 30	Reference
	Benzo(b)fluoranthene	--	7 8	NA	2 9	29	289	NA	NA	0 42	- -	2 9	ILCR = 10^{-6}
	bis(2-Ethylhexyl)phthalate	120	410	NA	164	1641	16413	16413	NA	0 17	- -	120	Leachability
	Dibenz(a,h)anthracene	--	0 8	NA	0 29	2 9	29	NA	NA	0 051		0 29	ILCR = 10^{-6}
	Indeno(1,2,3-cd)pyrene [6]	--	7 8	NA	NA	NA	NA	NA	NA	0 20	- -	7 8	I/C DEC
	Naphthalene	0 8	10000	NA	17	167	1671	585	NA	0 050	- -	0 8	Leachability
	Dioxin TEQ	--	--	NA	0 000015	0 00015	0 0015	0 00072	NA	0 000023	- -	0 000023	Reference
	Dieldrin	--	0 4	NA	0 14	1 4	14	41	NA	0 030	- -	0 14	ILCR = 10^{-6}
	Arsenic	--	7	NA	3 0	30	300	479	NA	5 1	1 7	5 1	Reference
	Beryllium [6]	--	1 5	NA	NA	NA	NA	NA	NA	0 27	- -	1 5	I/C DEC
	Lead	--	500	NA	NA	NA	NA	NA	2240	58	- -	500	I/C DEC
Nunes Parcel/RIDEM Removal Area Soil - mg/kg (Construction Worker Scenario)													
	Lead	--	NA	NA	NA	NA	NA	NA	910	58	- -	910	Lead

Notes

ILCR - Incremental Lifetime Cancer Risk

HQ - Hazard Quotient

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

1 RIDEM Rem Regs - RIDEM Remediation Regulations, DEM-DSR-01-93, February 2004, Table 1 (Residential Direct Exposure Criteria [DEC] and Industrial/Commercial [I/C] DEC) and Table 2 (GA Leachability Criteria), - - = no criterion

2 Risk-based cleanup levels are developed based on risk results from the human health risk assessment and consider the ingestion, dermal and inhalation routes of exposure, as applicable
Note that revisions to toxicity data since the Baseline HHRA and Supplemental HHRA for Unnamed Island have resulted in tetrachloroethene no longer being a risk driver Furthermore, dioxin previously did not have non-carcinogenic effects and arsenic previously did not account for relative bioavailability
PRG calculations are subject to change based on future changes to toxicity values

3 Geometric mean of Quinnville Wellfield locations LQW-014 to -018, SO-001-BG to SO-005-BG, SO-075-QW, and SO-076-QW, except for Dioxin TEQ, which was taken from Appendix A of Supplemental BERA for Unnamed Island, - - = not detected

4 Arsenic background based on Office Of Waste Management Policy Memo 00-01, Guidance for Arsenic in Soil, September 22, 2000

5 Risk-based soil lead cleanup levels were calculated utilizing EPA child and adult lead models for the appropriate exposure scenarios - See Appendix C 6 of FS

6 Analyte included only due to detections in exceedance of RIDEM Regulatory Criteria As this analyte was not determined to be a risk driver in the Baseline Human Health Risk Assessment, risk-based cleanup level calculations are not included for this analyte/exposure scenario

Appendix F:

Acronyms and Abbreviations

LIST OF ACRONYMS

AOC	Administrative Order on Consent
ALM	Adult Lead Model
ARAR	Applicable or Relevant and Appropriate Requirement
BEHP	Bis(2-ethylhexyl)phthalate
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BHC	Benzene hexachloride
BHHRA	Baseline Human Health Risk Assessment
BLL	Blood Lead Level
BMP	Best Management Practice
BSAF	Biota-Soil Accumulation Factor
CBR	Critical Body Residue
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
cm	centimeter
COC	Chemicals [or Contaminant] of Concern
COPEC	Contaminant of Potential Ecological Concern
CRIR	Code of Rhode Island Regulations
CRP	Community Relations Plan
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
CTE	Central Tendency Exposure
CVOC	Chlorinated Volatile Organic Compound
CWA	Clean Water Act
cy	cubic yard
DCE	Dichloroethene
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane
DEC	Direct Exposure Criteria
DF	Debris Field
dL	deciliter
EA	Exposure Area
EDI	Estimated Daily Intake
EPA	United States Environmental Protection Agency
EPC	Exposure Point Concentration
ESD	Explanation of Significant Differences
FIRM	Flood Insurance Rate Map
f_{oc}	fraction of organic carbon
FS	Feasibility Study
GZA	Goldberg Zoino & Associates, Inc. or GZA GeoEnvironmental, Inc.

HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
hr	hour
ICs	Institutional Controls
Id	*Idem* ("the same")
ILCR	Incremental Lifetime Cancer Risk
IUR	Inhalation Unit Risk
kg	kilogram
L	liter
LEDPA	Least Environmentally Damaging Practicable Alternative
LOAEL	Lowest Observed Adverse Effect Level
m	meter
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
mg	milligram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ng	nanogram
NOAEL	No Observed Adverse Effect Level
NPL	National Priorities List
NRWQC	National Recommended Water Quality Criteria
NTU	Nephelometric Turbidity Unit
O&M	Operation and Maintenance
ORNL	Oak Ridge National Laboratory
OSRR	Office of Site Remediation and Restoration
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
P&W	Providence and Worcester Railroad Company
PAH	Polyaromatic Hydrocarbon
PAL	Project Action Levels
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PEC	Probable Effect Concentration
ppb	parts per billion
ppm	parts per million
PQL	Practical Quantitation Limit
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
PS	Performance Standard
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RG	Remedial Goal
RI	Remedial Investigation
RI	Rhode Island

RIDEM	Rhode Island Department of Environmental Management
RIDOH	Rhode Island Department of Health
RIDOT	Rhode Island Department of Transportation
RI/FS	Remedial Investigation/Feasibility Study
RIGL	[State of] Rhode Island General Law
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RR	Residual Risk
RSL	Regional Screening Level
SARA	Superfund Amendments and Reauthorization Act
SEL	Severe Effects Level
SLERA	Screening Level Ecological Risk Assessment
SQT	Sediment Quality Triad
SSL	Soil Screening Level
SVOC	Semivolatile Organic Compound
TAG	Technical Assistance Grant
TASC	Technical Assistance Services for Communities
TBC	To Be Considered
TCA	1,1,1-Trichloroethane
TCE	Trichloroethene
TEC	Threshold Effect Concentration
TEQ	Toxicity Equivalent Quotient
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRV	Toxicity Reference Value
TSCA	Toxic Substances Control Act
UCL	Upper Confidence Limit
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
ug	microgram
USC	United States Code
VOC	Volatile Organic Compound

Appendix G:

Administrative Record Index and Guidance Documents

Phase 01: SITE ASSESSMENT

26767 **POTENTIAL HAZARDOUS WASTE SITE IDENTIFICATION, PRELIMINARY ASSESSMENT (PA), CUMBERLAND LANDFILL (4/14/1982 AND 12/21/1979 FORMS AND NPL CHECKLIST ARE ATTACHED)**

# of Pages: 19
Doc Date: 12/18/1979

Author: , US EPA REGION 1

Addressee:

Doc Type: PRELIMINARY ASSESSMENT (I
REPORT

File Break: 01.02
Access Type(s): REL

26930 **REMOVAL PROGRAM PRELIMINARY ASSESSMENT/SITE INVESTIGATION (PA/SI) REPORT FOR J M MILLS LANDFILL SITE**

# of Pages: 58
Doc Date: 06/01/1991

Author: , ROY F WESTON INC
, US EPA REGION 1

Addressee:

Doc Type: PRELIMINARY ASSESSMENT (I
REPORT
SITE INSPECTION (SI)

File Break: 01.02
Access Type(s): REL

297159 **FINAL FEDERAL REGISTER NOTICE VOL 48 NO 175 - SITE LISTING ON THE NATIONAL PRIORITIES LIST (NPL)**

# of Pages: 42
Doc Date: 09/08/1983

Author: , FEDERAL REGISTER

Addressee:

Doc Type: REPORT

File Break: 01.06
Access Type(s): REL

Phase 01: SITE ASSESSMENT

565450 **PHASE 2 SUBSURFACE SITE INVESTIGATION REPORT**

# of Pages: 157
Doc Date: 09/01/2014

Author: , LAKE SHORE ENVIRONMENTAL

Addressee: NAYAN PATEL, SLM PROPERTIES, LLC

Doc Type: REPORT
SITE INSPECTION (SI)

File Break: 01.03

Access Type(s): REL

Phase 02: REMOVAL RESPONSE

26884 **REQUEST FOR REMOVAL ACTION AT SITE**

# of Pages: 7
Doc Date: 09/25/1991

Author: PAUL R GROULX, US EPA REGION 1
Addressee: JULIE BELAGA, US EPA REGION 1
Doc Type: CORRESPONDENCE
MEMO
File Break: 02.01
Access Type(s): REL

26897 **FIRE INCIDENT REPORT FOR J M MILLS**

# of Pages: 2
Doc Date: 03/03/1991

Author: ROBERT GARON, BERKELEY FIRE DISTRICT
Addressee:
Doc Type: REPORT
File Break: 02.01
Access Type(s): REL

26904 **J M MILLS SITE INVENTORY FILE**

# of Pages: 100
Doc Date: 05/12/1992

Author: PAUL R GROULX, US EPA REGION 1
Addressee: DAVID J NEWTON, US EPA REGION 1
Doc Type: MISC
File Break: 02.02
Access Type(s): REL

Phase 02: REMOVAL RESPONSE

26932 **UNIFORM HAZARDOUS WASTE MANIFEST - CLEAN HARBORS OF KINGSTON INC**

# of Pages: 1
Doc Date: 11/20/1991

Author: MICHAEL BERRY, NONE
PAUL R GROULX, US EPA REGION 1
SCOTT R SULLIVAN, NONE
ALFRED A VIEIRA, NONE

Addressee:

Doc Type: FORM

File Break: 02.02
Access Type(s): REL

26933 **UNIFORM HAZARDOUS WASTE MANIFEST - CLEAN HARBORS OF KINGSTON INC**

# of Pages: 5
Doc Date: 11/19/1991

Author: PAUL R GROULX, US EPA REGION 1
SCOTT R SULLIVAN, NONE

Addressee:

Doc Type: FORM

File Break: 02.02
Access Type(s): REL

26934 **RECORD OF COMMUNICATION REGARDING ANALYSIS OF CONTENTS OF EXPOSED BARREL FOUND AT SITE**

# of Pages: 1
Doc Date: 09/07/1990

Author: LOUISE A HOUSE, US PUBLIC HEALTH SERVICE/ATSDR

Addressee: GEORGE BUYNOSKI, US PUBLIC HEALTH SERVICE/ATSDR

Doc Type: CORRESPONDENCE
MEMO
TELEPHONE MEMO

File Break: 02.02
Access Type(s): REL

Phase 02: REMOVAL RESPONSE

26941 **GAS CHROMATOGRAPHY-MASS SPECTROMETRY ANALYSIS OF EXTRACTABLE ORGANICS IN DRUM SAMPLES (RELATED DOCUMENTS ARE ATTACHED) - J M MILLS LANDFILL**

# of Pages: 21
Doc Date: 04/01/1992

Author: JOHN MIRISOLA, US EPA REGION 1
VORA SHIRISH, US EPA REGION 1
RICHARD SISCANAW, US EPA REGION 1

Addressee: DOROTHY GIRTEN, US EPA REGION 1
PAUL R GROULX, US EPA REGION 1

Doc Type: CORRESPONDENCE
MEMO

File Break: 02.03
Access Type(s): REL

26954 **ON-SCENE COORDINATOR'S REPORT (09/25/1991 - 04/14/1992)**

# of Pages: 84
Doc Date: 04/27/1992

Author: PAUL R GROULX, US EPA REGION 1
DAVID E STRZEMPKO, ROY F WESTON INC

Addressee:

Doc Type: REPORT

File Break: 02.05
Access Type(s): REL

559788 **LETTER WITH COMMENTS ON THE PROPOSED PLAN**

# of Pages: 85
Doc Date: 11/04/2014

Author: PETER E NANGERONI, WOODARD & CURRAN

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER
PROPOSED PLAN

File Break: 05.03
Access Type(s): REL

Phase 03: REMEDIAL INVESTIGATION (RI)

555340 **SLOPE STABILITY ANALYSIS REPORT**

# of Pages: **46**
Doc Date: **01/29/2004**

Author: , SHIELD ENGINEERING, INC

Addressee: , SHIELD ENVIRONMENTAL ASSOCIATES INC

Doc Type: REPORT

File Break: 03.04

Access Type(s): REL

Phase 04: FEASIBILITY STUDY (FS)

540999 **LETTER FROM LINCOLN TOWN ADMINISTRATOR WITH COMMENTS TO NATIONAL REMEDY REVIEW BOARD (NRRB) REGARDING OPERABLE UNIT (OU) 2 CLEANUP (ENVELOPE ATTACHED)**

# of Pages: 3
Doc Date: 09/11/2013

Author: T JOSEPH ALMOND, LINCOLN (RI) TOWN OF
N (RI)

Addressee: MICHAEL JASINSKI, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMME

File Break: 04.09
Access Type(s): REL

582102 **MEMO REVIEWING BACKGROUND SCREENING LEVELS FOR SEDIMENT AND SOIL SUPPLEMENTAL DATA COLLECTION EFFORTS TECHNICAL MEMO**

# of Pages: 13
Doc Date: 06/21/2013

Author: BART HOSKINS, US EPA REGION 1

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
MEMO

File Break: 04.01
Access Type(s): REL

582103 **MEMO REGARDING ADDITIONAL REFINEMENTS TO TERRESTRIAL ECOLOGICAL RISK CALCULATIONS**

# of Pages: 139
Doc Date: 04/12/2012

Author: BART HOSKINS, US EPA REGION 1

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
MEMO

File Break: 04.01
Access Type(s): REL

Phase 04: FEASIBILITY STUDY (FS)

582104 **MEMO REGARDING SEDIMENT CHEMICALS OF CONCERN (COC) REFINEMENT AND PRELIMINARY REMEDIATION GOALS (PRG) DEVELOPMENT**

# of Pages: 27
Doc Date: 04/11/2012

Author: BART HOSKINS, US EPA REGION 1

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
MEMO

File Break: 04.01

Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

559731 **EMAIL REGARDING DETAILS OF DEWIND (SUPPORTING DOCUMENTATION ATTACHED)**

# of Pages: 8
Doc Date: 12/09/2014

Author: L SMITH, NONE
Addressee: JAMES T OWENS, US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
File Break: 05.03
Access Type(s): REL

559777 **TRANSCRIPT: PUBLIC HEARING FOR PROPOSED PLAN (08/25/2014 CERTIFICATE ATTACHED)**

# of Pages: 31
Doc Date: 08/21/2014

Author:
Addressee:
Doc Type: PROPOSED PLAN
PUBLIC INFORMATION
File Break: 05.03
Access Type(s): REL

559778 **LETTER WITH REQUEST TO CONDUCT A SECOND PUBLIC HEARING ON THE PROPOSED REMEDIAL ACTION PLAN (PRAP)**

# of Pages: 2
Doc Date: 08/21/2014

Author: RYAN PEARSON, RI GENERAL ASSEMBLY
Addressee: MICHELLE LAUTERBACK, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PROPOSED PLAN
File Break: 05.03
Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

559779 **LETTER WITH REQUEST TO CONDUCT A SECOND PUBLIC HEARING ON THE PROPOSED REMEDIAL ACTION PLAN (PRAP)**

# of Pages: 1
Doc Date: 08/21/2014

Author: LAURIE WHITE, GREATER PROVIDENCE CHAMBER OF COMMERCE

Addressee: MICHELLE LAUTERBACK, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER
PROPOSED PLAN

File Break: 05.03
Access Type(s): REL

559780 **LETTER REQUESTING EXTENSION OF COMMENT PERIOD FOR THE REMEDIAL ACTION PROPOSED PLAN (PRAP)**

# of Pages: 1
Doc Date: 08/12/2014

Author: ROY P GIARRUSSO, GIARRUSSO NORTON COOLEY & MCGLONE PC

Addressee: MICHELLE LAUTERBACK, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER

File Break: 05.01
Access Type(s): REL

559789 **LETTER COMMENTING ON THE PROPOSED PLAN**

# of Pages: 3
Doc Date: 10/10/2014

Author: CHARLENE PERKINS CUTLER, BLACKSTONE RIVER VALLEY NATIONAL HERITAGE

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER
PROPOSED PLAN

File Break: 05.03
Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

559790 **LETTER REQUESTING EXTENSION FOR COMMENTING ON THE PROPOSED PLAN**

# of Pages: 1
Doc Date: 10/24/2014

Author: DANIEL J MCKEE, CUMBERLAND (RI) TOWN OF

Addressee: MICHAEL JASINSKI, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER
PROPOSED PLAN

File Break: 05.03
Access Type(s): REL

559791 **LETTER SUPPORTING EXTENSION OF COMMENTS DEADLINE**

# of Pages: 1
Doc Date: 10/28/2014

Author: MARCEL VALOIS, RHODE ISLAND COMMERCE CO.

Addressee: MICHAEL JASINSKI, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER

File Break: 05.03
Access Type(s): REL

559792 **LETTER COMMENTING ON THE PROPOSED PLAN**

# of Pages: 3
Doc Date: 10/31/2014

Author: EUGENIA MARKS, AUDUBON SOCIETY OF RHODE ISLAND

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER

File Break: 05.03
Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

559793 **LETTER COMMENTING ON THE PROPOSED PLAN**

# of Pages: 3
Doc Date: 10/29/2014

Author: THOMAS R CHAPMAN, US DEPT OF INTERIOR - FISH & WILDLIFE SERVICE

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER

File Break: 05.03

Access Type(s): REL

559794 **COMMENTS ON THE PROPOSED PLAN**

# of Pages: 4
Doc Date: 10/28/2014

Author: JOHN MARSLAND, NONE

Addressee:

Doc Type: CORRESPONDENCE
LETTER

File Break: 05.03

Access Type(s): REL

559795 **EMAIL WITH QUESTIONS REGARDING THE PROPOSED PLAN (EMAIL HISTORY ATTACHED)**

# of Pages: 1
Doc Date: 08/13/2014

Author: ROBERT VANDERSLICE, RI DEPT OF HEALTH

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
EMAIL

File Break: 05.03

Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

559796 **TOWN COUNCIL OF THE TOWN OF LINCOLN'S RESOLUTION TO SUPPORT THE REMEDIATION PLAN**

# of Pages: 1
Doc Date: 10/06/2014

Author: KAREN D ALLEN, LINCOLN (RI) TOWN OF
N (RI)

Addressee:

Doc Type: LIST

File Break: 05.03
Access Type(s): REL

559797 **EMAIL COMMENTING ON THE PROPOSED PLAN**

# of Pages: 1
Doc Date: 10/20/2014

Author: CLAUDE COTE, LINCOLN (RI) RESIDENT
N (RI) RES

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
EMAIL

File Break: 05.03
Access Type(s): REL

559798 **EMAIL WITH QUESTIONS REGARDING THE PROPOSED PLAN**

# of Pages: 1
Doc Date: 10/09/2014

Author: ALICE R CLEMENTE, NONE

Addressee:

Doc Type: CORRESPONDENCE
EMAIL

File Break: 05.03
Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

559799 **LETTER COMMENTING ON THE PROPOSED PLAN**

# of Pages: 2
Doc Date: 10/15/2014

Author: ROBERT D BILLINGTON, BLACKSTONE VALLEY TOURISM COUNCIL

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER

File Break: 05.03
Access Type(s): REL

565452 **[REDACTED] PUBLIC COMMENTS ON PROPOSED PLAN REGARDING CONCERNS ABOUT WETLAND CLEANUP AND THE OVERFLOWING OF PONDS A THROUGH D**

# of Pages: 4
Doc Date: 10/08/2014

Author: DUNCAN MCSWEENEY, CUMBERLAND (RI) RESIDENT

Addressee:

Doc Type: CORRESPONDENCE
LETTER

File Break: 05.03
Access Type(s): REL

568700 **EMAIL WITH RENDERINGS FOR THE PROPOSED PLAN**

# of Pages: 5
Doc Date: 08/22/2014

Author: ROY P GIARRUSSO, GIARRUSSO NORTON COOLEY & MCGLONE PC

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
EMAIL

File Break: 05.03
Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

568701 **LETTER COMMENTING ON THE PROPOSED PLAN**

# of Pages: 3
Doc Date: 11/06/2014

Author: JONATHAN STONE, SAVE THE BAY

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER

File Break: 05.03
Access Type(s): REL

568702 **TRANSCRIPT OF THE SECOND EPA PUBLIC HEARING**

# of Pages: 48
Doc Date: 10/08/2014

Author: , ALLIED COURT REPORTERS INC

Addressee:

Doc Type: PROPOSED PLAN
PUBLIC INFORMATION

File Break: 05.03
Access Type(s): REL

568704 **LETTER COMMENTING ON THE PROPOSED PLAN**

# of Pages: 28
Doc Date: 11/18/2014

Author: AMANDA LUDLOW, ROUX ASSOCIATES INC

LAWRENCE MCTIERNAN, ROUX ASSOCIATES

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER

File Break: 05.03
Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

568705 **SUPPORTING DATA FOR THE WATER BALANCE FOR THE ET CAP**

# of Pages: 216
Doc Date: 01/01/1111

Author: , ROUX ASSOCIATES INC
Addressee:
Doc Type: CORRESPONDENCE
LETTER
File Break: 05.03
Access Type(s): REL

568718 **LETTER COMMENTING ON THE PROPOSED PLAN**

# of Pages: 2
Doc Date: 12/09/2014

Author: KENNETH FINKELSTEIN, US NATIONAL OCEANIC AND ATMOSPHERIC
Addressee: DAVID J NEWTON, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PROPOSED PLAN
File Break: 05.03
Access Type(s): REL

568721 **LETTER REQUESTING EXTENSION OF THE COMMENT PERIOD**

# of Pages: 1
Doc Date: 12/01/2014

Author: H CURTIS SPALDING, US EPA REGION 1
Addressee: JACK REED, US SENATE
Doc Type: CORRESPONDENCE
LETTER
File Break: 05.03
Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

568722 **LETTER REQUESTING EXTENSION OF THE COMMENT PERIOD**

# of Pages: 1
Doc Date: 12/01/2014

Author: H CURTIS SPALDING, US EPA REGION 1
Addressee: SHELDON WHITEHOUSE, UNITED STATES SENATE
Doc Type: CORRESPONDENCE
LETTER
File Break: 05.03
Access Type(s): REL

568726 **LETTER REQUESTING EXTENSION OF THE COMMENT PERIOD**

# of Pages: 1
Doc Date: 12/01/2014

Author: H CURTIS SPALDING, US EPA REGION 1
Addressee: DAVID N CICILLINE, US HOUSE OF REPRESENTATIVES
Doc Type: CORRESPONDENCE
LETTER
File Break: 05.03
Access Type(s): REL

568727 **LETTER COMMENTING ON THE PROPOSED PLAN (GZA GEOENVIRONMENTAL INC. COMMENTS ATTACHED)**

# of Pages: 30
Doc Date: 01/22/2015

Author: WILLIAM MURRAY, US EPA
Addressee: DAVID J NEWTON, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
File Break: 05.03
Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

568731 **LETTER PROVIDING ADDITIONAL COMMENTS ON THE PROPOSED PLAN**

# of Pages: 10
Doc Date: 01/23/2015

Author: ALAN BENEVIDES, WOODWARD & CURRAN
PETER E NANGERONI, WOODARD & CURRAN

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER

File Break: 05.03
Access Type(s): REL

568784 **TECHNICAL MEMORANDUM REGARDING INNOVATIVE TECHNOLOGIES FOR USE IN CAP DESIGN AND CONSTRUCTION**

# of Pages: 290
Doc Date: 06/15/2015

Author: , AECOM

Addressee:

Doc Type: CORRESPONDENCE
MEMO

File Break: 05.01
Access Type(s): REL

568795 **LETTER GRANTING EXTENSION TO THE PUBLIC COMMENT PERIOD**

# of Pages: 2
Doc Date: 11/12/2014

Author: BRYAN OLSON, US EPA REGION 1

Addressee: DANIEL J MCKEE, CUMBERLAND (RI) TOWN OF
ND (RI)

Doc Type: CORRESPONDENCE
LETTER

File Break: 05.01
Access Type(s): REL

Phase 05: RECORD OF DECISION (ROD)

568797 **TECHNICAL ASSISTANCE SERVICES FOR COMMNUNITIES (TASC) BROCHURE**

# of Pages: 2
Doc Date: 07/01/2013

Author: , US EPA REGION 1
Addressee:
Doc Type: FACT SHEET
File Break: 05.01
Access Type(s): REL

568799 **LETTER REGARDING TECHNICAL ASSISTANCE SERVICES FOR COMMUNITIES (TASC) PROPOSAL FOR TECHNICAL ASSISTANCE**

# of Pages: 1
Doc Date: 11/10/2014

Author: DANIEL J MCKEE, CUMBERLAND (RI) TOWN OF
Addressee: SARAH WHITE, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
File Break: 05.01
Access Type(s): REL

582110 **RECORD OF DECISION (ROD) FOR OPERABLE UNIT (OU) 2**

# of Pages: 466
Doc Date: 09/08/2015

Author: , US EPA REGION 1
Addressee:
Doc Type: DECISION DOCUMENT
RECORD OF DECISION (ROD) REPORT
File Break: 05.04
Access Type(s): REL

Phase 09: STATE COORDINATION

568734 **LETTER WITH INSIGNIFCANT ALTERATION - PERMIT, ASSESSOR'S PLAT 12, LOTS 4 AND 15**

# of Pages: 4
Doc Date: 02/17/2015

Author: CHARLES A HORBERT, RI DEPT OF ENVIRONMENTAL MANAGEMENT

Addressee: NAYAN PATEL, SLM PROPERTIES, LLC

Doc Type: CORRESPONDENCE
LETTER
WORK PLAN

File Break: 09.01

Access Type(s): REL

568785 **LETTER REGARDING COMMENT PERIOD FOR THE PROPOSED PLAN**

# of Pages: 1
Doc Date: 06/17/2015

Author: H CURTIS SPALDING, US EPA REGION 1

Addressee: JANET COIT, RI DEPT OF ENVIRONMENTAL MGMT

Doc Type: CORRESPONDENCE
LETTER

File Break: 09.01

Access Type(s): REL

568786 **LETTER REGARDING CONCERNS RHODE ISLAND DEPT. OF ENVIRONMENTAL MANAGEMENT (RIDEM) HAS WITH THE SELECTED REMEDIAL ACTION (RA)**

# of Pages: 2
Doc Date: 05/26/2015

Author: JANET COIT, RI DEPT OF ENVIRONMENTAL MGMT

Addressee: H CURTIS SPALDING, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER

File Break: 09.01

Access Type(s): REL

Phase 09: STATE COORDINATION

568796 **ANNUAL REPORT FOR FISCAL YEAR 2002 FOR OIL SPILL PREVENTION, ADMINISTRATION AND RESPONSE (OSPAR) FUND**

# of Pages: 13
Doc Date: 04/01/2003

Author: JAN H REITSMAN, RI DEPT OF ENVIRONMENTAL MANAGEMENT

Addressee:

Doc Type: REPORT

File Break: 09.10
Access Type(s): REL

568798 **REVISED RHODE ISLAND SOIL EROSION AND SEDIMENT CONTROL HANDBOOK**

# of Pages: 422
Doc Date: 08/13/2014

Author: , RHODE ISLAND COASTAL RESOURCES MANAGEMENT COUNCIL
, RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
, RHODE ISLAND DEPARTMENT OF TRANSPORTATION
, RHODE ISLAND STATE CONSERVATION COMMITTEE
, UNIVERSITY OF RHODE ISLAND

Addressee:

Doc Type: REPORT

File Break: 09.10
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

27191 **LAND DISPOSAL SITE INVESTIGATION REPORT**

# of Pages: 10
Doc Date: 11/28/1967

Author:
Addressee:
Doc Type: REPORT
File Break: 10.03
Access Type(s): REL

30386 **LANDFILL DISPOSAL SITE INSPECTION REPORT**

# of Pages: 2
Doc Date: 11/20/1973

Author: JAMES CULLINANE, RI DEPT OF HEALTH
Addressee:
Doc Type: FORM
File Break: 10.03
Access Type(s): REL

30405 **RHODE ISLAND DEPARTMENT OF HEALTH DIVISON OF SOLID WASTE MANAGEMENT - FIELD VISIT**

# of Pages: 1
Doc Date: 05/08/1974

Author: JAMES CULLINANE, RI DEPT OF HEALTH
FRANK B STEVENSON, RI DEPT OF HEALTH
Addressee:
Doc Type: FORM
File Break: 10.03
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

30517 **RHODE ISLAND DEPARTMENT OF HEALTH DIVISON OF SOLID WASTE MANAGEMENT - FIELD VISIT (PHOTO IS ATTACHED)**

# of Pages: 2
Doc Date: 08/29/1974

Author: JAMES CULLINANE, RI DEPT OF HEALTH
Addressee:
Doc Type: FORM
File Break: 10.03
Access Type(s): REL

31798 **NOTES REGARDING ACTIVITIES AT J M MILLS LANDFILL AND BLACKSTONE RIVER (07/01/74 HANDWRITTEN NOTE IS ATTACHED)**

# of Pages: 1
Doc Date: 10/02/1973

Author:
Addressee:
Doc Type: NOTES
File Break: 10.04
Access Type(s): REL

32109 **STATE AND LOCAL ENFORECMENT RECORDS OF POTENTIALLY RESPONSIBLE PARTY (PRP) CORRESPONDENCE IN REFERENCE TO LANDFILL CLOSURE**

# of Pages: 62
Doc Date: 01/01/1978

Author:
Addressee:
Doc Type: CORRESPONDENCE
LETTER
File Break: 10.04
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

32118 **COMMENTS REGARDING 08/18/83 INSPECTION OF UNKNOWN BARRELS**

# of Pages: 1
Doc Date: 08/30/1983

Author: JOHN P LEO, RI DEPT OF ENVIRONMENTAL MANAGEMENT
Addressee: , FILE
Doc Type: CORRESPONDENCE
MEMO
File Break: 10.03
Access Type(s): REL

32119 **RESULTS OF 09/01/83 INSPECTION OF BARRELS (RELATED DOCUMENTS ARE ATTACHED)**

# of Pages: 4
Doc Date: 09/07/1983

Author: JOHN P LEO, RI DEPT OF ENVIRONMENTAL MANAGEMENT
Addressee: FRANK B STEVENSON, RI DEPT OF ENVIRONMENTAL MANAGEMENT
Doc Type: CORRESPONDENCE
MEMO
File Break: 10.03
Access Type(s): REL

32279 **DEPARTMENT OF ENVIRONMENTAL MANAGEMENT, DIVISION OF AIR AND HAZARDOUS MATERIALS -- NOTICE OF VIOLATION AND ORDER**

# of Pages: 2
Doc Date: 12/27/1985

Author: THOMAS D GETZ, RI DEPT OF ENVIRONMENTAL MANAGEMENT
Addressee: JOSEPH MARSZALKOWSKI, J M MILLS INC
Doc Type: FORM
File Break: 10.03
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

32335 **REQUEST FOR EPA ID NUMBER FOR COORDINATION OF HAZARDOUS WASTE REGULATORY ACTIVITIES FOR J M MILLS**

# of Pages: 1
Doc Date: 09/13/1983

Author: STEPHEN MAJKUT, RI DEPT OF ENVIRONMENTAL MANAGEMENT

Addressee: FRANK BATTAGLIA, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER

File Break: 10.03
Access Type(s): REL

38119 **DEPOSITION TRANSCRIPT OF GARRETT F KEEGAN**

# of Pages: 29
Doc Date: 05/19/1983

Author:

Addressee:

Doc Type: ENFORCEMENT & SETTLEMEI

File Break: 10.09
Access Type(s): REL

38154 **COMPLAINT FILED FOR UNILEVER BESTFOODS, ET AL V AMERICAN STEEL, ET AL, C. A. NO. 01-496L**

# of Pages: 12
Doc Date: 10/15/2001

Author: , CCL CUSTOM MFG INC

, UNILEVER BEST FOODS (FORMERLY CPC INTERNATIONAL) E

Addressee: , US DISTRICT COURT/DISTRICT OF RI

Doc Type: ENFORCEMENT & SETTLEMEI

File Break: 10.09
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

299733 **DEPOSITION TRANSCRIPT OF THOMAS A CASTELLO - VOL 1**

# of Pages: 69
Doc Date: 02/06/2009

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

299734 **DEPOSITION TRANSCRIPT OF THOMAS A CASTELLO - VOL 2**

# of Pages: 140
Doc Date: 03/11/2009

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

457600 **DEPOSITION TRANSCRIPT OF JOHN CASTELLO - VOL 1**

# of Pages: 58
Doc Date: 05/13/2009

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

457601 **DEPOSITION TRANSCRIPT OF JOHN CASTELLO - VOL 2**

# of Pages: 131
Doc Date: 05/14/2009

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

457602 **DEPOSITION TRANSCRIPT OF PHILIP LOUIS LAPRE - VOL 1**

# of Pages: 66
Doc Date: 12/18/2008

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

457603 **DEPOSITION TRANSCRIPT OF PHILIP LOUIS LAPRE - VOL 2**

# of Pages: 78
Doc Date: 02/05/2009

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

457604 **DEPOSITION TRANSCRIPT OF MAURICE H LUTHY - VOL 1**

# of Pages: 51
Doc Date: 06/02/2009

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

457605 **DEPOSITION TRANSCRIPT OF MAURICE H LUTHY - VOL 2**

# of Pages: 101
Doc Date: 06/03/2009

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

457606 **DEPOSITION TRANSCRIPT OF STEVEN MARCACCIO - VOL 1**

# of Pages: 64
Doc Date: 05/07/2009

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

457607 **DEPOSITION TRANSCRIPT OF STEVEN MARCACCIO - VOL 2**

# of Pages: 54
Doc Date: 05/08/2009

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

457608 **DEPOSITION TRANSCRIPT OF ERNEST ROCHA - VOL 1**

# of Pages: 192
Doc Date: 03/25/2008

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

457609 **DEPOSITION TRANSCRIPT OF ERNEST ROCHA - VOL 2**

# of Pages: 7
Doc Date: 05/13/2009

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

459578 **DEPOSITION TRANSCRIPT OF RICHARD ELDERKIN**

# of Pages: 82
Doc Date: 07/28/2009

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

459579 **DEPOSITION TRANSCRIPT OF MICHAEL L SHEA**

# of Pages: 206
Doc Date: 10/05/2009

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

470530 **DEPOSITION TRANSCRIPT OF WILLIAM MURRAY (EXHIBITS ATTACHED)**

# of Pages: 467
Doc Date: 03/03/2010

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

470531 **DEPOSITION TRANSCRIPT OF STEPHEN R MESSINGER (EXHIBITS ATTACHED)**

# of Pages: 368
Doc Date: 03/12/2010

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

470533 **DEPOSITION TRANSCRIPT OF BRADFORD C MIDDLESWORTH (EXHIBITS ATTACHED)**

# of Pages: 877
Doc Date: 05/12/2010

Author:
Addressee:
Doc Type: ENFORCEMENT & SETTLEMEI INTERVIEW
File Break: 10.04
Access Type(s): REL

511404 **EXHIBITS 1-7 FOR DEPOSITION OF ERNEST ROCHA: J.M. MILLS LANDFILL RECEIPTS DATED 09/01/1981 - 03/26/1982**

# of Pages: 236
Doc Date: 03/26/1982

Author:
Addressee:
Doc Type: TRANSACTIONAL DATA
File Break: 10.04
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

511405 **EXHIBITS 1-7 FOR DEPOSITION OF JOHN CASTELLO: J.M. MILLS LANDFILL RECEIPTS DATED 12/05/1980 - 04/12/1982**

# of Pages: 854
Doc Date: 04/15/1982

Author:
Addressee:
Doc Type: TRANSACTIONAL DATA
File Break: 10.04
Access Type(s): REL

511406 **EXHIBITS 1-16 FOR DEPOSITION OF MAURICE H LUTHY: RESUME AND J.M. MILLS LANDFILL TICKETS DATED 11/17/1980 - 04/09/1982**

# of Pages: 915
Doc Date: 04/09/1982

Author:
Addressee:
Doc Type: TRANSACTIONAL DATA
File Break: 10.04
Access Type(s): REL

511407 **EXHIBITS 1-4 FOR DEPOSITION OF MICHAEL L SHEA: 10/12/1993 AFFIDAVIT, 03/31/1980-06/22/1982 MASTER ROLL-OFF ROUTE SHEETS AND 08/14/1978-02/24/1982 CAL'S ENTERPRISES DRIVERS DAILY REPORTS**

# of Pages: 338
Doc Date: 10/12/1993

Author:
Addressee:
Doc Type: TRANSACTIONAL DATA
File Break: 10.04
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

511408 **EXHIBITS 1-7 FOR DEPOSITION OF PHILIP LOUIS LAPRE: J.M. MILLS LANDFILL TICKETS DATED 12/09/1980 - 03/29/1982**

# of Pages: 104
Doc Date: 03/29/1982

Author: , J.M. MILLS, INC.

Addressee:

Doc Type: TRANSACTIONAL DATA

File Break: 10.04
Access Type(s): REL

511409 **EXHIBITS 1-5 FOR DEPOSITION OF STEPHEN MARCACCIO: J.M. MILLS LANDFILL TICKETS DATED 11/17/1980 - 03/31/1982**

# of Pages: 181
Doc Date: 03/31/1982

Author:

Addressee:

Doc Type: TRANSACTIONAL DATA

File Break: 10.04
Access Type(s): REL

511410 **EXHIBITS 1-3 FOR DEPOSITION OF THOMAS A CASTELLO: 12/15/1980-03/24/1982 J.M. MILLS LANDFILL TICKETS, 01/14/1981-05/25/1982 GODITT & BOYER RECEIPTS, 01/16/1973-08/10/1973 ROUTE SHEETS AND 10/05/1973 DEMPSTER ROUTE SHEET**

# of Pages: 66
Doc Date: 05/25/1982

Author:

Addressee:

Doc Type: TRANSACTIONAL DATA

File Break: 10.04
Access Type(s): REL

Phase 10: ENFORCEMENT/NEGOTIATION

526892 **COMMENTS REGARDING 09/10/1983 SITE VISIT (PHOTOGRAPHS ATTACHED)**

# of Pages: 2
Doc Date: 09/15/1983

Author: JOHN P LEO, RI DEPT OF ENVIRONMENTAL MANAGEMENT
Addressee: FRANK B STEVENSON, RI DEPT OF ENVIRONMENTAL MANAGEMENT
Doc Type: CORRESPONDENCE
MEMO
PHOTOGRAPH
File Break: 10.03
Access Type(s): REL

578439 **LEXIS NEXIS CASE SUMMARY - JM MILLS INC V MURPHY**

# of Pages: 14
Doc Date: 02/26/1976

Author: , LEXIS-NEXIS
Addressee:
Doc Type: REPORT
File Break: 10.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

17557 **COMMENTS REGARDING POSSIBLE INVOLVEMENT AT SITE (RELATED DOCUMENTS ARE ATTACHED)**

# of Pages: 151
Doc Date: 06/07/1999

Author: MICHELLE LAUTERBACK, US EPA REGION 1

Addressee: DENNIS H ESPOSITO, ALDER POLLOCK & SHEEHAN

Doc Type: CORRESPONDENCE
LETTER

File Break: 11.09
Access Type(s): REL

17793 **GENERAL NOTICE LETTER (GNL) - CCL CUSTOM MANUFACTURING INC (09/24/1999 FEDEX AIRBILL ATTACHED)**

# of Pages: 75
Doc Date: 09/24/1999

Author: , US EPA REGION 1

Addressee: JONATHAN A MURPHY, LESTER SCHWAB KATZ & DWYER LLP

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

20152 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - CORNING INC (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 40
Doc Date: 12/30/1999

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: ROGER G ACKERMAN, CORNING INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

20959 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - DAVID J BRASK (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 45
Doc Date: 11/25/1998

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: DAVID J BRASK, GODITT & BOYER INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

23098 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - LINDA MARSZALKOWSKI C/O JM MILLS INC**

# of Pages: 36
Doc Date: 11/25/1998

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: LINDA MARSZALKOWSKI, J M MILLS INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

23116 **GENERAL NOTICE LETTER/INVITATION TO PERFORM OR FINANCE PROPOSED CLEANUP ACTIVITIES - J M MILLS INC**

# of Pages: 6
Doc Date: 10/07/1991

Author: EDWARD J CONLEY, US EPA REGION 1

Addressee: JOSEPH MARSZALKOWSKI, J M MILLS INC

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

24238 **RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (DEM), DIVISION OF AIR AND HAZARDOUS MATERIALS COMPLAINT REPORT**

# of Pages: 6
Doc Date: 08/21/1986

Author: FELIX HARVEY, RI DEPT OF ENVIRONMENTAL MANAGEMENT
Addressee:
Doc Type: REPORT
File Break: 11.09
Access Type(s): REL

24323 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - MICHAEL JOHN REALTY (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 42
Doc Date: 12/30/1999

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: JOHN A NUNES, MICHAEL JOHN REALTY
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

24435 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - CLEAN HARBORS INC (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 50
Doc Date: 08/24/2000

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: , CLEAN HARBORS INC
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

24436 **RESPONSE TO US EPA REQUEST FOR INFORMATION REGARDING RECYCLING INDUSTRIES INC**

# of Pages: 8
Doc Date: 05/17/2001

Author: ROY P GIARRUSSO, GIARRUSSO NORTON COOLEY & MCGLONE PC

Addressee: MICHELLE LAUTERBACK, US EPA REGION 1

Doc Type: CORRESPONDENCE
LETTER

File Break: 11.09
Access Type(s): REL

24456 **GENERAL NOTICE LETTER (GNL) - NUNES DISPOSAL INC (MICHAEL JOHN REALTY) (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 11
Doc Date: 12/30/1999

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: MICHAEL NUNES, NUNES DISPOSAL SERVICE

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

24472 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - CLEAN HARBORS INC (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 48
Doc Date: 12/30/1999

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: , CLEAN HARBORS INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

24481 **COMMONWEALTH OF MASSACHUSETTS MONTHLY OPERATION REPORT FOR RECYCLING INDUSTRIES INC (RELATED DOCUMENTS ARE ATTACHED)**

# of Pages: 7
Doc Date: 11/01/1977

Author:	Addressee:	Doc Type:	File Break: 11.09
		MISC	Access Type(s): REL

25784 **MONTHLY OPERATIONAL REPORTS (10/01/1978 - 05/01/1979) - RECYCLING INDUSTRIES INC (RII)**

# of Pages: 42
Doc Date: 01/23/2001

Author:	Addressee:	Doc Type:	File Break: 11.09
ROY P GIARRUSSO, GIARRUSSO NORTON COOLEY & MCGLONE PC	MICHELLE LAUTERBACK, US EPA REGION 1	TRANSACTIONAL DATA	Access Type(s): REL

25929 **GENERAL NOTICE LETTER (GNL) - WASTE MANAGEMENT OF NORTH AMERICA (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 38
Doc Date: 06/07/2001

Author:	Addressee:	Doc Type:	File Break: 11.09
PATRICIA L MEANEY, US EPA REGION 1	JAMES M ROONEY, WASTE MANAGEMENT OF NORTH AMERICA INC	CORRESPONDENCE GENERAL NOTICE LETTER LETTER	Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

27207 **HAZARDOUS WASTE MANIFESTS AND SHIPPING PAPERS FROM JM MILLS INC TO RECYCLING INDUSTRIES**

# of Pages: 2
Doc Date: 09/16/1983

Author:
Addressee:
Doc Type: FORM
TRANSACTIONAL DATA
File Break: 11.05
Access Type(s): REL

28771 **GENERAL NOTICE LETTER - GTE OPERATIONS SUPPORT INC (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 21
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: ALVIN E LUDWIG, GTE
Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

28782 **GENERAL NOTICE LETTER AND 104E LETTER- THREE R TRANSPORTATION INC (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 137
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: ROBERT G FUNKE, LAW OFFICES ROBERT G FUNKE
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

28967 **GENERAL NOTICE LETTER AND 104E LETTER - TIMEX CORPORATION INC (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: , TIMEX CORPORATION
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

28973 **GENERAL NOTICE LETTER AND 104E LETTER - VA HOSPITAL (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: TIM S MCCLAIN, US DEPT OF VETERANS AFFAIRS
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

28978 **GENERAL NOTICE LETTER AND 104E LETTER - WESTERN ELECTRIC (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: , LUCENT TECHNOLOGIES INC (W ESTERN ELECTRIC)
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

28982 **GENERAL NOTICE LETTER - RAYTHEON COMPANY (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 21
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: KEN TIERNEY, RAYTHEON COMPANY
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
LETTER
File Break: 11.09
Access Type(s): REL

28992 **GENERAL NOTICE LETTER (GNL) - SEQUA (SUN CHEMICAL CORPORATION) (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 21
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: BILL GENDREAU, SEQUA CORP
Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

28994 **GENERAL NOTICE LETTER AND 104E LETTER - FOXBORO CO (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: , FOXBORO CO (AKA INVENSYS SYSTEMS INC)
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

29015 **GENERAL NOTICE LETTER - HARVARD UNIVERSITY (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 21
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: MARY T FEENEY, HARVARD UNIVERSITY

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29020 **GENERAL NOTICE LETTER - HONEYWELL (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 21
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: DAVID P COOKE, HONEYWELL INTERNATIONAL INC

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29022 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST- I.C.I. / ICI AMERICAS IN CARE OF ASTRAZENECA (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 45
Doc Date: 01/02/2002

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: JOSEPH C KELLY, ZENECA INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

29038 **GENERAL NOTICE LETTER AND 104E LETTER - MAINE ELECTRONICS (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: , ROCKWELL COLLINS INC (FORMERLY MAINE ELECTRONICS)

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29090 **GENERAL NOTICE LETTER AND 104E LETTER - DIGITAL EQUIPMENT (COMPAQ COMPUTER CORPORATION) (CERTIFIED MAIL RECEIPTS ARE ATTACTED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: WALT ROSENBERG, DIGITAL EQUIPMENT (COMPAQ COMPUTER CORP)

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29424 **GENERAL NOTICE LETTER AND 104E LETTER - COMPUGRAPHIC CORP (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 52
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: , COMPUGRAPHIC CORP (A/K/A AGFA CORP) (AKA)

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

29471 **GENERAL NOTICE LETTER AND 104E LETTER - AEROVOX (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: DANIEL N LOPES, AEROVOX
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

29477 **GENERAL NOTICE LETTER (GNL) / 104 REQUEST FOR ADDITIONAL INFORMATION - ARMSTRONG HOLDINGS INC (CERTIFIED MAIL RECEIPTS, FAX TRANSMITTAL SHEET AND COPY OF FIRST PAGE ATTACHED)**

# of Pages: 44
Doc Date: 08/06/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: ELIZABETH B DAVIS, WOMBLE CARLYLE SANDRIDGE & RICE
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

29478 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - MORSE CUTTING TOOL DIVISION (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: WILLIAM HAGEN, MORSE CUTTING TOOL DIVISION
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

29479 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - MICROWAVE ASSOCIATES (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: , M/A-COM INC (FORMERLY MICROWAVE ASSOCIATES)

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29480 **GENERAL NOTICE LETTER AND 104E LETTER - LIQWACON (ENVIRITE CORP) (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: JAMES CASSIDY, ENVIRITE CORP (FORMERLY LIQWACON)

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29481 **GENERAL NOTICE LETTER AND 104E LETTER - HAZELTINE (BAE SYSTEMS) (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: SUE TYNAN, HAZELTINE (A/K/A BAE SYSTEMS)

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

29482 **GENERAL NOTICE LETTER AND 104E LETTER - KAMAN AEROSPACE (CERTIFIED MAIL RECEIPT IS ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: WILLIAM PAKUNIS, KAMAN AEROSPACE CORP

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29483 **GENERAL NOTICE LETTER AND 104E LETTER - GENERAL ELECTRIC (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: MARK HERWIG, GENERAL ELECTRIC CO (GE)
IC CO (GE)

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29484 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - GENERAL TIRE (CONTINENTAL GENERAL TIRE INC) (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: RICK LEDSINGER, CONTINENTAL GENERAL TIRE INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

29486 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - ADVANCED ENVIRONMENTAL TECHNOLOGY (C/O ONYX ENVIRONMENTAL SERVICES, LLC) (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: GREIG SIEDOR, ONYX ENVIRONMENTAL SERVICES, LLC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29487 **GENERAL NOTICE LETTER AND 104E LETTER - SCHEPENS EYE RESEARCH INSTITUTE (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: KIMBERLY GEER, EYE RESEARCH INSTITUTE

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29488 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - LOUIS M GERSON COMPANY (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: DAVE ANTESKI, LOUIS M GERSON CO

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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29489 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - TEXON USA INC (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: JACK DEMPSEY, TEXON USA INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29490 **GENERAL NOTICE LETTER AND 104E LETTER - CITY HOSPITAL (BOSTON MEDICAL CENTER) (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: , BOSTON MEDICAL CENTER (AKA CITY HOSPITAL)

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29491 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - UNION CARBIDE (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: , UNION CARBIDE

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

29492 **GENERAL NOTICE LETTER (GNL) AND 104 INFORMATION REQUEST - SHIPLEY CO (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: , SHIPLEY CO
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

29494 **GENERAL NOTICE LETTER AND 104E LETTER - CROSBY VALVE (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: ELLEN ROBERTS (A CROSBY VALVE INC) (AKA TYCO INC)
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

29495 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - SCOTT GRAPHICS (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: , SCOTT GRAPHICS
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

29496 **GENERAL NOTICE LETTER AND 104E LETTER - FAULKNER HOSPITAL (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: PAUL KEATING, FAULKNER HOSPITAL

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29500 **GENERAL NOTICE LETTER AND 104E LETTER - NEORESINS (POLYVINYL CHEMICAL) (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: , NEORESINS

, POLYVINYL CHEMICALS INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29502 **GENERAL NOTICE LETTER AND 104E LETTER - E C WHITNEY & SON (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 56
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: DONALD P NAGLE, LAW OFFICES OF DONALD P NAGLE, PC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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29508 **GENERAL NOTICE LETTER AND 104E LETTER - REVERE COPPER PRODUCTS (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: WAYNE LINN, REVERE COPPER PRODUCTS INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29686 **GENERAL NOTICE LETTER AND 104E LETTER - ACME SERVICE (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: , ACME SERVICE

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

29687 **GENERAL NOTICE LETTER AND 104E LETTER - COASTAL TRANSPORTATION SERVICES (CERTIFIED MAIL RECEIPT IS ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: , COASTAL SERVICE

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

29691 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - RE-UPPING / RUEPING EAST TANNERY (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: , RE-UPPING
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

29692 **GENERAL NOTICE LETTER AND 104E LETTER - M W CARR (CERTIFIED MAIL RECEIPT IS ATTACHED)**

# of Pages: 51
Doc Date: 12/19/2001

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: , M W CARR
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

32560 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - KMART CORP (06/24/2002 ROUTING AND TRANSMITTAL SLIP ATTACHED)**

# of Pages: 12
Doc Date: 06/21/2002

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: LOUIS ZEDNICK, KMART CORPORATION
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

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32561 **GENERAL NOTICE LETTER/104 REQUEST FOR INFORMATION - OWENS CORNING WORLD HEADQUARTERS**

# of Pages: 12
Doc Date: 06/21/2002

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: TOM MERLINO, OWENS CORNING
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

32562 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - A T CROSS COMPANY**

# of Pages: 34
Doc Date: 06/21/2002

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: DAVID WHELAN, A T CROSS
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

32563 **GENERAL NOTICE LETTER (GNL)/104 REQUEST FOR INFORMATION - AMPEREX ELECTRONICS C/O PHILIPS ELECTRONICS NORTH AMERICA CORPORATION**

# of Pages: 47
Doc Date: 06/21/2002

Author: PATRICIA L MEANEY, US EPA REGION 1
Addressee: RISA H WEINSTOCK, PHILIPS ELECTRONICS NORTH AMERICA CORP
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

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32564 **GENERAL NOTICE LETTER (GNL) /104 INFORMATION REQUEST - KAISER ALUMINUM & CHEMICAL CORPORATION**

# of Pages: 37
Doc Date: 06/21/2002

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: JOSEPH A TRE FISCHER II, KAISER ALUMINUM CORP

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

35552 **NOTICE OF POTENTIAL LIABILITY - PROVIDENCE & WORCESTER RAILROAD CO**

# of Pages: 7
Doc Date: 11/30/1993

Author: MERRILL S (MEL) HOHMAN, US EPA REGION 1

Addressee: , PROVIDENCE & WORCESTER RAILROAD CO

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

35555 **NOTICE OF POTENTIAL LIABILITY - PROVIDENCE & WORCESTER RAILROAD CO (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 23
Doc Date: 01/29/2002

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: , PROVIDENCE & WORCESTER RAILROAD CO

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

36106 **LEGAL DOCUMENTATION RELATING TO J M MILLS LANDFILL**

# of Pages: 32
Doc Date: 01/01/1111

Author:	Addressee:	Doc Type: ENFORCEMENT & SETTLEMEI	File Break: 11.05 Access Type(s): REL

36114 **J M MILLS, INC, ET AL V DENNIS MURPHY, DIRECTOR, DEPARTMENT OF NATURAL RESOURCES, NO. 73-301-APPEAL**

# of Pages: 12
Doc Date: 02/26/1976

Author:	Addressee:	Doc Type: ENFORCEMENT & SETTLEMEI	File Break: 11.05 Access Type(s): REL

36121 **J M MILLS, INC, ET AL V DENNIS MURPHY, DIRECTOR, DEPARTMENT OF NATURAL RESOURCES, C.A. FILE NO. 74-1789 DENIAL OF APPLICATION TO ALTER FRESH WATER WETLANDS**

# of Pages: 15
Doc Date: 02/26/1976

Author:	Addressee:	Doc Type: ENFORCEMENT & SETTLEMEI	File Break: 11.05 Access Type(s): REL

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37897 **[REDACTED] GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - TEKNOR APEX (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 82
Doc Date: 02/21/2002

Author:	Addressee:	Doc Type:	File Break: 11.09
		104 INFO REQUEST CORRESPONDENCE GENERAL NOTICE LETTER LETTER	Access Type(s): REL

38056 **104 INFORMATION REQUEST RESPONSE - DAVID BRASK**

# of Pages: 11
Doc Date: 08/12/1999

Author:	Addressee:	Doc Type:	File Break: 11.09
DAVID J BRASK, NONE	MICHELLE LAUTERBACK, US EPA REGION 1	104 INFO REQUEST RESPONSE CORRESPONDENCE LETTER	Access Type(s): REL

41407 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - AMERICAN INSULATED WIRE CORP (CERTIFIED MAIL RECEIPT IS ATTACHED)**

# of Pages: 55
Doc Date: 11/07/2002

Author:	Addressee:	Doc Type:	File Break: 11.09
RICHARD A CAVAGNERO, US EPA REGION 1	DANIEL GILLINGHAM, AMERICAN INSULATED WIRE CORP	104 INFO REQUEST CORRESPONDENCE GENERAL NOTICE LETTER LETTER	Access Type(s): REL

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41409 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - MOSSBERG INDUSTRIES (CERTIFIED MAIL RECEIPT IS ATTACHED)**

# of Pages: 58
Doc Date: 11/07/2002

Author: RICHARD A CAVAGNERO, US EPA REGION 1

Addressee: GREGORY BENIK, MCGOVERN NOEL AND BENIK

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

41413 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - GENERAL CABLE INDUSTRIES (CAROL CABLE CO) (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 122
Doc Date: 11/07/2002

Author: RICHARD A CAVAGNERO, US EPA REGION 1

Addressee: KENNETH N KLASS, BLANK ROME COMISKY & MCCAULEY

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

41415 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - MICROFIBRES INC (CERTIFIED MAIL RECEIPT IS ATTACHED)**

# of Pages: 63
Doc Date: 11/07/2002

Author: RICHARD A CAVAGNERO, US EPA REGION 1

Addressee: JAMES R MCCULLOCH, MICROFIBRES

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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41417 **GENERAL NOTICE LETTER (GNL) - BENJAMIN MOORE & CO (CERTIFIED MAIL RECEIPT AND COPY OF LETTER ATTACHED)**

# of Pages: 39
Doc Date: 11/07/2002

Author: RICHARD A CAVAGNERO, US EPA REGION 1

Addressee: MARC L ZOLDESSY, BENJAMIN MOORE & CO

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

41660 **[REDACTED] ATTACHMENT 3A CARRIER SURVEY IN RESPONSE TO REQUEST 5(A) FOR CAL'S ENTERPRISES INC**

# of Pages: 9
Doc Date: 07/01/1999

Author: , WASTE MANAGEMENT INC

Addressee:

Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
REPORT

File Break: 11.09
Access Type(s): REL

41720 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - POLAROID CORP (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 39
Doc Date: 11/06/2001

Author: PATRICIA L MEANEY, US EPA REGION 1

Addressee: KIM HERMAN GOSLANT, POLAROID CORPORATION

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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41792 **[REDACTED] 07/01/1999 ATTACHMENT 5A CARRIER SURVEY IN RESPONSE TO REQUEST 5(A) FOR L W FONTAINE TRUCKING INC**

# of Pages: 12
Doc Date: 04/17/2000

Author: , WASTE MANAGEMENT INC

Addressee:

Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
REPORT

File Break: 11.09
Access Type(s): REL

41912 **[REDACTED] DRAFT INTERVIEW REPORT**

# of Pages: 18
Doc Date: 01/07/1992

Author:

Addressee:

Doc Type: ENFORCEMENT & SETTLEMEI
INTERVIEW

File Break: 11.09
Access Type(s): REL

43660 **GENERAL NOTICE LETTER/DEMAND LETTER/104 INFORMATION REQUEST - SEARS ROEBUCK & CO (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 54
Doc Date: 04/25/2003

Author: SUSAN STUDLIEN, US EPA REGION 1

Addressee: JAMES R WALPOLE, SEARS ROEBUCK & CO

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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43728 **GENERAL NOTICE LETTER/DEMAND LETTER - AMERICAN STEEL AND ALUMINUM CORP (CERTIFILED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 23
Doc Date: 04/25/2003

Author: SUSAN STUDLIEN, US EPA REGION 1

Addressee: PETER V BALDONI, AMERICAN STEEL AND ALUMINUM CORP

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

43729 **GENERAL NOTICE LETTER/DEMAND LETTER - VINYL PACKAGING CO INC (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 23
Doc Date: 04/25/2003

Author: SUSAN STUDLIEN, US EPA REGION 1

Addressee: LEONARD ACCARDO JR, ACCARDO LAW OFFICES

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

43731 **GENERAL NOTICE LETTER (GNL) - VENTRON C/O ROHM & HAAS (CERTIFILED MAIL RECEIPTS ATTACHED)**

# of Pages: 67
Doc Date: 04/25/2003

Author: SUSAN STUDLIEN, US EPA REGION 1

Addressee: , VENTRON

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

46348 **GENERAL NOTICE LETTER - NSTAR (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 23
Doc Date: 08/21/2003

Author: MICHELLE LAUTERBACK, US EPA REGION 1

Addressee: JEFFREY N STEVENS, NSTAR SERVICES CO

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

46351 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - MULE EMERGENCY LIGHTING INC (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 51
Doc Date: 08/21/2003

Author: MICHELLE LAUTERBACK, US EPA REGION 1

Addressee: ROBERT P CROSS, MULE EMERGENCY LIGHTING INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

46354 **GENERAL NOTICE LETTER/104 INFORMATION REQUEST - VALENTINE TOOL & STAMPING INC (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 50
Doc Date: 08/21/2003

Author: MICHELLE LAUTERBACK, US EPA REGION 1

Addressee: RICHARD A SHERMAN, EDWARDS & ANGELL LLP

, VALENTINE TOOL & STAMPING INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

202695 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST FOR ADDITIONAL INFORMATION - MANDEVILLE SIGNS (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 43
Doc Date: 12/15/2003

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: THOMAS MANDEVILLE, MANDEVILLE SIGNS

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

202696 **GENERAL NOTICE LETTER/104 REQUEST FOR ADDITIONAL INFORMATION - HALLIDAY LITHOGRAPH CORP (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 52
Doc Date: 12/15/2003

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: WILLIAM D WICK, CROSBY HEAFEY ROACH & MAY

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

202698 **GENERAL NOTICE LETTER - PROVIDENCE & WORCESTER RAILROAD CO (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 30
Doc Date: 12/15/2003

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: DEBORAH E SEDARES, PROVIDENCE & WORCESTER RAILROAD CO

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

203162 **GENERAL NOTICE LETTER - LARSON TOOL AND STAMPING CO (CERTIFIED MAIL RECIEPT IS ATTACHED)**

# of Pages: 24
Doc Date: 09/04/2003

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: MICHAEL T MCGAHAN, COOGAN SMITH BENNETT MCGAHAN LORINCZ & JACOBI LLP
, LARSON TOOL & STAMPING COMPANY

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

203164 **COMBINED GENERAL NOTICE LETTER (GNL) 104 INFORMATION REQUEST - DAMON INC / QUEST DIAGNOSTICS (CERTIFIED MAIL RECIEPT IS ATTACHED)**

# of Pages: 54
Doc Date: 09/17/2003

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: MICHAEL E PREVOZNIK, QUEST DIAGNOSTICS INCORPORATED

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

205071 **PACKET OF BILL OF LADING ACKNOWLEDMENTS, INVOICES, AND RECEIPTS**

# of Pages: 82
Doc Date: 01/01/1111

Author:

Addressee:

Doc Type: FORM

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

209817 **GENERAL NOTICE LETTER/104 REQUEST FOR ADDITIONAL INFORMATION - IMPERIAL KNIFE PLATE**

# of Pages: 49
Doc Date: 05/28/2004

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: DAVID A SWINDEN, IMPERIAL KNIFE PLATE

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

209818 **GENERAL NOTICE LETTER/104 REQUEST FOR ADDITIONAL INFORMATION - NARRAGANSETT ELECTRIC CO (BLACKSTONE VALLEY ELECTRIC CO)**

# of Pages: 50
Doc Date: 05/28/2004

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: CAROLYN L MCINTOSH, NARRAGANSETT ELECTRIC CO

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

213273 **GENERAL NOTICE LETTER (GNL)/104 REQUEST FOR ADDITIONAL INFORMATION - GALEGO EQUITIES INC (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 62
Doc Date: 09/21/2004

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: PAUL F GALEGO, GALEGO EQUITIES INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

213274 **GENERAL NOTICE LETTER (GNL) / 104 REQUEST FOR ADDITIONAL INFORMATION - MOTOROLA INC / CODEX (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 90
Doc Date: 09/21/2004

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: LISA M SHELTON, MOTOROLA INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

213275 **GENERAL NOTICE LETTER/104 REQUEST FOR ADDITIONAL INFORMATION - EASTERN WIRE PRODUCTS CO (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 60
Doc Date: 09/21/2004

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: MARVIN GRANOFF, EASTERN WIRE PRODUCTS CO
, EASTERN WIRE PRODUCTS CO

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

230828 **GENERAL NOTICE LETTER (GNL) - J E CASE INC (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 31
Doc Date: 05/04/2005

Author: SUSAN STUDLIEN, US EPA REGION 1

Addressee: JOHN E CASE III, J E CASE INC

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

230830 **GENERAL NOTICE LETTER/104 REQUEST FOR ADDITIONAL INFORMATION - STANDARD RUBBER PRODUCTS INC (CERTIFIED MAIL RECEIPTS ARE ATTACHED)**

# of Pages: 61
Doc Date: 05/04/2005

Author: SUSAN STUDLIEN, US EPA REGION 1

Addressee: ADAM J BRODSKY, NONE

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

250001 **GENERAL NOTICE LETTER (GNL) - HENRY OIL CO, INC (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 26
Doc Date: 01/23/2006

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: CARMINE H DISANTO, HENRY OIL

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

250002 **GENERAL NOTICE LETTER - CRYSTAL THERMOPLASTICS INC (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 54
Doc Date: 01/23/2006

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION

Addressee: DAN FROST JR, CRYSTAL THERMOPLASTICS INC

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

251352 **NOTICE OF POTENTIAL LIABILITY AT OPERABLE UNIT (OU) 2 - VERIZON (NEW ENGLAND TELEPHONE)**

# of Pages: 28
Doc Date: 06/28/2006

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION
Addressee: DAVID M FELDMAN, VERIZON NEW ENGLAND
Doc Type: CORRESPONDENCE
LETTER
File Break: 11.09
Access Type(s): REL

251353 **GENERAL NOTICE LETTER (GNL) FOR OPERABLE UNIT TWO AND 104 REQUEST FOR SUPPLEMENTAL INFORMATION - MAINLINE PAINT MFG CO**

# of Pages: 57
Doc Date: 06/12/2006

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION
Addressee: RICHARD J MAIN, MAIN LINE PAINT
Doc Type: CORRESPONDENCE
LETTER
File Break: 11.09
Access Type(s): REL

264279 **GENERAL NOTICE LETTER/104 REQUEST FOR ADDITIONAL INFORMATION - FORTIFIBER CORP**

# of Pages: 38
Doc Date: 05/28/2004

Author: SUSAN STUDLIEN, US EPA REGION 1 - OFFICE OF SITE REMEDIATION & RESTORATION
Addressee: ROBERT S SANOFF, FOLEY HOAG LLP
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

265191 **GENERAL NOTICE LETTER (GNL) / SUPLLEMENTAL 104 INFORMATION REQUEST - NYMAN MANUFACTURING CO (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 72
Doc Date: 02/27/2007

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: CLAY DUNN, HUHTAMAKI - EAST PROVIDENCE INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

271277 **COMBINED NOTICE OF POTENTIAL LIABILITY AND 104 INFORMATION REQUEST - AMERICAN OPTICAL LENS CO (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 62
Doc Date: 06/28/2007

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: JEREMY C BISHOP, AMERICAN OPTICAL LENS CO

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

271424 **COMBINED NOTICE OF POTENTIAL LIABILITY AND 104 INFORMATION REQUEST - US ENVELOPE (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 59
Doc Date: 06/28/2007

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: JAMES A BUZZARD, US ENVELOPE

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

275416 **NOTIFICATION OF HAZARDOUS WASTE SITE - CORNING GLASS WORKS (TRANSMITTAL LETTER ATTACHED)**

# of Pages: 5
Doc Date: 06/08/1981

Author: SCOTT S SOMERS, CORNING GLASS WORKS

Addressee: , US EPA REGION 1

Doc Type: FORM

File Break: 11.09
Access Type(s): REL

282040 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - SEACONKE WAMPANOAG TRIBE (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 39
Doc Date: 04/14/2008

Author: RICHARD A CAVAGNERO, US EPA REGION 1

JAMES T OWENS III, US EPA REGION 1

Addressee: WILFRED W GREENE, SEACONKE WAMPANOAG TRIBE

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

282060 **NOTICE OF VIOLATION AND ORDER AND PENALTY (NOVAP) - JOSEPH AND LINDA MARSZALKOWSKI**

# of Pages: 5
Doc Date: 02/01/1991

Author: THOMAS D GETZ, RI DEPT OF ENVIRONMENTAL MANAGEMENT

Addressee: JOSEPH MARSZALKOWSKI, J M MILLS INC

LINDA MARSZALKOWSKI, J M MILLS INC

Doc Type: CORRESPONDENCE
LETTER

File Break: 11.09
Access Type(s): REL

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284665 **FAX TRANSMITTAL OF FIRE DEPARTMENT INCIDENT REPORTS - NUNES DISPOSAL INC (04/02/2008 COVER LETTER ATTACHED)**

# of Pages: 7
Doc Date: 04/03/2008

Author: BRIAN JACKVONY, VALLEY FALLS FIRE DEPARTMENT

Addressee: DAVID J NEWTON, US EPA REGION 1

Doc Type: REPORT

File Break: 11.09
Access Type(s): REL

289866 **NOTICE OF POTENTIAL LIABILITY AND SUPPLEMENTAL REQUEST FOR INFORMATION - ACS INDUSTRIES INC (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 60
Doc Date: 07/28/2008

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: STEVEN BUCKLER, ACS

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

289873 **NOTICE OF POTENTIAL LIABILITY AND REQUEST FOR SUPPLEMENTAL INFORMATION - TRUEX INC (CERITIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 50
Doc Date: 07/28/2008

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: DANIEL P DYER, TRUEX INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

297153 **PRICE SCHEDULE FOR WASTE CHEMICAL DISPOSAL EFFECTIVE JUNE 1978 - RECYCLING INDUSTRIES INC**

# of Pages: 1
Doc Date: 06/01/1978

Author: , RECYCLING INDUSTRIES INC

Addressee:

Doc Type: CORRESPONDENCE
MEMO

File Break: 11.09
Access Type(s): REL

447428 **GENERAL NOTICE LETTER / 104 INFORMATION REQUEST - ALLIED CONTAINER CORP (INTERNATIONAL PAPER CO)**

# of Pages: 53
Doc Date: 02/04/2009

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: CAMILLE A CORBIN, INTERNATIONAL PAPER CO
, ALLIED CONTAINER CORP

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

448376 **[REDACTED] 07/01/1999 ATTACHMENT 4A CARRIER SURVEY IN RESPONSE TO REQUEST 5(A) FOR GODITT & BOYER**

# of Pages: 55
Doc Date: 03/07/2000

Author: , WASTE MANAGEMENT INC

Addressee:

Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
REPORT

File Break: 11.09
Access Type(s): REL

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466379 **GENERAL NOTICE LETTER (GNL) / SUPPLEMENTAL 104 INFORMATION REQUEST - COMPO CHEMICAL CO INC (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 51
Doc Date: 06/04/2010

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: BRENT ANDERSON, IRG MANSFIELD LLC
, COMPO CHEMICAL CO INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

471000 **GENERAL NOTICE LETTER (GNL) - ACS AUXILIARIES GROUP / CUMBERLAND ENGINEERING (CERTIFIED MAIL RECEIPTS AND HANDWRITTEN NOTE ATTACHED)**

# of Pages: 66
Doc Date: 08/26/2010

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: ANDY MARSH, ACS AUXILIARIES GROUP
, CUMBERLAND ENGINEERING CO INC

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

474807 **GENERAL NOTICE LETTER (GNL) - ALLIED WASTE INDUSTRIES INC (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 46
Doc Date: 11/09/2010

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: JONATHAN R HADEN, LATHROP & GAGE
, ALLIED WASTE INDUSTRIES INC

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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474896 **GENERAL NOTICE LETTER (GNL) / SUPPLEMENTAL 104 INFORMATION REQUEST - TEXAS INSTRUMENTS INC (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 605
Doc Date: 12/16/2010

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: JOSEPH HUBACH, TEXAS INSTRUMENTS INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

474897 **GENERAL NOTICE LETTER (GNL) - BLANE DIV OF REICHHOLD CHEMICALS INC (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 51
Doc Date: 12/16/2010

Author: RICHARD CAVAGNERO, US EPA REGION 1

JAMES T OWENS III, US EPA REGION 1

Addressee: DAVID P FLYNN, PHILLIPS LYTLE LLP

, REICHHOLD CHEMICALS INC

, REICHHOLD INC

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

484617 **GENERAL NOTICE LETTER (GNL) - ADAMS DRUG CO (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 335
Doc Date: 05/05/2011

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: CHRISTINE L EGAN, CVS PHARMACY

, ADAMS DRUG COMPANY

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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484648 **GENERAL NOTICE LETTER (GNL) - DATEL INC (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 77
Doc Date: 05/24/2011

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: ROBERT CASPAR, MURATA POWER SOLUTIONS INC

, DATEL SYSTEMS INC (A/K/A DATEL INC)

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

484684 **GENERAL NOTICE LETTER (GNL) - THOMAS AND BETTS CORP / AUGAT INC**

# of Pages: 24
Doc Date: 07/14/2011

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: MICHAEL J GEIGER, THOMAS AND BETTS CORP

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

491997 **GENERAL NOTICE LETTER (GNL) / SUPPLEMENTAL 104 INFORMATION REQUEST - ANALOG DEVICES**

# of Pages: 199
Doc Date: 11/16/2011

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: , ANALOG DEVICES

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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491998 **GENERAL NOTICE LETTER (GNL) / SUPPLEMENTAL 104 INFORMATION REQUEST - OKONITE CO**

# of Pages: 52
Doc Date: 11/16/2011

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: ALFRED C COPPOLA, OKONITE COMPANY

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

497043 **GENERAL NOTICE LETTER (GNL) / SUPPLEMENTAL 104 INFORMATION REQUEST - SHAWMUT CORP (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 171
Doc Date: 01/24/2012

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: BRENT ANDERSON, SHAWMUT

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

509441 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - HEALTHCO (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 101
Doc Date: 06/14/2012

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: JOHN H HAMMERGREN, MCKESSON MEDICAL-SURGICAL INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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509492 **EVALUATION OF RAILROAD SIDING: RESTORED SECOND TRACK ADJACENT TO JM MILLS LANDFILL - PROVIDENCE & WORCESTER RAILROAD CO (P & W)**

# of Pages: 153
Doc Date: 08/01/2012

Author: DAVID ADILMAN, GZA GEOENVIRONMENTAL INC

Addressee: , PROVIDENCE & WORCESTER RAILROAD CO

Doc Type: REPORT

File Break: 11.09
Access Type(s): REL

522079 **GENERAL NOTICE LETTER (GNL) - STOP AND SHOP (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 187
Doc Date: 11/02/2012

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: WILLIAM P KEEFE ESQ, SHERIN AND LODGEN LLP
, STOP & SHOP CORP

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

522080 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - HANDY & HARMAN (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 97
Doc Date: 11/02/2012

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: GLEN M KASSAN, HANDY & HARMAN

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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522081 **GENERAL NOTICE LETTER (GNL) - STANDISH JOHNSON CO (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 112
Doc Date: 11/02/2012

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: VICTORIA L BROWN, STANDISH-JOHNSON CO

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

526864 **GENERAL NOTICE LETTER (GNL) / SUPPLEMENTAL 104 INFORMATION REQUEST - J.H. LYNCH & SONS INC**

# of Pages: 377
Doc Date: 02/04/2014

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: STEPHEN P LYNCH, JH LYNCH & SONS

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

526865 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - HUNT CHEMICAL C/O OLIN CORP**

# of Pages: 912
Doc Date: 02/04/2014

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: JOSEPH D RUPP, OLIN CORP

, HUNT CHEMICAL

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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526866 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - NORTH TERMINAL C/O OLIN CORP**

# of Pages: 88
Doc Date: 02/04/2014

Author: MICHAEL JASINSKI, US EPA REGION 1

Addressee: JOSEPH D RUPP, OLIN CORP
, NORTH TERMINAL

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

526889 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - AMERICAN OPTICAL CORP C/O PFIZER INC (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 101
Doc Date: 06/04/2014

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: DOUG LANKLER, PFIZER INC
, AMERICAN OPTICAL CORP

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

526890 **GENERAL NOTICE LETTER (GNL) - SISALKRAFT DIV OF ST REGIS PAPER CO C/O INTERNATIONAL PAPER CO (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 362
Doc Date: 06/04/2014

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: STEVEN J GINSKI, INTERNATIONAL PAPER CO
, SISALKRAFT

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

531010 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - CAP INC / LFE (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 131
Doc Date: 01/11/2013

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: , CAP INC
, THE CORPORATION TRUST CO

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

531011 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - HASBRO INC**

# of Pages: 223
Doc Date: 01/11/2013

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: BRIAN D GOLDNER, HASBRO INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

531015 **GENERAL NOTICE LETTER (GNL) - BROADWAY TIRE**

# of Pages: 139
Doc Date: 01/23/2013

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: GARY ORLECK, BROADWAY TIRE INC

Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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531016 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - HINDLEY MANUFACTURING**

# of Pages: 377
Doc Date: 01/23/2013

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: CHARLES J HINDLEY JR, HINDLEY MANUFACTURING

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

531040 **GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - FLINT INK CORP (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 128
Doc Date: 02/07/2013

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: WILLIAM B MILLER, FLINT INK

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

538781 **GENERAL NOTICE LETTER (GNL)/104 INFORMATION REQUEST - UNIROYAL INC. (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 164
Doc Date: 06/04/2013

Author: NANCY BARMAKIAN, US EPA REGION 1
JAMES T OWENS III, US EPA REGION 1

Addressee: JOSEPH P FLANNERY, UNIROYAL CHEMICAL COMPANY INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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538787 **GENERAL NOTICE LETTER (GNL)/104 INFORMATION REQUEST - BROWN AND SHARPE MANUFACTURING CO. (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 612
Doc Date: 06/04/2013

Author: NANCY BARMAKIAN, US EPA REGION 1
JAMES T OWENS III, US EPA REGION 1

Addressee: , CT CORPORATION

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

540954 **GENERAL NOTICE LETTER (GNL) /104 INFORMATION REQUEST - BENNY'S (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 2089
Doc Date: 09/17/2013

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: HOWARD M BROMBERG, BENNY'S OF R I INC
MALCOLM C BROMBERG, BENNYS DEPT STORE
, BENNYS OF MASS INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

540955 **GENERAL NOTICE LETTER (GNL) /104 INFORMATION REQUEST - LANDRY & MARTIN OIL CO (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 239
Doc Date: 09/17/2013

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: BERNARD R MARTIN, LANDRY & MARTIN OIL CO

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

540956 **GENERAL NOTICE LETTER (GNL) /104 INFORMATION REQUEST - UNITED AIRCRAFT / UNITED TECHNOLOGIES (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 218
Doc Date: 09/17/2013

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: LOUIS R CHENEVERT, UNITED TECHNOLOGIES CORP

, UNITED AIRCRAFT CORP PRATT & WHITNEY AIRCRAFT

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

541906 **GENERAL NOTICE LETTER (GNL) /104 INFORMATION REQUEST - HILSINGER CORP. (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 1009
Doc Date: 07/26/2013

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: ROBERT NAHMIAS, HILSINGER CORPORATION

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

541907 **GENERAL NOTICE LETTER (GNL) /104 INFORMATION REQUEST - WEINGEROFF ENTERPRISES, INC. (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 1730
Doc Date: 07/26/2013

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: LISA E WEINGEROFF, WEINGEROFF ENTERPRISES INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

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541908 **GENERAL NOTICE LETTER (GNL) /104 INFORMATION REQUEST - PLAINVILLE MACHINE WORKS, INC. (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 381
Doc Date: 07/26/2013

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: HENNING FREDERICKSEN, PLAINVILLE MACHINE

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

548495 **GENERAL NOTICE LETTER / 104 INFORMATION REQUEST - IGA INC AND SUPERVALU HOLDINGS INC (ROGER WILLIAMS FOODS) - PART 1, LETTER AND ENCLOSURES (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 56
Doc Date: 11/07/2013

Author: JAMES T OWENS, US EPA REGION 1

Addressee: MARK K BATENIC, IGA INC

SAM DUNCAN, SUPERVALU HOLDINGS INC (ROGER WILLIAMS FOODS)

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

548496 **GENERAL NOTICE LETTER / 104 INFORMATION REQUEST - SHERWIN WILLIAMS CO (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 133
Doc Date: 11/07/2013

Author: JAMES T OWENS, US EPA REGION 1

Addressee: CATHERINE M KILBANE, SHERWIN WILLIAMS CO

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

549414 **[REDACTED] GENERAL NOTICE LETTER (GNL) - AVNET INC (CAROL CABLE / GENERAL CABLE) (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 125
Doc Date: 02/15/2007

Author: JAMES T OWENS III, US EPA REGION 1
Addressee: ROY VALLEE, AVNET INC
Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

549415 **[REDACTED] GENERAL NOTICE LETTER (GNL) - HOLLINGSWORTH & VOSE CO (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 31
Doc Date: 02/16/2007

Author: JAMES T OWENS III, US EPA REGION 1
Addressee: DEIRDRE M MURPHY, HOLLINGSWORTH & VOSE COMPANY
Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

549416 **[REDACTED] GENERAL NOTICE LETTER (GNL) - WYMAN-GORDON COMPANY (CERTIFIED MAIL RECEIPT ATTACHED)**

# of Pages: 37
Doc Date: 02/16/2007

Author: JAMES T OWENS III, US EPA REGION 1
Addressee: BRADFORD C MIDDLESWORTH, WYMAN - GORDON
Doc Type: CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER
File Break: 11.09
Access Type(s): REL

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549418 **[REDACTED] GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - TEXTRON INC (GORHAM MANUFACTURING) (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 37
Doc Date: 04/25/2007

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: PATRICIA BISSHOPP, TEXTRON SYSTEMS CORPORATION

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

549419 **[REDACTED] GENERAL NOTICE LETTER (GNL) / 104 INFORMATION REQUEST - ARKWRIGHT INC (CERTIFIED MAIL RECEIPTS ATTACHED)**

# of Pages: 47
Doc Date: 04/25/2007

Author: JAMES T OWENS III, US EPA REGION 1

Addressee: JESSE WHITTEMORE, ARKWRIGHT INC

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

549423 **GENERAL NOTICE LETTER / 104 INFORMATION REQUEST - IGA INC AND SUPERVALU HOLDINGS INC (ROGER WILLIAMS FOODS) - PART 2, ATTACHMENT 1 - IGA ROUTE SHEETS**

# of Pages: 892
Doc Date: 11/07/2013

Author: JAMES T OWENS, US EPA REGION 1

Addressee: MARK K BATENIC, IGA INC

SAM DUNCAN, SUPERVALU HOLDINGS INC (ROGER WILLIAMS FOODS)

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 11: POTENTIALLY RESPONSIBLE PARTY

549424 **GENERAL NOTICE LETTER / 104 INFORMATION REQUEST - IGA INC AND SUPERVALU HOLDINGS INC (ROGER WILLIAMS FOODS) - PART 3, ATTACHMENT 2 - ROGER WILLIAMS FOODS ROUTE SHEETS**

# of Pages: 1178
Doc Date: 11/07/2013

Author: JAMES T OWENS, US EPA REGION 1

Addressee: MARK K BATENIC, IGA INC

SAM DUNCAN, SUPERVALU HOLDINGS INC (ROGER WILLIAMS FOODS)

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

549425 **GENERAL NOTICE LETTER / 104 INFORMATION REQUEST - IGA INC AND SUPERVALU HOLDINGS INC (ROGER WILLIAMS FOODS) - PART 4, ATTACHMENTS 3-9 - DEPOSITIONS**

# of Pages: 835
Doc Date: 11/07/2013

Author: JAMES T OWENS, US EPA REGION 1

Addressee: MARK K BATENIC, IGA INC

SAM DUNCAN, SUPERVALU HOLDINGS INC (ROGER WILLIAMS FOODS)

Doc Type: 104 INFO REQUEST
CORRESPONDENCE
GENERAL NOTICE LETTER
LETTER

File Break: 11.09
Access Type(s): REL

Phase 12: COST RECOVERY

568736 **LETTER RESPONDING 02/12/2015 LETTER REGARDING THE EPA OVERSIGHT BILL NUMBER 14**

# of Pages: 3
Doc Date: 02/26/2015

Author: BRYAN OLSON, US EPA REGION 1

Addressee: ROY P GIARRUSSO, GIARRUSSO NORTON COOLEY & MCGLONE PC
JONATHAN A MURPHY, LESTER SCHWAB KATZ & DWYER LLP
ANDREW SHAKALIS, UNILEVER UNITED STATES INC

Doc Type: CORRESPONDENCE
LETTER

File Break: 12.01

Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

559765 **NEWS RELEASE: EPA EXTENDS PUBLIC COMMENT PERIOD FOR PETERSON/PURITAN SITE PLAN**

# of Pages: 2
Doc Date: 08/18/2014

Author: , US EPA REGION 1
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PRESS RELEASE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

563947 **SAVE THE DATE CARD, PUBLIC INFORMATIONAL MEETING AND PUBLIC HEARING ON PROPOSED PLAN**

# of Pages: 2
Doc Date: 07/09/2014

Author: , US EPA REGION 1
Addressee:
Doc Type: PRESS RELEASE
PUBLIC INFORMATION
File Break: 13.04
Access Type(s): REL

565453 **NEWS ARTICLE: OFFICIALS RAISE CONCERNS ABOUT EPA CLEANUP OF BLACKSTONE SUPERFUND SITE**

# of Pages: 1
Doc Date: 10/10/2014

Author: RICHARD SALIT, PROVIDENCE JOURNAL
Addressee:
Doc Type: NEWS ARTICLE
File Break: 13.03
Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

565454 **NEWS ARTICLE: PETERSON/PURITAN SITE CLEANUP RAISES CONCERNS AMONG BLACKSTONE VALLEY OFFICIALS**

# of Pages: 2
Doc Date: 10/11/2014

Author: RICHARD SALIT, PROVIDENCE JOURNAL
Addressee:
Doc Type: NEWS ARTICLE
File Break: 13.03
Access Type(s): REL

565455 **NEWS ARTICLE: LINCOLN TOWN COUNCIL NOT PLEASED WITH EITHER SUPERFUND CLEANUP PLAN**

# of Pages: 7
Doc Date: 10/08/2014

Author: JESSICA BOISCLAIR, VALLEY BREEZE
Addressee:
Doc Type: NEWS ARTICLE
File Break: 13.03
Access Type(s): REL

565456 **NEWS ARTICLE: SUPERFUND 'CAP' NEEDS STUDY**

# of Pages: 2
Doc Date: 09/11/2014

Author: ALICE R CLEMENTE, BLACKSTONE RIVER WATERSHED COUNCIL/FRIENDS OF]
Addressee:
Doc Type: NEWS ARTICLE
File Break: 13.03
Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

565457 **NEWS ARTICLE: EPA DISCLOSES PLANS FOR 40 MILLION DOLLAR CLEANUP OF FORMER RIVERSIDE DUMP**

# of Pages: 3
Doc Date: 08/28/2014

Author: MARCIA GREEN, VALLEY BREEZE
Addressee:
Doc Type: NEWS ARTICLE
File Break: 13.03
Access Type(s): REL

568703 **PRESS RELEASE: EPA EXTENDS PUBLIC COMMENT PERIOD**

# of Pages: 1
Doc Date: 10/31/2014

Author: , EPA
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

568706 **ARTICLE: CONCERNS AIRED OVER EPA'S PROPOSED CAPPING SOLUTION**

# of Pages: 5
Doc Date: 10/15/2014

Author: MARCIA GREEN, VALLEY BREEZE
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

568708 **ARTICLE: CLEANUP PROPOSED**

# of Pages: 4
Doc Date: 07/31/2014

Author: , ECORI NEWS
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

568709 **ARTICLE: CLEARING UP FACTS REGARDING RIVER CLEANUP**

# of Pages: 1
Doc Date: 11/26/2014

Author: ALICE R CLEMENTE, BLACKSTONE RIVER WATERSHED COUNCIL/FRIENDS OF]
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

568710 **ARTICLE: DEADLINE FOR COMMENT ON EPA CLEANUP EXTENDED TO JANUARY**

# of Pages: 1
Doc Date: 11/12/2014

Author: MARCIA GREEN, VALLEY BREEZE
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

568711 **ARTICLE: SITE HEARING IS NEXT WEDNESDAY 10/08/2014**

# of Pages: 1
Doc Date: 10/08/2014

Author: , VALLEY BREEZE
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

568712 **PUBLIC NOTICE: INVITATION TO BID, BUILDING DEMOLITION**

# of Pages: 1
Doc Date: 08/06/2014

Author: BRIAN SILVIA, CUMBERLAND (RI) TOWN OF
ND (RI)
, VALLEY BREEZE
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

568713 **ARTICLE: EPA DISCLOSES PLANS FOR $40 MILLION CLEANUP OF FORMER RIVERSIDE DUMP**

# of Pages: 3
Doc Date: 08/06/2014

Author: MARCIA GREEN, VALLEY BREEZE
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

568714 **ARTICLE: NEW STRIP PLAZA PROPOSED ON SOUTHERN MENDON ROAD (PUBLIC NOTICE ATTACHED)**

# of Pages: 3
Doc Date: 06/11/2014

Author: SANDRA M GIOVANELLI, CUMBERLAND (RI)
TOWN OF
MARCIA GREEN, VALLEY BREEZE

Addressee:

Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION

File Break: 13.03
Access Type(s): REL

568715 **PUBLIC NOTICE: EPA ANNOUNCES A PROPOSED PLAN CLEANUP**

# of Pages: 1
Doc Date: 08/06/2014

Author: , US EPA REGION 1

Addressee:

Doc Type: PUBLIC INFORMATION

File Break: 13.03
Access Type(s): REL

568716 **ARTICLE: EPA SITE MEETING IS 08/07/2014**

# of Pages: 1
Doc Date: 08/06/2014

Author: , VALLEY BREEZE

Addressee:

Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION

File Break: 13.03
Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

568717 **ARTICLE: BLACKSTONE CANAL GOES DRY**

# of Pages: 2
Doc Date: 08/06/2014

Author: JESSICA BOISCLAIR, VALLEY BREEZE
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

568720 **ARTICLE: US HOUSE APPROVES NATIONAL PARK DESIGNATION**

# of Pages: 1
Doc Date: 12/05/2014

Author: JOSEPH B NADEAU, WOONSOCKET CALL
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PRESS RELEASE
File Break: 13.03
Access Type(s): REL

568728 **ARTICLE: BLACKSTONE VALLEY CELEBRATES NATIONAL PARK DESIGNATION**

# of Pages: 3
Doc Date: 12/17/2014

Author: , TELEGRAM & GAZETTE
Addressee:
Doc Type: NEWS ARTICLE
File Break: 13.03
Access Type(s): REL

Phase 13: COMMUNITY RELATIONS

582100 **SAVE THE DATE CARD, SECOND PUBLIC INFORMATIONAL MEETING AND PUBLIC HEARING ON PROPOSED PLAN**

# of Pages: 2
Doc Date: 10/08/2014

Author: , US EPA REGION 1
Addressee:
Doc Type: PRESS RELEASE
PUBLIC INFORMATION
File Break: 13.01
Access Type(s): REL

582109 **FACT SHEET: SITE CLEANUP UPDATE**

# of Pages: 2
Doc Date: 09/01/2015

Author: , US EPA REGION 1
Addressee:
Doc Type: FACT SHEET
PUBLIC INFORMATION
File Break: 13.05
Access Type(s): REL

582111 **PUBLIC NOTICE: US EPA ANNOUNCES ITS DECISION FOR CLEANUP**

# of Pages: 1
Doc Date: 01/01/1111

Author: , US EPA REGION 1
Addressee:
Doc Type: PUBLIC INFORMATION
File Break: 13.03
Access Type(s): REL

Phase 14: CONGRESSIONAL RELATIONS

568745 **LETTER REQUESTING REVISION OF THE PROPOSED PLAN**

# of Pages: 1
Doc Date: 03/31/2015

Author: DAVID N CICILLINE, US HOUSE OF REPRESENTATIVES

Addressee: H CURTIS SPALDING, US EPA REGION 1

Doc Type: CONGRESSIONAL RECORDS
CORRESPONDENCE
LETTER

File Break: 14.01
Access Type(s): REL

568746 **LETTER EXPLAINING PROPOSED PLAN PROCESS**

# of Pages: 1
Doc Date: 04/23/2015

Author: H CURTIS SPALDING, US EPA REGION 1

Addressee: DAVID N CICILLINE, US HOUSE OF REPRESENTATIVES

Doc Type: CONGRESSIONAL RECORDS
CORRESPONDENCE
LETTER

File Break: 14.01
Access Type(s): REL

Phase 17: SITE MANAGEMENT RECORDS

289876 **MAP: ASSESSORS PLAT 34**

# of Pages: 1
Doc Date: 12/07/2006

Author: , APPLIED GEOGRAPHICS INC
Addressee:
Doc Type: MAP
File Break: 17.04
Access Type(s): REL

289877 **MAP: ASSESSORS PLAT 14**

# of Pages: 1
Doc Date: 12/07/2006

Author: , APPLIED GEOGRAPHICS INC
Addressee:
Doc Type: MAP
File Break: 17.04
Access Type(s): REL

289878 **MAP: ASSESSORS PLAT 12**

# of Pages: 1
Doc Date: 12/07/2006

Author: , APPLIED GEOGRAPHICS INC
Addressee:
Doc Type: MAP
File Break: 17.04
Access Type(s): REL

Phase 17: SITE MANAGEMENT RECORDS

568707 **FACT SHEET: TYPICAL ANATOMY OF A LANDFILL**

# of Pages: 1
Doc Date: 01/01/2003

Author: , WASTE MANAGEMENT
Addressee:
Doc Type: FACT SHEET
File Break: 17.08
Access Type(s): REL

568732 **SENATE REPORT ON THE BLACKSTONE RIVER VALLEY NATIONAL HISTORIC PARK**

# of Pages: 8
Doc Date: 06/27/2013

Author:
Addressee:
Doc Type: CONGRESSIONAL RECORDS REPORT
File Break: 17.07
Access Type(s): REL

568733 **BLACKSTONE RIVER VALLEY NATIONAL HISTORICAL PARK ESTABLISHMENT ACT**

# of Pages: 8
Doc Date: 02/14/2013

Author:
Addressee:
Doc Type: CONGRESSIONAL RECORDS REPORT
File Break: 17.07
Access Type(s): REL

Phase 17: SITE MANAGEMENT RECORDS

568735 **MEMO PROMOTING COLLABORATION ON CONTAMINATED SEDIMENT**

# of Pages: 3
Doc Date: 02/12/2015

Author: CYNTHIA GILES, US EPA
Addressee: , REGIONAL ADMINISTRATORS-REGIONS I-X
Doc Type: CORRESPONDENCE
MEMO
File Break: 17.07
Access Type(s): REL

568778 **MAP - HISTORICAL AERIAL PHOTOS (1941-CURRENT), LANDFILL AND DISPOSAL AREAS**

# of Pages: 1
Doc Date: 12/10/2012

Author: , US EPA REGION 1
Addressee:
Doc Type: MAP
File Break: 17.04
Access Type(s): REL

568779 **HISTORICAL PHOTOGRAPH OF SITE**

# of Pages: 1
Doc Date: 01/01/1111

Author:
Addressee:
Doc Type: MAP
File Break: 17.04
Access Type(s): REL

Phase 17: SITE MANAGEMENT RECORDS

568781 **AMENDED ABSTRACT OF THE JANUARY 1998 PLANNING AND MANAGEMENT OF THE WATERSHED RESOURCES**

# of Pages: 67
Doc Date: 05/01/2004

Author: , RI STATEWIDE PLANNING PROGRAM
Addressee:
Doc Type: REPORT
File Break: 17.07
Access Type(s): REL

568782 **RHODE ISLAND NONPOINT SOURCE MANAGEMENT PROGRAM PLAN**

# of Pages: 118
Doc Date: 09/01/2014

Author: , RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Addressee:
Doc Type: REPORT
File Break: 17.07
Access Type(s): REL

568787 **ENVIRONMENTAL SCIENCE AND TECHNOLOGY: SEASONAL ARSENIC ACCUMULATION IN STREAM SEDIMENTS AT GROUNDWATER DISCHARGE ZONE**

# of Pages: 10
Doc Date: 12/16/2013

Author:
Addressee:
Doc Type: ARTICLE - PERIODICAL
File Break: 17.07
Access Type(s): REL

Phase 17: SITE MANAGEMENT RECORDS

568790 **MAP: UNNAMED ISLAND AND NUNES PARCEL**

# of Pages: 1
Doc Date: 06/23/2015

Author: , US EPA REGION 1 GEOGRAPHIC INFORMATION SYSTEM LAB ION

Addressee:

Doc Type: MAP

File Break: 17.04
Access Type(s): REL

568791 **MAP: GROUNDWATER COMPLIANCE BOUNDARY AT A SCALE OF 1 TO 1250**

# of Pages: 1
Doc Date: 06/23/2015

Author: , US EPA REGION 1 GEOGRAPHIC INFORMATION SYSTEM LAB ION

Addressee:

Doc Type: MAP

File Break: 17.04
Access Type(s): REL

568792 **MAP: BLACKSTONE RIVER FLOW DIRECTION WITH GROUNDWATER COMPLIANCE BOUNDARY**

# of Pages: 1
Doc Date: 06/22/2015

Author: , US EPA REGION 1 GEOGRAPHIC INFORMATION SYSTEM LAB ION

Addressee:

Doc Type: MAP

File Break: 17.04
Access Type(s): REL

Phase 17: SITE MANAGEMENT RECORDS

568793 **MAP: GROUNDWATER COMPIANCE BOUNDARY AT A SCALE OF 1 TO 3,000**

# of Pages: 1
Doc Date: 06/23/2015

Author: , US EPA REGION 1 GEOGRAPHIC INFORMATION SYSTEM LAB ION

Addressee:

Doc Type: MAP

File Break: 17.04
Access Type(s): REL

582101 **FACT SHEET: REVEGETATING LANDFILLS AND WASTE CONTAINMENT AREAS**

# of Pages: 12
Doc Date: 10/08/2014

Author: , US EPA REGION 1

Addressee:

Doc Type: FACT SHEET

File Break: 17.07
Access Type(s): REL

582105 **BLANK AND WHITE PHOTOGRAPH OF CONSTRUCTION AT SITE**

# of Pages: 1
Doc Date: 01/01/0111

Author:

Addressee:

Doc Type: PHOTOGRAPH

File Break: 17.04
Access Type(s): REL

Phase 17: SITE MANAGEMENT RECORDS

582106 **BLACKSTONE RIVER WATER QUALITY FINAL REPORT 1: EXISTING DATA, VOLUME I: DATA SUMMARY**

# of Pages: 648
Doc Date: 01/01/2004

Author: , LOUIS BERGER GROUP INC THE

Addressee: , RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Doc Type: REPORT

File Break: 17.07
Access Type(s): REL

582107 **BLACKSTONE RIVER WATER QUALITY FINAL REPORT 2: FIELD INVESTIGATIONS**

# of Pages: 536
Doc Date: 02/01/2008

Author: , LOUIS BERGER GROUP INC THE

Addressee: , RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Doc Type: REPORT

File Break: 17.07
Access Type(s): REL

Number of Documents in Administrative Record: 299

Selected Key Guidance and Other Documents

The following documents may be reviewed at the OSRR Records and Information Center in Boston, MA

DOC#	DOCDATE	TITLE	OSWER/ EPA ID
C1020	01-Jan-1949	SURFICIAL GEOLOGY, PAWTUCKET QUADRANGLE, RHODE ISLAND-MASSACHUSETTS	
C471	24-May-77	EXECUTIVE ORDER 11988 - FLOODPLAIN MANAGEMENT	
C003	24-May-77	PROTECTION OF WETLANDS: EXECUTIVE ORDER 11990. 42 FED. REG. 26961	
C1019	01-Jan-1983	GEOLOGY OF THE BLACKSTONE SERIES IN THE PAWTUCKET QUADRANGLE, RHODE ISLAND: PHD DISSERTATION	
CO55	09-Jul-87	INTERIM GUIDANCE ON COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS	OSWER 9234.0-05
2002	01-Oct-88	INTERIM FINAL GUIDANCE FOR CONDUCTING REMEDIAL INVESTIGATIONS AND FEASIBILITY STUDIES UNDER CERCLA	OSWER 9355.3-01
C172	01-Jul-89	FINAL COVERS ON HAZARDOUS WASTE LANDFILLS AND SURFACE IMPOUNDMENTS	EPA 530-SW-89-047
3009	01-Dec-89	CERCLA COMPLIANCE WITH OTHER LAWS MANUAL - CERCLA COMPLIANCE WITH STATE REQUIREMENTS [QUICK REFERENCE FACT SHEET]	OSWER 9234.2-05FS
C174	01-Dec-89	RISK ASSESSMENT GUIDANCE FOR SUPERFUND. VOLUME I. HUMAN HEALTH EVALUATION MANUAL (PART A). INTERIM FINAL.	EPA 540/1-89/002

C254	01-Aug-90	GUIDE ON REMEDIAL ACTIONS AT SUPERFUND SITES WITH PCB CONTAMINATION. QUICK REFERENCE FACT SHEET.	OSWER 9355.4-01FS
C177	01-Feb-91	CONDUCTING REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES FOR CERCLA MUNICIPAL LANDFILL SITES.	OSWER 9355.3-11
C247	01-May-91	DESIGN AND CONSTRUCTION OF RCRA/CERCLA FINAL COVERS.	EPA 625/4-91/025
C247	01-May-91	DESIGN AND CONSTRUCTION OF RCRA/CERCLA FINAL COVERS.	EPA 625/4-91/025
C644	01-Dec-91	RISK ASSESSMENT GUIDANCE FOR SUPERFUND. VOL 1. HUMAN HEALTH EVALUATION MANUAL (PART B, DEVELOPMENT OF RISK-BASED PRELIMINARY REMEDIATION GOALS) INTERIM	OSWER 9285.6-03
C157	01-Sep-93	PRESUMPTIVE REMEDY FOR CERCLA MUNICIPAL LANDFILL SITES.	OSWER 9355.0-49FS
C390	01-Aug-93	GUIDELINES FOR THE PROTECTION AND MANAGEMENT OF AQUATIC SEDIMENT QUALITY IN ONTARIO	
C1012	01-Jan-94	BEDROCK GEOLOGIC MAP OF RHODE ISLAND	
C590	01-Feb-94	GUIDANCE MANUAL FOR THE INTEGRATED EXPOSURE UPTAKE BIOKINETIC MODEL FOR LEAD IN CHILDREN	EPA/540/R-93/081
C692	01-Aug-94	FEASIBILITY STUDY ANALYSIS FOR CERCLA MUNICIPAL LANDFILL SITES	EPA 540/R/94/081
C317	01-Jan-95	LAND USE IN THE CERCLA REMEDY SELECTION PROCESS	OSWER 9355.7-04

C931	01-Jun-95	REMEDIAL DESIGN/REMEDIAL ACTION HANDBOOK	OSWER 9355.0-04B
C269	01-Jan-96	ECO UPDATE. ECOTOX THRESHOLDS. INTERMITTENT BULLETIN VOLUME 3, NUMBER 2	OSWER 9345.0-12FSI
C368	01-Jun-96	TOXICOLOGICAL BENCHMARKS FOR WILDLIFE: 1996 REVISION	
C1002	1-May-97	CONSOLIDATED GUIDE TO CONSULTATION PROCEEDURES FOR SUPERFUND RESPONSE DECISIONS	OSWER 9200. 1-18FS
C526	01-Jul-99	GUIDE TO PREPARING SUPERFUND PROPOSED PLANS RECORDS OF DECISION AND OTHER REMEDY SELECTION DECISION DOCUMENTS	OSWER 9200.1-23 P
C1003	1-Sep-99	REUSE OF CERCLA LANDFILL AND CONTAINMENT SITES	OSWER 9375.3-05P
C862	01-Jul-00	GUIDANCE FOR DATA QUALITY ASSESSMENT: PRACTICAL METHODS FOR DATA ANALYSIS, QA/G-9 (QA00 VERSION	EPA/600/R-96/084
C531	01-Sep-00	INSTITUTIONAL CONTROLS: A SITE MANAGER'S GUIDE TO IDENTIFYING, EVALUATING AND SELECTING INSTITUTIONAL CONTROLS AT SUPERFUND AND RCRA CORRECTIVE ACTION CLEANUPS.	OSWER 9355.0-74 FS-P
C525	05-Feb-01	REVISED ALTERNATIVE CAP DESIGN GUIDANCE PROPOSED FOR UNLINED HAZARDOUS WASTE LANDFILLS IN THE EPA REGION I	

C849	01-Mar-01	EPA REQUIREMENTS FOR QUALITY MANAGEMENT PLANS (QA/R-2)	EPA/240/ B-01/002
C850	01-Mar-01	EPA REQUIREMENTS FOR QUALITY ASSURANCE PROJECT PLANS (QA/R5)	EPA/240/ B-01/003
C539	01-Jun-01	COMPREHENSIVE FIVE-YEAR REVIEW GUIDANCE	OSWER 9355.7-03B-P
C567	12-Feb-02	PRINCIPLES FOR MANAGING CONTAMINATED SEDIMENT RISKS AT HAZARDOUS WASTE SITES	OSWER 9285.6-08
C663	01-Sep-02	GUIDANCE FOR COMPARING BACKGROUND AND CHEMICAL CONCENTRATIONS IN SOIL FOR CERCLA SITES	EPA-540-R-01-003
C723	26-Apr-02	ROLE OF BACKGROUND IN THE CERCLA CLEANUP PROGRAM	OSWER 9285.6-07P
C851	01-Dec-02	GUIDANCE FOR QUALITY ASSURANCE PROJECT PLANS (QA/G-5)	EPA/240/ R-02/009
C598	01-Jan-03	RECOMMENDATIONS OF THE TECHNICAL REVIEW WORKGROUP FOR LEAD FOR AN APPROACH TO ASSESSING RISK ASSOCIATED WITH ADULT EXPOSURES TO LEAD IN SOIL	EPA-540-R-03-001
C569	01-Nov-03	ECOLOGICAL SOIL SCREENING LEVEL FOR LEAD, INTERIM FINAL	OSWER 9285.7-70
C925	01-Apr-05	SUPERFUND COMMUNITY INVOLVEMENT HANDBOOK	EPA/540/ K‑05/003
C673	01-Jul-07	ECOLOGICAL SOIL SCREENING LEVELS FOR ZINC, INTERIM FINAL	OSWER 9285.7-73

C1013	02-Aug-07	FREQUENT QUESTIONS FROM RISK ASSESSORS ON THE ADULT LEAD METHODOLOGY (ALM)	
C869	01-Feb-09	ECOLOGICAL REVITALIZATION: TURNING CONTAMINATED PROPERTIES INTO COMMUNITY ASSETS	EPA 542-R-08-003
C743	26-Jun-09	SUMMARY OF KEY EXISTING EPA CERCLA POLICIES FOR GROUNDWATER RESTORATION	OSWER 9283.1-33
C916	17-Mar-10	CONSIDERING REASONABLY ANTICIPATED FUTURE LAND USE AND REDUCING BARRIERS TO REUSE AT EPA-LEAD SUPERFUND REMEDIAL SITES	OSWER 9355.7-19
C631	20-Oct-10	ECOLOGICAL SOIL SCREENING LEVELS (ECO-SSL) GUIDANCE AND DOCUMENTS	
C866	1-Nov-10	INSTITUTIONAL CONTROLS: A GUIDE TO PLANNING, IMPLEMENTING, MAINTAINING, AND ENFORCING INSTITUTIONAL CONTROLS AT CONTAMINATED SITES, INTERIM FINAL	OSWER 9355.0-89 /EPA-540-R-09-001
C1018	1-Jan-11	RHODE ISLAND GEOGRAPHIC INFORMATION SYSTEM, RHODE ISLAND DIGITAL ATLAS	
C936	01-Dec-12	INSTITUTIONAL CONTROLS: A GUIDE TO PLANNING, IMPLEMENTING, MAINTAINING, AND ENFORCING INSTITUTIONAL CONTROLS AT CONTAMINATED SITES	OSWER 9 355.0-89; EPA/540/ R-09/001
C1016	01-Jun-13	THE PRESIDENTS CLIMATE ACTION PLAN	
C918	05-Aug-13	NATIONAL RECOMMENDED WATER QUALITY CRITERIA: CURRENT WATER QUALITY CRITERIA	
C1021	01-Jan-14	EVALUATION OF ACTIVE CAP MATERIALS FOR METAL RETENTION IN SEDIMENTS	
C941	02-Feb-14	HUMAN HEALTH EVALUATION MANUAL: SUPPLEMENTAL GUIDANCE - UPDATE OF STANDARD EXPOSURE FACTORS	OSWER 9200.1-120
C1015	01-May-14	CLIMATE CHANGE ADAPTATION TECHNICAL FACT SHEET: LANDFILLS AND CONTAINMENT AS AN ELEMENT OF SITE REMEDIATION	EPA 542-F-14-001
C1011	01-Sep-14	TECHNICAL GUIDELINES ON PERFORMING A SEDIMENT EROSION AND DEPOSITION ASSESSMENT (SEDA) AT SUPERFUND SITES	
C1014	01-Nov-14	CLOSED WASTE SITES AS COMMUNITY ASSETS: A GUIDE FOR MUNICIPALITIES, LANDFILL OWNERS, AND REGULATORS	EPA/600/R -14/349