**Comments on the Phase III Remedial Action Plan —**
**RTN 4-601, Former Aerovox Facility, New Bedford, MA dated June 2017**

1. The permeable reactive barrier on the shoreline will be in jeopardy pending a decision on the remedial action by EPA in New Bedford Harbor. A PRB will be unprotected and any excavation or construction on the harbor side will likely damage the barrier, reducing or eliminating its total effectiveness. The implementability of this alternative should be addressed in regard to its role as the boundary between the AVX and the EPA remedial actions. (TT)

2. While excavation of soils as described in Alternative OU3-9 will remove the major contaminated soils along the boundary, the results of the soil characterization of MW-15D show that considerable quantities of PCBs could be found under the peat layer and in the deeper portions of the outwash and glacial till. Leaving this material in place could jeopardize the Harbor by mass transport of DNAPL gravimetrically or by erosion into the Harbor. The preferred alternative must address the potential for soils sloughing Into the Harbor as a result of the wear and tear on the PRB and the reconstructed shoreline. (TT)

3. Alternative OU3-9 calls for excavation of northeast corner soils to bedrock to address the deep contaminated soils above the till as represented by MW-15D. Does this excavation include the highly contaminated soils in MIP-53 and MIP-54 that are currently north of the present sheet pile wall? It is not clear from Figure 4.3.3-9 if this is an excavation to bottom of peat or top of bedrock. However, since DNAPL has clearly migrated down to and into bedrock, an excavation such as described for this alternative should be performed down to the top of rock. (TT, NAE)

4. The last paragraph of Section 2.4.1 states that the sheet pile wall will not be included as part of the final Aerovox remedial alternative. What is the disposition of the sheet pile wall in the design of preferred Alternative OU3-9? The third paragraph on page 2-6 states that the sheet pile wall will be removed. Based on the production of sheen during the intermediate removal actions, a barrier should be included in the remedy to prevent transport of contaminants into the Harbor during the removal of the sheet pile wall. (TT)

5. The hydraulic conductivity reported in the Phase II CSA for bedrock is comparable to a well graded sand (34.9 ft/day, page 2-11). This affects the modeling of each of the alternatives and it is our contention that the bedrock regime is not as open as modeled. This would in turn, affect the flux of contaminants from the bedrock through the sediments into the Harbor, and, in turn, affect the estimations of the likely pore water concentration in the sediment. While it is possible that the original estimate is conservative, the assumption that the bedrock layer is porous is probably not realistic in regard to discharge of contaminants to the Harbor. Please re-evaluate the hydraulic conductivity of the upper bedrock layer and the subsequent impact on mass flux. (TT)

6. The text states that "Groundwater modeling indicates that pumping at the required rates to create hydraulic capture would draw contamination down from the overburden soils into bedrock fractures complicating subsequent removal." (Section 4.1.2.1, pg 4-4). It is difficult to envision pumping rates that pull contaminants from the upper layers and subsequently push contaminants into the bedrock fractures. If the bedrock is as open as modeled, this should not be a problem. After re-evaluation of the hydraulic conductivities used in the model for the upper bedrock layer, please re-assess the use of hydraulic capture as a remedy. (TT, NAE)

7. Based on the estimates in the last paragraph of Section 2.4.5.1 (page 2-15), approximately 53 percent of the PCB mass will be addressed in Alternative OU3-9 by removal of all soils 0-25 ft from the shoreline and from the surface to the bottom of the peat layer. However, these soils will be staged on site and therefore will not be removed but managed. Therefore, all of the remaining mass of PCBs from the Aerovox site would remain on site, but just pose a less immediate threat to the Harbor. This should not be considered a "permanent solution" and should be scored accordingly. (TT)

8. The selected remedies for the site are centered around on-site consolidation of the most contaminated soil and capping. However, the Phase III indicates that all remedies with AULs were rejected due to concerns of the property owners. But it is not clear how the an on-site "cell" or "landfill" can be constructed and maintained as secure without institutional controls (or AULs). Please explain how the remedy without institutional controls can ensure that future building or construction of any sort will not have the potential to cause future releases or exposures. (NAE)

9. The first paragraph of Section 5.3.3 (pg 5-10) states, "Thus none of these factors are differentiators. Rather, a point was given to those alternatives which provide a hard vertical barrier wall along the shoreline since this would provide the EPA cleanup (whenever and however it occurs) with a definitive, solid structural surface along the former Aerovox facility shoreline." It appears that the selection of a preferred alternative gave a modicum of consideration for implementability in its evaluation of compatibility with any EPA remedial action. In turn, this preferred alternative will limit the alternatives that the EPA may consider for addressing the contamination in the Harbor adjacent to the Aerovox property. There are limited options for remediating the contamination in the Harbor and not severely impacting the effectiveness of the Aerovox preferred alternative. The scoring of alternatives should be re-scored to address the interactions of the alternative and river/Harbor sediment remediation. (TT, NAE)

10. Mass flux: Section 2.4.4: Mass flux of TCE for both the bedrock and the overburden is calculated for the plume width where TCE exceed the GW-3 standard of 5,000 µg/L (as stated in both sections 2.4.4.1 and 2.4.4.2). The GW-3 standard is an exposure-based criterion that is not appropriate for use in calculating the overall mass flux since mass flux itself is not an exposure-based construct, but rather a straightforward estimate of the amount of COC entering the harbor. Mass flux estimation helps determine whether eventually the mass entering the harbor will lead to unacceptable water or sediment concentrations within the harbor. For example, 1,000 gallons per day of water with 4,900 µg/L were entering the harbor would be vastly more concerning that 10 gallons per day of water with 5,100 µg/L, despite the fact that the water in the latter scenario exceed the GW-3 standard. It would more appropriate to select a MUCH lower concentration contour of TCE for use in estimating mass flux. The only reason to select a contour at all for a flux estimation (rather than extending the width to the non-detect boundary) is the argument that a large area discharging at a low concentration (e.g., 5 µg/L) will not significantly change the overall calculated mass flux. However, by setting the plume width to 5,000 µg/L contour, mass flux through bedrock or overburden where concentrations are still in the thousands of µg/L is ignored, though this mass may be significant. For example, the concentration of TCE in bedrock shown on Appendix B Figure 1 is 4,400 µg/L. This location is well outside the bounds of the mass flux estimation, resulting in a significant underestimation of mass flux. Selecting the 100 µg/L contour to bound the plume width is considered a conservative, reasonable assumption. (NAE)

11. ZVI PRB: ZVI lab testing was performed using groundwater from MW-15D, a well that has historically had high concentrations of PCBs and CVOCs as well as observed DNAPL. From a contaminant standpoint, it was logical to use this location for testing. A USACE comment on the 2016 Phase III recommended doing the kind of bench-scale testing that B&C contracted SiREM to perform. However, one of the concerns that was expressed in that comment was to evaluate the effect of the site groundwater to determine whether the water from the site would result in passivation or clogging of the ZVI and degradation of the efficacy of the iron. Given the depth of well MW-15D, it does not appear to be representative of the shallow groundwater influenced by tidal estuary waters the PRB would be in contact with. Specific conductivity for MW-15D was between 3 and 4 mS/cm in samples collected in 2014 and 2015, sulfate concentrations were approximately 170 mg/L, and chloride concentrations were approximately 1,100 mg/L. Shallower samples closer to the harbor bottom tended to have higher specific conductivity, ranging to greater than 30 mS/cm during the same 2014-15 sampling events, with these elevated values assumed due to the influence of more saline estuary waters (values for sea water are: conductivity ~5,000 mS/cm; sulfate concentration ~2,500 to 3,000 mg/L; and chloride concentration ~19,000 mg/L). Did SiREM consider the impact of high total dissolved solids from the sea water-groundwater mixture that would be expected to flow through the PRB during the hydraulic gradient reversal that has been documented to occur at the higher stages of the tidal cycle? Other PRBs installed in high total dissolve solids environments have experienced heightened solids precipitation within the barrier, causing porosity loss due to plugging and armoring. These processes adversely affect the PRB effectiveness and longevity. This issue should be addressed when considering PRB alternatives. Please provide site-specific data that addresses the impact of sea water on the performance of a ZVI PRB.

    Specifically, in Section 5.3, assessments of effectiveness, reliability, and long term costs appear to be inaccurate for the ZVI PRB component of the OU3-9 alternative relative to saline environment in which the PRB will be installed. No consideration is apparent for PRB performance and long term maintenance cost due to loss of permeability that is likely to occur as a result of ZVI corrosion or clogging. For the proposed installation along the eastern edge of the site property, loss of porosity of the PRB will occur on both the upgradient and downgradient sides of the barrier wall due to the tidally-influenced change in flow directions. Tidal water exchange is likely to accelerate loss of PRB porosity and transmissivity and require active long-term maintenance to maintain or recover the ability of the PRB to treat the contaminant plume. Thus, the assignment of ratings for the OU3-9 alternative needs to account for this performance uncertainty. (NAE and ORD)

12. For the 2016 Phase III, the USACE provided comments about the assumptions of efficacy of installing a PRB along the bedrock surface using one-pass trenching. This is not likely to be effective for a bedrock with significant topography, and therefore there is likely to be sections of the overburden above the bedrock without ZVI. (NAE)

13. A PRB is a key element of the selected remedies. However, in addition to the issues discussed above, as described in the USACE comments on the 2016 Phase III, a PRB is designed to treat dissolved phase contamination and will not treat DNAPL that may move through it. As noted in the next comment, the revised Phase III indicates that a shoreline PRB would be installed directly through probable DNAPL zones and that the DNAPL at the site has the potential for short-distance migration (i.e., DNAPL present in the soil that is sufficiently mobile to drain into wells may also be sufficiently mobile to migrate short distances through a permeable barrier). Please explain how this migration can be prevented or mitigated, since the presence of DNAPL within or beyond a PRB will prevent the PRB from eliminating contaminant migration. (NAE)

14. DNAPL Summary (Section 2.4.7 and Appendix D): In response to comments on the 2016 Phase III, a detailed DNAPL evaluation of the site was completed for the revision. Figures 2 and 3 of Appendix D show "probable" DNAPL zones extending along approximately 40% of the Aerovox shoreline, immediately adjacent to the harbor, for the shallow and deep overburden zones of the aquifer, with the following statements provided in the supporting text (bolding of text has been added for emphasis):

    "Therefore, the DNAPL mobility evaluation is congruent with the investigative findings and supportive of a **middle**- to late-stage DNAPL plume condition" (Appendix D, page 21)

    "Current site conditions indicate that contiguous DNAPL bodies of sufficient lateral extent to migrate under these gradient influences are not likely present at the Site and the major if the DNAPL present today is in the form of residual DNAPL." [assumed text is "…major form of DNAPL…"] (Appendix D, page 21)

    "Rather, the DNAPL is considered to be stable, but may have micro-scale mobility, defined by the MCP as NAPL with a footprint that is not expanding, but which is visibly present in the subsurface in sufficient quantities **to migrate or potentially migrate as a separate phase over a short distance and visibly impact an excavation**, boring or monitoring well." (Section 2.4.7, page 2-23)

    DNAPL guidance documents define the "middle" stage condition as still having some pooled DNAPL in the subsurface. Although it is agreed that the major form of DNAPL at the site is likely residual at this time, even a small amount of pooled DNAPL along the boundary of the site presents a significant risk of recontamination of harbor sediments. Just as DNAPL was able the migrate the "short distance" into monitoring well MW-15D and into the shoreline excavations performed in 2016, some release into the harbor is expected as sediments adjacent to the Aerovox site are excavated. With a remediation criteria of 10 mg/kg for the sediments of the upper harbor, release of even a small amount of DNAPL has the potential to recontaminate substantial areas of the harbor. (NAE)

15. Furthermore, no information on the characteristics of the on-site storage, such as use of a bottom liner to prevent water infiltration/exfiltration during periods of potential inundation from storm surge or large precipitation events. Such design issues affect consideration of the suitability of this alternative. (ORD)

16. Appendix G, Groundwater Flow Model. On page 747 of the Phase 3 RAP (Appendix G, Page 2-1), the following statement is made:

    "The barrier wall does, however, reduce the estimated groundwater flux through the contained

overburden by approximately 50 percent. This is due to the more circuitous route groundwater from the overburden units must take to discharge to the river, as well as the reduced gradients and tidal fluctuations caused by the barrier wall."

More detail needs to be provided relative to the modeled boundary conditions employed to represent Remedial Scenario 1. Based on the description in Appendix G, Section 2.1, this model scenario should represent zero water input from the surface, nearly zero water input laterally via Model Layers 1 and 2 (overburden), and primary water input through the Model Layer 3 (bedrock) within the lateral boundary of the modeled hydraulic barrier in overburden. As stated in the description of the model output for this scenario, the bedrock layer controls one-half (50%) of the volumetric water exchange between the enclosed portion of the model domain and the Acushnet River. This value for bedrock water exchange with the Acushnet River appears unreasonably high given the summary of site characterization data depicting the measured distribution of fractures in bedrock, as shown in Appendix B, Figure 1. Please also provide a graphical presentation of the modeled particle tracks through bedrock to the Acushnet River for the elevation domain represented in Figure 1 of Appendix B.

This is a critical issue for the remedy selection process, since the modeled degree of water exchange between bedrock underlying the site property and the portion of the Acushnet River abutting the property dominates the rating scores for the various remedial technologies. Thus, the accuracy of this modeled site characteristic needs to be understood with a high level of confidence and will be highly dependent on the accuracy of the Phase II CSA description of the estimated spatial distribution of fractured bedrock.] (ORD)

17. Section 4.1. Initial screening of remedial technologies did not include deep soil mixing as an alternative for installation of hydraulic containment barriers and/or introduction of treatment agents for destruction of contaminant mass. In combination with horizontal (surface) and vertical engineered barriers for controlling flow in the overburden aquifer, deep soil mixing could provide a reasonable alternative to achieve a reduction in transport of contaminant mass. (ORD)

18. Page 39, Section 2.5.2:

    "A peat layer of varying thickness is present across much of the eastern portions of the Site. The sheet pile wall that defines the eastern edge of the Property was keyed into this peat layer to impede the migration of contaminants within shallow groundwater and from shallow soils into the river. However, contaminants in deep overburden groundwater and at the overburden bedrock interface migrate with tidal flow both toward and away from the river."

    As demonstrated by prior data collection efforts by the Responsible Party, there is direct evidence from soil borings (MIP45, MIP46, MIP47) immediately west of the existing sheet pile wall that demonstrate the peat layer is not a continuous subsurface feature. While the prior intent may have been to key the sheet pile wall into the subsurface peat layer, more recent site characterization data demonstrate that this design objective was not and could not be achieved in the northeast portion of the site property. Please revise this statement and any other references throughout the document that directly state or imply that the sheet pile wall is fully keyed into a subsurface peat layer. (ORD)