U.S. Environmental Protection Agency
INITIAL SCOPING WORKSHOP ON THE DEVELOPMENT OF REGULATIONS FOR AIRCRAFT PUBLIC WATER SYSTEMS
Hotel Washington, Washington, DC
January 18-19, 2006

Meeting Summary

BACKGROUND

EPA is holding a series of meetings as part of a collaborative process to develop aircraft drinking water regulations. EPA held the first public meeting on June 1, 2005. Attendees at the June 2005 public meeting represented a large spectrum of stakeholders and interested parties. Based on public comments from the June 2005 workshop and follow up interviews with representatives from about 15 interested stakeholder organizations, recommendations for a collaborative approach were prepared by the contracted facilitator, RESOLVE. The initial scoping workshop held on January 18 and 19, 2006 was intended to serve as the next step in implementing the collaborative rulemaking process.

The initial scooping workshop was held to provide an opportunity for the following:

- Shared learning about aircraft water systems and watering points, current regulations, and other information relevant to the proposed rulemaking;
- To raise issues for consideration in developing the proposed rule; and,
- To understand some of the conceptual options for the proposed rule.

In general, presenters at the initial scoping workshop utilized presentation materials which were made available in hard-copy to attendees. Hard copies of a two-page handout summarizing stakeholder questions and issues compiled to date by RESOLVE were also available.

This summary of the workshop provides key points from the presentations and discussion and is not intended to serve as a meeting transcript.

DAY 1: JANUARY 18, 2006

Welcome, Introductions, Review Agenda

Ms. Gail Bingham, RESOLVE, welcomed participants and conveyed the objectives of the meeting. Each meeting attendee was asked to briefly introduce themselves and their affiliation. Ms. Bingham then introduced the morning's first panel and speakers.

Mr. Stephen Heare, Director of the Drinking Water Protection Division in EPA's Office of Ground Water and Drinking Water (OGWDW), began the 2-day workshop by providing a few introductory comments and providing a historical perspective. Mr. Heare emphasized EPA is committed to a collaborative rulemaking process that relies on associations, agencies, and organizations to contribute their knowledge about certain aspects of the airline industry and drinking water. EPA will use this information to develop a proposed rule. EPA will then request comments from the public and develop a final rule. Possible rule options that EPA presented later in this two-day session will be discussed in more depth at the next workshop.

For the historical perspective, Mr. Heare explained that EPA established a workgroup in early 2002 to evaluate the drinking water program for Interstate Carrier Conveyances (ICCs). Water quality onboard aircraft drew national attention after the Wall Street Journal published an article questioning the safety of aircraft drinking water in November 2002. EPA and the Food and Drug Administration (FDA) met with the airlines to discuss the issue in May 2003. In the fall of 2003, some Air Transport Association (ATA) members conducted sampling, and in the summer and fall of 2004 EPA conducted its own sampling. Results from these sampling efforts indicated that there was an issue with contamination in aircraft drinking water and that tailoring of the drinking water regulations to address the unique characteristics of aircraft water systems was necessary.

Mr. Heare explained that many rulemaking processes rely on a Federal Advisory Committee, that must be chartered, which takes considerable time. EPA wants to move quickly on this rulemaking to ensure public health is protected. Instead of using the FACA approach, EPA is using a collaborative process that falls under alternative dispute resolution. Mr. Heare also noted that because a rulemaking effort in any form is time-consuming, EPA signed administrative orders on consent (AOCs) with individual airlines that will govern airline drinking water safety for the interim (http://www.epa.gov/compliance/resources/cases/civil/sdwa/airlines/index111705.html).

Overview of Aircraft Water Systems & Watering Points

Mr. Rick Naylor, OGWDW, began the discussion of aircraft water systems by presenting a diagram of the aircraft potable water transfer and supply chain and explaining how water is transferred through each step as it is moved from the source of water to the aircraft. Mr. Naylor noted that although some airports have their own water supply, such as wells, and would be regulated as public water systems, most airports receive or purchase water from a public water system (PWS). Mr. Naylor explained that public water systems in the United States are regulated by the states and EPA. He noted that regardless of how the drinking water at the airport is obtained, water reaches the airport terminal and is accessible to aircraft or water service providers at watering points. Mr. Naylor explained the FDA regulates watering points from which water is distributed to the aircraft via any combination of water cabinets, trucks, carts, and hoses. He noted storage tanks, water distribution systems, and plumbing systems usually exist onboard the

aircraft. Finally, human consumption of the water occurs at lavatory and galley sinks and water fountains where water is available to passengers and crew.

Mr. Naylor stated that many aircraft fly internationally and board water that is not regulated by EPA or FDA. He noted that water boarded from foreign water sources that is subsequently served in the U.S. must meet EPA regulations and that this creates a challenge due to the unknown quality of that water. In addition, he noted a single aircraft might board water from multiple domestic and/or foreign airports in the same day.

Panel 1: Potable Water Transfer and Supply to Aircraft

Mr. Richard Marchi, Airports Council International (ACI); Tiffany Goebel, Midwest Airlines; and Stan Mackiewicz, National Air Transportation Association (NATA), discussed how water is transferred from the airports onto aircraft.

Mr. Marchi explained that ACI is a trade association that represents 150 U.S. and 20 Canadian airports. He explained that most airports are municipally owned and operated, although some are managed under private contracts. He noted most airports lease space to airlines and that in the U.S. air carriers have the right to self-handle fuel, catering, and other services. He also noted most large U.S. carriers choose to handle their own services, but some smaller airports handle this for all aircraft. In contrast, at the majority of airports in other countries the airport operators provide these types of services. He indicated that although most airports receive water from a PWS, some draw their water from a private water supply. He noted that ACI is planning to conduct a survey of its members to gather information on a variety of topics relevant to the rulemaking.

As a point of clarification, it was noted that in the U.S. a public water system is defined as one that serves water to the public and meets certain criteria for the number of people served per day. This definition of a public water system is not dependent on whether the ownership of the water system is by a public or private entity.

Ms. Tiffany Goebel presented several photographs and described the various equipment used to transfer water from a watering point to aircraft. Ms. Goebel noted that at most airports water is obtained from the airport through water cabinets, which are essentially extensions of the tap and are physically attached to the outside wall of the airport. She explained the cabinet contains a hose that transfers water to aircraft, although some airports do not supply cabinets or other water filling equipment.

Ms. Goebel described the variety of equipment and methods of boarding water and noted the specific requirements and capabilities of the individual airport and aircraft determine methods used at any particular location. She noted the distance that aircraft are parked from a gate may prohibit directly using a cabinet due to the length of the hoses in the cabinet. Therefore, in many airports water trucks are used to carry water from the cabinet to aircraft parked out of reach of the water cabinets. Water carts may also be used to carry water. These carts may not have a truck component and tend to vary in design, as

compared to trucks and cabinets, which have fairly standard designs. Water carts are not self-propelled and therefore must be pulled by humans or baggage tugs. These carts have the advantage of small size, providing better access to planes.

Ms. Goebel also explained that small aircraft, particularly regional jets, might have tanks that can be removed and refilled, but lack a service port. Such a tank would hold 5 gallons of water and may only serve one sink in the lavatory or galley. These tanks are advantageous for aircraft operating in cold climates where water would freeze overnight if not removed from the aircraft. The tanks can also be replaced quickly between flights.

Ms. Goebel indicated water services can be provided by a number of different entities. The entities include the airline, a different airline, a ground service provider, a fixed based operator, the airport, or an airport contractor. Airlines base their decisions on the source of labor and equipment to use on several factors:

- Aircraft type – Smaller aircraft may operate different water systems than larger aircraft and require less complex handling facilities.

- Size and type of operation – The number of flights and gates that need servicing may dictate whether it is worthwhile to invest in trucks. In addition, some airlines have dedicated gates while others share gates with several airlines.

- Manpower and vendor availability – In some cases, there may be a dedicated crew to manage the water trucks and carts. In other cases, the same crew may handle baggage and water. When an airline needs these types of services, they may look for interested parties and subcontract the work instead of using their own staff. In certain locations it may be difficult to retain a subcontractor and the company responsible for refilling water tanks on aircraft may change frequently.

- Airport infrastructure and restrictions – Airports and airlines also consider issues such as the risk of ground collisions from moving equipment near aircraft and the consistency of equipment used throughout an airport. Although aircraft water systems are relatively simple, there is a lot of variability in the equipment and methods used to operate them.

- Equipment Availability – At times the availability of equipment at a given location may determine what must be used. Replacement of equipment may not be warranted if the number of flights and types of aircraft serviced do not warrant a change.

Mr. Stan Mackiewicz, NATA, noted his organization represents aviation businesses that own, operate, and service aircraft. Mr. Mackiewicz elaborated on the handling of water between the PWS and aircraft by providing procedures used by the Saint Louis-based Airport Terminal Services (ATS). Mr. Mackiewicz noted he selected ATS for this example because he believes them to be among the top 20 percent of service providers in the U.S. ATS has a published procedure – “Sanitation of Service Vehicle Potable Water

Systems," which was made available to attendees, along with his presentation materials, on the second day of the workshop. Like most businesses that service aircraft, ATS uses equipment described by Ms. Goebel. However, Mr. Mackiewicz explained that there is variability in how the equipment is used and cleaned by different companies.

Mr. Mackiewicz presented sections of "Sanitation of Service Vehicle Potable Water Systems" that outline sanitation requirements for water carts, trucks, and hoses and personnel, and that must be completed every 30 days. Mr. Mackiewicz noted a daily checklist for portable water trucks and carts is used to ensure quality is controlled. The checklist requires daily checks for leaks, seals on fill ports, storage of fill hoses, and draining of tank dumps, in addition to monthly checks of the hose diameter (in relation to lavatory fill hose), tank vents, flushing and sanitizing of tanks, and "drinking water only" markings on vehicles. The checklists are submitted to ATS personnel on a monthly basis.

Mr. Mackiewicz noted that his association was pleased to be involved in the development of these regulations from the onset and compared the benefits of this early involvement to the less desirable situation now being addressed through spill prevention and contamination control regulations.

Dr. Neeraj Khanna, Bio-Cide International, presented information on the use of chorine dioxide to disinfect aircraft drinking water systems and described the procedure for completing the disinfection.

Discussion and Responses to Questions

Removable tanks
Removable tanks on aircraft are taken inside the airport to a catering facility where they are refilled. These tanks are cleaned and disinfected using standing solutions and a procedure similar to those used for water tanks and carts.

Sampling at an airport
Currently airlines are being held responsible for water boarded on aircraft, but it is not clear who is responsible for the contaminated water delivered from the terminal. More sampling needs to be done at municipal airports to ensure water delivered to aircraft is safe. Municipal water suppliers often sample at airports within their distribution system, but only to comply with the Total Coliform Rule (TCR) and Lead and Copper Rule (LCR). Information on the frequency of sampling at airports may become available as a result of the upcoming survey by Airports Council International. Under the TCR, each system must develop a sampling plan to ensure it takes representative samples throughout distribution system. EPA is considering ways to encourage systems to take more samples at municipal airports. EPA is also pursuing strategies to ensure that when a system reports a violation to the state that requires public notification, airports and airlines are also notified of the situation.

Disadvantages of chlorine dioxide
Chlorine dioxide is generally more expensive than chlorine. The user also has to mix the contents of two bottles.

ATS' Procedures
ATS' procedures are not standard and are only used by ATS. ATS is willing to share their procedures with other vendors. FDA does require procedures for attaching caps to hoses, using clean hands at the watering point, and regularly inspecting watering points. EPA also required watering points to be disinfected every 30 days through Water Supply Guidance (WSG) 29. In spite of these various requirements, attendees expressed concern that watering points are not checked regularly and maintained properly, especially since no monitoring is required. EPA hopes to collect more information on disinfection schedules for truck, hoses, and other water system components through the AOCs.

Panel 2: Aircraft Watering Systems

Ms. Leah Raney, Continental Airlines, and Dave Supplee, International Association of Mechanics, described the components of drinking water systems onboard aircraft. The components include galley and lavatory faucets, galley coffee makers, and vacuum toilets (that use 7 oz of water per flush). A generic pipe diagram was presented which illustrated piping that runs from the front to the back of the aircraft. Ms. Raney explained that the water is supplied to the aircraft through a fill port and is drained through a drain port on the underbelly of aircraft. The diagram also illustrated how pressurized air from the operation of the engines is used to pressurize the water system.

The presenters explained that most aircraft water systems are not complex, but they do vary between aircraft. The presenters then described some of the variations. For example, water tanks on aircraft vary greatly in size – a regional jet has a 5-gallon tank, a Boeing 737 has a 35-gallon tank, and the large Boeing 777 has a 360-gallon tank. They noted the configuration of the galley can also vary – the sink may be plumbed separately and there may only be a hot water spout on the coffeemaker. The presenters added that some aircraft have installed carbon filters on their coffeemakers, which are changed regularly (e.g., quarterly basis), and some regional jets lack running water onboard. In addition, they mentioned that many with running water have placards near the faucet indicating that the lavatory water is not for drinking, but that not all jets consistently use these signs.

Ms. Raney reported that Continental Airlines disinfects its aircraft on a quarterly basis and testing is completed annually. She mentioned that if the airline receives any complaints about its drinking water, they sanitize the aircraft drinking water system, test the water, and assign an engineer to investigate the problem. She noted Continental also has a general maintenance manual that explains all operation and maintenance (O&M) procedures in detail, and that based on the manual engineers prepare detailed work cards for the maintenance crew to follow. She also noted that the maintenance crew initials each step on the work card when it is completed.

Ms. Raney conveyed that Continental also has established the following procedure to disinfect their aircraft drinking water systems:

- Pressurize the system and add the disinfectant to push the solution through the entire system – all sinks must have solution drain through them.
- Drain the solution with the sanitizer out of the system and into a tank.
- Run fresh potable water through whole system until clear water comes out of every faucet.
- Neutralize the remaining acid in the system.

Dave Lotterer, Regional Airline Association (RAA), described the unique aspects of regional carriers. He noted that most regional carriers rely on disinfection recommendations by manufacturers (based on FDA input); therefore, the disinfection frequency varies between regional carriers. Mr. Lotterer also noted that most regional jets lack fill ports, and turbo props generally do not have running water. He indicated the passengers and crew on these aircraft rely on the use of antimicrobial hand gels and wipes for hand sanitization.

Christopher Witkowski, Association of Flight Attendants, provided an introduction to his association, which represents 46,000 flight attendants (including international, national, and regional carriers), and discussed the role of flight attendants in ensuring safe drinking water on aircraft. Mr. Witkowski noted that since September 11, 2001, flight attendants have become responsible for the health and safety of passengers, including ensuring that there are sanitary conditions on the aircraft.

Mr. Witkowski explained that flight attendants have three basic priorities: safety announcements, safety demonstrations, and evacuation/emergency situations. He noted that they are required to wash their hands before preparing food, after picking up trash, after medical emergencies, and after using the lavatory. He also noted many rely on lavatory water to brush their teeth and wash their hands.

Mr. Witkowski reported that in recent years flight attendants have experienced stress related to financial problems of airlines, communicable diseases (e.g., SARS, avian flu), and long workdays (often 12-16 hours). He noted that most flight attendants are forced to use lavatories on the aircraft during their workday due to their short layovers. He also noted that while EPA regulates onboard drinking water, FDA regulates food service on land, ice and food handling onboard, lavatory requirements on aircraft that prepare/serve food, and cleaning the aircraft. He acknowledged the goal of both agencies is to prevent the spread of disease and mentioned some of their related responsibilities. Examples of FAA-related requirements provided by Mr. Witkowski included inspections during the design of the aircraft to ensure sanitation is adequate; the issuance of airworthiness certificates by FAA; and FAA's minimum equipment lists (MEL) which specify

equipment that can be inoperative in an aircraft and for how long. He mentioned it is allowable for planes to fly for up to 10 consecutive days if the potable water and lavatory waste systems are not functioning on an aircraft.

Regarding regional carriers, Mr. Witkowski mentioned most carry 20 to 100 passengers; have 30-minute to 4-hour flights; a beverage service but minimal or no food service; lavatories and galleys that often lack running water and soap so flight attendants use wet wipes or gel to clean their hands; and flight attendants drink bottled water. He explained that discount carriers operate primarily 1- to 6-hour domestic flights; fly a large number of flights each day; typically carry 100 to 200 passengers; and usually have running water and soap. He noted that most discount carriers offer a snack and beverage service. He also noted the major carriers operate both domestic and international flights that typically have 100 to 500 seats; flight lengths of 1 to 18 hours; long flights that may offer full food and beverage services; lavatories with running water and soap; and fully equipped galleys.

Mr. Witkowski raised some concerns over placarding water sinks. He mentioned that although FDA regulations state all employees that prepare food must wash their hands with potable water, some airlines identify non-potable water with placards. He mentioned these placards might not be effective for children and non-English speakers and pose a problem for teeth brushing for flight attendants and passengers. Mr. Witkowski expressed concern that international travel poses serious disease risks and hand washing with soap and water is a critical step in preventing the spread of disease.

Mr. Witkowski conveyed that the Association of Flight Attendants has received numerous reports on sanitation problems in aircraft. He stated the association strongly believes that EPA, FDA, and FAA should ensure that galley and lavatory water is potable, in spite of the pressure to minimize costs, and should require running water on all aircraft with flight attendants. He reported the association would also support an independent testing program conducted by EPA during the AOC process, mandatory break time for flight attendants, and reducing the time aircraft can operate without functioning water and lavatory systems from 10 days to 72 hours.

John Grace, AFA Health and Security Committee Chair, shared excerpts from several reports from flight attendants regarding the unhygienic conditions onboard aircraft. These examples included reports of diarrhea and abdominal cramps associated with consumption of hot water and coffee onboard a regional jet, a lack of water pressure and ground power when aircraft are parked at the gate (when flight attendants need to use and clean lavatories), and broken lavatory systems that led to severe overflows.

Discussion and Responses to Questions

Coffeemakers
A participant asked what temperature was reached by water in coffee makers while in-flight. Another participant reported coffeemakers generally heat the water to about 185 degrees Fahrenheit, which was noted as being above the pasteurization temperature.

Location for disinfection procedures
A participant asked where sanitation procedures are completed. A presenter responded that sanitation procedures are completed in the hangers where potable water cabinets are available and that the disinfectant solution and water are added through a fill port in the aircraft.

Monitoring after disinfection
In response to a question on whether a bacteriologic test is performed after disinfection, a participant answered that they are not done on a routine basis after disinfection unless a problem is suspected.

Filters
A participant asked where carbon filers were installed on aircraft water systems. A presenter responded that airlines do not currently install carbon filters on water tanks, but only on coffee makers.

Potable water in lavatories
A participant noted that although regional jets have placards where water is not deemed safe to drink, they reported seeing cups in some of the placarded lavatories. A participant mentioned they would not want to drink water from lavatory sinks. Another participant noted lavatory sinks are often the only cold water taps available on the aircraft for collecting water samples.

Lack of hygienic conditions
There was some discussion regarding whether the reports from flight attendants were anecdotal anomalies or common problems. A presenter stated that there were a significant number of reports collected over the last 2 to 2.5 years. Flight attendants confirmed that some situations occur every day, which are especially problematical on aircraft that lack potable water.

Lack of running water
A participant expressed concern that since clean hands are necessary to serve drinks and food, especially after using the lavatory or after addressing a medical problem, running water was essential. The participant noted that although some airlines provide flight attendants with kits, which include gloves, to deal with bodily fluids, the aircraft might not provide running water to wash hands after utilizing the kits. Another participant noted that some flight attendants have repeatedly asked the airlines to provide gloves for food service, but the airlines have chosen not to provide them. It was noted that whether flight attendants wear gloves while serving food must be determined by the airlines and unions, since it is not required by regulation.

Definition of food handling
Discussion addressed the need for a more clear definition of food handling as it relates to prepackaged food distributed on aircraft and a related requirement for running water and soap for hand washing. It was noted FDA has not established a definition for food

handling and there is a need for consistency in the terminology. The participant said food service has been defined, but is different from food handling. It was also noted that a definition would affect other FDA applications and would need to be addressed with those in mind.

Boarding foreign water
Regarding how an airline determines whether it will board foreign water, a participant noted that each airline collects data on foreign water using its own procedures and that some take quarterly samples at international airports and will not board water if the samples fail to meet U.S. drinking water standards. Another participant stated airlines also make extensive efforts to find safe water and food in developing countries.

Reporting procedures
In response to a question regarding the reporting of sanitation problems, a presenter explained that the Association of Flight Attendants collects reports from flight attendants on sanitation problems. They indicated the reports are submitted to the appropriate air carriers and some carriers, such as Continental, use a hotline to collect complaints to identify trends. It was noted OSHA also collects data from carriers on work-related injuries.

Placards
A participant asked whether signage and placards are an acceptable alternative to providing safe water and cautioned that such placards might discourage people from washing their hands. Discussion included comments that based on sampling results, some airlines that use placards for non-potable water have found their water quality to be lower than in municipal water systems. It was noted that other airlines that use placards have a 5-gallon tank, which is disinfected annually, but water is not sampled using EPA-approved tests. Since these airlines cannot ensure the water is potable so they post notices on placards. It was also noted that WSG 29 specifically allowed airlines to use placards if water is not deemed potable.

Regulations covering cabin quality
A participant noted that FAA procedures were changed after September 11, 2001, to require an operating front lavatory for use by the pilots. The participant suggested FAA should further revise their required procedures to cover other cabin quality issues, which are not covered by other agencies. For example, the participant suggested guidance should be developed for lavatory cleaning procedures, and a tracking and reporting process should be implemented to address problems.

Sampling in stationary Transient Noncommunity Water Systems (TNCWSs)
A participant asked whether there is a sampling requirement for lavatories in restaurants. An EPA representative responded that the state regulatory agency or health department is responsible for ensuring water served at stationary water systems is potable water. They noted that if a restaurant has its own source of water they would collect a bacteriological sample and the lavatory may be one location where samples are collected, although more often a tap in the kitchen may be used. EPA also noted it is important in all cases to

ensure the tap is cleaned and flushed before taking samples. In addition, it was mentioned that sampling points must be available 24 hours a day. EPA indicated they would encourage public water systems that serve airports to collect samples in the airports as part of their distribution system sample-siting plan required for compliance with the Total Coliform Rule.

Consumption of galley water
A participant noted that when the supply of bottled water is used up during flight, some airlines allow water bottles to be refilled with galley water.

Effectiveness of disinfectants
A participant noted that although chlorine dioxide has been proven to be an effective disinfectant, the procedures for disinfection are in question and the effectiveness of disinfectants on biofilms is still being studied. A participant noted it appears that chlorine dioxide is effective at penetrating and inactivating biofilms; however, the effectiveness of disinfectants varies by contaminant. EPA is currently developing information on disinfectants and biofilms.

Whether selling water as a beverage would count as selling water
EPA responded that they did not believe selling beverages for direct consumption would be considered 'selling' water but they will refer to the question to the Office of General Council.

Disinfectant Residual Monitoring in lieu of bacteriological sampling
A participant asked whether additional disinfectant residual monitoring could be performed instead of bacteriological monitoring. The participant stated they believed the logistics of getting bacteriological samples to an approved laboratory were prohibitive. EPA responded that this may be looked at as an option in the future and acknowledged the time delay in receiving sample results means several additional flights may have occurred before test results are reported to the airline.

Overview of Current Multi-Agency Regulations Affecting Aircraft Water Systems and Watering Points

Rick Naylor, EPA OGWDW, presented an overview of how aircraft drinking water is regulated by EPA. Mr. Naylor explained that all public water systems (PWSs), including ICCs, are regulated under the Safe Drinking Water Act and, therefore, ICCs are subject to national primary drinking water regulations (NPDWRs). He noted that a PWS is a system that serves water for human consumption through at least 15 service connections or serves an average of at least 25 people daily for 60 days or more per year. He also noted that water consumption includes water used for cooking, drinking, dishwashing, and maintaining oral hygiene. He explained that a PWS could be excluded from regulation if it meets all of the following conditions:

- Consists of only distribution and storage facilities

- Obtains all of its water from, but is not owned or operated by, a PWS to which the regulations apply
- Does not sell water
- Is not a carrier that conveys passengers in interstate commerce

Mr. Naylor indicated EPA and FDA jointly regulate ICCs through a memorandum of understanding (MOU). He also indicated the regulations apply to aircraft as follows:

- Under the NPDWRs, aircraft would be considered TNCWSs and surface water systems (since they may use surface water or ground water under the direct influence of surface water (GWUDI) in whole or in part).
- Based on the NPDWRs, TNCWSs using surface water that serve 25 to 1,000 persons per day are required to take one total coliform sample every month, one nitrate sample every year, one nitrite sample every 3 years, and conduct one sanitary survey every 5 years.
- The Surface Water Treatment Rule and Long Term 1 Surface Water Treatment Rule require at the treatment plant: turbidity monitoring at the filters, and specific log removals of *Cryptosporidium*, *Giardia*, and viruses through filtration and disinfection. In the distribution system, one disinfectant residual sample must be taken every month (at the same time and location as samples collected for compliance with the Total Coliform rule).

Mr. Naylor pointed out that taking one total coliform sample per month or one disinfectant residual sample per month is not very meaningful for an aircraft that obtains water from multiple sources. He mentioned that although some monitoring would be useful, because aircraft board their water from so many different sources, it would be difficult to sample frequently enough to always know whether an aircraft's drinking water was contaminated.

Mr. Naylor explained that the NPDWRs give EPA and states flexibility in determining monitoring schedules for consecutive systems, which obtain all their water from another PWS. He noted that there might be problems with categorizing aircraft as consecutive systems since aircraft do not have fixed connections to PWSs which presents a variety of opportunities for cross contamination. Also, many aircraft obtain water from foreign sources that are not subject EPA regulations.

Dean Davidson, FDA, summarized the FDA's role in the development of drinking water regulations on aircraft.

FDA's role in water on conveyances is guided by the Public Health Service Act, section 361, Quarantine and Inspection, that provides the legal basis for FDA's regulations that pertain to passenger conveyances in interstate commerce and their the food, water, and waste systems. Section 361 of the PHS Act focuses on the transmission of communicable disease from state to state and from foreign countries into the U.S. Passengers and crew on conveyances in interstate commerce, the food, water, and the waste systems aboard these conveyances historically have been a source of disease outbreaks. These outbreaks and their underlying causes were the driving force in the

development of the Interstate Quarantine Regulations to protect the crews and traveling public and resident populations from communicable disease and contamination of the environment where these conveyances stop and travel through.

- 1894 – Interstate Quarantine Regulations (IQR) were developed in response to the railroad's role in an outbreak of yellow fever in the late 1800s; waste was dumped directly on the tracks. The regulation allowed FDA to detain and quarantine sick individuals.
- 1911 – Great Lakes steamers experienced waterborne disease outbreaks.
- 1912 – IQR was amended to prohibit sharing of cups and towels.
- 1913 – In response to an outbreak of typhoid, a section for handling of ice and water was added to IQR.
- 1919 – The first scheduled airline and international flight.
- 1921 – IQRs were revised again in response to more illnesses. In the amendments, water was required to be obtained from a source approved by the Surgeon General; milk was required to be pasteurized; states were forced to cooperate with agencies; certificates were issued for water supplies; requirements were made for general sanitation and cleanliness; cross connections were prohibited on vessels; and disinfection methods were described.
- 1922 – Treasury Department Circular #282 was published that required the installation of potable water systems on vessels.
- 1925 – With passage of the Kelly Air mail act, the US Postal Service contracted many aircraft to carry mail. This provided the necessary stimulus that resulted in rapid expansion and growth of the passenger airline industry that we see today. With more passengers came more amenities, e.g., food and toilets.
- 1935 – Aircraft in flight were forbidden to let matter fall during flight.
- 1939 – IQR was transferred to the Federal Security Agency, which played a critical role in handling pandemics.
- 1943 – 1,179 men became ill as a result of a cross connection problem in a vessel's water system.
- 1944 – Comprehensive vessel evaluations were required.
- 1947 – Regulations were re-codified to 42 CFR Part 72.
- 1953 – Department of Health was created from the Federal Security Agency.
- 1962 – Drinking water standards were amended.
- 1969 – Drinking water activities were shifted to FDA (Parts 1240 and 1250). FDA began issuing certificates of sanitary construction.

Mr. Davidson noted that FDA has not determined whether washing hands is considered to be a culinary use in the context of regulations that apply to conveyances in interstate traffic. FDA regulations require that toilet and lavatory facilities, that is, hand wash sinks with running water of appropriate temperature be provided on conveyances for food handling employees. Food handling is not defined in the regulations. It is sound public health policy and a protective measure against communicable disease transmission that persons wash their hands frequently and particularly after using the toilet, handling garbage, or touching unsanitary surfaces.

Barry Basse described FAA's role in drinking water regulations. He noted that FAA doesn't have any regulations that directly affect potable water but they do have maintenance requirements for aircraft (14 CFR 43). He explained airlines must have a continuous airworthiness maintenance and inspection program (14 CFR 25), which includes tracking servicing information, capacity of tanks, and other relevant information. He indicated manufacturers produce a maintenance planning document, maintenance manual, and maintenance review board report, which should be followed by airlines.

Mr. Basse stated that under FAA's surveillance programs, principal inspectors examine carriers' maintenance programs, cabin safety issues, etc. He said carriers are recertified based on whether they meet current regulations, and sanctions can be applied if they are out of compliance. He also noted that the National Work Program oversees the tracking and reporting system for compliance, and administers sanctions for noncompliance and this information can prove vital during pandemics and outbreaks.

Discussion and Responses to Questions

Logistical constraints for sampling
A participant stated quarterly testing is difficult for airlines to complete for logistical reasons. The participant believed sampling methods that have a quicker turn-around should be considered to enable airlines to address contamination problems more efficiently. They expressed that if faster sampling methods are not available, EPA should have airlines test for other indicators that have easier and more rapid tests. *Onboard treatment*
A concern was expressed that if airlines install filters or UV treatment devices onboard an aircraft to treat all boarded water, the aircraft would be considered a water treatment facility and would be subject to all the NPDWRs.

Water Supply Guidance
A participant noted that WSG 29 allowed airlines to develop O&M plans in lieu of monitoring for NPDWRs. EPA responded that they determined monitoring does not provide enough useful information and regular disinfection is more important in this type of system. They also indicated that although EPA has discontinued WSG 29, they still recommend using the procedure for disinfecting tanks.

Boarding water from foreign sources
A participant noted that although drinking water in many countries may not meet U.S. standards, aircraft usually obtain water from private companies that treat their water to U.S. standards. EPA clarified that public and private systems are both subject to the NPDWRs based on the number people they serve. EPA stated they do not currently have information on foreign water sources used by different airlines and do not have control over where aircraft take on water. They also noted it is unlikely that EPA will list

countries where airlines can and cannot board water, but EPA does hope to gather crucial information on this topic based on data provided under the consent orders.

EPA is currently meeting with the Canadian government to develop parallel programs. EPA, in working with international organizations such as the International Air Transport Association, World Health Organization and the International Civil Aviation Organization, hopes to establish international protocols for airline drinking water. At an International Air Transport Association meeting on cabin health, EPA shared its ideas and direction on regulation of airline drinking water.

Requirements for hand-washing facilities

It was noted regional airlines and FDA have had long discussions about requirements for running water onboard aircraft on which food is prepared/served. Packaged food is served on regional airlines and is not covered under the regulations. Although regional airlines look forward to a breakthrough in gels and hand wipes (in lieu of washing hands with soap and water), FDA indicated that they would not support an alternative procedure to hand washing.

Alternative hand cleaning methods

FDA reported that although the effectiveness of hand gels and wipes has improved, they do not offer the save level of public health protection as washing hands with soap and water. FDA is currently developing criteria to approve hand antimicrobials for food service use and consumer use. FDA representatives noted that it is unlikely that any will be approved for consumer use (with the possible exception of alcohol hand gels) as there is no proven benefit of using antimicrobial over soap and water and there are serious concerns about developing anti-microbial resistance.

FDA representatives further explained that hand wipes are less effective than gels in cleaning hands and both are most effective when used on clean (not contaminated) hands. FDA mentioned reports of studies that showed on contaminated hands, hand washing achieves 2-log removal, gels achieve 1-log removal, and hand wipes achieve less than 1-log removal. Therefore, gels and wipes are not replacements for washing hands with soap and water. FDA indicated regional airlines may need to consider switching from gels and hand wipes to bottled water, but need to decide on a standard procedure.

Priority of various regulations

A participant noted that regional carriers are required to shut off water to avoid freezing the water system, and FAA regulations do not allow aircraft to operate for more than 10 days with a nonfunctioning lavatory or water system. The participant stated regional carriers are uncertain which regulation applies, especially if hand washing facilities are required. It was recommended that the airlines pose this question to their principal inspector to resolve their question.

Minimum Equipment Lists

A participant asked whether a MEL could be changed. FAA responded that the master MEL from FAA is the benchmark for all airlines and each airline can create its own MEL, but it cannot be less restrictive than the master MEL. They indicated that to

change the master MEL, airlines would need substantial amounts of data on contamination and sanitation problems (reported on a per flight basis).

Jurisdiction over watering points
A participant asked whether FDA or EPA regulates watering points. Presenters clarified that FDA approves each watering point, but watering points are also part of a distribution system, which allows EPA to regulate them. It was also noted that FDA refers to EPA's regulations for water quality when approving watering points, so the agencies complement each other.

DAY 2: JANUARY 19, 2006

Facilitated Panel Discussion: Perspectives on Scope of Issues for Regulations Tailored to Aircraft Water Systems

A diverse panel was asked to comment on a preliminary list of issues for EPA to consider while developing regulations for aircraft drinking water systems. The panel posed questions and topics not considered by EPA, proposed new approaches for the rulemaking, and discussed key topics in more depth.

Katherine Andrus, Air Transport Association, stated her organization believes the problem with aircraft drinking water systems is a regulatory problem, not a public health problem. She indicated that if the systems posed a serious public health risk, agencies would handle the situation differently and take action. She noted the journal Lancet recently published a study on outbreaks related to air travel, but none were traced to aircraft. She acknowledged that since the study relied on reported cases of illness, the study is not perfect, but that available records do not suggest a water quality problem on aircraft.

Ms. Andrus emphasized the need for drinking water regulations to be carefully tailored to aircraft to meet their unique design and operation. She said frequent monitoring would not provide enough information to make the cost and burden worthwhile, since aircraft board water from multiple sources. Ms. Andrus suggested that EPA adopt a systems management approach that prevents problems at each section of the water system. She believed this approach should consider system design, operation, and monitoring data and that the systems management approach has been proven to be very effective.

Ms. Andrus also proposed the establishment of different MCLs for aircraft drinking water systems, since consumption and exposure patterns differ from stationary systems.

EPA clarified that the SDWA clearly adopts one set of MCLs, which must remain uniform across all PWSs, and EPA can only change monitoring and operational requirements for systems.

Christopher Witkowski, Association of Flight Attendants, emphasized that aircraft without hot and cold running water pose health risks. He believes that the installation of technology to treat water onboard U.S. aircraft should be considered. He also stated it is clear that there needs to be cooperation between EPA, FDA, and FAA to resolve the numerous issues associated with aircraft drinking water systems. Mr. Witkowski would support testing conducted by EPA or FDA and, at a minimum, would like to see them involved in the sampling. He believes that would give airlines an incentive to comply.

Stan Mackiewicz from, National Air Transportation Association explained that rulemaking takes years to complete, and sometimes rulemakings are never finalized. He expressed concern that enforcement of regulations is often difficult, demonstrated by the lack of enforcement of current regulations. Mr. Mackiewicz stated that although

technology is available to improve drinking water quality on aircraft, application of the technology through regulation is more challenging. He believes airlines with financial constraints are unlikely to follow advisory circulars or guidance and will only comply with minimum requirements in regulations. Other panel members agreed that guidelines are not going to be effective in reaching EPA's goal and that regulations are necessary.

Mr. Mackiewicz emphasized the effectiveness of safety management systems implemented by air carriers and felt this philosophy could also be applied to drinking water systems on aircraft.

Tyler Setchell, American Association of Airport Executives, stated that he is not aware of any major drinking water problems on aircraft. He expressed concern over the burden and costs imposed by sampling and speculated that costs incurred by airports would be passed onto airlines. Mr. Setchell emphasized the need to provide clear direction for airport operators regarding their responsibilities and any changes in operation and maintenance procedures. He also noted that although aircraft drinking water is primarily an airline issue, many airports own and operate the water cabinets. Mr. Setchell is also concerned that the source of contamination in drinking water will be difficult to trace, leading airports and aircraft to push fault onto each other.

Erik Olson, Natural Resources Defense Council (NRDC), reminded attendees that monitoring data collected by the airline industry and EPA showed widespread bacterial problems on aircraft. He noted that documenting waterborne illnesses associated with exposure to aircraft drinking water systems is not critical in justifying the need for additional regulation, especially since pathogens generally have incubation periods that exceed the length of most flights.

Mr. Olson pointed out that water used to make coffee and tea onboard is not boiled, which CDC recommends to inactivate key pathogens of concern. Mr. Olson also stated that water should be equally safe in TNCWSs in the air and on the ground, particularly to protect the immune-compromised population, which is more susceptible to waterborne illnesses.

Mr. Olson suggested potential elements that EPA could include in the rulemaking, including disinfection requirements for boarded water, requirements for distribution systems, O&M, monitoring, and reporting. He also believes jurisdictional issues of water cabinets should be clarified, and that sanitary surveys would be an important component if the rule uses a systems management approach.

Nancy McKinley, International Airline Passengers Association, stated she would like to see documentation of a water quality problem so EPA can develop a rule that is directly proportional to the actual health risk. She noted that although flight attendants and passengers have complained about a variety of sanitation problems on aircraft (e.g., non-functioning restrooms, food poisoning issues), none involve drinking water. She acknowledged people might not isolate drinking water as the source of their illness or problem.

Ms. McKinley and Mr. Mackiewicz both emphasized the importance of collecting data (through sampling and logging of complaints, for example) to determine the risk of exposure to aircraft drinking water. They believe that EPA should wait until they have collected and reviewed additional data before moving forward. Ms. McKinley stated that the risk model EPA develops should consider consumption patterns on aircraft. She felt this type of information could be collected in a survey of her members. Charles Otto, CDC, suggested she include water consumption patterns in their survey so that teeth brushing, use of bottled water, and other water use practices are included.

Ms. McKinley pointed out that disclosure is essential to minimize risk for passengers, which makes reporting critical. Therefore, she believes disclosure should be incorporated into the rulemaking. She also emphasized manufacturers are an important part of the regulatory process since designing new aircraft that meet new requirements is preferable to retrofitting existing aircraft.

Charles Otto, Centers for Disease Control Environmental Health Services, mentioned the substantial number of hazardous analysis critical control aspects that apply to aircraft drinking water systems, and that close collaboration is needed with the airline industry to make the approach effective. He noted that currently the burden of boarding foreign water falls on the airlines. He also noted CDC has information on their Web site regarding procedures for boarding water from foreign sources, which focus on an inspection process to validate a system. He suggested this procedure could potentially be tailored and incorporated into aircraft drinking water regulations.

Discussion and Responses to Questions

Interagency coordination
Participants agreed interagency coordination should include FAA, FDA, and EPA and that FAA's maintenance requirements may indirectly affect drinking water requirements.

Guidance versus regulation
A participant asked whether WSG 29 could be used again. EPA responded that the intent of WSG 29 was to tailor the NPDWRs to ICCs and that legally guidance cannot overturn a regulation. Therefore, EPA needs to correct this problem by changing the regulation.

Potential marketing tools
A participant suggested that there is potential for airlines to use improved drinking water quality as a marketing tool, similar to promotions for Boeing 777's air program that allows fresh air into cabin (instead of recycling the same air). The participant noted a variety of water treatment products are available from manufacturers, but regulations will still need to effectively reduce health risks.

Consumption of water on aircraft
It was noted that many people do consume galley and lavatory water on planes, especially children. On some airlines, water served to economy class is galley water (as opposed to bottled water) as a cost-saving measure. The need for safe water onboard aircraft was emphasized.

EPA should wait for data
It was noted that data currently being collected under the AOCs would take about a year to acquire. Attendees stressed that EPA should wait for data before developing the rule, as the data may show that poor water quality on the aircraft may not be directly related to the components of the system under the airlines' control. For example, it is possible the cabinets are the source of the contamination, the water delivered from the airport may be contaminated, or operators need additional training on how to board water onto planes. Participants noted that although sanitizing water before it enters aircraft is an option, treatment systems on aircraft would be very expensive to install and maintain.

Sanitation program for buses
A participant noted that FDA regulates the bus sanitation program, which does not use running water. It was also noted that although hand sanitizers are available in lavatories, they are only effective on clean hands. A participant stated there was a documented outbreak involving a rotavirus on a bus traveling cross-country.

Alternatives for airlines
There is concern that regulations may force airlines to remove their water system to remain cost effective. Participants believed this action would increase the public health risk and water should be available for hand washing. Participants stated EPA needs a regulatory approach that is reasonable in cost and still protects health. It was noted treating water at the watering point and/or onboard the plane with a point of use (POU) treatment device along with the training for ground handling crews are some options that should be considered in the regulation.

Approach to Rulemaking Process

Mr. Stephen Heare, Director of the Drinking Water Protection Division in EPA's Office of Ground Water and Drinking Water (OGWDW), presented EPA's approach to this rulemaking process. Mr. Heare provided a historical perspective on rulemaking efforts for public water systems and the basis for tailoring the implementation of existing health-based drinking water standards to aircraft public water systems.

Mr. Heare explained that most rulemakings involve the development of a health-based standard to regulate a specific contaminant (e.g., *Cryptosporidium*, *Giardia*, nitrite/nitrate) and require a significant amount of time. To collect occurrence data on a contaminant, EPA often requires selected PWSs to sample for the contaminant of concern. EPA uses this data to determine the occurrence of the contaminant and to conduct a risk analysis. These analyses help EPA decide whether to regulate the contaminant. If regulation is deemed necessary, EPA develops standards for the

contaminant of concern. The standards may consist of an MCL, a treatment technique, such as filtration, or even an action level.

Mr. Heare noted that compliance with an MCL is usually determined through monitoring, but that in some cases monitoring can be based on a surrogate (e.g., monitor turbidity instead of pathogens). He noted that rules could be risk-based targeted, meaning that systems must meet requirements based on the measured level of contaminants in their system.

Mr. Heare explained that some contaminants, such as lead, enter the water system through plumbing instead of the water treatment plant. However chemicals added at the treatment plant can promote corrosion in pipes and intensify the contamination problem. He noted that EPA created an action level since there is no safe level for lead in water and compliance with the action level is based on a statistical analysis of measurements taken at taps throughout the distribution system.

Mr. Heare acknowledged EPA lacks evidence that illnesses are directly related to exposure to aircraft drinking water systems. He stated that although outbreak data is considered during a rulemaking, it is not essential for EPA to collect this information to support a rule. He emphasized EPA is interested in preventing problems and reducing public health risks rather than reacting to a problem after it occurs. He said that while EPA would like to obtain additional outbreak data related to waterborne illnesses, as it would also help them measure the effectiveness of current NPDWRs, detailed data on outbreaks is generally very limited for a variety of reasons.

Mr. Heare noted that EPA retained the company RESOLVE to help EPA develop and facilitate a collaborative stakeholder process to tailor the implementation of existing health-based drinking water standards to aircraft PWSs. As part of this process, EPA expects to sponsor two or three learning workshops before proposing regulations for aircraft drinking water systems. In an effort to promulgate the regulations as quickly as possible to protect the health of crew members and passengers, EPA hopes to propose the regulation in 2006 and finalize it in 2007. Since EPA originally planned to propose the rule in 2007 and finalize it between 2008 and 2010, EPA will do its best to meet the accelerated schedule. AOCs are currently in place with about 40 different carriers, which will provide data for the rulemaking.

Mr. Heare stated that since the Office of Management and Budget (OMB) must review all of EPA regulations, EPA would work together with OMB to develop the background documents to support the rule. In particular, OMB reviews data used to support the economic analysis, risk analysis, and other documents. Mr. Heare explained that typical rulemaking documents include a preliminary screening analysis, technology and cost document, health criteria document, occurrence document, risk analysis, and economic analysis, although EPA may be able to combine some documents. He described the background documents as follows:

First, EPA must develop a screening analysis to determine if the rule will have a significant impact on a substantial number of small entities. The technology and cost document considers Best Management Practices (BMPs), technologies, and their costs to reduce health risks on aircraft. By the next workshop, EPA hopes to have options for the technology and cost document so they can be reviewed and discussed. The health criteria document looks at the likelihood that contaminants will be present in the drinking water system, including cabinets, carts, trucks, and hoses.

The occurrence document summarizes the nature and occurrence of contaminants and situations that lead to contamination (e.g., improper handling of filler hoses). The economic analysis will be a key piece of the rule, similar to past rules, and will compare the costs and benefits of alternative rule options. EPA expects the risk analysis to be difficult to complete due to a lack of data on outbreaks and exposure. The risk analysis will consider the likelihood that someone will get sick from drinking water on an airplane. Information used to generate the risk assessment and all studies will be made available to the public.

EPA used the AOCs as a bridge to ensure consistency in how airlines handle drinking water. The AOCs include monitoring requirements, BMPs, corrective action, public notification requirements, and a study of possible sources of contamination. The AOCs are expected to contribute a significant amount of information that will be useful for most of the background documents. EPA found that the AOCs had to be tailored due to differences between carriers. These differences included practices for boarding foreign water (e.g., avoiding water in certain countries), operations, disinfection practices, sampling, and the general philosophy. Therefore, each AOC will likely provide different types of information.

If new issues arise as a result of the AOCs or if EPA needs to solicit more information or comment on the rule, EPA will publish a Notice of Data Availability (NODA) in the Federal Register. This would likely occur after EPA proposes the rule.

In response to comments that EPA should wait and investigate whether disease outbreaks from aircraft water systems have occurred, Mr. Heare noted that EPA recognizes they are lacking good data on disease outbreaks in public water systems as a whole due to underreporting. He also noted EPA does not need to find out how many people have become sick in order to develop a regulation, and does not need to revisit the health effects of the contaminants in question because they are well established. Mr. Heare indicated EPA feels it would not be productive to look for outbreaks of illness because reports of such incidents will be anecdotal due to the transient nature of aircraft passengers. EPA believes the best approach is to focus on how to apply existing requirements to aircraft water systems.

Discussion and Responses to Questions

AOCs
A participant asked whether AOC information would be available. EPA responded that Laurie Dubriel at EPA has developed the AOCs with the various airlines. She said EPA intends to aggregate the data and will present it to stakeholders if there are any trends or conclusions. EPA also stated they will also make the information available on their Web site.

EPA should wait for data
Attendees supported waiting to propose a rulemaking until the data from the AOCs becomes available. EPA responded they are also concerned about the timing of the information and the rulemaking, but hope to use and benefit from information collected under the AOCs in subsequent workshops.

Monitoring approaches
It was suggested that EPA monitor disease-causing organisms, such as *Legionella* and *E. coli O157:H7*. EPA explained the analytical and cost problems associated with monitoring for pathogens and that using an indicator of fecal contamination, such as total coliform, is the simplest and most cost effective sampling method. EPA noted that pathogens often occur in low numbers and it would be difficult to detect the organisms in the volume of water sampled. EPA also noted they are mostly concerned with acute health effects such as are caused by nitrates/nitrites and bacterial contaminants. EPA indicated it is likely they will consider monitoring requirements for total coliform (and *E. coli* when a total coliform sample is confirmed), Heterotrophic Plate Count (HPC), and disinfectant residual in the rulemaking.

Additional testing
A participant asked if there would be another round of EPA monitoring. EPA responded that although EPA has not talked about conducting another round of sampling or spot checks, EPA could decide to conduct one in the future, depending on the information provided by the carriers under the AOCs.

Risk assessment
A participant asked whether criteria used for the risk assessment model will be available to the public and whether the risk will be associated with hand washing since bottled water is provided to most airline passengers. EPA responded that risks associated with total coliform positive samples would not be revisited under the aircraft drinking water regulation as these have already been discussed in detail under TCR. EPA also explained that in the risk assessment, risk is associated more with occurrence than with the risk of illness from drinking water compared to washing hands with contaminated water. Since water could potentially be consumed all aircraft with running water and all TNCWSs should provide the same level of public health protection, all aircraft drinking water systems will be treated equally.

TCR monitoring
Participants asked several questions regarding follow-up sampling for positive samples and public notification. EPA responded that PWSs routinely collect total coliform samples each month based on the population they serve, not on how the water is used. For example, large systems may take 300 or more samples each month. When a system has a total coliform positive sample, it must be tested for the presence of fecal coliforms or *E. coli*. If any routine samples are positive repeat samples are required. If the positive sample is followed by another positive sample, then the system must conduct public notification, and investigate the source of the problem (e.g., water main break). All total coliform positive samples are tested to determine if they are also positive for fecal coliform or *E. coli*. If a stationary system tests positive for *E. coli*, it must issue a boil water notice until the problem can be corrected. Boiling the water onboard aircraft, however, is not feasible. Airlines would need to notify passengers to prevent them from drinking the water. Also, it was noted that airlines have an advantage over stationary systems, in that they can flush and disinfect their whole system.

Presentation: Options for Proposed Rulemaking

Rick Naylor, EPA OGWDW, presented a preliminary approach and options for regulating the aircraft potable water transfer and supply chain. The approach for the rulemaking draws on the Hazard Analysis and Critical Control Points (HACCP) and multiple-barrier approaches. Mr. Naylor explained HACCP assesses risk associated with each step in the water transfer and supply chain and focuses on managing these risks. The multiple-barrier approach puts in place barriers to prevent the contamination of drinking water from source to consumer. Mr. Naylor noted EPA gives states about $100 million each year to help run their drinking water programs but foreign sources of water are outside EPA and FDA's jurisdiction and the agencies lack information on their water quality.

Mr. Naylor explained that under the HACCP approach, the water transfer and supply train can be divided into a few major sections, which he described as follows:

- PWS or Foreign Source
- Airport authority and terminal
- Watering points and service providers
- Aircraft water systems

Airport authorities generally purchase water from regulated PWSs that must comply with, drinking water regulations. There is some risk that this water could be contaminated due to treatment failure, plumbing problems, cross connection/backflow problems, water main breaks, and contaminated storage tanks. There are a variety of preventative measures to reduce risk of contamination. For example, water suppliers notify airports and airlines of any water quality issues to prevent aircraft from boarding contaminated water. Microbial and disinfectant residual monitoring, cross connection control/backflow prevention programs, and on-site water treatment can also reduce risks. Airlines can also obtain information on water quality from foreign sources.

Service providers can adopt a variety of practices to avoid contaminating water while transferring it from watering points to aircraft. Workers should only use watering points approved by FDA, employ minimum maintenance requirements, follow proper procedures and protocols, and only use trained and qualified personnel. Even though the responsible party for boarding water may vary (e.g., contractor, airport, airline), it is important that disinfection occurs regularly. Watering points could use a point-of-entry (POE) treatment such as filtration and disinfection to ensure water boarded onto aircraft is safe.

Aircraft water systems have risks associated with cross connections from sinks and sewage systems, aging water (which leads to biofilm growth and depletes the disinfectant residual), and boarding water that has not been disinfected (e.g., provided by some foreign countries or a ground water source). Based on sampling results, disinfectant residual is undetectable in large percentage of aircraft. A number of preventative measures can be used to minimize the various risks associated with aircraft water systems. For example, implement cross connection control/backflow prevention programs, review by FDA of the plans and specifications for aircraft water systems, follow minimum maintenance requirements, conduct microbial and disinfectant residual monitoring, and install POU treatment.

Lavatory and galley sinks have additional risks that should be considered. Contamination can be transferred to the water users or the distribution system as a result of hand to surface contact, splash back and aerosols from sinks and toilets, and contaminated cleaning rags. Airlines can minimize these risks by using bottled water, placing placards above lavatory sinks in emergencies to use them for hand washing only, developing minimum cleaning and maintenance procedures, and installing POU treatment.

Ensuring that airports and airlines comply with regulations could be accomplished through a compliance assurance and surveillance program. Reporting and record keeping are important aspects of this program, but it needs to be clear what information needs to be maintained/reported and to whom. Sanitary surveys would be a very useful tool to ensure the aircraft water system is properly operated and maintained. These surveys should be based on flight hours rather than number of years and could be conducted by EPA, an approved third party surveyor, or possibly the airlines self survey using a certified checklist. Airlines currently self-survey the safety features of each aircraft and submit their surveys to FDA, a process that appears to be effective.

For compliance assurance, airlines should continue to only use FDA-approved watering points, and training and implementation guidance should be developed for owners and operators of watering points. FDA and EPA will need to play a role in providing compliance assistance, inspections and enforcement, when appropriate.

EPA generally agrees that a systems approach would be most effective for regulating the aircraft potable water transfer and supply chain. Most NPDWRs depend on monitoring to identify a problem after it has occurred, but EPA wants to focus on placing controls to

prevent problems in aircraft drinking water systems, especially since monitoring may not be as effective for mobile water systems like aircraft. Flushing and disinfection are crucial aspects of this approach and are not included in the current regulations. Public notification will also play an important role by notifying the public when a violation occurs. Notification can occur by posting information near lavatories, galleys, and drinking fountains or by distributing handouts to passengers. It will be more difficult to notify passengers after they de-plane, if a problem is detected through sampling. This poses a substantial challenge since results of monitoring may not be available for 24 hours or more after sampling.

Discussion and Responses to Questions

Certification for foreign watering points

Adequate measures to ensure that water from foreign sources is safe to board are critical to controlling risk Pieces of the program could potentially be modeled from CDC's procedure for cruise ships that load water from foreign ports. Charles Otto, CDC, reported that under the vessel program, at every approved port, the ship takes a free chlorine and pH sample, and reviews recent microbial reports from each port before boarding to verify that the water meets potable standards. In addition, he noted that most cruise ships have labs onboard that use EPA-approved methods. The ships monitor their chlorine residual on an hourly basis to ensure it remains at 2 ppm. If bacteriological monitoring results indicate a problem, the ship re-samples the tank to determine if there is a problem then discharges the water to sea if a problem is found. It was noted that cruise ship physical and operational characteristics are not parallel with aircraft and, therefore, some of these procedures would not apply to aircraft drinking water systems.

FDA's regulation of fish and fisheryproducts industry using HAACP

FDA described an approach that was adopted to address various contamination problems encountered in the fish and fishery products industry. This approach could potentially be adopted to regulate aircraft drinking water systems. Under FDA's approach, each facility is required to perform a hazard assessment, develop a plan to address each hazard (which vary between facilities), identify critical control points in the facility, and monitor these points on a regular basis. When the facility exceeds critical limits, as defined in the plan, it must investigate the problem. Verification procedures are necessary to ensure the hazards are minimized, and the plan is revisited if anything changes in the facility. Recordkeeping is minimized under this approach. A control site is also necessary under this approach where certain hazards can be controlled to determine the effectiveness of various measures. Finally, FDA developed a training program and a training manual to explain what the regulation requires and how a facility should assess its hazards.

FDA believes the HACCP regulatory approach minimizes the burden on FDA, but allows FDA flexibility, as they can revise the hazard guide as new threats emerge. They feel the regulation is effective for overseeing a large number of operators facing different situations while minimizing cost. The regulation also helped to improve consumer confidence in the fisheries industry.

Overall, FDA has found the HACCP approach to be straightforward, easy to apply, and flexible. The food processing and water business share some similarities, so the same regulatory approach may be applicable to both industries.

POU treatment

The use of POU treatment devices was discussed. Additional information on their effectiveness and feasibility for aircraft is needed. Also, the regulatory burden would be heavier on airlines if EPA requires POU devices. It was questioned whether this would be a viable option since systems are not allowed to meet SDWA regulations for acute contaminants using POU devices. It was also questioned whether a POE device used in an aircraft would technically be a POU device.

Avoiding rule requirements

A participant noted that if the rule is too burdensome or costly, airlines are likely to investigate ways to avoid being subject to it. For example, regional airlines may switch to 5-gallon tanks of bottled water. It was clarified that EPA does not require aircraft to have running water in the lavatories. That is an FDA requirement. Also, FDA not EPA regulates bottled water. EPA stated that the quantity of water served is not considered by drinking water rules and that the definition of a PWS will not be changed for this rule.

Flexibility

Although sampling efforts uncovered a problem with drinking water quality on planes, smaller airlines, particularly regional airlines, are concerned about the cost of fixing the problem. A participant noted that performance-based rulemaking allows more flexibility and regional airlines on tight budgets need flexibility, making this an ideal approach. There is concern that EPA will develop a rule that will lock airlines into a costly program to address a problem that may not pose a serious health risk.

Approach based on categories

FDA discussed another approach that involves categories based on the level of controls a facility has in place. After each facility determines its hazards and assesses the risks they pose, the facility places itself in the appropriate category. Facilities with stricter controls fall into a category with less supervision, while facilities with minimal controls are subject to regular audits. This type of program allows flexibility since facilities can influence their respective categories.

Update

A date for the next workshop has not been set.

LIST OF ATTENDEES

Katherine Andrus
Air Transport Association

Janet Baad
Alaska Airlines

Jenna Barbour
The Cadmus Group, Inc.

Glenn Bass
U.S. Food & Drug Administration

Barry Basse
Federal Aviation Administration

Ron Bergman
U.S. EPA

Scott Biernat
The Cadmus Group, Inc.

Manja Blazer
IDEXX Laboratories, Inc.

Marianne Csaky
Continental Airlines, Inc.

Ramon Cirio
JetBlue Airways

Gabrielle Coovrey
ENSR

Joe Cotruvo
Joseph Cotruvo & Associates / NSF International

Travis Creighton
U.S. EPA, Office of Ground Water & Drinking Water

Mark Dachille
Goodrich Corporation, De-icing and Specialty Systems

Deb Dalton
U.S. EPA, Conflict Prevention and Resolution Center

Dean Davidson
U. S. Food and Drug Administration Center for Food Safety & Applied Nutrition

Wade Davis
AirTran Airways

Spencer Davis
Ryan International Airlines

Christy Draper
STL, Inc.

Laurie Dubriel
U.S. EPA

Bill Edmunds (only 1/19)
Air Line Pilots Association, Int'l

Wendy Fanaselle
FDA/CFSAN

Kristin Fiore
United Airlines

Stephanie Flaharty
U.S. EPA

Holly Fleming
U.S. EPA

Angela Foster-Rice
United Airlines

David Fox
International Water-Guard Industries, Inc Unit One

AnnMarie Gebhart
Underwriters Laboratories Inc.

Sanjeev Gera
JetBlue Airways

Tiffany Goebel
Midwest Airlines, Inc.

John Grace
Association of Flight Attendants - CWA

Debra Gray
US Airways

W. Chris Harrison
Pinnacle Airlines, Inc./Northwest Airlink

Stephen Heare
U.S. EPA

William Hoffman
USA 3000 Airlines

Freeman Holifield
AF / ILEV

Angela Hsueh
Monogram Systems

Linda Hutchison
U.S. EPA

Maggie Javdan
U.S. EPA/ORD

Donna Jensen
The Cadmus Group, Inc.

Elaine Karnes
Southwest Airlines Co.

Ghassan Khaled
U.S. EPA

Neeraj Khanna
Bio-Cide International

Bruce Kummer
U.S. Food & Drug Administration

Gene Langereis
Air Wisconsin Airlines

Patricia Lemay
Health Canada

David Lotterer
Regional Airlines Association

Stan Mackiewicz
National Air Transportation Association (NATA)

Richard Marchi
Airports Council International - North America

Carol Maready
U.S. Airways

Clover Marsh
LCG, Inc.

Nancy McKinley
International Airline Passengers Association

Jason McLinton
Health Canada

Kevin Morley
American Water Works Association

Sharon Moss-Bonner
Atlantic Southeast Airlines - AFA

Rick Naylor
U.S. EPA

Jay Osterholt
PSA Airlines, Inc.

Charles Otto, III
U.S. PHS/CDC/NCEH

Scott Owens
Bio-Cide International

Noel Pacheco
Comair, Inc.

Craig Patterson
U.S. EPA

George Paul
National Air Carrier Association

Tim Pohle
Air Transport Association

Everett Pringle
U.S. EPA, Region 9

Leah Raney
Continental Airlines

Ganesh Rao
Underwriters Laboratories Inc.

Kenneth Rotert
U.S. EPA

Bernie Sanders
Air Line Pilots Association, Int'l

Mohammad Sarai
Maryland Department of the Environment

Bob Scharback
AeroSafe Products, Inc.

Loren Semler
Semler Industries, Inc.

Tyler Setchell
American Association of Airport Executives

Jennifer Singh
EMD Chemicals

Rob Skresvig
Gulfstream

Deborah Small
Northwest Airlines, Inc.

Melinda Smith
Atlantic Southeast Airlines, Inc.

Jessica Steinhilber
ACI-NA

David Supplee
International
Association of
Machinists

Michelle Sweeney
LCG, Inc.

Claude Thibeault
International Air
Transport Association

Frank R. Valenzano
Spirit Airlines

Kevin Vandeberg
Huntsville-Madison
County Airport
Authority

Everett Volk
U.S. EPA

Jean Watson
Federal Aviation
Administration

Bryan Weber
Underwriters
Laboratories Inc.
Christopher
Witkowski
Association of Flight
Attendants - CWA

Stephanie Woods
American Airlines, Inc.

Doug Wyatt
SkyWest Airlines

David Yuhasz
AeroSafe Products, Inc.

Victor Zare
Amtrak