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On Oct. 6, 2009, the U.S. Environmental Protection Agency (EPA) published the National Primary Drinking Water Regulations For Aircraft Public Water Systems to ensure the safety of potable water onboard commercial passenger aircraft. The regulations, which will take effect in October 2011, focus on inspecting all components that make up an aircraft's onboard potable water storage and distribution system. At the same time, they mandate what, for many carriers, will amount to a stepped-up rate of coliform sampling to detect the presence of harmful organisms in the water.

The new EPA rules come at a time when airlines are deploying equipment on more international routes and when business jets are flying into countries where water quality is suspect. These two trends could generate increased interest in water purification component retrofits or new water system maintenance procedures to assure passengers consume safe water.

“The traveling public is becoming more sensitive to environmental issues onboard the aircraft, and water is an environmental issue,” says David Fox, president and CEO of International Water Guard (IWG), a Vancouver-based specialist in on-aircraft potable water systems. As Fox explains, IWG's devices are installed at the water tank exit and/or at point of use, such as a galley or lavatory sink. As water passes through the devices, ultraviolet (UV) light irradiates any harmful microbes in it, rendering them harmless.

“Normally, the system is installed where the water exits the tank and enters the distribution system to the galleys and lavatories. That provides fundamental protection for the entire aircraft,” Fox explains. “For additional assurance, another unit could also be installed at a point of use, such as a wet galley. This provides a final barrier that secures the water safety because it kills off any bacteria that might be growing in the water lines throughout the airplane—beyond just the lavatory, which is closer to the tank exit.”

The IWG-A6, the company's latest product, has been selected by Gulfstream for its G650 long-range business jet, slated for service entry in 2012.

“To date, most installations have been done on long-haul, high-end business jets from Dassault, Bombardier and Gulfstream,” says Fox. About half of the Boeing Business Jets operating today have specified the NPS series of systems (IWG's other leading UV water treatment product) and that installations have begun on the Airbus Corporate Jet.

Most of the product installations are forward fit, either by the airframe OEMs or at a completion center, Fox notes. “Historically, about 10% of our sales have been for retrofit, but we expect this to grow by another 10% in the next few years, mostly in the business jet market,” he says. “We also see an evolving potential airline market as the need for water treatment becomes more recognized and accepted.”

One reason for this, says Fox, is that airlines, trying to address water quality problems, are uploading huge amounts of bottled water. “Large quantities of plastic bottles filled with water cause weight and space issues onboard an aircraft, especially a long-haul commercial jet.”

The other major supplier of onboard water purification systems is General Ecology. Its Versa-Pure product “uses no chemicals or direct electrical connection. It offers a choice of three interchangeable cartridges, which an operator can choose, based upon the cartridge's optimum characteristics for specific routes,” says President Richard T. Williams. “Using a proprietary

mechanism, all three were designed to retain bacteria and prevent it from multiplying within the cartridge, and possibly re-elute these organisms after dormant, nonuse [of the water system] periods. The cartridges also control scale and eliminate bad taste, odor and visible dirt—defined as larger than five microns of impurities. It will also filter out chlorine or other chemicals that may exist in the water system as a residual from maintenance."

"Commercial jets account for about 80-90% of our shipments worldwide, with most installations done by the OEMs at the factory. General Ecology has FAA-designated manufacturing and inspection representatives on staff who can assist the airframe OEMs and MRO facilities with any installation issues, including STCs, service bulletins or field approvals," says Williams.

According to IWG's Fox, most air carriers rely more on the application of disinfectants and testing rather than on devices placed at the point of exit or use of potable water.

"As it is now, in the time period between the application of disinfectants and water testing, there is nothing onboard most commercial aircraft to assure that water quality will be maintained and that contaminants are not reaching the passengers and crew," he says. "I think that the new EPA regulations might give the airlines at least an added incentive to address the root cause of water contamination issues and galvanize interest in applying the technology to do that."

It's not out of the question that the application of new technology might be required in the future to assure potable water safety.

"Based on the information that EPA had at the time of the rulemaking, there is not sufficient information or data to support a requirement of supplemental treatment for aircraft water systems," says Mindy Eisenberg, associate chief of the Drinking Water Protection Branch of the EPA in Washington, D.C. "However, EPA plans to revisit this issue as part of the six-year review of this rule under Section 1412(b)(9) of the Safe Water Drinking Act, and as more data become available."

### Corporate Applications

The real movement in the forward and retrofit market for onboard potable water safety systems appears to be in the heavy iron segment of corporate aviation.

"Over the past five to six years, an IWG water purification system installation has become a normal part of our VIP aircraft completion projects," says Tom Kennedy, president of Richardson, Texas-based Magellan Services Co. The firm provides engineering services to modification centers specializing in VIP configurations of large airliners. "Many of these airplanes will fly into third-world countries where water quality is questionable. In fact, about 75% of our completion projects are for operators from outside the U.S."

Kennedy reports that on a VIP aircraft, a single water purification system typically is installed below the deck, at the water tank's exit. "But we will specify additional units linked together, if a higher water flow rate is required," he says. "That's very typical for something the size of a Boeing 737 or Airbus A320. For the IWG systems, the flow rate is about four gallons per minute."

He adds that since the water treatment component is considered just one part of a full interior, its installation usually is covered under the STC for the total interior package.

In fact, in most cases, the installation of a water purification component, as a separate, stand-alone item, can be accomplished under a field approval, according to Matt Duntz, director of sales-interior refurbishment for Gulfstream Aerospace Product Support.

"It's a simple installation that places the unit at the water tank and then connects the UV unit to a 28V power source, a circuit breaker and a ground line," Duntz says. "The goal is to clean the water as it physically leaves the tank, filtering it as well as subjecting it to UV light. And, since all airplanes have an inspection program specifically for their water systems, the

purifier's installation could be done during the inspection process and require only an additional day or two to accomplish.”

Eddie Morrison, VP completions and integration at Midcoast Aviation, reports that the business aircraft modification specialist includes “passive” (conventional, non-electric) water filters in all of its baseline completion package specifications. However, the systems are engineered for an upgrade to an optional UV system.

“We offer the UV option on medium- to long-range business jets, such as the Challenger 605, Challenger 850 and Global Express,” Morrison explains. “However, the [selection] rate for the UV option is approximately 10% on the shorter Challenger platforms but much higher on the Global Express. It is also very commonly selected on very high utilization aircraft.”

Morrison reports that the selection of passive water filters remains popular because water purification often is not high on a customer's list.

“Many customers carry bottled water for drinking and don't travel internationally—or if they do, they are going to countries where they can trust the quality of the water loaded onto the aircraft.

Morrison says that a UV water filter adds 10-15 lb., depending on unit selected. While a UV filter does reduce the maintenance costs involved in accessing and replacing conventional filter cartridges, there is a tradeoff. “With all electrical components, there is a higher risk of failure,” he says. “For that reason, the mean-time-between-failure rate for a UV filter would have to be assessed, as well as the cost of replacement of a unit that is out of warranty.”

Morrison says that all of Midcoast's cabin water system installations are field approved, although the company is studying the marketing benefits of offering them under an STC. “Fitting a system via field approval means that you have to engage DERs to approve the installation on an individual aircraft basis,” Morrison says. “Often, if you try to export an aircraft with a field approved system, the importing country's airworthiness authority could take issue with the approval basis. Also, producing an STC means that the system can be kitted and sold as a pre-approved package that does not require any DER involvement.”

The EPA's Aircraft Drinking Water Rule and other supporting information are available on EPA's website at <http://www.epa.gov/safewater/airlinewater/index2.html>. For additional information about the rule, contact the Safe Drinking Water Hotline toll free Monday through Friday, 10 a.m. to 4 p.m. EST (except Federal holidays) at 1-800-426-4791.

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