U.S. Environmental Protection Agency

WORKSHOP ON THE DEVELOPMENTOF REGULATIONS FOR AIRCRAFT PUBLIC WATER SYSTEMS

Sheraton Crystal City Hotel, Arlington, VA
March 28-29, 2007

Summary

BACKGROUND

This workshop was one of a series of meetings held by the Environmental Protection Agency (EPA) as part of a collaborative process to develop aircraft drinking water regulations. EPA held the first public meeting on June 1, 2005. Following the June 2005 meeting, the contracted facilitator, RESOLVE, utilized public comments from the meeting and conducted follow-up interviews with representatives from about 15 interested stakeholder organizations to prepare a document of recommendations for a collaborative rulemaking approach. An initial scoping workshop was then held on January 18 and 19, 2006, to begin implementing that approach by providing an opportunity for stakeholders and EPA to: share learning about aircraft water systems and watering points, current regulations, and other information relevant to the proposed rulemaking; raise issues for consideration in developing the proposed rule; and, understand some of the conceptual options for the proposed rule.

Following the January 2006 workshop, EPA utilized the information provided at the workshop, available data from airline monitoring programs, and other information provided by various stakeholder groups to prepare a proposed Water Safety Plan approach to the development of the Aircraft Drinking Water Rule (ADWR). The March 2007 workshop was then held with the following objectives:

- Provide information about recent activities and anticipated milestones for an ADWR;
- Present and discuss the water safety plan framework for the proposed rule and review data to date from the Administrative Orders on Consent; and,
- Provide an opportunity to ask questions, offer suggestions, and comment on pros and cons of different approaches.

The general approach to the workshop included EPA presentations of the proposed water safety plan approach and available monitoring data, with questions and discussion following each presentation. Participants were then divided into small discussion groups to address specific topics and questions associated with the proposed water safety plan approach and ADWR related issues. On day two of the workshop each discussion group presented their key points and issues to the group as a whole, with discussion and questions following each presentation. The workshop concluded with a synthesis

discussion of the key issues identified by the groups and any additional stakeholder items and concerns.

This summary of the workshop provides key points from the presentations and discussion and is not intended to serve as a meeting transcript. The summary is organized in accordance with the meeting agenda with key points of each presentation followed by questions and answers and discussion issues pertaining to the presentation. A summary of the discussion from each of the break-out groups is also included. A list of acronyms is attached as appendix A to the summary.

DAY 1: MARCH 28, 2007

Welcome and Review Agenda

Ms. Gail Bingham, RESOLVE, welcomed the participants, reviewed the purpose of the previous ADWR-related meetings, and conveyed the objectives of the current meeting. Based on a show of hands, roughly half the participants had not attended the January 2006 stakeholder meeting. Ms Bingham then introduced Mr. Stephen Heare, Director of the Drinking Water Protection Division (DWPD) in EPA's Office of Ground Water and Drinking Water (OGWDW).

Mr. Heare welcomed previous participants and newcomers, and provided some review and background to frame the discussions that would take place during the stakeholder meeting. Mr. Heare shared with the participants that the EPA has learned a lot over the past year about aircraft water systems and issues related to providing safe drinking water on mobile public water systems (PWSs). To put the rulemaking effort in context, Mr. Heare explained how EPA administers the Safe Drinking Water Act (SDWA) in about 160,000 stationary PWSs. EPA must regulate public water systems on aircraft because SDWA authorizes EPA to regulate interstate carrier conveyances (ICCs), which include trains, ferries, aircraft, and buses involved in interstate commerce. ICCs are included in the definition of PWSs. Regulations written for stationary water systems do not fit well with ICCs, so this rule is intended to make the requirements more effective.

Mr. Heare explained that other recent rulemaking processes have included a federal advisory committee process, or FACA, which is a formal process with a designated official. In the FACA process, designated committee members (selected from stakeholders) are the only ones at the table, and they develop a rule proposal. The proposed rule would be open for public comment, after which EPA would finalize the rule. Because of the time requirements of the FACA process and the diversity of stakeholders involved, EPA wanted to use an alternative dispute resolution method for the ADWR to allow participation of more stakeholders. Through the alternative dispute resolution process, EPA will gather information and concerns from stakeholders but will be responsible for developing the proposed rule.

Mr. Heare then provided an overview of the two presentations scheduled for the morning session. Mr. Heare explained that the two presentations would discuss the risk management approach and the monitoring data received to date.

Mr. Heare requested that participants direct questions regarding the administrative orders on consent (AOCs) and issues related to the Comprehensive Representative Monitoring Plans (CRMPs) and Quality Assurance Project Plans (QAPPS) to the Office of Enforcement and Compliance Assurance (OECA). Directing those questions to OECA would allow the time available for the meeting to focus on issues to be considered when developing the ADWR. Mr. Heare added that discussions should not be limited to the items on the breakout group guides, and encouraged open discussion.

International Context

Mr. Heare conveyed the ADWR would regulate only those aircraft that board water from domestic water systems, while water boarded from foreign water sources would be addressed through an effort coordinated by the World Health Organization (WHO). Mr. Heare explained EPA has been working with Health Canada, WHO, the International Civil Aviation Organization, and the International Air Transport Association to initiate the effort. Mr. Heare introduced Ms. Lena Hope, who via telephone provided an overview of the WHO efforts planned for addressing the international side of drinking water on aircraft.

Ms. Hope explained she was originally from NSF International, a collaborative center for world safety, and is on detail to work with Dr. Bartram (EPA's contact at WHO) in Geneva, Switzerland. Ms. Hope described her role as coordinator of the revision of the guidelines for hygiene and sanitation in aviation, which will become a revision of the 1977 WHO guidelines. Ms. Hope noted the guidelines will be in harmony with international health regulations that revised the 1969 guidelines and are planned for publication in June 2007.

Ms. Hope also noted that WHO's Guidelines for Drinking Water Quality include a portion dedicated to water safety in aviation (Chapter 6). The international health guidelines are available on the WHO website. Ms. Hope explained an international committee will be formed for the effort, and she requested input on potential participant members from today's meeting attendees. Ms. Hope expects a core group of 4 to 5 people to be involved in the entire project and to represent each technical subject.

Ms. Hope described the plan for the process as utilizing many meetings by telephone, in addition to in-person meetings in June 2007 in Geneva, and in October 2007 in North America (possibly in Canada). Ms. Hope noted the plan for the international effort was in place prior to her starting in this position a few weeks ago. Ms. Hope concluded by emphasizing that WHO will work with stakeholders and regulatory agencies for global and worldwide consensus on the issue.

Presentation #1: Progress on and Proposed Approach to the Aircraft Drinking Water Rule.

Mr. Heare introduced Mr. Rick Naylor, Rule Manager for the ADWR. Mr. Naylor used a slide presentation to review the progress to date in the development of the proposed rule, including the conceptual framework for the water safety plan approach. Copies of Mr. Naylor's presentation were made available to participants. Mr. Naylor emphasized the goal of this rule is to develop a practical application of EPA's existing regulations for aircraft as mobile transient noncommunity water systems (TNCWSs). Mr. Naylor noted this rule was particularly important for airlines due to their need to work on tight operating schedules.

Mr. Naylor began his presentation by stating that EPA introduced the Hazard Analysis and Critical Control Point (HACCP) approach at the January 2006 meeting and did not hear opposition to using the HACCP or Water Safety Plan (WSP) approach in the development of the ADWR. Mr. Naylor emphasized that airlines will not prepare their own WSP under ADWR. The nine steps of EPA's WSP approach were explained, and are listed below.

1. Assemble Rule Team
2. Describe the Water System and Construct Process Flow Diagrams
3. Identify and Evaluate Hazards
4. Identify Critical Control Points, Control Measures, and Barriers
5. Define Critical Limits and Validate Limits

   Mr. Naylor noted EPA does not plan to revalidate coliform monitoring and will use the validation of the original Total Coliform Rule (TCR). EPA is reviewing the TCR but will not be through that process within the timeframe assigned to the ADWR. Mr. Naylor emphasized the breakout groups will discuss possible monitoring frequencies in the sessions to be held in the afternoon. Mr. Naylor also noted that for a typical stationary PWS of this population and type, monthly coliform monitoring is required.
6. Establish Monitoring Procedures for Critical Limits
7. Establish Corrective Actions for Critical Limits
8. Establish Responsibilities, Reporting, and Recordkeeping
9. Establish Procedures for Program Oversight and Regulatory Verification

   Mr. Naylor noted implementation of the ADWR will be performed by EPA Regions and not states because this is an interstate effort which requires direct implementation by EPA.

Mr. Naylor elaborated on each of the nine steps. Mr. Naylor explained the ADWR Team (WSP Step 1) works collaboratively with stakeholders and consists of EPA Headquarters, EPA Regions, the Food and Drug Administration (FDA), and the Federal Aviation Administration (FAA). An overview of the aircraft potable water transfer and supply

chain was provided to address Step 2, with the presentation focusing on the respective jurisdictions of EPA and FDA. Mr. Naylor explained the supply chain diagram indicates where different agencies including EPA, the Food and Drug Administration (FDA), and states have jurisdiction over PWSs serving the airport, the airport itself, the water transfer equipment, and the water system onboard the aircraft. Mr. Naylor stated EPA has jurisdiction over the drinking water on board the aircraft; while FDA has jurisdiction over the water transfer to the aircraft (cabinets, carts, trucks, and hoses) and culinary water on board the aircraft. He also noted water boarded at foreign airports or on aircraft outside of the United States is not regulated by either EPA or FDA.

Mr. Naylor then elaborated on Step 3 – Identify and Evaluate Hazards. Mr. Naylor explained that the regulatory development team identified the following hazard events as pertaining to the aircraft water transfer and supply chain:

1. Boarding contaminated water
2. Contamination due to improper water system design or construction
3. Contamination due to unsanitary operations and maintenance (O&M) practices
4. Degradation of water in the aircraft water system
5. Contamination due to failure of backflow prevention device(s)

The presentation of Step 4 - Identify Critical Control Points, Control Measures, and Barriers, included the following:

1. Boarding contaminated water

   Mr. Naylor noted FDA rules required only potable water be boarded, and discussion groups will be asked to address implications of knowingly or unknowingly boarding water that is in violation of the Safe Drinking Water Act (SDWA).

2. Contamination due to improper water system design/construction

   This is addressed under FDA regulations. FDA performs review of plans and specifications for aircraft water systems.

3. Contamination due to unsanitary O&M practices

   Mr. Naylor provided an example of a control measure as a routine inspection/audit with follow-up actions. He mentioned audits could be considered comparable to sanitary surveys that are performed in traditional PWSs, which ensure the system is operated and maintained properly.

4. Degradation of water quality in aircraft water system

   Mr. Naylor noted water quality degradation may occur if water does not have frequent turn-over within the water system.

5. Contamination due to failure of backflow prevention device(s) installed in aircraft water system.

Mr. Naylor noted the FDA ADWR team member has indicated routine replacement of backflow prevention devices often occurs for the devices that cannot be tested.

To conclude the presentation, Mr. Naylor remarked that the goal of the presentation was to introduce EPA's approach with examples, and emphasized that EPA has not yet solidified anything. He emphasized EPA's intent is to develop a rule that works for aircraft water systems and protects public health and safety.

Presentation #1: Questions, Answers, and Discussion

Q1: What is the timeline for the rule?
A1: The rule is on an accelerated schedule, with proposal for public comment in December 2007. This will be followed by 60 or 90 days for comment, and another 7 to 8 months for EPA to respond to comments and develop the final rule.

Q2: Will there be another meeting like this before the proposal?
A2: No. That is why EPA needs to get as much information as possible at this meeting from stakeholders to consider for the proposal. EPA is currently behind schedule primarily due to the shifting of data collection and data management responsibilities from OECA to OGWDW.

Q3: What is the scope of the rule given that the entire water transfer and supply chain was diagrammed and discussed?
A3: The rule will cover the onboard aircraft water system only. FDA has regulations for watering points (cabinets, trucks, and hoses) and plan and specification review of aircraft water systems.

Q4: What attempt was made to include water service organizations in the rule process?
A4: Fixed base operators were invited to the stakeholder meeting; however, they did not attend.

Q5: What is EPA's jurisdiction regarding food service if packaged food and packaged water and ice are provided? Airlines should not all have the same response to every control measure since some provide only bottled water. Commenter also believed these packaged food services do not have the same severity of consequences as other practices.
A5: FDA has jurisdiction over food service. The types of organisms involved determine the severity of the consequences, not the frequency of problems identified. EPA is not trying to make a judgment between planes of 500 passengers and 30 passengers.

Q6: Does an aircraft fit the definition of a public water system (PWS)?
A6: Aircraft serving water to 25 or more persons at least 60 days per year fit the definition of PWSs.

Q7: Doesn't potable water need to be provided for handwashing and coffee making?

A7: Handwashing, brushing teeth, and drinking water all fall under the definition of water for human consumption, which is used to define a PWS.

Q8: Will there be consistency between the disinfection requirements of watering points and aircraft given that watering points and cabinets are disinfected once per year? Is there an effort to synchronize existing sampling frequencies?
A8a: FDA has regulations for watering points and expects to update its rules once the ADWR is finalized. The FDA rule modifications will strive for consistency.

Q9: Can stakeholders get on the ADWR team?
A9: No. The ADWR team is part of an internal EPA regulatory process. Since the ADWR is not using a FACA process, stakeholders are not on the team.

Q10: The HAACP model allows for different levels of compliance to fit different entities. For example, requirements may include from 1 to 3 alternatives, with application of an alternative to a specific entity based on its economics. Alternatives may allow a lower compliance oversight level with more required monitoring. Will this rule include one compliance level?
A10: This question presents a good example of the information desired in breakout discussions – can we develop reasonable and equivalent options for how to comply? EPA is open to hearing these kinds of suggestions, if different solutions are appropriate. There are existing regulations that require sampling monthly. EPA wants to see if best management practices (BMPs) can be appropriately applied, perhaps to small and large airlines. However, there are no shades of potability of the water - water is either safe or unsafe.

Q11: There appears to be a dichotomy between WHO and EPA approaches regarding the microorganisms of interest. WHO deals only with *E. coli* and fecal coliforms. Plate counts are used for aesthetic issues, and they don't deal with total coliforms. Is there a way to rationalize this difference of using total coliform as a trigger vs. using *E. coli* as the actual discriminator of safe water?
A11: EPA is proceeding based on the existing Total Coliform Rule (TCR), and is tailoring the rule to aircraft. EPA is not developing a substitute for the TCR. The sister division to DWPD at EPA, Standards and Risk Management Division (SRMD), is taking a fundamental look at whether the TCR needs revision. Ideally there would be a quick indicator of water quality before it is boarded; research on such methods is ongoing.

Q12: Our organization represents fixed base operators and ground service providers, and it provided a sanitation of service vehicle handout at the January 2006 meeting. How can we obtain a copy?
A12: RESOLVE or EPA may be contacted to provide a copy of the presentation.

Q13: Is handwashing water in lavatories considered potable and where does ice come into play?
A13: Water for handwashing and sanitation uses is considered drinking water. Ice is considered a food and is under FDA jurisdiction. Water used to make ice must be of

drinking water quality and meet the requirements of the SDWA. All ice is provided as a catered service to aircraft.

Q14: If water in lavatories in interstate commerce is only for handwashing, does it have to be potable water or are there lower standards that could apply
A14: FDA has this issue up for review by its General Counsel, but does not believe there would be separate standards for handwashing vs. other uses.

Q15: Are aircraft that only have water on board for handwashing subject to the ADWR?
A15: Handwashing water must be potable water, whereas water for flushing toilets does not have to be potable. If water is not boarded for potable water uses, then an aircraft would not be subject to the ADWR. Aircraft must meet the definition of a PWS to be subject to the ADWR.

Q16: Can EPA's interpretation of the consumption of water be changed?
A16: If food is served, then handwashing water must be available. In effect, if water is coming out of the taps and ice is served, the water has to be potable. EPA is not considering changing the definition of water for human consumption which includes handwashing. [Steve Heare]

Q17: Would replacing handwashing water in lavatory faucets with sanitary wipes be sufficient to avoid being subject to the ADWR?
A17: No, not if the aircraft still has any food service including ice, which is considered food service and therefore requires potable water be available for handwashing. [Steve Heare]

Q18: Would an aircraft be subject to the ADWR if the only water boarded was bottled water?
A18: No. Bottled water is regulated by FDA.

Q19: What is the definition of handwashing?
A19: The FDA standard is in the Food Code of 2005, which describes the process of handwashing and must be applied if food service is provided. It prescribes 20 seconds of handwashing and is intended to remove soil, viral particles, etc. It is physical removal of particles followed by drying with a dry towel. FDA requires handwashing after toilet use for food service personnel, therefore, FDA requires that airlines board potable water.

Q20: A participant questioned the severity of the consequences if airlines provide only packaged food and no ice and whether they are really providing food service. The commenter further questioned that since aircraft are boarding water from a municipality, how many more steps should be necessary in the process
A20: This was presented as a statement rather than a question. No reply given.

Q21: A participant stated that because handwashing is very important, and sanitary wipes are most effective in conjunction with handwashing, all aircraft should want to have potable water, even if food is not served.

A21: This was presented as a statement rather than a question. No reply given.

Q22: Where is the rule language going to be; in 40 CFR or FAA 121?
A22: The ADWR will be an EPA regulation and may become its own subpart, which is dedicated to ICCs, although this has not been decided. EPA envisions having all relevant requirements together in the subpart

Q23: Is there a vehicle in this rulemaking to put concession standards (such as standards or equivalents) into place for ice and ice machines?
A23: EPA does not regulate ice machines. FDA regulates design and construction of machines; therefore, this won't be in the ADWR.

Q24: Is there scientific literature on biofilms in aircraft environments; is there information that suggests that it is a problem?
A24: Biofilms form in any type of water system. There is a small pilot study underway, by an EPA technical assistance center, to evaluate biofilm growth in airplane systems.

Q25: For a transient population, what kind of public notification will be included in the rule?
A25: This will be discussed in the public notification breakout group. EPA is looking forward to receiving some suggestions for a practical approach. The existing AOCs have notice requirements to post a notice or turn the water off until flushing, disinfecting, and re-testing can be performed. Currently, the aircraft response is to turn the water off and not serve it, coupled with notice indicating that the water is not safe to drink.

Presentation #2: Overview of Preliminary Data (Presenter – Cindy Mack, EPA)

Ms. Cindy Mack, DWPD, was introduced as the presenter for the second presentation. The presentation was titled, **"**Development of Aircraft Drinking Water Rule (ADWR), Preliminary Findings: Monitoring Period I Sampling Data." Copies of Ms. Mack's presentation were made available to participants.

In her introductory comments, Ms. Mack included a brief description of the data and information submittal requirements of the AOCs. Ms. Mack noted that under the AOCs, two plans are required to be submitted for EPA approval – a Comprehensive Representative Monitoring Plan (CRMP) and a Quality Assurance Project Plan (QAPP). Ms. Mack described the AOCs as an interim measure to protect public health, and noted there are limits on the expected use of the monitoring data. Ms. Mack emphasized several times that EPA views the data presented today as only preliminary findings that represent only a few airlines.

Ms. Mack presented a slide comparing the monitoring requirements applicable to airlines with a fleet of more than 20 aircraft to those with a fleet of 20 or fewer aircraft. The only difference between the two groups was that airlines with 20 or fewer aircraft in their fleet were required to sample all aircraft quarterly, while airlines with more than 20 aircraft sampled all aircraft once per year but distributed the monitoring to represent 25 percent of the fleet each quarter.

Ms. Mack noted the information used for the presentation included data for 11 airlines, which represent 24 percent of the total airlines addressed under AOCs. A total of 1,057 aircraft, which represent 19 percent of aircraft under AOCs, were analyzed. Ms. Mack made special mention that 54 percent of the data was from one airline. Ms. Mack also noted total coliform-positive routine sample results trigger action, including repeat samples, but only routine results are reported. Ms. Mack explained that of the 3,139 total coliform samples collected, 105 (3.3 percent) were positive for total coliform (84 lavatory samples, 19 galley samples, and 2 of unknown sample collection location).

Ms. Mack explained that two questionable *E. coli*/fecal coliform-positive lavatory samples were not included in the analysis - one that was total coliform negative but *E. coli* positive, which is not possible; and another that was noted as a false positive but had not provided an explanation/validation for this conclusion.

Ms. Mack presented slides that indicated airlines with unapproved QAPPs and CRMPs have slightly more total coliform-positive results than those airlines with approved QAPPs and CRMPs. Ms. Mack noted the data also indicated more positive routine total coliform samples occur in warm months and that of the 3,139 samples, 13 percent of the samples had a non-detectable disinfectant residual.

Ms. Mack presented a slide showing total coliform hit-rates for other studies and databases and noted that in comparison to other data, EPA is not alarmed by the preliminary aircraft monitoring results because they fall within the studies' ranges. Ms.

Mack noted that the data indicate something has changed in the last few years (*i.e.*, the percentage of coliform positive samples from airlines appears to have decreased over the past few years since EPA's sampling).

Ms. Mack described the next steps pertaining to the data are to work with the 46 airlines under AOCs to sample and report for monitoring period 1, analyze data for cross-relationships and summary statistics, and research and analyze comparative drinking water sampling data to better understand public health implications.

Presentation #2: Questions, Answers, and Discussion

Q1: On the data slides, what is meant by categories of "indeterminate"?
A1: Information was either missing or needs to be clarified by the airline. Specific information provided was not clear so EPA can't categorize those data points. For example, it may not have been clear whether a sample was collected from a tap in a galley or a lavatory.

Q2: In the database, if a lavatory and galley from the same aircraft both test positive, was that counted as two separate occurrences? The commenter noted the two positive samples are originating from one potentially contaminated aircraft. The commenter suggested that in this type of situation, positive lavatory and galley samples should be counted as a single hit. The commenter also supported the use of positive sample location information for diagnostic purposes (*i.e.*, galley and lavatory positive samples indicate an aircraft problem; lavatory-only positives may indicate a more localized problem).
A2: Data presented in the preliminary analysis counted hits separately. Each positive is taken as a singular hit (*i.e.*, an aircraft with a positive lavatory and positive galley sample would be counted as two hits).

Q3: In the presentation, comparative data were mentioned – what data are going to be looked at? Is the water on aircraft better than the water received from the parent system – what is the analysis hit rate for the parent PWS?
A3: Better analysis of how sample results correlate with PWS water quality is needed. EPA hopes to obtain information on the locations (airports) where aircraft board water and to use the sample results from states and the Safe Drinking Water Information System (SDWIS) to normalize the results. Unfortunately, SDWIS provides only an "exceptions" data set and reports only violations, so information is not readily available on the percentage of routine samples that are positive.

Q4: In the presentation the term "cross-relationship" was mentioned, what is meant by that term?
A4: Establishing relationships between disinfecting practices at one aircraft at one time and other airlines/aircraft at different times (including comparing different aircraft fleet sizes – *i.e.*, less than 20 aircraft vs. greater than 20 aircraft). Currently, if we were to

segment our data that way our total sample size would become very small, so this will be done with the full data set later.

Q5: Could you please clarify if this is correct: large airlines collected samples on all aircraft once per year with 25 percent of the samples collected each quarter?
A5: Yes, that is correct.

Q6: If 54 percent of samples in the presentation are from a single airline, is the data representative? It seems very misleading.
A6: The data are not representative of the whole, as noted in the presentation.

Q7: You mentioned in the presentation that the data indicate that something has changed - can you state there is improvement?
A7: If data are indeed representative of the whole, then we can say that an improvement has occurred. However, as noted in the presentation, the data are only preliminary.

Q8: Why can't we estimate risk to public health once we collect the data?
A8: Overall risk was already established through the TCR rulemaking process in 1989. Estimating risk to public health associated with drinking water on aircraft involves exposure data, which we don't have. Enforcement of the AOC doesn't capture fields needed for risk assessment and analysis.

Q9: Use of state-certified laboratories is specified in the AOCs. Will the rule address laboratories that are accredited to ISO 17025 standards (minimum requirements for testing labs established under international standards)?
A9: EPA will use the method and certification requirements that are already in the TCR and is not prepared to discuss ISO 17025. EPA will not be addressing laboratory certification requirements as part of the ADWR and will continue working with existing requirements for laboratory certification.

Q10: Can you please clarify what was meant by aircraft water not being better than the parent source water?
A10: Water on the aircraft would not be expected to be of higher quality than the water boarded from the PWS. This is based on the assumption that there is not any point-of-entry (POE) or point-of-use (POU) treatment onboard the aircraft that would improve the water quality.

Q11: TCR monitoring for the PWS serving the airport may not include taps anywhere near the airport, so it is difficult to determine the quality of the parent source water at the watering point. Is it valid to compare aircraft water with the water from the PWS?
A11: EPA will evaluate the data we are able to obtain and requests feedback from stakeholders on the best way to extrapolate data back to stationary systems.
Q12: Using community water system (CWS) data for making comparisons of the parent PWS to aircraft water quality presents false assumptions since it does not consider what may be happening to the water inside the airport. How can this comparison be justified?

A12: EPA is open to comments and suggestions on what types of alternative data sets to use as a comparative data set.

March 28, 2007: Afternoon Discussion Groups

Ms. Gail Bingham, RESOLVE, provided introductory comments describing the breakout session groups. Ms. Bingham explained that while no one was moved out of their preferred topic, individuals representing the same stakeholder entity may have been split into parallel sessions to provide balance amongst the various breakout sessions. Individuals who had not requested a specific breakout session were assigned to a session that appeared to be of interest to the stakeholder, with consideration for balancing session participant affiliations.

Participants were referred to the discussion outlines provided for each breakout session and were encouraged to discuss additional items as needed, as the outlines were not meant to be all-inclusive. Ms. Bingham noted that the morning of the second day of the meeting was dedicated to presentations from each breakout session. Ms. Bingham explained each session would have stakeholders present a summary of their discussion to the group at large, which would provide an opportunity for other stakeholders to hear a summary of the discussion and make comments.

The three main discussion topics included the following:

- Topic A: Standard Operating Procedures (SOPS) and Operations and Maintenance Practices (Best Management Practices)
- Topic B: Monitoring
- Topic C: Public Notification of Passengers and Crew; Reporting and Recordkeeping; Program Oversight and Verification.

Both Topic A and Topic B had two parallel discussion groups. Each group that addressed the same topic used the same discussion outline and presented their summary independently to the group at large on the morning of March 29, 2007. Each break out session had a facilitator, a resource person from the ADWR team, and a note taker. The reminder of the meeting on March 28 was spent in the breakout sessions.

Summary notes for each topic represent discussion notes recorded during the sessions. The discussion summaries vary somewhat in format due to the dynamics of each group's discussion. Questions and answers from the presentations to the group at large on March 29, 2007, are provided following the discussion group summaries.

Breakout Sessions A-1 & A-2
Standard Operating Procedures and Best Management Practices
March 28, 2007

Participants (A-1)
Stephen Heare, EPA
Maureen Elkins, Goodrich Corporation
Scott Owens, Biocide International
Ashley Moore, National Air Transportation Association
Tim Pohle, National Air Transportation Association
Tyler Campbell, Mesa Airlines
Razmik Boodaghians, Monogram Systems
Haven Ward, Hawaiian Airlines
Wade Davis, AirTran
Gene de Jacome, Celeste Corporation
Leroy Paine, Allegiant Air
Mike Morgan, Delta Airlines
Tiffany Goebel, Midwest Airlines
Deborah Small, Northwest Airlines
John Grace, Association of Flight Attendants
Bruce Kummer, FDA
Axel Dellenbusch, EMD Chemicals
Pascal Joly, Airbus North America
Susan Ogden, Goodrich Corporation

Participants (A-2)
Katie Porter, EPA
Stephanie Woods, American Airlines
Bob Scharback, AeroSafe Products
Patrick Ireland, Mesa Airlines
Eugene Taylor, Pace Airlines
George Palil, NACA
Phoebe Srinivasan, Sun County Airlines
Ed Maurer, PSA Airlines
Marianne Csaky, Continental Airlines
Loren H. Semler, Semler Industries
D. Wyatt, Sky West
James Witkowski, Minnesota Department of Health
Jean Watson, FAA
Craig Patterson, EPA
Suzanne Berman, Jet Blue
James Freeman, American Association of Airport Executives

Both groups were asked to follow the topic framework that was provided in the distributed handout. Group A-1 was facilitated by Gail Bingham. Stephen Heare, who served as the EPA discussion lead, added that within the concept of the WSP approach, there were some hazards and best management practices (BMPs) that may apply. He asked the Group A-1 to consider and discuss what, if any, elements should be included in the ADWR regarding standard operating procedures (SOPs) and BMPs. Robin Roberts facilitated the A-2 workgroup with Katie Porter of EPA leading discussions.

The following summarizes the key points of the discussion by topic and by sub-group.

1. What are the components of an adequate O&M plan for watering points?

Breakout Session A-1

EPA Comments

FDA has jurisdiction over everything up to the point where the hose's nozzle touches the service panel on the plane. FDA also certifies the water system components and approval of plans for the system.

Participant Comments

Water boarding practices are listed on the handout as possible control measures for hazards 1 (boarding contaminated water) and 3 (contamination of water due to unsanitary O&M practices). However, water boarding is not within the scope of the rule. Why are we talking about things under FDA jurisdiction? This is an EPA rule and we should not be including anything outside of EPA's jurisdiction.

EPA should be regulating "connection points." Connection points are one of the major opportunities for contaminants to enter the system. Eliminating such contamination is protective of the water.

Can the model determine where the control points are – are we leaning towards the HACCP to identify critical control points?

EPA and FDA Comments

Boarding water and watering points are not part of the scope of the rule, but they fit into the overall framework of risk assessment and determination of control points, although the rule will not regulate anything under FDA authority. EPA will look at *all* the points where a problem might occur and look within the context of the rule to address the things that EPA has the authority to address – the plan is to look holistically and then target steps EPA is authorized to take. BMPs for watering points may be useful to inform other aspects of the rule EPA is authorized to regulate. EPA may include watering points in guidance, as noted on the handout.

Items under FDA jurisdiction will be reviewed during EPA's rule development process. FDA will see what EPA does and then consider complementary rules that address appropriate areas under FDA jurisdiction.

Additional Topics

- Where do systems that provide treatment on board or at the point of boarding water fit in?
- How will any chemical treatment requirements impact water system components; are materials compatible?
- What training and qualifications are needed for individuals who board water?
- International component - should there be more maintenance and monitoring requirements for aircraft that operate in and out of foreign countries?

Breakout Session A-2

Participant Comments

Existing O&M plans are rigorous. Manufacturer specifications and manuals include a full suite of O&M protocols and BMPs that are sufficient for maintaining water quality and system integrity. ATA Chapter 38 requires that manuals must be followed. EPA should review manufacturer protocols.

Manufacturers' manuals may not always convey with older aircraft upon change of ownership. Also, foreign manufacturers' manuals require some protocols that aren't standard in the U.S. and some airlines would like to move away from chlorine as a disinfectant. EPA should consider allowing alternative methods.

Regarding seasonal differences in water quality and potential differences in O&M practices, warm weather could pose more frequent problems due to accelerated biofilm and organic growth at elevated temperatures. However, based on the AOC data so far, it is not clear that there is a statistically significant difference in water quality on a seasonal basis.

Airlines have specific SOPs in O&M manuals for backflow prevention – maintenance of systems is required. Devices are most often integral to the system and not conducive to easy visual inspection (i.e., outside of major maintenance). However, a failure of an onboard backflow prevention device is easily identified (e.g., blue water at tap).

Manufacturers and airlines have a robust feedback loop for identifying and correcting any potential maintenance problems.

Any EPA guidance must be harmonized with airlines' SOPs and O&M manuals.

EPA should spend "a day on the ramp" to observe aircraft ground operations and, in particular, water boarding and O&M practices.

2. What minimum components should be included in SOPs for boarding potable water?

Breakout Session A-1

Gail Bingham asked the group members who work for airlines what parts of their SOPs should be incorporated into the rules.

Participant Comments

Aircraft are separate from everything outside of the aircraft; once water enters the plane it becomes a mechanical problem. The ground handlers' manual has procedures and testing already in place.

One airline has performed maintenance associated with water itself for a year – it has a 1.6 percent failure rate due to water quality, 1 percent due to mechanical problems, and some percentage due to human error. Human error resulted from failure to follow the manufacturer's recommended holding time. Re-disinfection cleared up the problem. The mechanical issue was associated with faucet valves, which could be caused by something like children playing with faucets. After repeated faucet failures, this airline replaced the faucet cartridges, which resulted in no more positive samples.

Sampling results should be evaluated on a per-aircraft basis, not a per sample basis. Sampling can be used for diagnostics: one positive sample on the aircraft may mean a localized faucet problem; multiple positive samples may mean water system problems. Removing an aircraft from service based on one faucet hit is an extreme response to what could be a localized problem. A troubleshooting tree was suggested as an option to extreme corrective actions. Other participants supported the troubleshooting tree concept.

Last year there was no oversight of the airport terminals themselves – water is regulated up to the airport, but no one is looking at the effects of the airport on the quality of water from the PWS.

What if the airline believes the problem is upstream of the aircraft? Don't make the aircraft responsible for the quality of the water obtained from the system. The rule should not be so prescriptive that it requires aircraft to disinfect repeatedly when the problem is coming from a PWS.

There is a greater concern over boarding contaminated water from the PWS, particularly in small cities where there is a greater possibility of having contaminated water in the system.

Airlines should not be held responsible for water quality they cannot control. EPA cannot regulate everything – there is concern that aircraft are regulated for the risks that are evaluated on a holistic basis.

EPA Comments

Aircraft occasionally boarding foreign water must still be responsible for ensuring the water they serve the public and crew is safe to drink. The goal of WHO is to address risks in foreign water, but EPA has no statutory authority over foreign water quality.

Participant Comments

Make sure the PWS, ground handlers, water cabinets and other appurtenances are operated and managed correctly before the water is boarded. Emphasis should be on the other more significant sources of risk, such as foreign water.

The rule can address water boarding and water on board, but how should it address intentional tampering with water system fixtures, etc.? Perhaps there should be an intentional contamination regulation to complement the current rules we are considering.

Security is already adequately addressed by the Transportation Security Administration (TSA).

TCR organisms take 24 hours for results; we need an immediate indicator to detect tampering or problems with foreign water supplies.

Resolve Comment

Gail Bingham asked the group members what provisions they would include if they were writing the rule.

Participant Comments

Crew members currently have no information regarding where, how much, and when water is boarded. These data should be recorded. This provides a paper trail for a total coliform-positive aircraft and removes guesswork.

Recordkeeping for boarding water is unnecessary.

The rule should include EPA-mandated and -approved training for the person boarding water.

Flexibility is important – no single prescriptive method will work for everyone. EPA should allow flexibility on how a carrier may meet the intent of the rule. For instance, draining and refilling will not work for everyone and at every location (icing on the tarmac, availability of water to refill, air binding in the system).

Materials compatibility – FAA has a system to determine compatibility but EPA needs to be wary of this issue. Flushing may be better than disinfection when compatibility is considered.

Recordkeeping by the maintenance crew in a log book turns boarding water into a maintenance action, with signatures from supervisors required. This introduces union issues. One commenter recommended use of flight crews to keep records to avoid this problem. The issue is not really whether to require recordkeeping but how it should be done.

Breakout Session A-2

Participant Comments

Airlines have written SOPs for boarding water.

Boarding water is often performed by ground operations contractors. Contractors' contractual agreements mandate that they follow and certify performance of all airline SOPs.

3. What procedures should be included in the management of water age?

Breakout Session A-1

Gail Bingham asked the group for suggestions on how EPA can write the rule to allow flexibility but achieve results. She also asked for performance measures to enable this flexibility.

Participant Comments

Foreign water is pertinent when considering water age; water from Germany will not have the same standards. Some airports world-wide have booster chlorination, while others do not.

Water age definitely affects systems; topping off is definitely a concern. Whatever procedure is used to manage age must also include disinfection; Purogene is better on biofilm with less wear on materials. There is a materials damage cost of not using the preferred disinfectant.

Heterotrophic plate count (HPC) monitoring ought to be seriously considered – it is a better way to see if the system is clean than coliform monitoring.

Consider free versus bound chlorine - bound chlorine is more aggressive than free chlorine. Organisms in crevices in the water system one day may increase to over a million the next day. Cleaning the system may be better than maintaining a residual.

The normal practices that have been in place for 10 years are fine, but leaving water in the aircraft system while it is down for maintenance for two weeks is a biofilm growth concern.

For normal operations, it would be standard practice to dump and refill every morning. This is better than treating the tank once a week or every 2 weeks. However, weather is a consideration. Water cannot be dumped if it will freeze on the tarmac.

Water weighs a lot so airlines do not carry more than they need. Airlines have procedures to limit the water they board so it promotes water turnover. Water age is not really a problem now – flushing may be a BMP that is an easy way to address an aircraft-specific problem, not an airline-wide SOP.

Monitoring under the AOCs (concurrent with the total coliform samples taken once per year) has shown adequate chlorine residual. If the current data do not indicate a problem, then there is no need to make big changes. The concern is that the rule will push airlines to make a change that causes more problems later.

Codifying the submittal of maintenance plans tailored to aircrafts, as required under the AOCs, provides needed flexibility. Airlines should draft their own control plans and maintenance plans for EPA approval.

Although the idea of submitting maintenance plans to EPA sounds useful, it creates additional complication by adding another government agency to the current FDA/FAA mix. Self-regulation would be preferable. Airlines could be required to have a plan in place but not to submit it.

Breakout Session A-2

Participant Comments

Draining of tanks every three days (daily in cold weather) is already required in most manuals. More frequent draining of tanks (i.e., daily) would be burdensome, costly, and wasteful. Because of intense schedules, water age is not considered a concern – water is continuously used and refilled, often several times in the course of a single day.

Perhaps additional consideration should be given to long layovers/overnights in high temperature areas. Potential exists ($\geq$ 4 hrs) for rapid growth of organisms in warm water – although time is much greater with presence of chlorine residual.

4. What are the minimum components of an adequate O&M plan for flushing and disinfecting?

Breakout Session A-1

EPA Comments

Water Supply Guidance 29 allowed substituting quarterly flushing and disinfection for monthly monitoring. Supposedly, quarterly intervals were recommended by aircraft manufacturers and were then incorporated into maintenance plans. But no one is really sure where the quarterly requirement originated. Some manufacturers do not recommend a frequency. EPA believes there is a need for flushing and disinfecting, but the appropriate frequency and methods to be used are unknown.

Participant Comments

The number of hours a plane has been in operation is used to schedule other maintenance activities and may be appropriate for water system maintenance. Water system maintenance could be included in a maintenance activity that is already scheduled, if the maintenance check is one that occurs every 75-90 days.

Based on flight hours, some checks may be every 9 months or 12 months. Smaller aircraft go through checks more often.

The quarterly benchmark has become a controlling schedule as it determines when aircraft are taken out of service, which is an extreme measure for tight flight schedules.

Other computer forecasting, etc. is done by aircraft hours or aircraft days. Quarterly monitoring doesn't match other aircraft monitoring schedules.

Monitoring would be easier if the requirement were based on flight hours – it would still get done annually.

Flushing and disinfection every 6 months would allow for movement of equipment into warm weather climates for flushing and disinfection or, in colder climates, to avoid flushing when it will cause ice formation on the tarmac.

Data have not shown a correlation between total coliform-positive sampling events and disinfection practices. And EPA does not expect sampling data to determine an optimum frequency for flushing and disinfection. Airlines agree that periodic flushing and disinfection is an acceptable requirement, but prefer that the frequency be based on science. If no data are available, what will EPA use?

EPA Comments

EPA would try to base the schedule on flight hours. EPA will look at monitoring data but there may not be enough data; EPA also may be able to use information on biofilm build-up when the biofilm study is complete.

Participant Comments

Most of the 46 airlines subject to AOCs are on quarterly flushing and disinfection. EPA should run a control session with some airlines flushing and disinfecting every 6 months. Then it should evaluate how/if monitoring results change. Or EPA could sponsor an independent study to randomly sample aircraft, review specific O&M procedures, and identify appropriate frequencies.

The flushing and disinfection schedule needs some flexibility; it should be based not strictly on hours. If an aircraft is in D-check for 6 weeks, it needs to be flushed and disinfected before it is put back on line. Foreign-performed D-checks may create a problem if the foreign airports don't have good water.

Chlorine dioxide in the aircraft at 5 ppb residual may be better as a biofilm control than flushing frequently. Other chemicals are not as effective against biofilm as chlorine dioxide is.

After a real contamination incident it is easy to determine the need for flushing and disinfection; frequency as a precaution is not so easy. However, it should be dealt with before it becomes a real problem – biofilms build up over time and need to be removed with more than just a sanitizer.

Breakout Session A-2

Participant Comments

Regular flushing and disinfection is key to maintenance of water quality.

Monthly flushing and disinfection is not realistic from both an operational and cost perspective.

Airlines would like flexibility. Normal airline operations are scheduled in terms of flight hours or maintenance cycles - EPA should try to base requirements on these airline industry standards. Although, airlines have been able to adapt to AOCs and one airline's system specifically allows scheduling by calendar time without a conversion to flight hours.

5. What are the minimum qualifications and training for personnel boarding water?

Breakout Session A-1

EPA Comments

Operator training and qualification are not currently part of the AOCs, but EPA believes training is an issue.

Participant Comments

There is currently no dedicated position for the water boarding role – it may be a baggage handler, etc. The same people who board water may also discharge wastewater and refill blue water. They may not take precautions between water and wastewater handling responsibilities. Basic training currently instructs how to perform these tasks and does not necessarily address sanitary practices. It's not clear that a regulatory requirement is needed, although the problem should definitely be addressed; perhaps a recommendation is adequate.

Regulation and mandating training should be left up to the actual carrier, not regulated by EPA. General practices should be implemented by each carrier. Require the airlines to have a plan but let the plan vary. Accountability for getting it done should be a part of the flexibility.

EPA Comments

Are there training requirements mandated for other procedures such as fueling?

Participant Comments

Yes, training is required by FAA, other servicing requirements are set by the airlines.

International Air Transport Association (IATA) writes manuals and airlines may adopt them, but IATA does not dictate how aircraft are operated or serviced. Each airline has its own fuel procedures manual; some airlines are not IATA members and they don't follow their standards and aren't required to.

An example of the fuel testing requirements for MD88 aircraft was provided - fuel testing is required and follow up actions are specified.

EPA Comments

Were those procedures developed because they were required or for other reasons.

Participant Comments

Both – some procedures are developed and on file but have not been ruled on. FAA-approved means the procedure has been reviewed and looks okay; FAA-accepted means FAA has no objection to those procedures.

FAA requires airlines to follow procedures, but does not specify those procedures. The procedures are incorporated in airlines' maintenance manuals, however.

Airlines may provide initial training but not follow-up unless there is a personnel change.

Review of one field services manual included diagrams and instructions but did not include sanitary practices or BMPs. These details should be included and the participant supports a standard requirement.

Breakout Session A-2

Participant Comments

There are three potential viable avenues for training personnel with water boarding responsibilities: 1) airline, 2) outside vendor, and 3) train the trainer.

Airlines do not provide a separate "certification" for water handling. Certification has a very specific connotation for airlines that would be very costly. Instead, airlines focus on adequate periodic training to maintain proficiency.

Airline training requirements for water personnel are documented and adequate to ensure water safety. They should not require the type of high level certification required by mechanics and engineers.

6. What are adequate inspection practices?

Breakout Session A-1

EPA Comments

EPA has a requirement that States perform a sanitary survey on every PWS in the state at intervals of every 3-5 years, depending on the type of system. During the visits systems are reviewed for operations and maintenance practices. This model doesn't really work for aircraft, and the Agency is wondering if these items are more accessible during some of the routine checks (D-checks, etc). EPA does not intend to inspect every aircraft but is looking for an analog that would provide an equivalent review and would specify components to be inspected.

Participant Comments

This seems like a reasonable approach, but an EPA rulemaking may not be the appropriate context. Would FAA regulations be a better fit since FAA already conducts inspections?

Could HPC results from certain water system components be used in sanitary surveys to get an idea if additional action must be taken?

At some point in the check process every component of the aircraft will be looked at and repaired or replaced as needed. Lines are inspected, pressure checked, leaks repaired or replaced, and disinfected already.

Breakout Session A-2

Participant Comments

By requiring strict adherence to manufacturers' O&M manuals and protocols, performance of adequate O&M is self-policing. All O&M procedures require an official work card. Performance of work under work cards in compliance with manufacturer and airline protocols is approved and reviewed by FAA. Significant penalties can be imposed by FAA if an airline does not follow through with protocols.

7. Other Topics

7.1 Technology

Breakout Session A-1

Participant Comments

The rule should be written to allow airlines to ensure water quality with other means (i.e., technologies that have not yet been developed).

The technology should not have to be chemical-based. Filters or other treatment methods may solve the problem.

Breakout Session A-2

The rule should be written to allow airlines to ensure water quality with other means (i.e., technologies that have not yet been developed).

7.2 WHO Effort and Foreign Water

Breakout Session A-1

Participant Comments

The WHO timeline is longer than EPA's; there is some concern that the programs will not wind up being consistent.

EPA Comments

The goal is that the protocols for other countries are compatible with EPA's. EPA recognizes the implications of more stringent requirements for U.S. carriers in a competitive market, and the goal is to see uniform standards that protect public health. EPA is working with NSF as well.

Participant Comments

EPA's accelerated schedule for proposing the rule in late 2007 precludes waiting on the outcome of the WHO effort.

Since we cannot trust the water boarded in other countries, will EPA require that aircraft disinfect all water before boarding or install treatment on board? This would be unrealistic.

There is not a significant problem with foreign water quality; some airlines are monitoring the quality of foreign water before they board it. They do not board water at some locations known to have problems. SOPs exist for how they fill water, the cleanliness of the hoses, etc. The foreign water is not the problem in all situations.

How much of an impact would monitoring foreign water quality be on larger airlines? One airline already monitors foreign water quality – do other airlines do this?

One airline does not currently operate outside of the United States; however, it has designated spots where it takes on water – perhaps foreign designated locations would be appropriate for international routes. Once back in the United States, aircraft could immediately drain, flush, and refill with a 5 percent Biocide solution (chlorine dioxide), which would be consumable and would leave a residual.

Are practices for boarding foreign water available for use as a template for SOPs? Yes. The rule should assume foreign water boarded in foreign countries is okay just as they assume water they board here is okay.

It is difficult for airlines to know the quality of the water they are boarding. EPA and FDA should be jointly responsible for what is boarded, so the airlines know the watering points are safe to use.

If there are significant issues with foreign water, wouldn't they have been detected in AOC monitoring? Problems have not been detected yet.

Breakout Session A-2

No comments on this topic.

7.3 Monitoring

Breakout Session A-1

Participant Comments

EPA should consider a control set of monitoring to learn if there really is a problem. Existing data and studies do not tell EPA and the airlines what kind of problem exists and how serious it is.

EPA should *not* conduct control monitoring; the monitoring being done now indicates there is not a problem.

All locations on the aircraft should be evaluated, not just one or two. Monitoring the whole aircraft allows airlines to better diagnose the problem and implement appropriate follow-up.

Monitoring should *not* be required at every location on an aircraft. Monitoring as performed now works well, and additional diagnostic monitoring is not necessary.

Data should be evaluated on an aircraft basis – not a per sample basis—so two positive samples on a single aircraft represent only one aircraft with problems.

The analogy to regular PWSs is that they are not required to test every spigot to determine that the PWS is adequately monitored.

EPA Comments

For one airline, hit rates on a particular type of aircraft led to replacement of the lavatory spigots, which were determined to be the problem. That is, carriers already do sampling and analysis to identify and isolate a problem and to direct the action. [EPA, Stephen Heare]

Participant Comments

What is the purpose of this rule? Diagnosing every tap on every aircraft may be beyond the intent of this rule.

If a plane is already out of service for routine maintenance, why not test all of the system and all taps?

One positive sample from one tap should not result in an aircraft's removal from service.

Repeat sampling already specifies additional samples; it is up to the airline to determine how to resolve the problem.

The false positive rate for the analytical methods is higher that the positive rate reported in the preliminary data – additional sampling requirements would just increase the chance the false positive results will be included in the database.

For an open meeting, representations of data or studies that do not identify the entity should not be included.

Sharing of carrier-specific information is not pertinent to the discussion.

Breakout Session A-2

Participant Comments

FDA monitoring and oversight should closely mirror EPA requirements.

It is very difficult/nearly impossible to pinpoint source of bad water due to the lag time in receiving monitoring results and the intense schedules of aircraft. Therefore, sampling is virtually useless.

Records of volume and date of boarded water are impossible to track without major costs and disruptions to operations.

Because of intense schedules and the high cost of sampling (contract sampling is particularly costly) airlines would like flexibility and cost effectiveness:

- Airlines could sample a statistically significant percentage of the fleet.
- Number of required samples could be dependent on airlines' O&M practices.
- Number of required samples could be dependent on history of positive samples.

Airlines must rely on chlorine residual supplied by the municipal water source. It is not practical to add treatment on the aircraft to boost residual levels and it may be forbidden by FAA (e.g., carrying concentrated chlorine solution on board may be flight hazard).

A better system for communicating water quality between the PWS, airport, and airlines is needed. If an airline were to receive a notice of "bad" water quality, they would not board water.

7.4 Materials Compatibility

Breakout Session A-2

Participant Comments

EPA must be careful in the promulgation of any requirements involving use of chemicals. Manufacturers and FAA have very strict guidelines regarding materials compatibility and any changes to procedures (e.g., spraying panels, changes in concentrations or chemicals used) could have serious flight safety concerns (e.g. corrosion of skin, seals, etc.). Many new composites are in use that can be adversely affected by contact with the wrong chemical(s).

7.5 Sources of Contamination Outside the Aircraft

Breakout Session A-2

Participant Comments

Several major sources for contaminated water were stressed: 1) water source (PWS); 2) water cabinets (nozzles, changing and operation of hoses, greasing wheel); 3) water trucks (open hatches, nozzles, changing and operation of hoses); and trunk lines from onsite wells. Because of the variety of pathways for contamination, a one-size-fits-all solution was not possible. However, watering points outside the aircraft were acknowledged as being under FDA jurisdiction and that they will not be a subject of the ADWR.

Sanitization of watering points as currently practiced (usually monthly) is sufficient.

Because the water that is boarded by aircraft is already regulated at the PWS, airlines should not be held responsible for ensuring the quality of the water it receives from the vendor (e.g. airport). Airline O&M practices ensure that the water quality is maintained from the airport to the consumer (including watering points and aircraft).

Upon return to the U.S., some airlines have procedures in place to dump water taken onboard from countries with suspect water sources.

Breakout Sessions B-1 & B-2
Monitoring
March 28, 2007

Participants (B-1)
Andy Matuson, JetBlue Airways
Donald Cooper, Celeste Corporation
Dora Cheatham, Celeste Corporation
Venkatraman Subramanian, American Airlines
Holly Verchay, Northwest Airlines
Steve Via, AWWA
Dinkar Mokadam, Association of Flight Attendants
David Yuhasz, AeroSale Products
Neeraj Khanna, Biocide International
Everett Volk, EPA
Rick Naylor, EPA
Angela Foster-Rice, United Airlines
Robert Hinton, Spirit Airlines
Victor Zare, Amtrak
Richard Mason, EMD Chemicals
Thomas Grubbs, EPA
David Lotterer, Regional Airlines Association
Jessica Steinhilber, ACI-NA

Group B-1 was facilitated by Kathy Grant (Resolve) and lead by Rick Naylor (EPA). After Rick read through the discussion questions, Kathy asked whether anyone had any other topics they wanted addressed in addition to those already outlined. Kathy said the group could discuss other topics, time permitting, after the monitoring discussion. The following additional discussion items were put forth by Group B-1:

- Comments on sampling process protocols (e.g., surface contact - aircraft lavatories are difficult places to get samples)
- Who takes samples – are they trained? Are they the same people that fill and empty the septic tank? Do they wear gloves between each process? The credibility of the test rests on who takes the sample.
- Tie monitoring into other regulations.
- Evaluation and verification of results. How do you ascertain what negative or positive results are from (e.g., human error, process error, problem with water, etc.)?
- Standard chain of custody form. Who took the sample? Tail number of plane? Method used? Where was the sample taken (implication on what you're monitoring for)? Source of water?
- What questions is the monitoring trying to answer?
- Operational constraints or operational factors?
- Alternative programs (e.g., supplemental treatment).

Participants (B-2)

Everett Pringle, EPA
Dean Davidson, FDA
Dan Trachewsky, FDA
Nancy McKinley, International Airline Passengers Association
Gerald Eiers, International Water Guard
Kenny Hughes, Watertrax
Mini Smith, Atlantic Southeast Airlines
Ellen Dolinar, Republic Airways
Joe Cotruvo, Joseph Cotruvo and Associates
Janet Baad, Alaska Airlines
Elaine Karnes, Southwest Airlines
Kenneth Froude, Continental Airlines
Megan Ayres, Delta Airlines

In group B-2, Jennifer Peyser, the facilitator, began by asking whether anyone had any other topics they wanted addressed in addition to those provided on monitoring. Jennifer said the group could discuss other topics, time permitting, after the monitoring discussion. The following additional discussion items were put forth by Group B-2:

- Verification and data quality.
- Who at each airline is taking the samples? Do they know the proper procedures?

1. What contaminants should be monitored and why?

Fecal coliform and *E. coli* are considered indicators of fecal contamination. Total coliform are intended for screening. HPC bacteria grow on any damp surface and are considered to be indicators of water quality in a more cosmetic way. WHO has discontinued the use of total coliforms and HPC as indicators; however, EPA is constrained by the existing TCR. Total coliform could be considered an early warning system or an indicator of operational problems; it causes the operator to investigate the water system and head off larger problems. Participants were reminded that unless we figure out what question we are trying to answer with the monitoring, it will be difficult to figure out what contaminants should be monitored.

The participants did not specifically oppose monitoring for total coliform, although they had some concerns about the actions to be taken when samples are total coliform-positive. Monitoring for total coliform does not pick up pathogenic *E. coli*. The total coliform test measures if the environment has intruded into the system, and in order to pick up pathogenic *E. coli*, a second step has to be performed.

Several participants were opposed to requiring HPC monitoring, and one participant felt that it was overkill to test for HPC since stationary PWSs are not required to test for HPC

under SWTR. Some of the O&M constraints of HPC sampling were also discussed. For example, if an aircraft is disinfected at midnight, the HPC sample, which has a six-hour holding time, will have to be at the lab by 6 am; whereas the total coliform sample has a longer holding time of 30 hours. HPC is difficult to eliminate completely, and the cost for HPC monitoring is much higher than the cost for total coliform monitoring. Additionally, it is not likely that a statistical sample of either HPC or total coliform can be obtained unless there is a huge contamination problem.

There is little health risk because no one drinks the water, according to surveys the participant's organization has conducted. Overregulation of water on planes would be expensive and the costs would be passed on to consumers. As mentioned in the morning session, EPA requires water used for handwashing to be treated to drinking water standards.

It was asked whether the laboratory analysis for total coliform could be done in-house to reduce costs? The response indicated it could; however, airlines would need to apply for laboratory certification.

The related subject of disinfectant residual was raised, which can be tested very easily in house. The precision of the reading is not that important; what matters is whether there is a residual. A residual of even 0.2 mg/L inactivates total coliform bacteria. Loss of chlorine residual may or may not be because of the PWS. Monitoring chlorine residual is more effective than monitoring total coliform, and O&M should not be fully dependent on total coliform. One participant asked why total coliform monitoring is necessary if maintaining a disinfectant residual can eliminate bacteria. The response suggested protozoa are not as responsive to disinfection, and monitoring is part of the multiple barrier approach used to ensure that contaminants do not slip through the cracks.

2. At what frequency should contaminants be monitored?

One participant felt that one coliform sample per year per plane was acceptable, but that more would be difficult. Other participants felt that a monitoring frequency between daily and yearly would provide representative data. Testing once a year was like not testing at all, but frequent disinfectant residual testing could make up for infrequent coliform testing. One airline stated that they would be willing to measure residual more often; this would be relatively easy for regional airlines. Monthly coliform sampling was also suggested. O&M limitations with sampling multiple times a year were discussed – a preference for obtaining a statistical sample of the fleet was expressed. However, EPA explained that since each aircraft is an individual PWS, each individual aircraft needs to be monitored.

Testing would be more difficult for larger airlines - they would need to station mechanics in every city where they board water. In addition, disinfectant residual monitoring does not always make sense. For instance, one airline boards water in Phoenix, which is a non-disinfecting ground water system. It would not be fair to require a disinfectant

residual if the source water did not have one. This airline preferred annual monitoring for both coliform and disinfectant residual.

Some participants felt that monitoring frequency could be related to the destination of a flight. However, it was stated that it is not possible because a single aircraft flies different routes every week, month, etc. It was suggested to monitoring for total coliforms when a major tank service was performed, followed by two or three other randomly scheduled monitoring events. This method would shed light on the delta between the zero or baseline (i.e., major tank service) and the remainder of the time. EPA asked what the participants thought about varying the monitoring frequency based on sample results. For instance, the rule could require airlines to sample quarterly initially and then reduce sampling to annual if results were negative. All the group members representing airlines opposed such a provision. Some airlines suggested starting out with annual monitoring and increasing to quarterly where results were positive; initial quarterly monitoring for all their aircraft would be very expensive.

It was advised to wait until the results were in from the 2nd phase of monitoring under the AOCs; the results could help determine the need for frequent monitoring.

A strong O&M program is really important, and monitoring verifies that an O&M program is working. Along those lines, some participants felt that the quality of data is completely dependent on the O&M program and not the frequency of sampling. Under the HACCP approach, the O&M plan, disinfectant residual maintenance, and monitoring would all work together. It was suggested that where airlines board water from PWSs that are not required to disinfect that the rule allow chlorination without it being considered treatment that would trigger compliance with additional drinking water regulations. Guidance could be written to address specific situations.

A participant commented that in the grand scheme of things, it does not make much difference whether monitoring is quarterly or annual, so why increase costs by requiring quarterly monitoring?

3. What taps should be sampled?

A participant noted that some tanks only have hot water taps and that hot water kills any microorganisms and destroys any disinfectant residual. Although the AOCs allow sampling from hot water taps, one participant disapproved of this, because hot water is not representative of the water on the aircraft. It was suggested to sample from the water tanks directly in such cases. EPA noted that samples are supposed to be representative of the distribution system, so tank sampling is not appropriate. Another participant added that many aircraft also have no way of drawing samples from tanks.

It was suggested that different requirements be established for regional airlines. These airlines could choose one tap from their cold water taps. However, sometimes the only cold water tap is in the bathroom; some group members would prefer not to use this tap because of the chance of cross-contamination (e.g., cleaning staff might use the same

cloth to clean the sink and toilet) and the increased likelihood of bacterial growth in lavatory environments. EPA noted that sampling protocol requires cleaning the tap with a disinfectant like an alcohol swab and flushing the tap, etc., prior to taking the sample. Therefore, if proper sampling techniques are followed, the faucet should be clean, and cross-contamination should not occur.

Another participant suggested sampling from the tap farthest from the tank. It was suggested to have a dedicated sampling station with a simple hookup in a protected area to be used just for sampling. EPA, however, was concerned that a dedicated sampling tap may not provide representative samples.

One participant recommended that additional taps be sampled when a routine sample is positive for coliform.

4 and 5. What should be the critical limit for each contaminant and what should the corrective action be?

One participant asked why are HPCs being considered. Are there any airlines monitoring for it? HPC has no link to health; it's just a taste issue. Historically, HPC was used to measure how well treatment was working.

Another participant commented that it was not fair to require a disinfectant residual if the PWSs from which the airlines obtain water are not required to maintain one. Airlines should not have to notify customers or shut off their water if no residual is detected, and notification and shutoff should not be required for positive total coliform results either.

Some participants suggested that, at a minimum, a total coliform-positive result should not trigger the most severe corrective action. Some thought public notification might still be necessary if shutoff was not required. The issue of total coliform false-positives was brought up. However, total coliform false-positives are not very common, especially if proper protocols are followed.

One participant wanted to know if only a representative number of aircraft in a fleet were monitored, would all aircraft undergo corrective action, or only those that were sampled?

A commenter said that one option for total coliform-positive corrective action could be to turn off the galley but not the lavatory; then public notification would not be necessary. Although coffeemakers pasteurize the water by heating it to 180-200 degrees for a few seconds, some would just turn off the water to be on the safe side. However, not offering coffee service would cause problems as well. One participant felt that public notification of this type doesn't take into account people who have consumed water on previous flights, which may have been serving potable water with *E. coli* positives.

Another option for total coliform-positive corrective action could be to turn off the water supply after the first total coliform-positive result. However, the aircraft is likely to go on multiple flights between the first and second total coliform test, and relying on

sanitary wipes alone between the two tests is very difficult. Additionally, many times it is difficult to take the second total coliform sample as the aircraft could be thousands of miles away.

For *E. coli*-positive samples, water should be taken out of service. Some participants suggested taking a second sample to rule out *E. coli* contamination if total coliform tests positive. However, another participant felt that there was no point in running a second sample to rule out *E. coli* in the case of a total coliform-positive, because the more efficient action would be to flush and disinfect after any total coliform-positive, and then run a second confirmation sample afterwards.

Some airline representatives were concerned about the current TCR requirement to take repeat samples within 24 hours of receiving the results. It is difficult to get an aircraft to a location where that can be done in such a short amount of time without disrupting the schedule for that plane, especially because to be on the safe side, the airline would flush and disinfect the plane after the first total coliform-positive to avoid having to come back again if the second total coliform sample was positive. Participants suggested allowing 72 rather than 24 hours for flushing and disinfection for total coliform-positive samples and allowing up to 7 days for repeat samples.

A participant asked whether an acceptable response to a total coliform-positive sample could be disinfection and removing the lavatory placard without waiting for the results of a second sample.

The only way to determine if biofilms were in the system was to inspect each pipe, since biofilms can break off and move around the aircraft water system. However, since biofilms are not necessarily visible to the naked eye, it is important to work with tangibles like total coliform.

6. Other topics

Group B-1 discussed two of the additional topics – discussions relating to those discussions are summarized in 6.1 and 6.2. Topics 6.3 – 6.6 were discussed by group B-2.

6.1 Minimum Components of a Sampling Protocol

One participant wanted to know if an airline or an aircraft could become an EPA-certified lab, and asked what it takes for a lab to become EPA certified. One airline mentioned that testing or disinfection is usually scheduled late at night. While costs for the actual total coliform test may only be roughly $25, airlines incur costs to pay for a sampler to come in the middle of the night, wait for the aircraft to arrive, and be ready for sampling, so in effect airlines often pay sampler's labor from midnight to 6 am. EPA stated that airlines could train someone in their maintenance department to collect and read samples.

6.2 Who should conduct sampling, and what should be their minimum qualifications?

EPA clarified that qualified and certified are different. It was explained that the ADWR is not a certification rule, and that it will only be specifying that a qualified sampler be used. The specific qualifications required of the sampler are normally determined by the State, but since this is a federally-administered program, EPA will determine.

Currently, some airlines have experienced staff members staying all night training new samplers, and some hire professionals to come onsite and provide training. EPA mentioned the train-the-trainer approach and that training materials would be available online. Most participants agreed that it is important that in addition to the basic required training on sampling procedures, samplers need to be aware of why the sample is being collected and understand the value of what he/she is doing. Essentially, it's in the airlines' best interest to train samplers well, because if sampling protocol is not properly followed, the likelihood of obtaining false-positives is higher, resulting in unnecessary corrective actions.

6.3 Verification

A comment was made that EPA should discuss SOPs with vendors. Also, it was asked, are airline personnel really following the procedures? Verification should be an ongoing process and part of the O&M plan. EPA should make sure that drinking water is adequately addressed in FAA maintenance manuals, and that training should be emphasized.

6.4 Public notification, reporting, and recordkeeping

It was asked whether notification is required for a lack of disinfectant residual in the AOCs. A response indicated notification is not required.

A participant stated that most airlines would never actually issue public notification if it were required for a total coliform-positive sample. They would just shut off the water and notify customers prior to boarding that no water or coffee would be available on the flight and that passengers should use the restrooms in the airport terminals, but they would not provide details about the violation. Therefore, the airlines would prefer that public notification not be required for total coliform-positive samples (assuming these samples are *E. coli*- or fecal coliform-negative).

It was asked whether draining and refilling (without disinfecting) was an acceptable corrective action for positive total coliform samples.

One person asked whether notification would be required for people who have already flown. EPA probably would not require this.

Regarding recordkeeping, it was mentioned that a 3-year requirement would likely be acceptable; this was the recordkeeping requirement for other regulations. Someone added that one year should be the minimum, although sanitary survey requirements, if applied to aircraft, might require a longer period. The current TCR requirement is 10 years.

Several participants noted that there is no requirement that airlines record where they board water, and they would prefer not to add such a requirement.

6.5 Water sources

Airlines stressed that they often do not have responsibility for water cabinets; the airports do. It was noted that there is difficulty getting airports to respond to problems with water cabinets. Someone clarified for EPA that water goes directly from water cabinets into the plane, where available. Where there are no cabinets, water is brought to the plane by truck. Water cabinets, which are regulated by FDA, are not routinely sampled, because they're considered low risk and are therefore a low priority for FDA inspections.

6.6 New technologies

It was asked whether new technologies for disinfection were being considered. Everett Pringle of EPA said they were being considered. Ozonation on board might cause problems because it generates hydrogen, which is explosive.

Breakout Session C
Public Notification, Reporting and Recordkeeping, Verification
March 28, 2007

Participants
Tom Walden, Omni Air International
Bob Dujon, AeroSafe Products Inc.
Rachel Walker, Continental Airlines
Bill Edmunds, Airline Pilots Association
Clint Lemmons, EPA
Claire Kammer, Underwriters Laboratories
Drew Chapell, ENSR
Janine Morris, EPA, Region 4
Jim Johnson, American Airlines
Adam Novish, AFA-CWA
Chris Witkowski, AFA-CWA
Jason McLinton, Health Canada
Carol Maready, US Airways
Noel Pachelo, Comair
Roy Deitchmann, Amtrak
Debbie Dalton, EPA (facilitator)
Cindy Mack, EPA (technical lead)
Stephanie Flaherty, EPA

1. Public Notification

The group was asked to identify any additional hazards to aircraft drinking water systems that would require public notification, and/or reporting elements. No additional hazards were identified.

1.1 What events should trigger public notification?

Some stakeholder groups such as flight attendants and presumably passengers may prefer public notification after the first positive total coliform sample. Airlines may prefer to confirm the positive result with a repeat sample prior to public notification. Airline representatives identified an option to shut off water service after a positive total coliform sample and avoid public notification. All parties agreed that public notification was appropriate after a positive *E. coli* sample.

1.2 What information should be included in a public notice?

The placards located at sinks should use simple language that does not instill panic in the passengers. Somehow the "do not drink" message needs to be conveyed to children, non-English speaking persons, and the illiterate. More detailed or technical information may

be conveyed to the aircraft crew. Immuno-compromised or otherwise sensitive passengers and crew need more detailed information such as that outlined by the public water system public notification requirements. Public notification information should include the positive actions being taken by the airline and should promote the airline's standard of care. Universal placards fall under FDA jurisdiction.

1.3 Who should be notified?

Five groups that may require different types of public notification were identified: (1) past aircraft crew (crew at time of sample collection until analytical results were available); (2) present aircraft crew (crew at time of sample analytical results); (3) past aircraft passengers (passengers at time of sample collection); (4) present aircraft passengers (passengers at time of sample analytical results); and (5) past and present passengers and crew that are immune-compromised or sensitive (children, pregnant women and seniors). It may be difficult to notify past passengers and crew but it is doable through airline records and crew schedule. Airline representatives did not think it is necessary to notify future passengers.

1.4 How should the public notice be delivered?

No specific suggestions were identified.

1.5 Who is responsible for notifying the public?

Each airline should designate a responsible party. Each airline is organized differently and may have responsible people in multiple departments such as Environmental, Safety, Recordkeeping, Engineering and Field Services. EPA may notify the airline's corporate office.

1.6 Other public right-to-know items?

None identified.

2. Reporting and Recordkeeping

2.1 What information should be reported?

The laboratory transmits analytical data to the airline. The airline reports analytical results to the primacy agency. The primacy agency reports a summary of violation data to EPA headquarters. One idea is to tie the required level of reporting to the percent of total coliform samples that are positive. Another idea is to report results by aircraft type, since some total coliform occurrence problems may be systematic. Some States use the SDWIS state database to record system information, sample results, and violation data. These websites are available to the public. For example:

Indiana (http://www.in.gov/apps/idem/sdwis_state/);

Illinois (http://www.epa.state.il.us/drinking_water_watch/index.jsp);
Oklahoma (http://sdwis.deq.state.ok.us/)

If total coliform samples are negative, airline representatives suggested that the date, time, and sample result should be recorded internally, and then all sample results would be summarized in an annual report to EPA. One airline representative suggested that total coliform positive results and corrective actions taken following the coliform occurrence could be summarized in an annual report to the primacy agency.

Maintenance staff record logbook entries for every maintenance activity and safety items. This logbook is kept for the aircraft until it is taken out of service permanently. Maintenance activities are recorded using a 4-digit ATA code with the first two numbers representing the system and the second two numbers representing the sub-system. After 2-5 years, maintenance logs are typically archived.

Most airlines do not record water boarding practices (where, when, how much). Airlines have typically documented the potential sources of water at each airport.

2.2 When should the information be reported?

Airline representatives indicated that reporting positive total coliform results within 24 hours is difficult. Airlines prefer less frequent reporting for total coliform hits, such as quarterly. Overall reporting on a quarterly basis would be burdensome according to airline representatives.

2.3 How should the information be reported?

Format was not discussed.

2.4 How long should records be maintained?

Not discussed.

3. Program Oversight and Verification

3.1 What should be the format of the verification program?

Review of records (i.e., data verification), and monitoring results. Canada developed a program for conveyances to conduct voluntary self-audits for monitoring and recordkeeping.

3.2 What should be included in the verification?

Checks on monitoring data and recordkeeping should be included in the verification.

3.3. When should verification be performed?

One example given was the data verification program for stationary PWSs that is conducted every 3 to 5 years. EPA conducts random audits but often schedules them up to one year in advance. These audits could be based on the frequency of total coliform hits.

3.4 Who should conduct the verification?

Some certified laboratories provide follow up services and could serve as third party inspectors. If they notice higher levels of total coliform hits based on analytical results, they can recommend to airlines that they increase monitoring frequency and inspections.

DAY 2: MARCH 29, 2007

Ms. Gail Bingham of RESOLVE provided an overview of the first day of the stakeholder meeting and reviewed the agenda for the second day of the meeting. The goal of the second day was to provide all participants an opportunity to hear a summary of the key points of the breakout group discussions. Ms. Bingham encouraged all participants to be open with their questions and comments and to feel free to send any additional questions and comments to Mr. Rick Naylor in the 3 to 4 weeks following the stakeholder meeting.

Plenary: Stakeholder input on Proposed Discussion Topics

The question and answer session was an open-ended session where participants freely expressed their comments. As such, many of the remarks summarized below are comments (indicated by "C") and not questions (indicated by "Q") and do not have specific answers (indicated by "A"). Bulleted text indicates additional comments that pertain directly to a response. EPA is committed to taking these stakeholder comments under consideration in developing the ADWR.

Standard Operating Procedures and Best Management Practices

Q: What are the current disinfection/draining frequencies for watering carts and tanks?
A: Carts are disinfected and drained once every 30 days according to AOC requirements; monitoring is not currently required. With such a regular flushing and disinfecting schedule, a sampling program for carts would not provide much additional information.

C: It may be reasonable to allow smaller aircraft to use the current disinfection/draining frequencies for their tanks. Many smaller aircraft have small tanks (e.g., 5 gallons). Turn-over can be achieved via routine water use, which could serve as an equivalent to the flushing requirement.

C: A General Maintenance Manual is an approved manual. Operators need to develop their own frequency for disinfection within the confines of their maintenance programs. EPA could specify performance standards for airlines and a broad range of parameters to work within and allow airlines to work flexibly within those parameters.

C: FDA looks at chemicals and coatings and compatibility with water tanks.

C: Each airline has a person who either specifically looks out for or works on potable water systems, under Chapter 38 of the ATA manual. This effort does not need to be re-created. Caution against introducing new requirements under ADWR that affect existing Chapter 38 items, as any new introductions can cause a problem. .

Monitoring

Q: Booster chlorination – does this qualify as treatment onboard an aircraft? Booster chlorination is not possible with some aircraft configurations.

C: Airlines shouldn't analyze their own total coliform samples – it won't be perceived well by the public.

C: If EPA is considering requiring a qualified professional collect samples it needs to define "qualified" sampler.

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C: We should stay away from the term "certified" and use the term "adequately trained."

C: It was suggested a representative number of aircraft be sampled, instead of all aircraft being sampled. Discussion addressed the implications of a representative sample. For example, what if one-third of the fleet is sampled, and 5 percent of the aircraft test total coliform-positive – what exactly does that data mean, and what action does that result in, and how are issues like public notification and disinfection to be dealt with?

C: The regulation should not exceed the actual risk to the passengers and crew. The commenter did not feel that there was actually any alarming risk and did not want to see over-regulation.

C: Using a dedicated sampling tap may not provide representative samples. It may not adequately capture dead zones in the system, where stagnant water, biofilm growth, and lower chlorine residual are more likely to be present.

C: There are currently testing methods that allow for testing both total coliform and *E. coli* in the same 24-hour period – which means you don't have to wait an additional 24 hours to take the *E. coli* sample.

C: Cross-contamination is more likely when handwashing with bottled water – the clean hand handles the same water bottle/top that was handled by the unwashed hand. Additionally, cross-contamination can occur when multiple people use the same water bottle for handwashing.

C: Sampling has an operational cost associated with it, especially if the aircraft has to be re-routed and taken off of its regular flight schedule.

C: Airlines want flexibility in where samples can be collected; identifying a designated sampling location removes this flexibility.

C: Bottled water use for handwashing should replace potable water in lavatories only under triggered events.

Public Notification

C: It is important to build flexibility into the trigger for corrective action and public notification. For example, aircraft should be provided the flexibility to turn off water instead of providing public notification. Additionally, corrective action should not be based on a single total coliform-positive; a confirmation sample is needed.

C: Some participants felt that it is necessary to notify past passengers for health reasons; other participants felt that notifying past passengers is not necessary. A few participants also felt airlines should be obliged to inform previous and current passengers if repeat samples are total coliform-positive.

Q: How does an airline determine who should be notified if only a target group within the passengers and crew is contacted?

Q: What should the trigger for public notification be? Total coliform is just an indicator of water quality; should the trigger to be an *E. coli*-positive sample or lack of disinfectant residual?

C: Passengers' records may not have accurate or current information that would be useful for locating them for public notification. Additionally, passenger illness is difficult to track – it is difficult to track the number of legs of a flight that a particular passenger flew on, which flights they flew on, and the aircraft used on those flights. Tracking down this type of information may take a few days, by which time the water has probably already been dumped and the aircraft has probably been flushed, etc.

C: It is the responsibility of airlines to inform past passengers. The information is available, and the difficulty of finding it is not a reason not to notify them.

C: Some participants were concerned about being required to immediately report total coliform-positives to EPA, because EPA notification may not be necessary if the airline is already taking immediate corrective action. The participants were in agreement with notifying EPA on a quarterly schedule regarding total coliform-positive samples, and on an annual basis regarding overall results.

C: Public notification should be limited to outbreaks and should not be required for total coliform-positive samples, otherwise it will create liability and legal issues.

C: Differentiation should be made between serious and hypothetical risks. For example, fecal coliform-or *E. coli*-positives indicate contamination and the possibility that pathogens are present. Total coliform-positive is a general indicator with *E. coli* analyzed concurrently. EPA does not currently treat total coliform-positives as an immediate risk – currently 30-day notification is required.

C: Public notification language should be carefully chosen to minimize concern on the part of the public. Mandatory language should not be required for public notification. Language should be more specific to the situation, such as, "water boarded had a positive sample and the lavatory water has been turned off."

C: Given high bottled water use on aircraft, what is the actual risk to passengers and crew given that potable water is used mainly for coffee, handwashing in lavatories, and brushing teeth.

C: How can airlines place placards on aircraft that can be followed by passengers of different nationalities, passengers who are children, and passengers who may not be able to read? With this difficulty in mind, the best option is to turn off the water.

C: We need to prevent problems from happening (e.g., reconstitution of infant formula, ingestion of poor quality water by people who cannot read, etc.). Safeguards need to be put into place to preclude these types of situations.

C: It is a Center for Disease Control (CDC) requirement to provide notification for communicable diseases. Airlines are required to provide a list of passengers to CDC, and CDC takes it from there. That is currently the limit of airlines' responsibility.

C: Airlines should be able to correct the problem before public notice is provided – look at this from a maintenance point of view.

Plenary: Synthesis Discussion/Wrap Up Session

Ms. Bingham introduced the final workshop session and explained the goal of this session was to identify and discuss additional cross-cutting issues and other items participants would like EPA to consider when proposing the ADWR. Questions were posed by EPA (Q), and responses from stakeholders are summarized below (R).

Q: *What are the key elements of flexibility? Are there any specific concerns regarding flexibility?*
R: Different aircraft types are under different maintenance timelines. Allow airlines to schedule rule required maintenance to coordinate with their existing maintenance schedule.
R: If an airline is able to demonstrate no positive samples based on its monitoring, allow decreased burden in sampling and monitoring.
R: Allow flexibility in the sanitation/disinfection chemicals so that aircraft can rely on chemicals other than chlorine. Consider allowing hydrogen peroxide and hypochlorite because they are less harsh on aircraft components over long periods of time.
R: Manufacturer recommendations are specific to each system. Aircraft need flexibility in choosing sanitation chemicals to match manufacturer's system requirements and recommendations in their O&M plans.

- EPA does not want to recreate methods if manufacturers have already developed recommended practices that they can share with EPA.

Q: *Based on AOCs, what items need to have more flexibility?*
R: Need more time to get aircraft in after a total-coliform-positive. Currently, aircraft have 24 hours but can ask for up to 72 hours. Why not just give aircraft 72 hours to begin with?
R: If a total coliform-positive sample is obtained in a lavatory, aircraft should be able to turn off only the lavatory water and not be required to turn off water in the galleys.
R: More flexibility is needed in determining the disinfection frequency.

- All aircraft have a monitoring frequency. The maintenance manual does not specify the monitoring frequency – it allows the operator to set the monitoring frequency.
- When FAA approves maintenance plans, it includes the disinfection/maintenance programs. So EPA does not need to set a new disinfection frequency.
- A disinfection interval can be set – perhaps after a contamination event and once after major maintenance. Neither the maintenance review board (MRB) nor the maintenance planning document (MPD) specify the disinfection frequency. A major maintenance action would be either a C-check (approximately every 18 months) or D-check (approximately every 4-5 years). Maintenance actions less than C-check or D-check visits are overnight visits.
- **R:** Each airline's logbook uses internally consistent terminology – the terminology used has operational significance to the aircraft. EPA will need to look into the abbreviations and definitions provided in each maintenance manual, and also look for generic terminology used across all airlines.
- We cannot necessarily rely on FAA terminology because certification procedures for pilots, etc., may be different than the certification needed for system handlers. ATA 2000 provides general terminology across the industry and may be a useful resource to EPA.
- EPA should consider defining each term in the ADWR to make sure airlines are clear about what everything means in the context of the rule, and what airlines need to do/understand.

Q: *How should EPA verify that required components of the rule are being satisfied?*
R: Internal auditing protocols (IAPs) are already in place – can EPA's verification be combined with this? These are approved by FAA, and FAA monitors whether they are complying with the program. FAA follows-up on everything - protocols, procedures, and paperwork are all checked.
R: Air Transportation Oversight System (ATOS) requires airlines to correct deficiencies. Therefore, actual discrepancies can be handled through FAA and ATOS. EPA can piggy-back on FAA regulations, but should not create double work for airlines. What are enforcement actions if what they say will happen doesn't happen?
R: Does EPA need to know if aircraft are complying with their O&M plans if FAA ensures this occurs – EPA is interested in water quality so that is what they should be enforcing.

Q: *How does FAA feel about the discussion of oversight and implementation being done under FAA? How does FAA feel about the added responsibilities that are being suggested to move in the direction of FAA?*
R: There is concern about increasing FAA oversight given the current FAA budget and resource issues.
R: Overseeing maintenance practices and manuals is not new; however, FAA does not have the resources to verify water quality and show compliance with EPA regulations (i.e., FAA cannot sample or check on disinfection intervals any more than what is currently being done).
R: SDWA does not implicate FAA to implement this rule – only EPA can do that.

Q: *Airlines have submitted their O&M plans under the AOC's – are they adequate or not and if not what are the deficiencies? What are the pros and cons of modeling the ADWR after one or more of the following options: AOCs, WSG 29, and current regulations.*
R: We should get all the data in and evaluate it fully to determine effectiveness before the pros and cons of using AOCs are evaluated, even if it means extending the deadline.
R: AOCs define corrective actions based on total coliform-positives, and WSG 29 allowed O&M monitoring, which was good. Don't make ADWR more restrictive than AOCs.
R: WSG 29 did not provide guidance on intervals. ADWR should allow variability between testing and O&M options. For example, if an aircraft tests frequently maybe disinfection can be performed on a less frequent basis, and if disinfection is done frequently, maybe testing can be done on a less frequent basis.
R: An alternative model that is used by food manufacturers could be used – a tiered approach. For example, those aircraft that have established disinfection/flushing programs in place can be less closely monitored, and those aircraft that do not have established disinfection/flushing programs in place can be more closely monitored.

Q: *Which is more important to airlines – flexibility in analytical method used for monitoring (i.e., less flexibility in required follow up actions), or flexibility in required follow up actions (i.e., less flexibility in monitoring method).*
R: Provide flexibility in both the analytical method and the required follow up action. For example, if method A is used, X options are available; if method B is used, Y options are available.
R: More flexible rules are often more complicated rules. OMB may think the rule is too complicated and want to know the additional costs for understanding and implementing the rule.
R: Make provisions for new technologies to be considered and set standards by which new technology performance can be measured. They must be verifiable, such as NSF's current new technology projects.

Q: *If treatment is included onboard, what would be the implications for monitoring, disinfection, etc.*
R: New technologies have to be at least as effective as what is currently being required.
R: New technologies should not be excluded.

Q: *What items should EPA consider in the cost analysis?*
R: Disinfection schedules, costs to disinfect aircraft (e.g., hangar costs, fleet size, additional aircraft issues such as rerouting aircraft and crew, maintenance scheduling, shipping costs, etc.) Costs decrease if there is sufficient time to get the aircraft to a maintenance facility equipped to perform the specific operation.
R: Maintenance could be tied to flushing/disinfection – this could help reduce costs. However, if these are mixed in together, it could become complicated.

- A and B checks are overnight and don't provide enough time for flushing and disinfection.
- C and D check intervals are better suited for tying in maintenance with flushing/disinfection; however, C and D checks occur on 18-month intervals.
- If flushing/disinfection is tied in A and B checks, EPA should allow deviation from the fixed schedule.
- A checks can be done in a gated area or in a hangar, and don't require much specialized equipment.
- B checks may be overnight, and require specialized personnel.
- Tying in disinfection/flushing with maintenance schedules is difficult, since there is already a lot or routine maintenance going on during these maintenance checks. It is easier for disinfection/flushing and maintenance to be done separately.

Q: *How do you suggest that EPA regulations minimize disruption to aircraft if there is a risk to public health?*
R: Allow aircraft to shut off water in a lavatory without canceling the flight.
R: Asking too much of EPA to develop an open-ended, flexible regulation for unproven disinfection technologies.

Q: *What are the standards that EPA should hold airlines accountable to?*
R: We need to know the baseline first before setting any guidelines.
R: Aircraft/Airlines can be held accountable to the same standards as non mobile PWSs.
R: Transient noncommunity water systems serving less than 1,000 people/day using surface water would sample once per month, and no more than one sample per month could be total coliform-positive.
R: Airlines negotiated corrective action after a single hit instead of being required to collect repeat samples in order to avoid a maximum contaminant level (MCL) violation and subsequent public notification requirements. AOCs require flushing/disinfecting after first total coliform-positive, with follow-up confirmation sampling.

Additional Topics and Comments

Frequency of Sampling

C: EPA should be open about frequency of monitoring to figure out if O&M practices are being followed. Consider taking a statistical sample of fleet as a way of making sure that O&M practices of fleet are being followed.
C: Sampling once per year is acceptable. However, sampling more than once per year is too much. The frequency of heavy checks is linked to the number of hours of flight time and the season. Consider incorporating number of miles or hours flown into the schedule so it can be fit with other existing maintenance items (such as every other A check). Consider sampling on a performance basis, where performance would dictate sampling frequency.
R: Routine disinfection and flushing should occur no less than once every two years. Monitoring should occur at least twice per year.

Costs

C: EPA asked for suggestions on how to assess the cost of the ADWR? The answer will determine baseline conditions EPA should use to assess costs of the ADWR proposals and final rule. EPA requested information on what was being done prior to the AOCs.

Biofilms

C: EPA requested information on any other studies related to biofilm growth in aircraft storage tanks.

FOIA request

Everett Volk, OECA, conveyed to participants that EPA received a Freedom of Information Act (FOIA) request from the National Resource Defense Council (NRDC) for all information submitted to EPA by airlines. Any information not declared as confidential business information (CBI) is being passed onto NRDC. Information that has been declared by airlines as CBI is being verified by EPA and will appropriately be passed onto NRDC (*i.e.,* the public domain). All monitoring data submitted under SDWA from this point on cannot be declared as CBI and can be passed onto NRDC or the public domain. Data cannot be coded, but airlines/aircraft can use serial numbers instead of nose/tail numbers to identify aircraft.

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The following is a summary of comments that EPA received by email shortly after the workshop:

- *E.coli* should be used as an indicator, since it's been proven to be the most reliable fecal contamination indicator and therefore the one of hygienic significance, as stated in the WHO Guidelines
- the frequency should be daily, at a minimum

- all taps should be monitored
- *E.coli* positive samples should trigger corrective action
- record monitoring results daily, report quarterly, and after each *E.coli* positive sample
- airline water must be fit for public consumption (i.e. drinking, teeth brushing and body washing) and cannot be replaced with “sanitary wipes”

Appendix A: List of Acronyms

ADWR	Aircraft Drinking Water Rule
AOC	Administrative Order on Consent
ATA	Air Transport Association
ATOS	Air Transportation Oversight System
AWWA	American Water Works Association
BMP	Best Management Practice
CBI	Confidential Business Information
CDC	Centers for Disease Control
CFR	Code of Federal Register
CRMP	Comprehensive Representative Monitoring Plan
CWS	Community Water System
DWPD	Drinking Water Protection Division
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FACA	Federal Advisory Committee Act
FDA	Food and Drug Administration
FOIA	Freedom of Information Act
HACCP	Hazard Analysis and Critical Control Point
HPC	Heterotrophic Plate Count
IAP	Internal Auditing Protocol
IATA	International Air Transport Association
ICC	Interstate Carrier Conveyance
ISO	International Standards Organization
MCL	Maximum Contaminant Level
MPD	Maintenance Planning Document
MRB	Maintenance Review Board
NACA	National Air Carrier Association
NATA	National Air Transportation Association
NRDC	National Resources Defense Council
OECA	Office of Enforcement and Compliance Assurance
O&M	Operations and Maintenance
OMB	Office of Management and Budget
POE	Point-of-entry
POU	Point-of-use
PWS	Public Water System
QAPP	Quality Assurance Project Plan
SDWA	Safe Drinking Water Act
SDWIS	Safe Drinking Water Information System
SOP	Standard Operating Procedures
SRMD	Standards and Risk Management Division
TCR	Total Coliform Rule
TNCWS	Transient Noncommunity Water System

TSA	Transportation Security Administration
WHO	World Health Organization
WSG	Water Supply Guidance (EPA)
WSP	Water Safety Plan