Technical Expert Working Group Conference Call

Friday June 30, 2006
10:00 a.m. – 11:15 a.m.

DRAFT CALL SUMMARY

Attendees:

EPA Region 3 and contractors: Jennie Saxe, Rick Rogers, Laura Dufresne, Karen Sklenar, Stephanie Jones, Gregory Korshin

The Aqueduct and contractors: Patricia Gamby, Savita Schlesinger, Elizabeth Turner, Miranda Brown, Lloyd Stowe, Tom Jacobus

DCWASA and contractors: Rich Giani, John Civardi

George Washington University: Marina Moses

Falls Church: Matthew Jacobi

Dept. of Health: William Slade

The meeting was led by Rick Rogers.

Agenda

There were no changes or additions to the agenda. The meeting agenda is enclosed below as Attachment A.

Summary of Discussions by Topic Area

I. WA Pipe Loop Study

Savita Schlesinger provided a general overview of WA's recent pipe loop results, including data received since WA returned to chloramine after simulating a chlorine burn. Data discussed were current up to June 23, 2006. Ms. Schlesinger provided most of her discussion in a memo sent to the group prior to the meeting. Notes from the memo follow, supplemented with comments and questions offered during the call.

- The pipe loop conditioning phase began on January 7, 2005. During this phase, the pipe loops were exposed to Washington Aqueduct finished water;
- On March 7, 2005 the pipe loops were put in automatic mode and were fed chemically-conditioned water, according to the Pipe Loop Plan.
- On September 5th, 2005 in Rack 3 we switched from chloramine to free chlorine. On November 4th, we switched back from free chlorine to chloramine. We did not see a significant increase in lead release after switching back to chloramine.

- On September 12th, 2005 we lowered the phosphate concentration in Rack 2 from a target of 3 mg/L to a target of 2 mg/L. And on November 14th, we switched from a target phosphate concentration of 2 mg/L to 1 mg/L. In this rack we have not seen an increase in lead due to the decreased phosphate dose.
- At the Washington Aqueduct plants the PO_4 dose to the finished water was decreased from 3 mg/L to 2.4 mg/L at the end of January 2006. In this rack we have not seen an increase in lead due to the decreased phosphate dose.
- Operation of Racks 1 (Zinc Orthophosphate), 4 (no orthophosphate inhibitor) and 5 (low chloramines dose) was discontinued because we concluded that the data we had was sufficient to draw conclusions from these racks. Sampling for these Racks was discontinued on February 3, 2006. Charts for these racks will not be included with the monthly report.
- The Racks that are remaining (Racks 2, 3, 6 & 7) will be operated through June 2006. Rack 7 (finished water) will be operated longer. During the meeting, Ms. Schlesinger stated that WA would continue operating racks 2, 3, and 6 for at least two weeks, until the lead levels stabilize for these racks (see below for discussion of results). Rack 7 shall be run indefinitely.
  - The phosphate dose in Racks 2 and 6 is currently 1 mg/L (Rack 6 was lowered from 3 mg/l to 1 mg/L in mid-February).
  - Rack 3 has 3 mg/L phosphate.
- Rack 7, plant water control rack, lead levels increased in the time period after the PO_4 level was decreased from 3 mg/l to 2.4 mg/l. In the same time period the temperature was increasing. The trend of lead levels appears to track closely with increase in temperature.
- Ammonia to all three racks in service was turned off on 4/14/06 to simulate a chlorine burn. This was done as previously discussed to observe the effect of a chlorine burn with typical spring water temperature (note that the earlier chlorine burn was simulated in September, in fall temperatures). We will observe and compare the effects of a spring chlorine burn in the loops at 1 mg/l phosphate (racks 2 and 6) and at 3 mg/l (rack 3). Prior to 4/14/06, in Rack 2, 3 and 6, lead levels appear to be rising slightly. After the switch to free chlorine (used to mimic the seasonal burn) lower lead levels can be seen in Racks 2, 3 and 6. In Rack 7 (plant water, which did not see the switch to free chlorine) lead levels appear to be rising. The increase in lead in Rack 7 appears to be due to the increase in water temperature as the treatment and control strategy of the finished water has not changed since January 2006.
- The ammonia was turned on again on 5/12/2006. This resulted in 4 weeks of free chlorine in the loops and 6 weeks of data after the loops were returned to chloramine. A decrease in lead levels can be seen in Racks 2, 3 and 6 after the switch to free chlorine. This is consistent with what was observed during the earlier chlorine burn simulation. On Racks 2 and 3, the increase in lead levels appears to have started just before the return to chloramines and may be correlated to both the return to chloramines as well as temperature. On Rack 6, the increase in lead levels is not quite as apparent. The plot showing all three loops for Rack 6 together indicate that the three loops are not mimicking each other as well as the loops on

Racks 2 and 3. This may be due to in part to the phosphate dose having been dropped from 3 mg/L directly to 1 mg/L.

- The data on the charts is through June 23, 2006. The data that we have to date does not clearly show the impact of the chlorine burn. The lead levels are still slightly rising and the temperature effect has not yet been fully identified. For this reason we will continue to operate the 4 racks until a conclusion can be made.

Ms. Schlesinger stated that WA has not yet performed a regression analysis of the pipe loop results, but such an analysis will be included in the final report.

Question	Mr. William Slade (DC DOH) asked about the possibility of maintaining a free chlorine residual during chloramination, noting that, according to data he reviewed, lead levels seemed to be lower when a minimal chlorine residual remained than when free chlorine was at zero or non-detect.
Answer	WA and EPA responded that due to the chemical reaction of chlorine and ammonia to form chloramine, it was impossible to control the chlorine residual in the water. Also, it was noted that results labeled “non-detect” may not necessarily be lower than the residuals noted by Mr. Slade, suggesting that there was not necessarily a correlation between free chlorine residual and lead concentration.

WA hopes to add more discussion of the pipe loop findings once lead levels stabilize and allow for further explanation.

II. DCWASA Pipe Loop Update

Rich Giani summarized the most recent pipe loop results for DCWASA, noting that results were about the same as the last time they were discussed.

- For Rack 1 (control rack), there was an increase in lead levels to 10, 11, and 17 ppb, but these went back down to 8, 9, and 7 ppb, respectively.
- Rack 2 has observed consistent lead results, which are hovering around 10 ppb.
- Lead levels in Rack 3 (stannous chloride) have dropped to non-detect, indicating that lead concentrations are below 2 ppb.

Mr. Giani noted that total lead levels are still pretty high. He stated that DCWASA plans to continue the pipe loops for a few more months, after which DCWASA will send pipes to Mike Schock at EPA, who plans to study the corrosion scale.

Question	Mr. Rick Rogers of EPA Region III asked how long DCWASA planned to keep the same chemical regimes in each pipe loop.
Answer	DCWASA plans to conduct research with AwwaRF in the near future, and it may use Rack 2 as part of this research. Mr. Giani stated that DCWASA will note any

changes to the TEWG as this takes place. As the control rack, Rack 1 will remain in operation indefinitely, for monitoring purposes.

III. NOM Fractionation Study

Karen Sklenar of the Cadmus Group, Inc. and Gregory Korshin of the University of Washington reviewed the executive study of the draft final report of the NOM Fractionation Study, conducted by Cadmus and Dr. Korshin. This study consisted of five main tasks, and was designed to determine how NOM (natural organic matter) changed throughout out the treatment process and how this affected DBP formation and lead solubility.

1. **Full-scale NOM Isolation and Fractionation**: Dr. Korshin analyzed raw water (treatment plant influent), post-sedimentation settled water, and filtered water at both of WA's water treatment plants. These samples were analyzed using reverse osmosis to measure the fraction of NOM types including hydrophobic acid, basic and neutral fractions, transphilic acid, base and neutral fractions, and hydrophilic fractions.
2. **Simplified NOM Fractionation**: Also called "Fractionation Lite", this process involved the collection of seasonal samples analyzed using a XAD8/XAD4 separation method. This analysis isolated hydrophobic, hydrophilic, and transphilic fractions but did not distinguish between acidic, basic, and neutral sub-fractions. Referring to a chart in the Executive Summary (p. ES-3), Dr. Sklenar stated that there was little change in the proportion of each respective NOM fraction over the seasons and that the hydrophobic fraction generally contributed the most to dissolved organic carbon (DOC).
3. **Characterization of Redox and Metal Binding Activities of Representative NOM**: RO isolates and NOM fractions were tested to assess their affect on lead solubility and release processes, specifically with respect to metal-binding capacity. Water samples with four different NOM concentrations were provided (0, 2, 5, and 10 mg/L), and the solubility of lead was tested. Both hydrocerrusite solubility and lead dioxide solubility were tested. It was found that as NOM concentration increased, so did lead solubility, although the different lead forms exhibited different rates of lead release. Whereas hydrocerrusite solubility was relatively linear, lead dioxide dissolved at a much slower, non-linear rate, and Mr. Korshin projected that it would take six months to observe a significant increase in lead.
4. **DBP Formation Measurements**: The respective role of various NOM fractions in DBP formation was measured based on an analysis of the composition of 21 different DBPs in the finished water. The hydrophobic portion was found to facilitate formation of the most DBPs.
5. **Ancillary Monitoring:** Weekly samples were collected to measure the variability of NOM concentration and composition over time across the influent, settled, and filtered water samples. Samples were measured for total organic carbon (TOC), DOC, $SUVA_{254}$, and other parameters.

Question Dr. Sklenar asked Dr. Korshin about any treatment types known that specifically facilitate the removal of hydrophobic (HPO) NOM fractions.

Answer Dr. Korshin replied that HPO can be removed readily using most methods.

Question It was asked if enhanced coagulation had any major effect on HPO fraction.

Answer Dr. Korshin replied that the benefits of this would not be tremendous. Rick Rogers added that WA already was practicing enhanced coagulation and that the results from the study represented this.

IV. Conclusion

Mr. Rick Rogers closed the call by thanking all participants and requesting any ideas for the next agenda. Although he originally envisioned a near end for the monthly TEWG calls, Mr. Rogers stated that monthly calls would take place for the remainder of the year and he welcomed any volunteers to take charge of leading the calls. There were no volunteers.

Attachment A
Proposed Agenda from EPA Region 3
TEWG Meeting
June 30, 2006

1. WA Pipe Loop Update
2. DCWASA Pipe Loop Update
3. NOM Fractionation Study