Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

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xxxxx

AVX Corporation
ATTN: Mr. Evan Slavitt
801 17th Avenue South, P.O. Box 867
Myrtle Beach, SC 29578

RE: **NEW BEDFORD**-BWSC
Release Tracking Number: 4-0000601
Former Aerovox Facility
740 Belleville Avenue
CONDITIONAL APPROVAL/NOTICE OF DEFICIENCY/PARTIAL DENIAL/PHASE III REMEDIAL ACTION PLAN - INTERIM DEADLINE

Dear Mr. Slavitt:

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The Massachusetts Department of Environmental Protection (MassDEP or the Department), Bureau of Waste Site Cleanup is tasked with ensuring the cleanup of oil and hazardous material (OHM) releases pursuant to the Massachusetts Oil and Hazardous Material Release Prevention and Response Act (M.G.L. c. 21E). The law is implemented through regulations known as the Massachusetts Contingency Plan (310 CMR 40.0000 et seq. – the MCP). Both M.G.L. c. 21E and the MCP require the performance of response actions to provide for the protection of harm to health, safety, public welfare and the environment which may result from releases and/or threats of releases of OHM at disposal sites.

Through the MCP, MassDEP is currently regulating a release of OHM that has occurred at the former Aerovox property located at 740 Belleville Avenue, New Bedford, Massachusetts (the Property). The term "Site," as defined in the Administrative Consent Order (ACO-SE-09-3P-016 or the ACO) executed on June 3, 2010, means any place or area where a release of OHM at or from the property at 740 Bellevue Avenue has come to be located, except for any such places or areas that are part of the New Bedford Harbor Superfund Site, but inclusive of the sheet pile wall that was previously installed at the Property. MassDEP has assigned Release Tracking Number (RTN) 4-0000601 to the Site. AVX Corporation (AVX) has been identified as a Potentially Responsible Party (PRP) for the Site and is conducting response actions pursuant to M.G.L., c. 21E, the MCP and the ACO.

The ACO, which was signed by MassDEP, the Massachusetts Attorney General's Office and AVX, establishes deadlines for the completion of Comprehensive Response Actions. Pursuant to the ACO, deadlines for completion of the subsequent Comprehensive Response Actions are dependent on AVX's receipt of MassDEP's written approval of each prior submittal. This letter provides MassDEP's written notice, pursuant to paragraph 14 of the ACO, of MassDEP's approval, approval with conditions, deficiency or denial regarding the Phase III Remedial Action Plan that was submitted by Brown & Caldwell on AVX's behalf on August 22, 2016 (Phase III RAP).

As you are aware, on December 8, 2016 MassDEP met with you (when used in this letter "you" and "your" refer to AVX); representatives from Brown & Caldwell, your environmental consultant; EPA and their contractor; and the City of New Bedford to discuss the Phase III RAP. The Phase III RAP divided the Site into five operable units (OUs) and identifies a recommended remedial alternative for each OU. At the December 8, 2016 meeting, MassDEP indicated that the recommended remedial alternative OU1-1 would be conditionally approved; the recommended remedial alternative OU2-1 would be approved; the recommended remedial alternatives OU3A-3 and OU4-1 were deficient; and the recommended remedial alternative for OU3B-4 (permeable reactive barrier or PRB) would be denied.

DISPUTE RESOLUTION

Paragraph 22(a) of the ACO provides that AVX may invoke dispute resolution to challenge a decision by MassDEP under paragraph 14 (and paragraph 20) of the ACO within five (5) days after obtaining knowledge of a dispute. On December 12, 2016, your legal counsel submitted a letter to MassDEP providing written notice of a dispute concerning MassDEP's denial of the recommended PRB remedial alternative OU3B-4. MassDEP and AVX have agreed to extend the deadline established in paragraph 22(b) of the ACO to allow sufficient time for MassDEP to issue this determination and for MassDEP and AVX to confer regarding the disputed denial. The December 8, 2016 meeting afforded the opportunity for some initial information exchange regarding same. In order to facilitate the dispute resolution process, MassDEP has supplemented this written determination regarding the Phase III RAP to include comments discussed at the December 8, 2016 meeting, as well as additional information regarding MassDEP's denial of AVX's recommended PRB remedial alternative OU3B-4.

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PHASE II COMPREHENSIVE SITE ASSESSMENT REPORT – ONGOING DEFICIENCIES

In accordance with the MCP, each phase of Comprehensive Response Actions must build upon the results of previous work and be documented in reports submitted to MassDEP in the manner specified at 310 CMR 40.0800 *et seq*. Several deficiencies were identified in the Conditional Approval letter for the Phase II Comprehensive Site Assessment Report (Phase II Conditional Approval) that was issued by MassDEP to AVX on March 11, 2016. Although AVX partially responded to the deficiencies in a letter received by MassDEP on August 22, 2016, the Phase II Conditional Approval required (and 310 CMR 40.0810(3) also requires) that the deficiencies in the Phase II be addressed in Phase III. If the identified Phase II deficiencies could be addressed using existing data, the relevant information was required to be documented in the Phase III RAP so that the reports supporting the Comprehensive Response Actions properly build upon each other and reflect the complete phased process. Because the Phase II Conditional Approval was issued contingent upon AVX addressing the deficiencies, several of which remain outstanding even after MassDEP's review of AVX's August 22, 2016 letter, MassDEP identifies them here as a reminder that these matters – along with the additional matters identified in the balance of this letter - must be addressed in a modified Phase III RAP (Phase III Modification). Indeed, several of these outstanding deficiencies have direct consequences for AVX's evaluation and recommendation of remedial alternatives, and are at the root of the Department's concerns.

1. MassDEP understands that there are two sources of historic flooding (drainage to the Site and high tide/weather effects from the Acushnet River/New Bedford Harbor), and that AVX has partially addressed drainage issues. However, three mechanisms have still not been addressed: (1) On-site flooding from the Acushnet River at flood stage, inundating the Site with surface water flowing at a relatively high velocity resulting in the potential for erosion; (2) Coastal flooding from New Bedford Harbor onto the Site from significant storm events; and (3) Overland flow from heavy rain events.

Although the New Bedford Harbor Superfund Site has been administratively separated from the former Aerovox disposal Site in the ACO, flooding of the former Aerovox Site from the Acushnet River/New Bedford Harbor must be considered when evaluating contaminant migration pathways as part of the Phase II Assessment. As you are aware, the "steel sheet pile cutoff wall" installed "to serve as a vertical barrier between PCB-contaminated soils and groundwater, and tidal flow into and out of the Acushnet River" (ACO at paragraph (6)(k)) has not been fully effective at serving its defined purpose. As there is no disagreement that the Site is located immediately adjacent to the Acushnet River and has been affected by tidal influences (including the recent King tides and other storm surges), consideration of flooding and other storm-related events is crucial to determining the appropriate remedial alternatives for the former Aerovox Site.

2. AVX has asserted in various Immediate Response Action (IRA) Status Reports and in the Phase II Report that Dense Nonaqueous Phase Liquid (DNAPL) is present in the mid- to late-stage of a chlorinated solvent release and that, on the basis of a November 2011 Interstate Technology Regulatory Council (ITRC) document called, "Integrated DNAPL Site Strategy," at this late stage the DNAPL is not likely to migrate. However, AVX has not presented any site-specific data to support the assertion that the DNAPL is not migrating to the river despite variable and dynamic conditions, nor has AVX demonstrated that DNAPL will not migrate in response to the planned New Bedford Harbor dredging (which AVX is required to consider, in accordance with the MCP performance standards for the Phase III RAP). MassDEP has requested site-specific support for this conclusion on multiple occasions, and it remains a significant gap in the phased analysis upon which the remedial alternatives must be developed.

   MassDEP does not accept AVX's assertion that source control on the former Aerovox Site is "contingent upon" source removal in the Acushnet River or as part of the EPA New Bedford Harbor Superfund cleanup. AVX's obligation to address source control on the Aerovox Site is not reasonably subject to such qualification. Moreover, as mentioned above and discussed further below, 310 CMR 40.0858(3)(b) specifically requires that integration of remedial action alternatives with "other current or potential remedial actions" in the Phase III evaluation. The planned harbor dredging is indisputably an "other current or potential remedial action" which must be considered when evaluating remedial alternatives in the Phase III Modification.

3. MassDEP notes that relevant information pertaining to the construction details and location of the sheet-pile wall relative to the areas of known contamination has been provided in IRA Status Report #4; in plans generated by EPA and others after the sheet-pile wall was installed; and in the required annual cap inspection reports under the EPA Action Memorandum and TSCA determination. However, in order to satisfy the requirements of the Phase II Conditional Approval and 310 CMR 40.0810(3), and to provide the public with a complete record of the phased Comprehensive Response Action process, this information must be included in the Phase III Modification .

4. Some information relative to the distribution of contaminants in the groundwater and the hydrogeologic properties of the bedrock aquifer, including the deep bedrock aquifer, has been documented in the Phase III RAP. However, additional data from the installation of new recovery wells in the vicinity of MW-15 that would supplement what is known relative to the shallow bedrock aquifer should have been included in the Phase III RAP. This information must be included in the Phase III Modification.

5. During Phase II activities, AVX and Brown & Caldwell were not able to evaluate the northernmost

portion of the disposal site due to their inability to gain access to the Coyne Laundry property. Therefore, the extent of contamination has not been fully evaluated. The Phase II Conditional Approval letter from MassDEP to AVX stated that this information should be provided in the Phase III. Brown & Caldwell has presented information related to this issue in IRA Status Reports 6 and 7 and by telephone to MassDEP after the submittal of the Phase III. However, this information should have been included in the Phase III RAP and must be included in the Phase III Modification.

PHASE III REMEDIAL ACTION PLAN – REVIEW AND WRITTEN DETERMINATIONS

The performance standards for a Phase III evaluation, established at 310 CMR 40.0850 *et seq.*, provide that a Phase III evaluation shall result in: the identification and detailed evaluation of remedial action alternatives which are reasonably likely to achieve a level of No Significant Risk considering the OHM present, media contaminated, and site characteristics; and, the recommendation of a remedial action alternative that is a Permanent or Temporary Solution, where a Permanent Solution includes measure that reduce, to the extent feasible, the concentrations of OHM in the environment to levels that achieve or approach background. (310 CMR 40.0853(1)(a)). Pursuant to 310 CMR 40.0853(2), the Phase III RAP "shall describe and document the information, reasoning and results used to identify and evaluate remedial action alternatives in sufficient detail to support the selection of the proposed remedial action alternative." Evaluation criteria for the screening of alternatives are specified in detail in 310 CMR 40.0858, and include the following: comparative effectiveness; short-term and long-term reliability; difficulty in implementing; costs; risks; benefits; timeliness; and the relative effect of the alternatives on non-pecuniary interests.

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The Phase III RAP, information from the Immediate Response Action (IRA) Status Reports, and information provided in a letter from Brown & Caldwell to MassDEP on August 22, 2016 were reviewed to evaluate whether or to what extent the Phase III performance standards have been met in the Phase III RAP. MassDEP appreciates the challenges associated with identifying and evaluating remedial action alternatives at a Site as complex as the Aerovox Site - with significantly high concentrations of co-located polychlorinated biphenyls (PCBs) and trichloroethylene (TCE) in a heterogeneous overburden aquifer; DNAPL consisting of mixed PCBs and TCE in both the overburden and bedrock aquifers; a shallow bedrock and deep aquifer system with DNAPL and high concentrations (above the MCP Groundwater Category GW-3 Standards) of PCBs and TCE; vapor intrusion issues; and tidal fluctuations that affect groundwater flow in both the overburden and bedrock aquifers. MassDEP notes that many of the alternatives identified by AVX for each Operable Unit (OU) are expected to achieve a Permanent Solution. MassDEP appreciates AVX's commitment to achieving a Permanent Solution for all individual OUs, and for the Site as a whole, despite its inherent complexities.

The following table presents a summary of each OU identified in the Phase III RAP, including: the location of each OU; the Remedial Action Alternatives recommended by Brown & Caldwell on behalf of AVX for each OU; and MassDEP's determination regarding each of the recommended alternatives.

Operable Unit	Portion of Disposal Site	Recommended Remedial Alternative	MassDEP Determination
OU1-1	Titleist property, southerly abutter to former Aerovox property, surficial soils impacted with PCBs	Soil excavation, soil cap, and an Activity and Use Limitation (AUL) requiring monitoring, maintenance, and documentation of the cap and repairs as necessary and prohibiting residential use of	**Conditional Approval**

		the area, et al.	
As described in more detail in the balance of this letter, MassDEP conditions its approval based on the following: 1. Inclusion of the additional soil data generated by EPA for the Titleist property with discussion of whether that data should be included in the Operable Unit. 2. Inclusion of results of AVX's meeting with Titleist representatives. At the December 8, 2016 meeting, AVX stated that the chosen alternative for OU1 will instead consist of removing all contaminated soil on the Titleist OU with concentrations of PCBs above 1 milligram per kilogram (mg/kg). This alternative does not require a cap or AUL and is described in the Phase III RAP as OU1-3.			
OU2-1	Precix property, northerly abutter, potential vapor intrusion pathway in future due to very high concentrations of TCE in sub-slab soil gas	Monitored natural attenuation (MNA) and an AUL that would require continued monitoring of groundwater, sub-slab soil gas and indoor air quality; prohibit disruption to the building floor slab and residential use of the property.	**Approval**
OU3A-3	Aerovox property - overburden soil	Asphalt cap over soil with PCBs > 2 mg/kg; Engineered barrier over soil with PCBs > Upper Concentration Limits (UCLs) and an AUL to prohibit residential use of the property, and require continued monitoring, maintenance and documentation of the cap and any necessary repairs.	**Deficiency**
OU3B-4	Aerovox property – groundwater in overburden aquifer	Vertical barrier wall, permeable reactive barrier (PRB), in-situ treatment of soil Hot Spots that are acting as a source to the groundwater contamination	**Denial**
OU4-1	Aerovox property – groundwater in bedrock aquifer	In-Situ Chemical Oxidation (ISCO) using sodium permanganate for TCE and alkaline persulfate for PCBs and TCE of areas with contaminant concentrations exceeding UCLs	**Deficiency**

Below are more detailed comments regarding MassDEP's review of the identification, evaluation and selection of the Comprehensive Response Action Alternatives as presented in the Phase III RAP. Each of these must be addressed in the Phase III Modification.

<u>Overall General/Technical Comment</u>

1. It is unclear whether some references to depth in the Phase III RAP are presented as feet below the ground surface (bgs) or as feet above mean sea level (amsl).

Comments Specific to each Operable Unit

Operable Unit 1 (OU1) – Acushnet Company

1. MassDEP understands that the recommended alternative as proposed in the Phase III RAP required that the owner of this property agree to provide access and also agree to the filing of an AUL for the property. During the December 8, 2016 meeting, AVX informed MassDEP that the owners of this property rejected AVX's proposal to excavate a specific volume of contaminated soil, install a cap over the remaining contaminated soil, and incorporate an AUL. AVX also indicated during the meeting that this information will be presented and one of the other alternatives will be recommended in the modified Phase III.

2. MassDEP understands that additional data obtained from the Titleist/Acushnet Company property by the EPA for the purposes of evaluating the New Bedford Harbor Superfund Site has been provided to AVX. AVX and Brown & Caldwell should evaluate this data as it pertains to the extent of contamination.

3. During IRA activities in July, August, and September 2016, releases causing sheens were observed on the river surface which likely resulted from the disturbance of soil and sediment during test pitting activities, sheet pile wall installation, and soil excavation activities. Given this past occurrence and the proposed alternative for soil excavation at the Titleist property that will likely result in similar releases to the Acushnet River, AVX should include the cost of a construction monitoring plan that addresses the potential occurrence of sheens during construction activities. These costs should be added to the costs already identified for this recommended alternative.

4. Pursuant to 310 CMR 40.0853(1)(a), "a Phase III evaluation shall result in the identification and evaluation of remedial action alternatives that are reasonably likely to achieve a level of No Significant Risk considering the OHM present, media contaminated, and site characteristics." The initial screening of remedial alternatives presented in Section 4.1.1.5 and Table 4.1 identify excavation and on-site consolidation of contaminated soil as an option that is reasonably likely to achieve a Permanent Solution. Table 4.1 also indicates that this alternative would be retained for OU1. However, excavation and on-site consolidation was not part of the detailed evaluation for OU1. It was also not discussed in the sections covering OU3 (the operable unit that would contain the on-site consolidation). 310 CMR 40.0855(2)(b) requires that a detailed evaluation shall be included for those alternatives identified in the initial screening. Therefore, excavation and on-site consolidation should have been considered as part of the detailed evaluation of OU1 (and for OU3, where the on-site consolidation would be located). A detailed evaluation of on-site consolidation option(s) should be presented in the Phase III Modification for this operable unit.

Operable Unit 2 (OU2) – Precix property: **CONDITIONALLY APPROVED**

1. The recommended remedial alternative for this area is monitored natural attenuation (MNA) and the implementation of an AUL that would require continued monitoring of groundwater, sub-slab soil gas and indoor air quality; prohibit the disruption to the building floor slab; and prohibit residential use of the property. A complete vapor intrusion pathway was identified, but no significant risk or substantial hazard was determined by AVX to exist at this time. MassDEP understands that for the recommended alternative to be implemented, the owner of this property would have to agree to provide access and

to the filing of an AUL. This approval is conditioned upon Precix's acceptance of this alternative.

Operable Unit 3A (OU3A) – Soils on the Aerovox property**: NOTICE OF DEFICIENCY**

1. As noted in the Interim IRA Status report dated December 2, 2016, the DNAPL in the vicinity of UV-17 and BGP-20 has been excavated to just below the peat layer. The soil above the peat in MIP-23 has also been excavated. It is unclear whether the IRA excavation has changed the estimated extent of contaminated soil that needs to be addressed under OU3A and whether this will affect the evaluation and scoring of remedial alternatives.

2. The following cost discrepancies were identified between Appendix D of the Phase III RAP and Section 5.3.1.4 (the text matches Table 5.3):

    a. OU3A-1: Appendix D capital = $19.4 million (M), elsewhere capital = $22.7 M

    b. OU3A-1: Appendix D estimated total net worth = $20.6 M, elsewhere total net worth = $23.1 M

    c. OU3A-2: Appendix D capital = $17.6 M, elsewhere capital = $26.3 M

    d. OU3A-2: Appendix D estimated total net worth = $18.8 M, elsewhere total net worth = $26.7 M

    e. OU3A-3: Appendix D capital = $2.0 M, elsewhere capital = $2.5 M

    f. OU3A-3: Appendix D estimated total net worth = $3.2 M, elsewhere total net worth = $2.9 M

    AVX has indicated that they are aware of these discrepancies. However, the discrepancies do not appear to have affected the scoring of the remedial alternatives. A corrected version of Appendix D must be provided in the Phase III Modification.

3. Pursuant to 310 CMR 40.0853(2), reasoning and results used to identify and evaluate remedial action alternatives in sufficient detail to support the selection of the remedial alternative shall be described and documented in the Phase III RAP. However, options OU3A-1 and OU3A-2 do not contain and apparently do not consider the estimated volume of soil with PCBs at concentrations that exceed 100 ppm. This is a critical data deficiency that must be addressed in the Phase III Modification.

4. The Phase I Report for Aerovox, prepared by URS Corporation on August 15, 2013, references a 2006 Conceptual Site Model study completed by ENSR that concluded up to 109,000 kg of PCBs (up to 120 tons) were present in the soil at the Aerovox facility at that time (see Table 3 in the Phase I). Using the data from this table and eliminating the data from the top two (2) feet of soil (which was likely excavated during building demolition), an estimated 50 tons of PCBs remain in the soil at the Site. Moreover, of the estimated 50 tons of PCBs remaining in the soil at the Site, approximately 90% of PCBs in the soil are located on the eastern portion of the Site, within 5 feet to 100 feet of the Acushnet River (MassDEP recognizes that the recent excavation of PCB-contaminated soil as part of the IRA has decreased the amount of PCB-contaminated soil). Revised PCB mass calculations should be incorporated to update current conditions. These calculations should then be used to evaluate the effectiveness, reliability, risks, costs, and implementability of the remedial alternatives.

5. As mentioned above, the initial screening of remedial alternatives presented in Section 4.1.1.5 and Table 4.1 identify excavation and on-site consolidation of contaminated soil as an option that is reasonably likely to achieve a Permanent Solution. Table 4.1 indicates that this alternative would be retained for OU1 (the abutting Titleist property/Acushnet Rubber property) and OU3 (the Aerovox property), but this alternative was not considered nor discussed for OU3 (the Aerovox property) in the Phase III RAP. Although Section 4.2.1 of the Phase III states that on-site consolidation at the Aerovox property (OU 3) is an alternative to consider, the cost estimates provided are for off-site disposal facilities. Pursuant to 310 CMR 40.0855(2)(b), a full evaluation of excavation and on-site consolidation should have been considered as part of the detailed evaluation of OU3 and must be included in the Phase III Modification.

6. Numerical tables summarizing itemized costs and soil volumes were not provided to support the calculations of soil volumes and estimated remediation costs to aide in evaluating the feasibility of remedial options. Specifically, for alternatives OU3A-1 and OU3A-2, the cost of the portion of the proposed 26,000 cubic yards of soil with concentrations of PCBs greater than 100 mg/kg is has not been provided separately from the disposal costs of the remaining soil. With regard to scoring of the alternatives, factors affecting each individual rating in Tables 5-1 through 5-4 were not included and therefore do not provide an understanding of how scoring was conducted. The background information for costs and soil volumes must be provided in the Phase III Modification, as well as a clear and concise description of the scoring methodology, in order to satisfy the requirements of 310 CMR 40.0853(2) (e.g., reasoning and results used to identify and evaluate remedial action alternatives in sufficient detail to support the selection of the remedial alternative shall be described and documented in the Phase III RAP).

7. Pursuant to 310 CMR 40.0858(2), the comparative short-term and long-term reliability shall be evaluated, including the degree of certainty that the alternative will be successful; and the effectiveness of any measures required to manage residues or remaining wastes or control emissions or discharges to the environment. However, information on the long-term reliability and certainty of the proposed remedial alternatives, including the chosen remedial option of a cap and barrier under OU3A, was not presented in the Phase III RAP. Reliability criteria should consider storm events, tidal fluctuations, and flooding, which can erode an asphalt cap and/or engineered barrier, and whether it is certain that the cap and barrier can withstand such forces. Further, if the cap or barrier were to fail because of storm events or extremely high tides, or for any other unforeseen event, the management of a release as a result of such destruction has been not evaluated. To satisfy the requirements of 310 CMR40.0858(2), a discussion of the short term and long term reliability of the alternatives evaluated under this operable unit must be included in the Phase III Modification. The scoring of this alternative should be modified based upon this evaluation.

8. According to the Phase III RAP, the Acushnet River immediately east of the sheet pile wall at the former Aerovox facility is "…also a source of contaminants back into the Aerovox site…[and mitigation of contaminant migration from Aerovox] is contingent upon EPA also completing source removal in the river…" However, 310 CMR 40.0858(3)(b) requires that AVX consider the remedial activities planned by EPA within the Acushnet River when it evaluates the implementabilty of its remedial alternatives. EPA's plan to dredge to remove PCB and TCE contaminated sediment from the area immediately east of the Aerovox facility by utilizing the Aerovox shoreline has been known to AVX for many years, and certainly was known to AVX sufficiently in advance of conducting its Phase III evaluations that it could have been appropriately considered. However, none of the remedial alternatives under OU3A

considered the planned EPA dredging or whether the recommended remedial alternative would impede the future dredging or potentially impact the sediment once the dredging is completed. This analysis is critical to evaluating an appropriate remedial alternative, and must be included in the Phase III Modification.

9. Pursuant to 310 CMR 40.0858(4) and (5), the comparative costs and risks must be evaluated with respect to the actual implementation of the alternative and the short term on-site and off-site risks posed during implementation of the alternative. Therefore, a construction monitoring plan that addresses releases caused by construction near the shoreline should be completed and the costs should be added to the costs already identified for this recommended alternative.

10. 310 CMR 40.0858(5) states that the comparative risks of the alternatives must be evaluated with respect to short-term on-site and off-site risks posed during the implementation of the remedial option; on-site and off-site risks posed over the period of time required for the alternative to attain applicable remedial standards; and the potential risk of harm to health, safety, public welfare or the environment posed to human or environmental receptors by any OHM remaining at the disposal site after completion of the remedial action. The ratings in Section 5.3.1.1 that presents the risks associated with remediation at OU3A appear to more heavily weigh short term risks associated with construction of the alternatives over the long term risks of leaving soils with concentrations of PCBs above the UCL in place along a shoreline that is vulnerable to flooding, storm events, and tidal fluctuations. The Phase III Modification must consider the risks described in 310 CMR 40.0858(5) and include a re-evaluation of these risks based upon these concerns.

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11. With regard to 310 CMR 40.0858(8), which requires that the relative effect of non-pecuniary interests be evaluated, MassDEP notes that the recommended alternative leaves the most contamination in place immediately adjacent to the Acushnet River. As discussed in paragraph 4 above, there may be approximately 50 tons of PCBs remaining the soil at the Site. This remedial alternative may therefore be the least desirable non-pecuniary scenario for the City of New Bedford. As such, the community acceptance rating of the chosen alternative should be reconsidered based upon discussions with the City, and re-evaluated relative to the community acceptance ratings assigned to other alternatives, especially the excavation and off-site disposal and the excavation and on-site consolidation options. A fresh comparison of these options may yield a different rating for non-pecuniary interests, after discussion with the City. Although Brown & Caldwell suggested during the December 8, 2016 meeting that on-site consolidation would score very low due to community concerns, no detailed evaluation was provided in the Phase III RAP that provides a basis for that conclusion or compares this option with the other options presented. Meeting the performance standards for this evaluation criterion requires that the remedial alternatives for OU3A be re-evaluated and that the Phase III Modification more fully develop and analyze the on-site consolidation options.

12. The Phase II report discussed that DNAPL containing both PCBs and chlorinated solvents is present at the northeast corner of the sheet pile wall and may also be present in the shallow soil above the peat layer near the south culvert. While it is known that DNAPL areas were excavated at MIP-23, UV-17, and BGP-20, DNAPL was not addressed in its entirety in the Phase III RAP. The anticipated Phase III Modification should include a discussion of DNAPL removed under the IRA and any residual DNAPL that exists or is believed to exist based on analytical data at the site and on construction obstacles encountered during IRA activities.

Operable Unit 3B (OU3B) – Shallow and deep overburden groundwater at the Aerovox property**: NOTICE**

OF DEFICIENCY AND PARTIAL DENIAL

DEFICIENCIES:

1. The following cost discrepancies were identified between Appendix D of the Phase III RAP and Section 5.3.2.4 (the text matches Table 5.3):

   a. OU3B-2: Appendix D estimated total net worth = $20.0 M, elsewhere total net worth = $13.9 M

   b. OU3B-3: Appendix D estimated total net worth = $15.4 M, elsewhere total net worth = $11.8 M

   AVX has verbally indicated that they are aware of these discrepancies. However, a corrected version of Appendix D along with any consequences for the scoring of alternatives should be provided in the Phase III Modification.

2. Enhanced reductive dechlorination (ERD) is not a generally accepted technology to eliminate DNAPL. Even it if were to be effective, what is known about ERD strongly suggests that it would likely not achieve that goal within the proposed ten-year timeframe. In addition, the overwhelming state of the evidence indicates that PCBs are not reliably remediated using ERD. Laboratory studies using Site media should be conducted to evaluate for effectiveness.

3. Pursuant to 310 CMR 40.0858(2), the comparative short-term and long-term reliability of alternatives shall be evaluated, including the degree of certainty that the alternative will be successful, and the effectiveness of any measures required to manage residues or remaining wastes or control emissions or discharges to the environment. Information on the long-term reliability and certainty of the proposed remedial alternatives, including the chosen remedial option of a PRB under OU3B, was not presented in the Phase III RAP. Storm events, tidal fluctuations and flooding, which may alter the effectiveness of a PRB, were not evaluated in the Phase III RAP and there is no known information that suggests a PRB could withstand such forces. High tides have been documented at the Site recently, which have caused flooding of river water over the existing sheet pile wall and onto the Aerovox property. This flooding has occurred absent of any storm event. Climate change and storm surges are occurring more frequently and causing an increase in erosion. Collapse of the PRB could occur as a result. The risk of this occurring is sufficient to persuade MassDEP that the use of PRB technology as proposed would not be sufficiently protective of health, safety, public welfare and the environment. In MassDEP's opinion, it is therefore not appropriate, given the contamination present on the Aerovox property. Control of contamination released from a PRB failure of any kind, but particularly due to flooding, storm surges and tidal fluctuations (or a combination thereof), would be extremely difficult if not impossible to recover or control. A more detailed evaluation of the comparative short term and long term risks of the alternatives for this operable unit must be included in the Phase III Modification. The scoring of the remedial alternatives identified by AVX should be modified to reflect the foregoing, among other issues raised in this letter.

4. MassDEP reiterates the comments made above in paragraph 8 under the discussion of OU3A, as they are likewise applicable to OU3B and should be addressed in the Phase III Modification.

5. The Phase II report indicated that DNAPL containing both PCBs and chlorinated solvents is present at the northeast corner of the sheet pile wall and within the overburden aquifer. In addition, DNAPL has been measured in MW-15D, and the IRA activities in 2016 unsuccessfully attempted to remove this DNAPL. As mentioned earlier in this letter, the issues that have been raised regarding DNAPL were not

fully addressed in the Phase III RAP. The Phase III Modification should include a discussion of DNAPL as it pertains to its presence or anticipated presence in the shallow and deep overburden groundwater. In addition, the presence of DNAPL should be discussed as it relates to the New Bedford Harbor dredging project.

Denial of the recommended PRB Remedial Alternative:

6. Mass Flux calculations were not completed for overburden groundwater (see comments below). However, according to [page X of the] Phase III RAP, the preliminary remedial goals for OU3 include, in part, to "reduce concentrations to the extent practicable, and control migration of overburden groundwater impacted by PCBs and/or CVOCs at concentrations that could migrate into and present a risk to receptors in surface water and sediment after New Bedford Harbor remediation is complete." This disclosure further supports the conclusion that PCBs and CVOCs are migrating to the New Bedford Harbor, despite the intended purpose of the sheet pile wall that has served as the administrative eastern boundary of the Aerovox Site pursuant to the ACO. If the PRB technology, according to the Phase III RAP, was intended to "treat CVOCs and PCBs in the overburden deposits prior to their discharge to the Acushnet River" (page 4-16, 4th full paragraph), then mass flux calculations would be fundamental to evaluating the effectiveness of TCE and PCB removal by the PRB. While additional mass flux calculations could be performed to address this specific comment, MassDEP anticipates that the information would ultimately not be sufficient to support the use of a PRB for the additional reasons described in paragraphs 7 through 11, below.

   Please be aware that MassDEP does request additional information regarding certain mass flux calculations provided in Appendix B to the Phase III RAP, in order to address deficiencies in other recommended remedial alternatives as noted throughout in this letter.

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7. As mentioned above in paragraph 4 under the discussion of OU3A, the PCB mass estimated to be present along the eastern portion of the site is approximately 50 tons. PCBs and TCE are co-located in the soil at concentrations exceeding UCLs. TCE is known to mobilize PCBs. Accordingly, allowing this mass of PCBs to potentially filter through a PRB is not reasonable or appropriate, or sufficiently protective, given the absence of data demonstrating that PRBs can effectively remediate PCBs combined with the known co-location of PCBs on this Site with TCE, which may exacerbate PCB contamination.

8. Analytical data provided in the Phase II Report indicates the presence of TCE and PCBs in soil within the top 15 feet of the soil horizon in and surrounding MW-15D at concentrations exceeding the UCLs. MW-15D is located in the northeastern portion of the Aerovox property and is located immediately upgradient of the proposed PRB. Analytical data for groundwater from the deep overburden aquifer indicates up to 70 µg/L of PCBs in the samples collected from MW-15D. This concentration is approaching the UCL of 100 µg/L for PCBs. TCE is known to mobilize PCBs and could increase the concentrations of PCBs in the groundwater migrating to and through the PRB. The PRB would be installed to the top of bedrock along the shoreline, further indicating that PCBs in groundwater are assumed to be captured by the PRB. However, since it is already established that TCE mobilizes PCBs, that PCBs in groundwater are approaching UCLs, that there are already UCL exceedances of PCBs and TCE in soil above the deeper aquifer, and that there is no information available to indicate that PRBs are effective at removing PCBs (including the statement in Table 4.1 of the Phase III RAP that PRBs are "unproven for PCBs"), MassDEP's reasonable conclusion is that PRB is not an appropriate remedial alternative technology and that it would not be sufficiently protective or otherwise satisfy the purposes of the MCP.

9. The evaluation of the recommended remedial alternative, along with a review of reliable industry literature, simply does not support an assertion that the PRB would effectively treat both TCE and PCB in a salt water environment with daily tidal fluctuations causing the groundwater to flush back and forth (e.g., travel in both directions) through the PRB.

10. A significant data gap exists relative to the hydraulic properties and contaminant concentrations in the uppermost bedrock aquifer due to the method of drilling utilized (rock socket). It is unknown if DNAPL is present in this zone. MassDEP understands that the actual installation of a shallow bedrock monitoring well could cause cross-contamination of contaminants in the groundwater from the deep overburden aquifer to the groundwater in the bedrock aquifer. Therefore, MassDEP does not expect AVX to install a well in the shallow bedrock and acknowledges that this data gap is unavoidable. Brown & Caldwell, on behalf of AVX, indicated that the groundwater in this zone does not have significant concentrations of TCE and/or PCBs. However, appropriately conservative estimates should consider that this shallow bedrock is likely to be significantly contaminated and potentially contains DNAPL. As outlined above, it has not been adequately demonstrated that the PRB would be effective at preventing the DNAPL from migrating to the river.

11. Installation of the PRB may itself exacerbate contamination to the Acushnet River and to the aquifer below the PRB. Specifically, when the PRB is being installed, it is a reasonable assumption that cross contamination would occur between the overburden and the upper bedrock in much the same way as AVX is concerned that well installation in the shallow bedrock could cross-contaminate the upper bedrock, as described in paragraph 10, above.

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MassDEP's review of the evidence presented by AVX in its Phase III RAP, combined with analysis provided by MassDEP's consultant, Nobis (including a review of the research to date regarding PRB technology), leads to the inevitable conclusion that the recommended PRB remedial alternative would be experimental at best. The uncertainty surrounding the effectiveness, reliability, implementability, costs risks, benefits, and timeliness concerns render the PRB inappropriate for the Aerovox Site. It is MassDEP's opinion that further study of the PRB remedial alternative in the face of overwhelming evidence against its appropriateness would frustrate the purposes of MGL ch, 21E and the MCP, which seeks to encourage parties to undertake necessary response actions that will result in the cleanup of sites in a timely fashion, using technologies that are appropriate for site-specific conditions and have a reasonable likelihood of success. Therefore, after consideration of all the evidence presented by AVX to date, and all available research regarding PRB technology, MassDEP has reached the inevitable conclusion that the recommended PRB remedial alternative will not prove effective relative to all other evaluated alternatives at reducing risk at the Site (as required by 310 CMR 40.0860(6)(b), and indeed is more likely to increase risk. MassDEP therefore denies the use of PRB technology as a remedial component of OU3B as not sufficiently protective and not capable of satisfying the Phase III evaluation criteria or RAPS, as required by the MCP. MassDEP notes that AVX has identified two (2) other feasible remedial alternatives for reaching a Permanent Solution at the Site in its Phase III RAP, and encourages AVX to further develop those alternatives consistent with the comments provided in this letter.

Operable Unit 4 (OU4) – Contaminated Groundwater in the Bedrock Aquifer at the Aerovox Property:
NOTICE OF DEFICIENCY

1. The Phase III RAP indicated in Section 4.1.2.1 that hydraulic control/containment of the groundwater in the bedrock aquifer, in conjunction with other alternatives, is a potentially good alternative for the bedrock aquifer. However, this option was not included in the detailed evaluation. The Phase III Modification should include further evaluation of this alternative.

2. The treatment area for the deep bedrock aquifer is identified as two hot spots, both located in the northern half of the property. Based on a review of the groundwater analytical data from monitoring wells in the area, and the distribution of existing monitoring wells, the extent of the hot spots may not have been adequately assessed to the east and west. Additional characterization should be conducted as part of the remedial design to determine the lateral extent of the hot spots of groundwater contamination in the bedrock aquifer. Additional evaluation should be conducted to determine whether hot spot treatment could mobilize/exacerbate contamination, particularly the DNAPL that has been observed at the eMW-15 cluster. Appropriate groundwater modeling and/or additional well installation may be necessary.

3. A containment option (such as groundwater extraction) should be retained as an alternative for remediation of the bedrock aquifer in Section 5. The hydraulic containment and ex-situ treatment alternative for groundwater shown on the second page of Table 4.1 in the Phase III RAP should be retained for OU4 deep bedrock. A groundwater extraction system targeting the known high-concentration deep bedrock fractures may not have the same problem with required high extraction rates compared to shallow bedrock, and may be comparable in feasibility to other treatment methods. This remedial alternative should be further evaluated in the Phase III Modification.

4. The alternative for OU4 does not include any remedial approach to prevent groundwater with TCE concentration above the Groundwater Category GW-3 Standards from migrating from the bedrock aquifer to the Acushnet River. Given that there is good hydraulic communication between the bedrock aquifer and the river and the concentration of contaminants in the groundwater, hydraulic control is critical to achieve NSR. The effectiveness and reliability of groundwater extraction and hydraulic control should be evaluated for OU4.

   Previous IRA activities beginning in 2014 and again in 2016 have included the recovery of DNAPL via both manual recovery, and most recently, the installation of a free product recovery system (FPRS). However, DNAPL did not pool in the bedrock well at a recoverable volume to render the FPRS effective. The Phase III Modification should include a discussion of the DNAPL in the bedrock aquifer as it relates to implementation of the remedial alternatives for this OU and the potential for DNAPL mobilization for each alternative.

General Comments Relative to EPA Dredging

As mentioned previously, there is no discussion as to the effect of EPA's planned New Bedford Harbor dredging on the proposed alternatives, particularly for OU3 and OU4. Such consideration must be included in any Phase III evaluation in order to meet the performance standards of a Phase III RAP. 310 CMR 40.0858(3)(b) specifically states that the comparative difficulty in implementing each alternative in terms of facility operations and other current or potential remedial actions must be addressed. The remedial alternatives presented in the Phase III RAP should discuss whether the EPA dredging will affect the individual remedial alternative's effectiveness and how the selected alternatives will maintain a level of NSR upon completion of the dredging. The New Bedford Harbor dredging project must be discussed relative to the selected remedial alternative, to ensure that the selected alternative will not compromise the dredging and that the dredging will not compromise the selected remedial alternative or cause an exacerbation of contamination. The scoring and detailed evaluation criteria for each remedial alternative must consider EPA's planned harbor dredging, as required by 310 CMR 40.0858(3), and must be incorporated in the anticipated Phase III Modification. MassDEP urges AVX to confer with EPA and to craft a coordinated approach to the remedial actions that will be undertaken concurrently on both sides of the sheet pile wall.

Comments Relative to Appendix B - Mass Flux Calculations:

It is MassDEP's opinion that the Mass Flux calculations presented in the Phase III RAP may not approximate Site conditions as outlined below:

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1. Mass Flux of Contaminants in the Overburden Aquifer

    a. The Phase III RAP does not include mass flux calculations for the groundwater migrating through the overburden aquifer. While the sheet pile wall does limit and/or contain the groundwater in the overburden, Brown & Caldwell acknowledges that mass flux of the contaminated groundwater in the vicinity of monitoring well MW-15D is occurring in the deep overburden aquifer (under the current sheet pile wall and below the peat layer). The mass flux calculations of contaminated groundwater in the overburden aquifer based on plume configuration, similar to the bedrock evaluation, are necessary to develop/evaluate remedial alternatives for addressing groundwater contamination in the overburden aquifer.

2. Mass Flux of Contaminants in Deep and Shallow Bedrock Aquifers

    a. The areas of the bedrock aquifer determined to be without fractures, and therefore without contaminated groundwater, may not be representative of Site conditions and may underestimate the concentrations of contaminants in the groundwater discharging into the river. Additional technical justification is necessary to support this assertion.

    b. The groundwater from the northernmost deep bedrock well (MW-34B) has TCE concentrations approaching 500,000 micrograms per liter (µg/L). There are no monitoring wells screened in the deep bedrock aquifer downgradient and to the north of MW-34B which are necessary to delineate the northern extent of groundwater contamination. The full extent of contaminated groundwater in the deep bedrock aquifer must be determined to adequately determine the mass flux of contaminants into the river and, therefore, to

conduct a complete evaluation of remedial alternatives.

c. The piezometric head data for the deep bedrock aquifer is extremely limited. Developing piezometric contours and calculating hydraulic gradients would provide more accurate mass flux calculations, which, as mentioned, could affect the final remedial alternative evaluation.

d. The bulk hydraulic conductivity of the deep bedrock aquifer is likely lower than the bulk hydraulic conductivity of the shallow bedrock aquifer, because the deeper aquifer has fewer water-bearing fractures. Therefore, using the shallow bedrock hydraulic conductivity value for deep bedrock is conservative as stated in the Phase III RAP. However, in the Phase III RAP, AVX has already limited the bedrock contaminant mass to few zones within the deep bedrock. Therefore, the ultimate mass flux calculated may not be excessively conservative, and should be evaluated as such with respect to the remedial alternatives presented in the Phase III.

e. The thickness of the groundwater contaminant plume at the northern section of the Site is assumed by Brown & Caldwell to be the length of the 10-foot well screen in MW-34B, and the thickness of the zone of groundwater contamination at the southern section of the Site is assumed to be the thickness of the 20-foot well screen in MW-32B. Given the limited number of monitoring wells installed in the deep bedrock aquifer, and the irregular nature of the fractures, a larger contaminated deep bedrock thickness should be used to estimate the mass flux in deep bedrock, such as double the thickness of the screened zones (20 feet in the northern section and 40 feet in the southern section). MassDEP acknowledges that plume thickness assumptions made by Brown & Caldwell were based, in part, on heat pulse flow meter (HPFM) data summarized in the Phase II report. However, in addition to a summary of the data from the HPFM, contaminant thickness should also consider the limited number of deep bedrock wells to provide a more conservative approach to estimate the thickness of the groundwater contaminant plume.

f. The hydrogeologic properties and groundwater contaminant concentration (including potential for DNAPL) of the uppermost portion of the shallow bedrock aquifer, from approximately 10' below the ground surface to 35' below the ground surface, has not been evaluated adequately because this portion of the aquifer is generally drilled using a roller bit to install a rock socket. DNAPL has been observed in both MW-15D and MW-15B and the groundwater in the vicinity of these wells is significantly impacted with both PCBs and TCE, and since no data has been provided that demonstrates the interval between the two monitoring wells is free of contamination, the top of the groundwater contamination in the shallow bedrock aquifer should be the top of bedrock for both the northern and southern portions of the Site. This should be considered when calculating the mass flux.

3. Mass Flux for PCBs and TCE

a. According to the Phase III RAP, mass flux calculations were not provided for PCBs because, "[a]lthough PCBs have been detected above [Upper Concentration Limits] UCLs in one bedrock well (MW-15B), PCBs have much lower mobility and therefore were not considered a driver for the mass flux calculations." However, the mobility of PCBs is likely affected by being co-located with TCE. In addition, the Phase III RAP compares the

calculated TCE pore water concentration to the Method 1 GW-3 Standard for TCE (5,000 µg/L), which is much higher than the Method 1 GW-3 standard for PCBs (10 µg/L). This information was used in the Phase III RAP to conclude that active bedrock remediation of PCBs is not necessary. However, the National Recommended Water Quality Criteria for PCBs for protection of aquatic life is 0.03 µg/L. TCE and PCBs vary widely in chemistry, fate and transport. Therefore, PCB mass flux calculations are critical to understanding the potential continuing impact that PCBs from the former Aerovox Site may have on the Acushnet River, and should be completed in order to satisfy the applicable performance standards and appropriately evaluate remedial options.

b. An estimate of the total mass of both PCB and TCE contamination should have been included in the Phase III RAP. While MassDEP has attempted to estimate the mass of PCBs based on available information, a more accurate calculation of PCBs, along with a calculation of TCE, should be completed and included in the Phase III Modification.

Mass flux calculations should consider the issues raised above and incorporate them into the evaluation of remedial alternatives.

<u>Comments Relative to Appendix C - Groundwater Modeling:</u>

1. The boundary conditions include a single recharge boundary applied over the uppermost model layer, with a recharge value of 10 inches per year. However, a significant portion of the domain area is paved or under building cover, including the former Aerovox property. The use of 10 inches for recharge should be technically justified or adjusted to account for the amount of impervious cover in the area.

2. The groundwater model was developed to support the recommended remedial alternative, which, according to the Phase III RAP, is a permeable reactive barrier (PRB) to address the contaminated groundwater in the overburden aquifer. The PRB wall is proposed to be installed parallel to the shoreline, where up to 11 monitoring wells have been installed. Hydraulic conductivity was calculated using 16 wells, but it appears that only two of the wells are located along the shoreline. Given that groundwater flow and contaminant migration is sensitive to variations in the hydraulic conductivity, the available slug test data is not representative of Site-specific hydraulic conductivity in the area where the PRB would be located. Using a larger set of wells with varying subsurface characteristics (if available in this area) will provide a more conservative estimate of hydraulic conductivity.

3. Insufficient detail is provided to assess the quality of the steady-state model calibration results. While a comparison of observed and modeled groundwater elevation is provided (Appendix C, Figure 1-7), there is no accompanying documentation to facilitate evaluation of potential systematic bias that should be used to ascertain the adequacy of the model domain.

4. It is not sufficiently explained whether the excavation of UV-17, BGP-20, and MIP-23 have changed, or will change, the modeled groundwater flow regime in this area.

REQUEST FOR MODIFIED PHASE III REMEDIAL ACTION PLAN AND INTERIM DEADLINE

MassDEP hereby requests the submittal of a Phase III Modification that must address the above mentioned conditions and/or deficiencies and further evaluate the remaining remedial alternatives that AVX has identified in the Phase III RAP for OU3B. This date constitutes an enforceable Interim Deadline pursuant to 310 CMR 40.0167. Failure to comply with an Interim Deadline may result in enforcement actions by the MassDEP, including, but not limited to, the issuances of a Notice of Noncompliance, an Administrative Penalty, and/or Enforcement Orders, or, referral to the Massachusetts Attorney General's Office.

MassDEP hereby established an enforceable interim deadline of XXX, XXX, 2017 for the submittal of a Phase III Modification that addresses all ongoing deficiencies identified in the Phase II Conditional Approval and herein, as well as all comments provided in this Phase III written determination, and which meets the performance standards and satisfies all other applicable requirements of the MCP.

If you have any questions regarding this matter, please contact Angela Gallagher at 508-946-2790. All future communications regarding this matter must reference Release Tracking Number 4-0000601.

Sincerely,

Gerard M.R. Martin
Deputy Regional Director
Bureau of Waste Site Cleanup

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