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By Federal Express

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Gentlemen:

The United States Environmental Protection Agency Region III ("EPA") has primacy for the Public Water System Supervision ("PWSS") Program in the District of Columbia. The primacy agency is responsible for implementing the PWSS Program and the National Primary Drinking Water Regulations ("NPDWRs"), including designation of optimal corrosion control treatment ("OCCT") under the Lead and Copper Rule ("LCR") for public water systems. The NPDWRs define OCCT at 40 C.F.R. § 141.2 as "the corrosion control treatment that minimizes lead and copper concentrations at users' taps while insuring that the treatment does not cause the water system to violate any national primary drinking water regulations." The Preamble to the LCR states that the effect of corrosion control treatment on the waste water stream also may be considered in selecting OCCT. 56 Fed. Reg. 26460, 26480 (June 7, 1991).

On July 16, 1997, EPA conditionally designated an OCCT for the drinking water treatment and distribution system for the District of Columbia and required additional study. In February 2000, EPA designated the use of pH adjustment as the OCCT for the drinking water distribution system for the District of Columbia, which required the Washington Aqueduct to maintain a pH in the finished water between 7.7 and 8.5. On May 17, 2002, EPA revised its designation of OCCT with respect to the monthly pH goals.

On August 26, 2002, the District of Columbia Water and Sewer Authority ("DCWASA") submitted a final report to EPA Region III stating that, during the compliance period July 1, 2001 - June 30, 2002, the level of lead in first draw water samples from 53 residences served by the District of Columbia drinking water distribution system was 75 parts per billion ("ppb") at the 90th percentile. This monitoring result exceeded the lead action level of 15 ppb at the 90th percentile. On July 29, 2003, DCWASA reported to EPA Region III that, during the compliance period January - June 2003, the level of lead in the first draw water samples from 104 residences was 40 ppb at the 90th percentile. For the July - December 2003 compliance period, DCWASA

reported that the level of lead in first draw water samples was 63 ppb at the 90th percentile. For the January -June 2004 compliance period, DCWASA reported that the level of lead in first draw water samples was 59 ppb at the 90th percentile.

On May 28, 2004, the U.S. Environmental Protection Agency Region III ("EPA") approved an interim modification of the OCCT for the drinking water distribution system for the District of Columbia. The interim modification consisted of an application of the corrosion inhibitor orthophosphate to the 4th High Pressure Zone of the District of Columbia drinking water distribution system. The 4th High Pressure Zone is hydraulically isolated from the remainder of the District of Columbia's drinking 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, prior to any full system application, operational characteristics and any unanticipated effects. At the time EPA approved this interim modification, it was expected that, absent any unresolvable problems and subject to EPA's approval, the system-wide OCCT ultimately would be modified to include application of orthophosphate to maintain reduced levels of lead in the entire District of Columbia drinking water distribution system.

This letter modifies EPA's interim designation of the OCCT for the District of Columbia distribution system. The interim OCCT for the District of Columbia drinking water distribution system shall consist of the application of the corrosion inhibitor orthophosphate subject to the conditions and water quality parameters ("WQPs") set forth below. This designation is being considered an "interim" designation because it applies only to the passivation period. A final designation for maintenance of corrosion control will be issued once the system is passivated. The Washington Aqueduct will use an orthophosphate product in the form of phosphoric acid that meets ANSI/NSF Standard 60: Drinking Water Chemicals -- Health Effects. The Washington Aqueduct will apply an initial passivation dose that will continue until the lead level in the 90th percentile of tap water samples is equal to or below the 0.015 mg/l (15 ppb) lead action level, or until water quality results indicate the need to reduce the dosage earlier. The initial passivation dose should be designed to achieve a residual of $\geq$ 3.0 mg/L measured as orthophosphate in tap samples. Following initial passivation, it is anticipated that the Washington Aqueduct will apply a maintenance dose sufficient to achieve a residual of approximately 0.5 - 1.5 mg/L measured as orthophosphate in tap samples, or a dose sufficient to ensure lead levels remain equal to or below 0.015 mg/l (15 ppb) at the 90th percentile of tap samples.

The interim WQPs set herein apply to the initial passivation dose. The LCR contemplates that the primacy agency will establish final water parameters following passivation of the system. EPA will review monitoring results and system operation records after passivation has been reached and will establish final WQPs for the Washington Aqueduct and DCWASA for maintenance of corrosion control following passivation. EPA anticipates that it will establish final WQPs that will allow for smaller variations in the parameters than the interim WQPs for the passivation dose set forth in this letter.

The Washington Aqueduct is a wholesaler of water and has no distribution system of its own. The Washington Aqueduct sells water to a number of other water systems. DCWASA,

Arlington County Public Works and the City of Falls Church are consecutive community water systems and provide no additional treatment to the water received from the Washington Aqueduct before they distribute it to their customers. The Washington Navy Yard is a consecutive community water system that purchases its water from DCWASA. The Anacostia Annex, the Naval Observatory and the Naval Security Station are consecutive non-transient, non-community water systems that purchase water from DCWASA. Ronald Reagan National Airport is a consecutive non-transient, non-community water system which has the capability of providing additional disinfection to the water it receives from the Washington Aqueduct. Thus, any treatment, including OCCT, applied by the Washington Aqueduct will affect all of its customer water systems. The public water systems affected are:

PWS Identification Number	Public Water System
DC0000001	Washington Aqueduct Division, U.S. Army Corps of Engineers
DC0000002	District of Columbia Water and Sewer Authority ("DCWASA")
DC0000003	Naval Station Washington – Washington Navy Yard
DC0000004	Naval Station Washington – Anacostia Annex
DC0000005	Naval Observatory
DC0000006	Naval Security Station
VA6013010	Arlington County Public Works
VA6013080	Ronald Reagan Washington National Airport
VA6610100	City of Falls Church Public Utilities

Background

Following DCWASA's report that it had exceeded the LCR lead action level in 2002, EPA recognized the need to conduct additional research into the cause of elevated levels of lead in the District of Columbia drinking water distribution system. (Arlington County and the City of Falls Church have not reported elevated lead levels in their drinking water distribution systems.) EPA contracted with an independent corrosion expert in May 2003 to research the cause of the increased lead levels. The expert presented a written report to EPA in October 2003. DCWASA developed a research strategy, which it presented to the Washington Aqueduct, Arlington County, the City of Falls Church and EPA in January 2004. EPA formed the Technical Expert Working Group ("TEWG") to address the problem of elevated lead levels in tap water in the District of Columbia in February 2004. The TEWG consists of representatives from EPA Region III, EPA Headquarters' Office of Ground Water and Drinking Water, EPA's Office of Research and Development, the Washington Aqueduct, DCWASA, the District of Columbia Department of Health, Arlington County, Falls Church and the Centers for Disease Control and Prevention.

The TEWG's Production Treatment Operations Team, led by the Washington Aqueduct and its contractor, developed a Desktop Study. The Desktop Study considered various treatment options, including maintaining a constant high pH at the Dalecarlia and McMillan water treatment plants using either quicklime (current practice) and/or sodium hydroxide (caustic

soda), and feeding a corrosion inhibitor, such as orthophosphate, while maintaining a constant pH throughout the year of about 7.7. The Desktop Study reviewed the various reports and recommendations previously prepared for the Washington Aqueduct and/or EPA, conducted a telephone survey about treatment techniques employed by drinking water treatment and distribution facilities similar to Washington, D.C.'s, performed mathematical modeling of corrosion abatement strategies, and reviewed water treatment industry accepted corrosion control practices.

The TEWG and the Washington Aqueduct originally recommended introduction of orthophosphate as a corrosion inhibitor. The Desktop Study and its recommendations were reviewed by an Independent Peer Review Panel assembled by EPA's Office of Ground Water and Drinking Water in Washington, D.C. Based upon one of its members' greater familiarity with the use of zinc orthophosphate, the Peer Review Panel recommended the use of zinc orthophosphate. On April 30, 2004, EPA designated use of zinc orthophosphate for partial system application in the 4th High Pressure Zone.

On May 28, 2004, EPA modified its April 30, 2004 designation, and EPA designated use of orthophosphate (rather than zinc orthophosphate) for the partial system application of a corrosion inhibitor in the 4th High Pressure Zone. This modification was based on concerns raised by Arlington County regarding its wastewater treatment plant's ability to handle the anticipated added zinc load from any future full system application and on data suggesting that zinc orthophosphate and orthophosphate are equally effective in achieving corrosion control endpoints. For an explanation of EPA's considerations, *see* Letter from Jon M. Capacasa to Thomas P. Jacobus and Jerry N. Johnson (May 28, 2004).

Orthophosphate (in the form of phosphoric acid) 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 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. *See* The Cadmus Group, Inc., *Investigation of Potential Environmental Impacts due to the use of Phosphate-based Corrosion Inhibitors in the District of Columbia* (July 22, 2004) ("Cadmus Report"). 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." *See* Letter from Jon M. Capacasa to Thomas P. Jacobus and Jerry N. Johnson (May 28, 2004).

EPA has considered the known studies and data. In addition, EPA has consulted with members of the TEWG, the Independent 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 achieving corrosion control end points in the District of Columbia drinking water distribution system. It should be noted that 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.

A measurable reduction of lead levels may take more than six months and possibly more than a year.

The partial system application to the 4th High Pressure Zone commenced on June 1, 2004. After reviewing the available data the Technical Expert Working Group reached consensus that there were no water quality monitoring results that would warrant delaying full system application of orthophosphate as a corrosion inhibitor. Although data from the 4th High Pressure Zone application have not yet shown a reduction in lead levels, this was expected based on experts' opinions and TEWG members' experiences elsewhere. Data did show some elevated numbers of heterotrophic plate count bacteria at several sample sites and elevated color and iron levels in about one third of samples taken from fire hydrants. These results can reasonably be expected during the start-up phase of a phosphate-based corrosion inhibitor treatment. There have been no customer complaints of red water in the 4th High Pressure Zone. The equipment installed to perform this temporary chemical feed has performed well. In summary, no results indicated unresolvable problems in connection with application of orthophosphate in the 4th High Pressure Zone, and no unexpected results from the water quality monitoring were seen. The TEWG's consensus, from its discussion on July 28, 2004, is that there is no reason to delay application of a full system treatment.

EPA considers this interim OCCT designation 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 interim OCCT designation 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; flow-through pipe loop studies; lead corrosion behavior studies in household plumbing (lead profiling); pipe scale analysis; a study of lead leaching rates; and pipe loop studies to compare the relative effectiveness of zinc orthophosphate and orthophosphate in reducing lead levels. In addition, studies are planned on galvanic corrosion related to partial lead service line and water meter replacement and potential impacts on corrosion rates from electrical system grounding to home plumbing systems.

Conditions and Water Quality Parameters

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. In addition, the application of orthophosphate is not expected to have an adverse effect on the Blue Plains Wastewater Treatment Plant or the Arlington County Water Pollution Control Plant. *See* Cadmus Report. Discharges of potable water from the drinking water distribution systems in the District of Columbia, Arlington County and the City of Falls Church to receiving streams

through planned and unplanned events such as line flushing, water main breaks, combined sewer overflows, lawn watering, etc. are not expected to cause any adverse effects to the receiving streams.

The application of orthophosphate may cause 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. Total coliform are indicator bacteria and any increase in total coliform bacteria caused by the application of orthophosphate does not present a human health risk. Information regarding these possible effects and what to do if there is "red water" was 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, which is posted on the District of Columbia Department of Health's website. EPA, DCWASA, the District of Columbia Department of Health and the Washington Aqueduct will continue with outreach programs designed to inform consumers of steps that should be taken as a result of the application of orthophosphate. DCWASA has informed EPA that DCWASA intends to send a letter to its customers informing of them of the application of orthophosphate and the steps that should be taken if they experience discolored water. EPA and the TEWG are scheduling additional public information meetings as well.

DCWASA, with support from Washington Aqueduct contractor flushing crews, will proceed with a unidirectional water main flushing program as quickly as possible to complete flushing the entire DCWASA distribution system prior to the onset of freezing weather. During this and all subsequent water main flushing events, DCWASA shall implement best management practices (in addition to dechlorination) to minimize discharges associated with water main flushings to storm sewers and receiving streams. Such best management practices shall include, but not be limited to, exercising best efforts to avoid conducting line flushings in combined sewer overflow ("CSO") service areas during or immediately after storm events and identifying and monitoring relevant CSOs during line flushings to determine whether the line flushings are associated with any discharges from CSOs.

No later than December 1, 2004, or within ten (10) days of completing a study to analyze pH control (whichever is sooner), the Washington Aqueduct shall submit to EPA a study analyzing methods of pH control designed to achieve the WQP goals set forth herein.

Monitoring

Pursuant to 40 C.F.R. § 141.82(f), EPA is required to set WQPs for water supplies implementing corrosion control treatment. The interim WQPs and WQP goals set forth herein apply both to water entering the distribution system and to water quality as measured in tap water samples from the distribution system collected pursuant to 40 C.F.R. § 141.87 and this letter. The Washington Aqueduct will be responsible for monitoring and achieving the WQPs for water entering the distribution system. DCWASA will be responsible for monitoring and achieving the WQPs in the distribution system. The interim WQP for orthophosphate in water entering the distribution system is set as a range to account for the possibility that the Washington Aqueduct may need to adjust treatment for a short period of time to respond to

temporary conditions in the distribution system (such as red water). The pH values for waters entering the distribution system are expressed as a range to allow the Washington Aqueduct to make adjustments to consistently attain WQPs in the distribution system. The interim WQP goals will serve as targets which both the Washington Aqueduct and DCWASA should strive to achieve.

Along with the typical parameters required of systems using a phosphate-based corrosion inhibitor, EPA is requiring that DCWASA monitor for and report supplemental parameters in the distribution system to help determine whether the application of orthophosphate causes any unexpected water quality changes. Because the purpose of monitoring for and reporting the supplemental parameters is to assist EPA, DCWASA and the Washington Aqueduct in evaluating and fine-tuning operations, the requirement is for monitoring and reporting, and no numeric values have been assigned to the supplemental parameters.

The Washington Aqueduct shall conduct monitoring for WQPs according to the requirements in 40 C.F.R. § 141.87. DCWASA shall conduct monitoring for WQPs according to the requirements in 40 C.F.R. § 141.87, with the following modifications. With respect to frequency, DCWASA shall monitor for WQPs monthly at all sample locations. DCWASA also shall monitor all locations selected pursuant to 40 C.F.R. § 141.87 for all parameters set forth below, including those parameters designated as "monitor and report." DCWASA's compliance with the numeric interim WQPs established herein shall be assessed based upon monitoring conducted at the locations selected pursuant to 40 C.F.R. § 141.87.

In addition to monitoring at the locations selected pursuant to 40 C.F.R. § 141.87, DCWASA also shall monitor at least twenty-five (25) additional or "supplemental" locations to provide additional information on any changes in the water chemistry during the passivation period. Monitoring at the supplemental locations shall consist of monitoring and reporting for all parameters set forth below, including pH, orthophosphate, free ammonia nitrogen and nitrite/nitrate nitrogen. Although DCWASA must monitor and report parameter values for these twenty-five supplemental locations to comply with 40 C.F.R. §§ 141.82 & 141.87, compliance with the numeric interim WQPs for pH, orthophosphate, free ammonia nitrogen and nitrite/nitrate nitrogen will not be assessed based on the data from these supplemental locations. Monitoring at the supplemental locations shall be conducted in accordance with a supplemental monitoring plan described below.

Prior to the full system application of orthophosphate, DCWASA shall develop and submit to EPA for review a supplemental water quality monitoring plan. This plan shall identify at least twenty-five (25) additional or "supplemental" sample locations beyond those required by 40 C.F.R. § 141.87. The additional or "supplemental" sample locations shall be representative of dead-end and low flow areas of the distribution system confirmed using DCWASA's calibrated hydraulic model. The supplemental water quality monitoring plan also shall include monitoring for all parameters listed below at all sampling locations, both those identified in the supplemental water quality monitoring plan and those identified pursuant to 40 C.F.R. § 141.87.

Reporting

The Washington Aqueduct and DCWASA shall report WQP monitoring data as required by 40 C.F.R. §141.90 with the modifications below. WQP reports are due to EPA within ten (10) days of the end of each monthly monitoring period. Where the tenth day falls on a weekend or holiday, reports are due the first business day thereafter.

DCWASA shall also report to EPA data collected under the supplemental WQP monitoring plan within ten (10) days of the end of each monthly monitoring period. Data for the parameters identified below as "monitor and report" will be used by EPA, the Washington Aqueduct, and DCWASA for evaluating and fine-tuning operations.

At this time, EPA is setting interim WQPs and WQP goals for the passivation period. As stated above, once the distribution system is passivated, EPA will establish more refined WQPs to be achieved in connection with maintenance of corrosion control. EPA anticipates that the WQP goals provided herein will form the basis of the more refined WQPs associated with the maintenance of corrosion control that will be established by EPA following the initial passivation period.

Interim Water Quality Parameters for the Passivation Period

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

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

*dose necessary to reach this residual in tap samples

For water samples from the distribution system during passivation period (These apply to DCWASA):

	Interim WQPs	WQP Goals
pH	7.7 ± 0.3	7.7 ± 0.1
Orthophosphate residual in tap samples	1.0-5.0 mg/l	3.0 mg/l
free ammonia nitrogen	0.5 mg/l	0.2 mg/l
nitrate/nitrite nitrogen	0.5 mg/l	≤ 0.1 mg/l
Supplemental Parameters		
free chlorine	monitor & report	
total chlorine	monitor & report	
temperature (°C)	monitor & report	
alkalinity	monitor & report	

Calcium hardness as CaCO3	monitor & report
Calcium dissolved hardness	monitor & report
iron	monitor & report
aluminum	monitor & report
total dissolved solids	monitor & report
oxidation-reduction potential	monitor & report
sulfate	monitor & report
color	monitor & report
heterotrophic plate count bacteria	monitor & report
total coliform bacteria and fecal coliform or E. coli testing of total coliform positive samples	monitor & report
free ammonia	monitor & report
total ammonia nitrogen	monitor & report
dissolved PO4	monitor & report
total PO4	monitor & report

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

Sincerely,

Jon M. Capacasa, Director
Water Protection Division
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cc: Hugh J. Eggborn, Director, Office of Water Programs, Culpepper Field Office, Virginia Department of Health,
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