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Gentlemen:

On April 30, 2004, the U.S. Environmental Protection Agency Region III ("EPA") approved an interim modification of the approved optimal corrosion control treatment ("OCCT") for the Washington Aqueduct and the District of Columbia Water and Sewer Authority ("DCWASA"). The interim modification consisted of an application of the corrosion inhibitor zinc orthophosphate to the 4th High Pressure Zone of the DCWASA distribution system. The 4th High Pressure Zone is hydraulically isolated from the remainder of the District of Columbia's water distribution system, but is representative of the entire system in terms of component materials (lead service lines, unlined cast iron pipe, etc.). The purpose of the proposed partial system application was to assess operational characteristics and any unanticipated effects that may occur prior to a full system application. At the time EPA approved this interim modification, it was expected that, absent any unanticipated problems and subject to EPA's approval, the systemwide OCCT ultimately would be modified to include application of zinc orthophosphate to maintain reduced levels of lead in the entire District of Columbia distribution system.

This letter amends EPA's April 30, 2004 letter and approves an interim modification to the OCCT for the Washington Aqueduct and DCWASA consisting of an application of the corrosion inhibitor orthophosphate in lieu of zinc orthophosphate to the 4th High Pressure Zone of the DCWASA distribution system. The terms and conditions of EPA's April 30, 2004 letter remain effective except as modified herein. The proposed full system application tentatively scheduled for later in the summer will be addressed in a separate letter closer in time to the proposed full system application.

The U.S. Environmental Protection Agency has primacy for the Public Water System Supervision program ("PWSS") in the District of Columbia. As the primacy agency, EPA must, among other things, designate an OCCT under the Lead and Copper Rule ("LCR") for public

water systems. *See* 40 C.F.R. §§ 141.81 & .82. The Washington Aqueduct is a wholesaler of water and has no distribution system of its own. Thus, any treatment, including OCCT, applied by the Washington Aqueduct will affect its customer water systems. Because this letter is limited to a partial system application to the 4th High Pressure Zone, the only affected public water systems ("PWS") are the Washington Aqueduct Division, U.S. Army Corps of Engineers (PWS Identification Number DC0000001) and DCWASA (PWS Identification Number DC0000002). DCWASA is a consecutive community water system which provides no additional treatment to the water received from the Washington Aqueduct before it is distributed to DCWASA's retail customers.

While EPA's April 30, 2004 approval affected only the Washington Aqueduct and the DCWASA distribution system, any future systemwide application also would affect the public water systems of Arlington County, Virginia, the City of Falls Church, Virginia, and the Ronald Reagan National Airport, all of which purchase water from the Washington Aqueduct. In its April 30, 2004 letter, EPA noted: "In anticipation of the full system application, DCWASA and the Virginia utilities are evaluating the impact of a potential full system application on their respective systems. In addition, EPA has retained a contractor to assess any impact on the Blue Plains water treatment facility, all permitted outfalls (including combined sewer overflows), and the Virginia receptors of water originating at the Washington Aqueduct. That report is due to EPA no later than June 15, 2004."

DCWASA's initial calculations indicate that the additional zinc and phosphate loads from full system application of zinc orthophosphate would not adversely impact the Blue Plains wastewater treatment facility. On May 21, 2004, however, Arlington County notified EPA that there are concerns regarding the ability of the Arlington County wastewater treatment plant to handle the anticipated added zinc load. The concentration of zinc Arlington County expects to receive in its waste water influent may be in the upper range of EPA's guidelines for inhibition of the nitrification/denitrification process. This inhibition would be due to potential toxicity of zinc toward that process's biomass. Inhibition of this process could result in the a decrease in the waste water treatment plant's ability to remove nitrogen. Consequently, Arlington County requested that EPA consider application of orthophosphate as a corrosion inhibitor in lieu of zinc orthophosphate. The Washington Aqueduct has joined in Arlington County's recommendation.

The recommendation to use orthophosphate, in the form of phosphoric acid, is consistent with the original recommendation of the Technical Expert Working Group ("TEWG"), a group formed by EPA to address the problem of elevated lead levels in tap water in the District of Columbia. The TEWG consists of representatives from EPA Region III, EPA Headquarters' Office of Groundwater and Drinking Water, EPA's Office of Research and Development, the Washington Aqueduct, DCWASA, DOH, Arlington County, Falls Church and the Centers for Disease Control and Prevention.

Orthophosphate is an approved and commonly used drinking water additive. Phosphoric acid, one of the three common forms of orthophosphate and the form proposed for the partial system application and full system treatment by the Washington Aqueduct, is a proven corrosion

inhibitor that is currently being used by the Washington Suburban Sanitary Commission for corrosion inhibition on Potomac River water. It also is used in a number of large distribution systems, including distribution systems in New York, Wisconsin and elsewhere. As noted in TEWG's Desktop Study, orthophosphate "has been used for many years as a reliable, known and safe chemical additive that has been shown to reliably reduce lead and copper corrosion." The Desktop Study notes that orthophosphate has been successfully used to reduce lead and copper corrosion in, among other localities, Norfolk, Winnipeg, Detroit and Milwaukee.

The active corrosion control ingredient in both zinc orthophosphate and orthophosphate is phosphoric acid. EPA is requiring the same residual concentration of the active ingredient (3 mg/L measured as orthophosphate) regardless of whether zinc orthophosphate or orthophosphate is applied. The data of which EPA is aware support a conclusion that zinc orthophosphate and orthophosphate are equally effective at achieving corrosion control endpoints. "The mechanism of zinc action on lead and copper has never been quantified. Most rigorous corrosion-control pilot programs that have compared zinc orthophosphate compounds versus simple orthophosphates have shown no significant benefit from zinc additives at operational dosage levels." *See Handbook of Public Water System 2nd edition*, 2001, HDR Engineering, John Wiley & Sons, Inc. At EPA's Lead and Copper Rule Workshop conducted in St. Louis, Missouri May 11-13, 2004, American Water Works Service Company ("AWWSC") presented a study showing that a change from zinc orthophosphate to orthophosphate in several AWWSC water distribution systems in the Midwest did not adversely affect lead levels in those distribution systems. EPA is aware that the zinc additive may have a beneficial protective effect in cement-lined pipes, although this theory has not been proven. However, this is not a significant consideration, as it is EPA's understanding that there are very few cement-lined pipes in the DCWASA system. Unlike zinc orthophosphate, application of orthophosphate does not present the concerns associated with an increased zinc loading, including concerns associated with the impact on the receiving treatment plants and any concerns that might arise from the discharge of zinc through combined sewer overflows.

EPA is aware that the Peer Review Panel suggested application of zinc orthophosphate and that suggestion formed the basis for the Washington Aqueduct's initial recommendation, which was approved by EPA on April 30, 2004. EPA has consulted with the Peer Review Panel and it is EPA's understanding that the Peer Review Panel's suggestion was **not** based upon any data demonstrating that zinc orthophosphate is more effective than orthophosphate. Rather, the Peer Review Panel's suggestion was based upon one of its members' greater familiarity with the use of zinc orthophosphate and on the premise that the Fairfax County Water Authority (FCWA), Virginia provided an example of the successful application of zinc orthophosphate for corrosion inhibition on Potomac River water. The Peer Review Panel's assumption that the City of Alexandria uses Potomac River water, however, is incorrect. The City of Alexandria obtains most of its drinking water from the Occoquon Reservoir/River system of FCWA, and thus does not provide an example of successful application of zinc orthophosphate to Potomac River water.

EPA has considered the known studies and data. In addition, EPA has consulted with members of the TEWG, the Peer Review Panel, other experts attending the recent Lead and

Copper Rule Workshop, and regulators in states that have water distribution systems using orthophosphate and/or zinc orthophosphate. EPA has concluded that zinc orthophosphate and orthophosphate are likely to be equally effective in controlling lead corrosion in the District of Columbia distribution system. It should be noted that, as was the case with application of zinc orthophosphate, the proposed application of orthophosphate will not immediately decrease lead levels in the tap water. It is expected that lead levels will decrease over the course of implementing the proposed treatment for at least several months and possibly more than a year.

The Washington Aqueduct will use an orthophosphate product that meets ANSI/NSF Standard 60: Drinking Water Chemicals – Health Effects. Based on the NSF certification, the application of orthophosphate is not expected to cause adverse human health effects. The application of orthophosphate may have some of the same effects as the application of zinc orthophosphate and which were described in EPA's April 30, 2004 letter. These include possible temporary rust-colored or "red water" events in the tap water, a potential increase in total coliform bacteria due to breakdown of biofilm on the pipes, and an increase in calcium (lime) deposits in water mains and residential plumbing. The advice provided by EPA in two public information sessions conducted on April 27 and 29, 2004, by DCWASA in a public information session conducted May 24, 2004, and by the TEWG's fact sheet regarding the application of zinc orthophosphate should continue to be followed. DCWASA , DOH and the Washington Aqueduct will continue with outreach programs designed to inform consumers of steps that should be taken as a result of the partial system application.

EPA considers the Desktop Study and the April 15, 2004 letter to be part of an ongoing process. Pursuant to 40 C.F.R. § 141.82(h), "[u]pon its own initiative or in response to a request by a water system or other interested party, [EPA] may modify its determination of the optimal corrosion control treatment ... where it concludes that such change is necessary to ensure that the system continues to optimize corrosion control treatment. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for [EPA's] decision and provide an implementation schedule for completing the treatment modifications." EPA's consideration of the recommended partial system application is informed by its understanding that additional studies are being undertaken. For example, the TEWG is conducting pipe loop experiments to evaluate optimal treatment dose, pH and other factors. The Washington Aqueduct also is studying means to optimize pH stability. Other ongoing research includes investigation into galvanic corrosion related to water meter replacement, lead profiling, pipe scale analysis and a study of lead leaching rates.

Accordingly, EPA agrees with the proposed interim modification of the approved OCCT to conduct a partial system application of orthophosphate in the form of phosphoric acid as a corrosion inhibitor in the 4th High Pressure Zone portion of the DCWASA distribution system commencing on or about June 1, 2004, subject to the modifications and conditions and additional studies set forth below. The requirements regarding flushing, water quality control parameters, sampling, monitoring, and other requirements set forth in the April 30, 2004 letter remain in effect unless modified below.

Interim Water Quality Parameters for the Partial System Applications

For water entering the distribution system
(These apply to Washington Aqueduct):

	WQP Goals	Interim WQPs
pH:	7.8 ± 0.1	7.8-7.9 ± 0.3
Orthophosphate	3.0 mg/l*	1.0-5.0 mg/l*

*dose necessary to reach this residual in tap samples

For water samples from the 4th High Pressure Zone distribution system
(These apply to DCWASA):

	WQP Goals	Interim WQPs
pH	7.7 ± 0.1	7.7 ± 0.3
Orthophosphate in residual in tap samples	3.0 mg/l	1.0-5.0 mg/l
ammonia nitrogen	to be determined	monitor and report
nitrate/nitrite nitrogen	to be determined	monitor and report

Additional Studies

- The Washington Aqueduct shall modify its flow-through pipe loop assemblies to perform a comparison study of zinc orthophosphate versus phosphoric acid to compare the benefits of both compounds in reducing lead and copper leaching and to investigate benefits of both compounds in improving iron corrosion control in old cast iron water mains.

- EPA will work with Arlington County WWTP and any applicable state authorities to ensure that appropriate studies are conducted to determine toxicity of zinc on their secondary and tertiary biomasses at both the higher passivation dosage and at a lower, expected maintenance dose for zinc orthophosphate.

EPA is aware that the Washington Aqueduct also recommends a full system application of orthophosphate to commence later in the summer. That recommendation, including any additional WQPs for full system application, will be addressed in a separate letter closer in time to the proposed full system application.

Thank you for your efforts to help secure a long term solution to elevated lead levels in the DCWASA water distribution system. If you or your staff require additional information, please contact Rick Rogers, Chief, Drinking Water Branch, EPA Region III at (215) 814-5711.

Sincerely,

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Water Protection Division
EPA Region III

cc: Hugh J. Eggborn, Director, Office of Water Programs, Culpeper Field Office, Virginia Department of Health,
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