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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND – REGION 1
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BOSTON MASSACHUSETTS 02109-3912

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MEMORANDUM

Date: September 28, 2011

Subject: Responses to National Remedy Review Board (NRRB) Recommendations for the Centredale Manor Restoration Project Superfund Site, North Providence, Rhode Island

From: James T. Owens, III, Director
Office of Site Remediation and Restoration
U.S. EPA Region 1

To: Amy R. Legare, Chair
National Remedy Review Board

EPA Region 1 has reviewed the recommendations of the National Remedy Review Board (the "Board") for the Centredale Manor Restoration Project Superfund Site ("Site"), as were documented in a memorandum dated October 28, 2010. Region 1 appreciates the Board's input and will incorporate the Board's recommendations into the Proposed Plan and Record of Decision, as appropriate. Specific responses to each of the recommendations are outlined below. The Board's recommendations are in bold italics followed by the regional response. Please note that reference to the Interim Final Feasibility Study includes the Addendum dated September 2011.

Recommendation #1

The information presented to the Board indicated that the State has not obtained approval of a Comprehensive State Groundwater Protection Program, so the groundwater classification would default to the federal classification. The Region indicated that the groundwater at the site was classified as Class III: Not a Potential Source of Drinking Water and/or of Limited Beneficial Use. Based on the information presented to the Board, the Region's groundwater classification approach may not be consistent with the 2009 Office of Solid Waste and Emergency Response (OSWER) Directive 9283.1-33, Summary of Key Existing EPA CERCLA Policies for Groundwater Restoration. The Region should more fully describe the basis that was used to classify the groundwater under the Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy (December 1986) or change the classification in accordance with these guidelines. In addition, the Region should coordinate this rationale or change with Office of Site Remediation and Technology Innovation (OSRTI) and Federal Facilities Restoration and Reuse Office (FFRRO) before proceeding.

Response:

After careful review of the above cited guidance documents and further discussions with EPA Headquarters regarding the unique groundwater situation presented at the Centredale Manor Site, we have revised the groundwater classification from Class III (non-potable water) to Class IIB (potential drinking water source) for the groundwater within the Source Area consistent with *Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy* (December 1986). As a result, federal drinking water standards will now be ARARs at the Source Area.

The Source Area at the Site is bounded by the Woonasquatucket River almost completely on all sides. Prior to 2009, contaminated groundwater in the vicinity of Brook Village discharged to the River. However, this contaminated groundwater discharge was likely eliminated by work conducted as part of the 2009 removal action. Additional monitoring will be conducted to confirm that this is the case.

In addition, data from EPA groundwater monitoring wells installed across the River in Johnston, and RIDEM data from several State regulated waste sites on both sides of the River in the vicinity of the Site, show non-site related groundwater contamination beyond the Source Area. Since 1992, the groundwater *entirely* surrounding the Centredale Manor Site has been classified as a non-drinking water (GB) aquifer by the State of Rhode Island due to the numerous non-Superfund sources located on both sides of the Woonasquatucket River (both downstream and upstream from the Source Area).

In fact, RIDEM has identified 18 State regulated waste sites along the Woonasquatucket River in the vicinity of the Centredale Manor Site within this GB-classified aquifer. At least six of these waste sites are located close to the Woonasquatucket River and upgradient of the Source Area. A map showing the locations of these non-Superfund contamination sources will be part of the Administrative Record for the decision document. Based upon a review of extensive historic groundwater data provided by RIDEM, locations away from the Source Area are influenced by releases (including TCE and PCE) not attributable to the Site. As a result, anthropogenic conditions beyond the Source Area represent background concentrations for the aquifer beyond the Source Area. This finding will be further documented in our decision documents and supporting data will be included in the administrative record.

<u>Recommendation #2</u>

The Board notes that the Region views the dioxin-contaminated flood plain soils and mill pond sediments as listed waste under RCRA. The classification of these contaminated media as listed waste affects (i.e., likely limits) the range of available remedy options and potential Remedial Action Objectives (RAOs). To help ensure consistency throughout the regions and the Superfund program, the Board recommends that the Region better explain in its decision documents and supporting administrative record the determination that the dioxin-

contaminated flood plain soils and pond sediments are RCRA-listed waste, and the rationale for addressing those soils and sediments differently.

Response:

In 1965, a chemical company manufactured hexachlorophene from trichlorophenol in a building on-site. EPA has spoken with the individual who developed the manufacturing process for the chemical company. This individual was also deposed in litigation filed by one of the potentially responsible parties. According to the testimony, impure trichlorophenol obtained from Diamond-Alkali was used in the manufacturing process. It is well established that trichlorophenol contained dioxin at that time. The soil in the vicinity of the building used to manufacture hexachlorophene has some of the highest dioxin concentrations on-site. EPA believes that dioxin from the manufacturing process contaminated Site soil and sediment of the Woonasquatucket River. Waste generated from the manufacturing use of trichlorophenol is classified as F020 waste under 40 CFR §261.31. Sediment contaminated by a listed hazardous waste is subject to regulation as a listed hazardous waste. There are no exceptions that would apply to this waste.

We also do not believe that the RAOs developed for contaminated floodplain soil and mill pond sediment are affected by our determination that waste at the Site is a listed waste for purposes of RCRA. A review of the RAOs for contaminated floodplain soil and mill pond sediment shows that action was not triggered by RCRA waste characterization but rather by unacceptable human health and ecological risks. In addition, the RAOs that address dioxin in contaminated floodplain soil in the Interim Final Feasibility Study are based upon EPA's recommended residential level for dioxin and not on our determination that contaminated floodplain soil is a listed waste.

Recommendation #3

As presented in the package, the residential polychlorinated biphenyls (PCBs) preliminary remediation goal (PRG) was identified as 10 milligrams per kilogram (mg/kg) for soils (Rhode Island Department of Environmental Management residential direct exposure criterion). The EPA recommended residential PCB PRG is 1 mg/kg for soils. At the meeting, the Region acknowledged that it did not use the EPA recommended PRG but that it would make this change in line with the Board's recommendation to do so. The Board also recommends that the decision document more clearly describe the frequency of occurrence and resulting changes in volume estimates for remediation.

Response:

The Interim Final Feasibility Study and the ROD will identify EPA's recommended residential level for PCBs (EPA, 1990) as a To Be Considered (TBC) criteria used in the development of cleanup goals for PCBs in soil at the Site. This change will result in a lower cleanup goal for PCBs (i.e., total PCB and Aroclor 1254) of 1 mg/kg in Source Area soil and Allendale and Lyman Mill floodplain soil. These cleanup areas are *not* impacted by this change because soil

locations with PCB concentrations in excess of the 1 mg/kg cleanup goal are already encompassed in the areas proposed for remediation in the Interim Final Feasibility Study. In addition, the decision documents will clarify that about a third of the soil samples taken in the Source Area have concentrations above 1 mg/kg for PCBs. Neither Allendale floodplain soil nor Lyman Mill floodplain soil showed *any* exceedance of EPA's recommended residential level for PCBs of 1 mg/kg.

Recommendation #4

Based on the package presented, the Board is concerned that the cleanup level (at this site, expressed as a remediation goal (RG) related to fish consumption) may not be achievable in the time frame specified, especially for the lower pond area since contamination will be left in place in the Oxbow Area and might possibly be remobilized during flooding events [see also the recommendation on the reliability of the RCRA cap in the source area]. The Board recommends that the Region review whether the cleanup level (at this site, expressed as related to fish consumption) is achievable in the time frame estimated in the package.

Response:

The Region believes the remediation goal proposed for sediment in Alternative 7a is achievable within the timeframe identified in the Interim Final Feasibility Study (approximately 2 years) but also acknowledge that there is always some degree of uncertainty in these types of estimates. In addition, the Region acknowledges that the proposed remedy does not entirely eliminate the potential for recontamination into the sediment environment (particularly Lyman Mill Pond) and that some contamination left in place under the proposed thin-layer cover within the Oxbow Area could be remobilized and potentially transported through the aquatic food chain in the event of a catastrophic event.

However, the proposed sediment remedy also includes plans to remove stranded fish during the pond dewatering and excavation phases of the proposed remedial measures. As a result, it is anticipated that there will be no substantial human or ecological exposures to fish in this portion of the River for several years until the forage base (e.g., macroinvertebrate community) has become re-established and fish have recolonized the ponds. During this recovery period, any exposure to fish tissue from Allendale and Lyman Mill Ponds would be consistent with background conditions. Our calculations indicate that exposure to fish, whose tissue concentrations are consistent with background conditions, will not pose an unacceptable risk to human or ecological receptors (Tables 3 and 6, Appendix F in the Interim Final Feasibility Study for human health and ecological, respectively).

The proposed remedy (i.e., Alternative 3a, Targeted Excavation, Enhanced Natural Recovery [Thin-layer Cover] and On-site Containment in an Upland CDF) includes excavation in the River channel between Allendale Dam and Lyman Mill Pond. This will remove contaminated sediment in the area of highest erosion potential and also provide a deeper flow channel for flood flows. The areas where some contamination would be left in place under the thin-layer cover would only be in stable, vegetated areas outside the main flow channel. As a result, the potential

for erosion will be reduced by the existing vegetation in the Oxbow Area, which is a net depositional environment as evidenced by the widespread dioxin contamination within the floodplain (based on the 2010 investigation results). To provide further protection against possible future erosion, engineering structures such as baffles within the Oxbow will be installed to retard current flow during flooding events and minimize potential for high energy flows to re-suspend and transport contaminated floodplain soils. In addition, long-term monitoring will be required to assess recovery of biological communities and assess the impact of the remedial action on downstream areas.

It should be noted that the Region has re-evaluated areas for excavation and thin-layer covering within the Oxbow Area based on soil and sediment data collected as part of supplemental investigations performed in this area in fall/winter 2010. This supplemental sampling confirmed elevated dioxin and other contaminant levels throughout most of the Oxbow Area within the floodplain. The highest contaminant levels were found in the areas previously found to have higher levels of contamination and were planned to be excavated as part of the proposed remedy for the Oxbow. Based on the new sampling data, the targeted excavation area has also been increased from 4.8 acres to 6.5 acres, resulting in an incremental increase of 10,800 cubic yards of contaminated sediment and soil for disposal and/or treatment.

Recommendation #5

Based on the package presented to the Board, there appear to be high levels of dioxin and PCBs[1] in soils and sediments throughout much of the site. The Region's preferred alternative calls for treatment of only a portion of these contaminants of concern. In light of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and NCP preference for treatment to the maximum extent practicable, and in light of the Agency's currently ongoing reassessment regarding the toxicity of dioxin, the Board recommends that the Region explain in its decision documents: 1) the basis for treating the volume of dioxin and PCB identified; and 2) why treatment of areas with significantly higher concentrations (potentially representing principal threat waste) would not be evaluated/considered as an alternative. In addition, the Board recommends that the decision documents explain how using 10 times the universal treatment standard (10xUTS) (where land disposal restrictions for soil and 10xUTS are not risk-based) as a screening mechanism ensures protection of human health and the environment, and is consistent with the preference for treatment in CERCLA and the NCP. Finally, the Board recommends that the Region explain its basis for effectively equating sediments with soils for purposes of this screening mechanism.

[1] PCB contamination in soil is not widespread but rather is concentrated at the Source Area. See Response # 3 which summarizes the frequency of occurrence of PCBs at different areas of the Site. PCB contamination in sediment at levels above the sediment cleanup goals generally represents a smaller area within the dioxin cleanup area, suggesting that cleanup for dioxin will address PCB contamination in sediment (see Sections 3.5.1 and 3.5.2 of the draft Feasibility Study). The maximum level of PCBs detected in sediment was below 50 ppm. As a result, any sediment contaminated with only PCBs would not be identified as principal threat waste.

Response:

a. Basis for Treating Volume of Contaminated Media

EPA's proposed remedy focuses treatment on the most highly contaminated material found on the Site. Overall, the volume of material identified for treatment (including the principal threat waste addressed in prior removal actions) includes 1) buried waste material that still may be present in the Source Area; 2) excavated sediment and floodplain soil with dioxin contaminant concentrations above 10 ppb (10 x UTS); 3) highly-toxic soils on the west side of the Brook Village parking lot (excavated during a previous removal action); and 4) highly toxic sediment from behind the Allendale Dam (excavated during a previous removal action). The decision documents will explain the basis for this decision as summarized below.

The NCP establishes an expectation that EPA will use treatment to address the "principal threats" posed by a site wherever practicable (NCP Section 300.430 (a)(l)(iii)(A)). Generally "principal threat" wastes are those source materials that cannot be reliably controlled in place, such as liquids, highly mobile materials (e.g., solvents) and high concentrations of toxic compounds (*A Guide to Principal Threat and Low Level Threat Wastes*, p. 2 (OSWER 9380.3-06FS, November 1991)).

1. Source Area

The Region believes that our proposed remedy for the Source Area uses treatment to address the principal threats posed by the Source Area to the maximum extent practicable. Principal threat wastes for the Centredale Site include source materials at the Source Area including buried waste material that may be present particularly near the southern area of Cap Area #1 (possible buried metallic materials are shown in Figure 2-1 in the Interim Final Feasibility Study). Buried waste material under Cap Area #1 could be highly toxic and highly mobile and could present a significant risk to human health or the environment should exposure occur. The proposed remedy includes excavation of this buried waste material under Cap Area #1 and off-site disposal by incineration thereby reducing toxicity, mobility and volume through treatment.

Large-scale excavation and ex-situ treatment of *all* source material at the Source Area (also principal threat waste) was evaluated as an alternative (Alternative 5) in the Interim Final Feasibility Study (See Section 5.4.5 for more detail). However, this alternative was screened out primarily because implementation of a treatment-based remedy would result in greater overall risk to human health due to risks posed to the surrounding community during implementation. Our evaluation concludes that these risks cannot be otherwise addressed through implementation measures. As a result, we believe treatment of all material in the Source Area is not practicable. In-situ treatment for soil, including solidification/stabilization, thermal treatment, and biological treatment were considered as part of the screening evaluation of general response actions and were not retained for

remedial alternative development due to a combination of low effectiveness, difficulty in implementation and high cost for site-specific conditions.

In particular, there is concern that large scale excavation could not be conducted in a way that would allow residents to remain in their homes given the close proximity of the contamination to two apartment buildings (the buildings were constructed on a portion of the Source Area). Excavation work would have to be performed up to the perimeter of the buildings, which would block access and have a high potential to generate dust and volatile emissions at concentrations that could increase health risks to the residents. To address this, the elderly and handicapped residents of the two apartment buildings (approximately 335 residents) would need to be relocated during construction. Because of the age and health of the residents in these buildings, relocation could have significant unacceptable short- and long-term human health impacts coupled with significant implementability issues. (See 55 FR 8703 - implementation of a treatment-based remedy would result in greater overall risk to human health and the environment due to risks posed to workers or the surrounding community during implementation.)

The proposed remedy for the Source Area includes a RCRA cap (including long term operation, maintenance, and monitoring) as well as clean corridors for utilities. This will prevent exposure to contaminated soil both to residents and utility workers. In addition, institutional controls will prevent any activities that could adversely impact the integrity of the cap. As a result, the Region believes our proposed remedy is fully protective.

The volume of material for treatment was calculated in AutoCAD based on the spatial and vertical extent of the excavation area. The spatial extent of the proposed excavation area encompasses the area interpreted as having the highest potential for containing buried bulk metallic materials, as determined by geophysical surveys conducted using electromagnetic and ground-penetrating radar survey techniques. The vertical extent of the proposed excavation area is 4 ft below ground surface (bgs), which is based on the average fill thickness at the Source Area and confirmed by soil borings collected at this area.

2. Floodplain Soil and Sediment

The Region also believes that our proposed remedy for floodplain soil and sediment uses treatment to address principal threats (beyond those noted above in the Source Area) to the maximum extent practicable. Based upon comments received from the NRRB in August 2010 regarding our initial characterization of floodplain soil and sediment as low-level threat waste, we believe that contaminated floodplain soil and pond sediment should now be classified as principal threat waste.

Treatment for *all* contaminated floodplain soil and mill pond sediment (principal threat waste) beyond the Source Area was evaluated in the Interim Final Feasibility Study. However, we are proposing that only a portion of this contaminated floodplain soil and mill pond sediment be treated as this represents treatment to the maximum extent practicable. This determination was made by balancing the trade-offs between alternatives based upon: (1) long-term effectiveness and permanence, (2) reduction of

toxicity, mobility, or volume through treatment, (3) short-term effectiveness, (4) implementability, and (5) cost. In addition, overall protection of human health and the environment and compliance with ARARs were also evaluated. In particular, we have determined that the extremely large volume of contaminated floodplain soil and sediment (approximately 216,600 cubic yards, including over-excavation allowance, from an area covering 69.2 acres) that needs to be addressed (and associated cost for treatment) coupled with the overall complexity of the Site make full scale implementation of treatment impracticable. (See 55 FR 8703 - the extraordinary size or complexity of a site makes implementation of treatment technologies impracticable.)

The Interim Final Feasibility Study and associated decision documents will be amended to reflect this change.

3) West Side Brook Village Parking Lot

Principal threat waste comprised of highly-toxic soils on the west side of the Brook Village parking lot was excavated and shipped off site for treatment under the 2009 time-critical removal action (approximately 2,286 tons).

4) Allendale Dam

In addition, principal threat waste comprised of highly-toxic sediment behind the Allendale Dam was excavated and shipped off site for treatment under the 2001-2003 non-time-critical removal action (approximately 315 tons).

b. Evaluation/Consideration of Treatment of Greater Volume of Contaminated Media

We have evaluated/considered treatment of greater volumes of contaminated media in the Interim Final Feasibility Study. The Interim Final Feasibility Study evaluated a number of alternatives that required varying levels of treatment for contaminated media at the Site. For example, some alternatives considered treatment of *all* contaminated sediment and floodplain soil (e.g., sediment Alternatives 7d and 10d) while other alternatives included treatment of excavated sediment and floodplain soil exceeding 10 ppb (10 x UTS) for dioxin (e.g., sediment Alternatives 7a, 7e, 10a and 10e). Alternatives evaluated for the Source Area focused on treatment of buried waste material that still may be present in the Source Area but also considered full excavation and treatment of this material. As a result, we believe we have evaluated and considered an appropriate range of alternatives in the Interim Final Feasibility Study with some alternatives requiring treatment of all contaminated media, some alternatives requiring treatment of only the most significantly contaminated material, and other alternatives requiring no treatment whatsoever.

As the Board notes, CERCLA contains a preference for treatment as a principal requirement for the selection of cleanup remedies. The NCP further establishes nine criteria for evaluating remedial alternatives to ensure that all appropriate considerations are factored into remedy selection decisions. In proposing to treat a portion of the

contaminated material, we took into account our evaluation of other criteria including long-term effectiveness and permanence, implementability, and cost in making the determination that we are using treatment to the maximum extent practicable. We believe that our proposed approach provides the best balance of trade-offs between the alternatives and satisfies both CERCLA's preference for treatment and the criteria established by the NCP for such evaluations.

c. Use of Alternative Treatment Standards for Soil

We agree that land disposal restrictions for soil and the alternative treatment standards for soil are not risk-based requirements. Our decision to use these treatment standards in the Interim Final Feasibility Study was focused on the requirement in the NCP that we develop a range of treatment alternatives combined with the requirement for compliance with ARARs. As such, our evaluation of overall protection of human health and the environment for the Site was not based upon our meeting the alternative treatment standards for soil, but instead was based upon an overall assessment of the alternatives drawing on our assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs. This evaluation also focused on how Site risks posed through each pathway being addressed are eliminated, reduced, or controlled through treatment, engineering, or institutional controls.

As discussed above, the Interim Final Feasibility Study evaluated a range of alternatives with some alternatives requiring treatment of all contaminated media, some alternatives requiring treatment of only the most significantly contaminated material, and other alternatives requiring no treatment whatsoever. We believe this is consistent with the NCP that requires EPA to evaluate:

> ...a range of alternatives in which treatment ... is a principal element. This range shall include an alternative that removes or destroys hazardous substances ...to the maximum extent feasible; ... other alternatives that vary in the degree of treatment employed; ...and...one or more alternatives that involve little or no treatment.

The decision to use the alternative treatment standards for soil as a basis for treatment in some of the alternatives in the Interim Final Feasibility Study was premised upon the need to evaluate alternatives that varied in the degree of treatment employed. In addition, because alternatives evaluated in the detailed analysis must meet ARARs (LDRs/alternative treatment standards for soil), the Region opted to use these requirements in developing a range of treatment when assembling alternatives. Because the alternative treatment standards for soil are ARARs and were developed by EPA for use in determining treatment for soil at Superfund sites where LDRs are triggered (as is the case at the Centredale Site), we believe it is supportable to use these standards in the Interim Final Feasibility Study when developing alternatives with varying degrees of treatment.

d. Equating Sediment with Soil

With respect to equating sediment with soil for purposes of evaluating material subject to LDRs, we used the alternative treatment standards for contaminated soil because the dewatered sediment fits within the LDR definition of soil – "unconsolidated earth material composing the superficial geologic strata, consisting of clay, silt, sand or gravel size particles...or a mixture of such materials with liquids, sludges or solids which is inseparable by simple mechanical removal processes and is made up of primarily soil by volume based on visual inspection." This conclusion was reached after further discussions with other regions, the Office of Solid Waste and Emergency Response, and the Office of General Counsel's national remedy selection group.

e. Dioxin Reassessment

The Board also raised the Agency's ongoing reassessment regarding the toxicity of dioxin and the recently proposed revised interim preliminary remediation goals. Despite these long-standing efforts, EPA has not proposed any change to the way dioxin contaminated soil is managed under RCRA; nor has it proposed any changes to the UTS for dioxin. In fact, EPA recently reiterated that the LDR treatment standards are to be used to decide whether dioxin will require treatment.[2] As discussed above, the Region's proposed remedy ensures that waste material will be treated, to the maximum extent practicable, prior to disposal consistent with Federal law.

Recommendation #6

When considering habitat value, the preferred alternative appears to rely on different approaches with respect to removal of contamination from Lyman and Allendale Ponds as opposed to removal of contamination from the Oxbow Area. Region 1 believes that the Oxbow Area represents a significant wildlife habitat, as compared to the ponds, and has delineated the area to ensure that the maximum net environmental benefit be derived from the proposed action. The Board recommends that the Region re-evaluate the areas selected for excavation, targeted excavation and enhanced natural recovery, while balancing the impacts to all areas to achieve maximum risk reduction. The decision documents should explain how leaving source material in the wetland areas ensures protectiveness and why hot-spot removal is not practicable.

Response:

With respect to the Lyman Mill and Allendale Ponds, these historical impoundments of the free running Woonasquatucket River created artificial lacustrine habitat and promoted a warm-water

[2] Fact Sheet on the Management of Dioxin Contaminated Soils, May 9, 2011, Dioxin Toolbox.

fishery that is relatively common in the region. There is no evidence that particularly sensitive environmental receptors exist in the ponds. The proposed remedy for the Lyman Mill and Allendale Ponds (i.e., draining and excavation of contaminated sediment) would temporarily eliminate the forage base for the pond ecosystem. However, it is anticipated that it would likely become reestablished within 2-3 years and that the functional values currently provided would return within 5 years following remedy implementation (which includes various habitat restoration measures). To the extent that the current environmental setting is valued by humans and fish and wildlife that currently use the ponds, the proposed remedy will enhance these values in the long term by setting back the timeline of wetland succession and the return of open water habitat that is characteristic of these two ponds.

Alternatively, the Oxbow Area is a mature 27-acre red maple swamp that is regionally significant and highly valued by state and federal resource agencies. Potential vernal pools (to be evaluated further during the remedy design) located within the Oxbow Area may provide essential breeding ground for regionally threatened/endangered amphibian and crustacean populations. An anuran call survey was conducted during the amphibian breeding season in both 2001 and 2002 (USFWS, 2001; 2002). A diverse assemblage of amphibians was identified. As concluded by the wetland delineation and functional value assessment (USACE, 2008), the most important function provided by the Oxbow wetlands is wildlife habitat[3].

The Region's preferred alternative for the Oxbow wetland area includes the targeted excavation of approximately 6.5 acres of contaminated sediment and floodplain soil from: 1) areas with contaminant concentrations in excess of RIDEM's residential direct exposure criteria and EPA's recommended residential level for dioxin in soil; and (2) highly erosional areas where a thin-layer cover is not suitable for potential contaminated sediment/soil being transported downstream if remobilized during flooding events. In addition, a thin-layer cover of 3 inches is proposed to be placed over the remaining Oxbow wetland area (approximately 22 acres) to accelerate the natural recovery processes.

These areas represent an increase over the areas set forth in the Interim Final Feasibility Study and presented to the Board. The Region incorporated the results from a more recent 2010 Oxbow investigation into the updated baseline risk assessment. The data confirmed elevated dioxin contamination throughout most of the Oxbow Area soil and sediment within the floodplain. The highest contaminant levels were found in the areas previously found to have high levels of contamination.

The proposed remedy for the Oxbow wetland area provides overall protection of human health and the environment because contaminated sediment from highly erosional areas and floodplain soil with the highest concentrations of contaminants would be removed and either contained in an upland disposal facility or treated. In addition, surface soil concentrations would be reduced by placement of the thin-layer cover over the entire area.

[3] Other wetland functions and values provided by the wetlands to a notable degree were determined to include flood flow alteration, fish habitat, sediment/toxicant reduction, nutrient removal/transformation, production export, uniqueness/heritage value, and carbon sequestration (USACE, 2008).

In developing the proposed remedy, the Region employed a Net Risk Reduction Analysis consistent with *Final Guidance: Ecological Risk Assessment and Risk Management Principles for Superfund Sites,* OSWER Directive 9285.7-28, Office of Emergency and Remedial Response, 1999, to balance excavation versus covering contaminated areas This Guidance states:

> Even though an ecological risk assessment may demonstrate that adverse ecological effects have occurred or are expected to occur, it may not be in the best interest of the overall environment to actively remediate the site. At some sites, particularly those that have rare or very sensitive habitats, removal or *in-situ* treatment of the contamination may cause more harm (often due to wide spread physical destruction of habitat) than leaving it in place. The likelihood of the response alternatives to achieve success and the time frame for a biological community to fully recover should be considered in remedy selection. Although most receptors and habitats can recover from physical disturbances, risk managers should carefully weigh both the short- and long-term ecological effects of active remediation alternatives and passive alternatives when selecting a final response.

Both Alternatives 3 and 5 for the Oxbow wetland area will result in a significant risk reduction compared to No Action. Both Alternatives 3 and 5 reduce human health risk immediately following remedy implementation and achieve the human health RAOs for this area within approximately 4 and 0.5 years, respectively. Exposure risks to wildlife receptors associated with dioxin immediately following remedy implementation are reduced by an order of magnitude and the ecological RAOs for this area are achieved decades earlier than under No Action. The short-term impacts to the environment from Alternatives 3 and 5 are limited to disruption of the soil invertebrate community and loss of the shrub layer that provides forage and habitat to wildlife and other ecological receptors. It is anticipated that if, as planned, shrub species were planted immediately following excavation activities under Alternatives 3 and 5 that the full functions currently being provided by this forest layer could be restored within 2 decades. Complete excavation, which was screened out in the Interim Final Feasibility Study, would eliminate nesting and foraging habitat for songbird populations and other wildlife that would require many decades to fully replace, although appropriate mitigative measures could limit some of these impacts.

While some residual ecological risk would remain in the relative short term following remedy construction if the preferred remedy were to be implemented, these risks will be substantially reduced from the current risks and are not substantially elevated above background conditions and would be expected to further decline over time as relatively clean sediments are deposited during annual flooding events.

Recommendation #7

The material presented to the Board indicated that the RCRA cap over the source area soils is intended to protect against direct contact and against contaminant vertical migration/leaching. In the event of a flood and in conjunction with the shallow groundwater flow conditions at the site, the RCRA cap may not provide sufficient protection from contaminant release to ground

and surface waters. The Board recommends that the Region better explain how the cap will prevent contaminant release via flow through residual soil contamination.

Response:

The proposed RCRA cap, in combination with shoreline erosion protection that has been installed as part of past removal actions, will provide protection against contaminant release from residual soil contamination to groundwater or surface water. In addition, the proposed RCRA cap will prevent floodwaters (as well as infiltration from precipitation) from flowing downward through the soils in the vadose zone. Therefore, the proposed Source Area remedy is expected to eliminate the pathway for contaminants to leach from vadose zone soil to the groundwater.

The only potential path for floodwaters to contact contaminated soil would be along the shoreline where floodwaters could seep laterally through the existing erosion protection stone. Floodwaters may seep into the soils during flooding and then seep back out towards the River when the floodwaters recede, which would only occur for a short time after a flood event. The erosion protection stone and underlying sand bedding layer will prevent movement of soil particles and prevent direct contact with contaminated soil. Additional monitoring and/or inspections will be required after flood events to confirm that soil and/or sediment adjacent to the proposed RCRA cap has not been adversely impacted. Furthermore, past monitoring indicates that groundwater does not recharge into the River in the southern portion of the Source Area, even during high precipitation and high-flow events. Even if it did, contaminant transport analysis suggests that the flux of contaminants from groundwater to surface water would not cause unacceptable concentrations in surface water relative to upgradient conditions.

As described above, with the RCRA cap in place, there will be no vertical seepage of floodwaters or precipitation through vadose zone soils. As a result, it is expected that groundwater concentrations in the future will be less than under current conditions. The data from the existing wells demonstrate that the concentrations in the groundwater, although exceeding MCLs in some locations for PCE and TCE, are generally low under current conditions. The area where higher concentrations were found was addressed in the 2009 removal action.

Recommendation #8

In the package presented to the Board (section 13.4, page 100), the Region stated that "appropriate land could be acquired to address this project need" referring to the replacement of wetlands that are damaged in the Remedial Action. Consistent with Clean Water Act section 404 and its implementing regulations, a remedy generally includes restoration/replication of the wetland areas disturbed by the response actions rather than acquiring land. The Board recommends that the Region clarify this component of the remedy in the decision documents.

Response:

Consistent with Section 404 of the Clean Water Act and implementing regulations, the remedial alternatives considered rely on maximizing the potential for in-place/in-kind restoration. Nonetheless, those remedial alternatives that include the placement of containment structures within or adjacent to the Woonasquatucket River (e.g., sediment Alternative 7b, On-site Containment in a Nearshore CDF) would result in some existing habitat (aquatic or floodplain, respectively) being unavoidably lost and would require wetland replication in existing upland areas and/or restoration of degraded existing wetland habitat. In addition, out-of-place mitigation (restoration and/or replication) would automatically be required if ratios greater than 1:1 are required consistent with Section 404 requirements. Under these circumstances, the Interim Final Feasibility Study offered a number of potential options for meeting additional out-of-kind restoration and/or replication requirements. These components of the remedy will be clarified in the upcoming decision documents.

Recommendation #9

In the package presented to the Board, sediment removal alternatives were preferred to those involving capping as a component. During the meeting, the Region explained that because capping necessitates institutional controls and maintenance, it makes it a less reliable remedial approach in this particular case. The Board notes that capping is often selected as a remedy for contaminated sediments, which can result in lower costs and less material requiring disposal. These features may be important at this site given the limited land available for a confined disposal facility. More specifically, the preferred alternative (7a) for the Allendale and Lyman Mill Reach sediments involves excavation and disposal of 155,800 cubic yards (cy) of material at a cost of $61 million. However, another alternative (8a), which includes a combination of excavation and capping, could also result in a protective remedy at a lower cost (i.e., as low as $45 million). Only 66,400 cy of sediment would be removed under this latter alternative. In view of the cost and disposal need features, the Board recommends that the Region further consider the merits of alternatives involving a combination of excavation and capping, and include the results of this evaluation in the alternatives analysis in the site decision documents.

Response:

The Region believes that we have fully considered the merits of all alternatives involving a combination of excavation and capping to address contaminated sediment. The Region recognizes that Alternative 8a, which relies on a combination of excavation and capping, would be lower in cost, have less material to process and dispose of, and would require a smaller parcel of land for the on-site confined disposal facility compared to full excavation under Alternative 7a. However, results from the comparative analysis of the Allendale and Lyman Mill Reach sediment alternatives, which evaluated key trade-offs among the alternatives with respect to the NCP evaluation criteria (see Section 6.3 of the Interim Final Feasibility Study), showed that Alternative 7a would provide a higher level of protection to human health and the environment and would be more effective in the long term compared to Alternative 8a. Under Alternative 7a,

all sediment above the proposed cleanup goals would be removed, which would quickly reduce human health and ecological risk to acceptable levels. Partial removal using excavation in conjunction with isolation capping (Alternative 8a) would also provide protection, although contaminated sediment would remain in place under the isolation cap in shallow ponds which could be released in the future should catastrophic events occur or if monitoring, maintenance and/or institutional controls are not effective/reliable in the long term (in perpetuity).

The situation at this Site is particularly unique because the proposed isolation cap identified in Alternative 8a could become unstable and potentially erode if the two mill pond dams were removed or breached. It should also be noted that the Lyman Mill Dam was not designed and constructed to modern standards and would require upgrades and reliable long-term maintenance in perpetuity in this alternative. Although Allendale Dam was reconstructed in 2002, it would also require maintenance in perpetuity. In addition, for site-specific reasons, dam maintenance is complex because the dams are privately owned and/or because ownership is unclear. Lack of maintenance likely contributed to the breaching of Allendale Dam in 1991 and 2001. The breaching of the dam in 1991 and again in 2001 exposed the pond bottom to residential properties along the eastern bank of the pond, and may have contributed to the transport of contaminated sediment downstream of the dam. Leaving contamination in place, as would be proposed under Alternative 8a, is of particular concern to the local community and State that have observed first-hand the breaching of Allendale Dam. In comments submitted to the Board, the State, municipalities and parties representing community groups have indicated that they oppose leaving contamination in the River. In particular, commenters have raised concerns with potential impacts from extreme weather events, long-term maintenance, enforcement of institutional controls, and potential changes to the footprint of the ponds and nearby land.

Another potential difference between Alternatives 7a and 8a would be if the isolation capping alternative (Alternative 8a) required a more erosion-resistant cover substrate than the excavation alternative (Alternative 7a). If the capping substrate was less favorable for recolonization by macroinvertebrates, the delay in the re-establishment of the base of the aquatic food web in the ponds could in turn delay the recovery of the fishery and wildlife populations.

Finally, a review of ARARs indicates that Alternative 8a may not be the least damaging practical alternative for purposes of Section 404 of the Clean Water Act. There may be unacceptable floodplain impacts as well under Alternative 8a. Our wetlands and floodplain assessment concluded that Alternative 7a is the least damaging practical alternative for purposes of Section 404 and meets floodplain requirements.

A more detailed discussion of this evaluation is included in the Site decision documents.