AIRCRAFT DEICING FLUID: THE RECYCLING SOLUTION: CAN WE ACHIEVE SAFETY, CONVENIENCE, AND A CLEAN ENVIRONMENT?
By David C. Richardson

Over the past few decades, air transport has emerged as the preferred mode of transport for the nation. The public has come to demand and expect continuous on-time service to and from virtually any point on the globe in all but the most extreme weather conditions. However, during that same time, environmental awareness has demonstrated that practices that make on-time winter air travel possible can have a detrimental effect on the environment. Can the public have it all: safety, convenience, and a clean environment?

After investigations of several winter weather accidents during takeoff, the Federal Aviation Administration (FAA) concluded that in some cases ice had been a contributing factor. Therefore, the FAA has ruled that no aircraft be cleared for takeoff with ice of any kind adhering to its wings or control surfaces. This policy mandates aircraft deicing procedures during the winter months, a practice that at some point must be performed at nearly every airport in North America. The load of ice on the aircraft can send thousands of gallons of glycol-contaminated stormwater sloshing to the pavement. Over the past few decades, air transport has emerged as the preferred mode of transport for the nation. The public has come to demand and expect continuous on-time service to and from virtually any point on the globe in all but the most extreme weather conditions. However, during that same time, environmental awareness has demonstrated that practices that make on-time winter air travel possible can have a detrimental effect on the environment. Can the public have it all: safety, convenience, and a clean environment?

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A DEVELOPING MARKET
Todd Brinkel, general manager of EQ Resource Recovery Inc., says that, as with many other airports, Detroit Metropolitan Airport (DTW) had been reliant upon the local publicly owned treatment works (POTW) to treat its spent ADFs. However, that arrangement presented a set of drawbacks. “The loading was too much for their treatment systems at the POTW. More to the point, because of the seasonal nature of the loading, they would go from having no glycol or BOD load coming into their system, to all of a sudden having large slugs of glycol and BOD load, which would kill their bugs. It was very difficult to keep their bugs alive and acclimated to deicing fluids.” Brinkel says ADF collection and recycling programs can offer airport environmental managers a viable alternative to hefty BOD surcharges from local POTWs.

SUSTAINABILITY IN A CHANGING ENVIRONMENT

Dave Lusk: Introduction to EQ
Dave Lusk is President of EQ. Dave set the stage for the day, discussing EQ’s efforts in sustainability as well as a general update on EQ’s services and operations.

Bob Doyle: Sustainability and You
Bob Doyle is the Marketing & Communications Manager at EQ. He introduced and defined Sustainability, discussing its opportunities and challenges.

Andrew Lawlor: Sustainability Innovations and Strategies
Keynote Speaker Andrew Lawlor is a Professor at the University of Michigan - Ross School of Business. In Professor Lawlor’s presentation, he talked about innovations and strategies in sustainability and gave examples of several corporations that lead in this effort.

Dave Fiedler: Michigan Department of Environmental Quality - Environmental Assistance Plan
Dave Fiedler is the Manager of the Michigan Department of Environmental Quality Environmental Assistance Program. In this presentation, he explained the assistance options offered by the DEQ.

Todd Walton: Ford Decommissioning Process
Todd Walton is an Environmental Engineer at Ford Motor Company. Todd discussed the facility decommissioning process used at Ford.

Tom Kunes: Business Risk Management
Tom Kunes is Principal at Kestrel Management Services. His presentation discussed business risk management utilizing environmental and safety best practices.

EQ hosted a conference titled “Sustainability in a Changing Environment” for customers and other friends of EQ on August 13, 2008 in Detroit. It was a very successful day with approximately 250 people in attendance. The following describes the different presentations that were given throughout the day. Please visit EQ’s website at www.eqonline.com to download these presentations.
The original concept was to put it back on the airplanes as ADF, but that there was too much risk involved. “There were no real specifications for recovered glycol that would go back into deicing fluid, and there were very few people who wanted to take that risk. As a result, we developed markets for recycled propylene glycol, as a replacement for virgin glycol, in several other markets. Typically, our fluid is sold to paint manufacturers and antifreeze manufacturers, as well as to specialty chemical manufacturers.”

With its recycling facility two miles from the Detroit Metropolitan Airport, EQ, has held the contract for glycol recovery and recycling at the airport since 1997, when the DTW ADF recycling project began. During the deicing season, from October through April, EQ assigns a staff of five to the airfield to work directly with the airport’s environmental department.

DTW has four centralized deicing pads that drain to a series of collection tanks. Brinkel says most aircraft deicing operations are conducted on these pads. “We collect 96 to 97% of our fluid from the pads. The other 3% is collected by Glycol Recovery Vehicles [GRV] from the areas around the gate,” where he says deicing is sometimes permitted.

ADF recycling project requires a team effort, which he begins before the first aircraft arrives at the gate. Brinkel says during the winter, “We actually have morning operations meetings with Northwest Airlines to coordinate deicing schedules.” This allows EQ to deploy the GRVs in an efficient manner. The cooperative arrangement allows the airline the convenience of deicing some of its larger planes at the gate.

Brian Wagoner, environmental administrator for the Wayne County Airport Authority, says he is an advocate of the pads as part of the recycling scheme. “The more planes you get to the pads, the less dirty snow you have at the gates. If you’ve seen a gate deicing operation, you just get a mess; there are unbelievable amounts of sloppy, slimy, orange-pink snow. That stuff has a pretty substantial load associated with it. So if you can minimize that quantity, you can help yourself out.” He says the airport has found ways to make the deicing pads more attractive to carriers with changes as simple as “adjusting the width of the slots, which involves taking the paint off, putting new paint on, and putting out new airfield diagrams.” And he says it’s working. “Our quantity of contaminated snow has steadily gone down as we moved more and more planes to the pads.”

Under EQ’s contract with DTW, the airport receives monetary compensation for streams of spent ADF that it collects that are more than 5% propylene glycol. For streams between 2% and 5%, the airport pays EQ a fee for processing the material. According to Wagoner, however, this fee is “nothing compared to what it would cost to dispose of it at a POTW.”

As feedback for the recycling process, Brinkel says EQ aims for a target average glycol concentration of 15% from the mix of effluent streams. This, he says, ensures the economic feasibility of the recycling process. “Over the years, our average concentration from DTW has worked out to be about 17%.”

MOVING THE WATER

“A lot of times our bigger challenge is moving clean water, rather than handling spent deicing fluid,” Wagoner says. “If it starts out raining and you have a whole collection system that’s full of water, and then things turn to freezing rain, somehow you’ve got to move an awful lot of water and get ready to start moving spent deicing fluids.”

Wagoner says, “The first thing is to make sure the belowground systems and the aboveground storage areas are empty. Once the storm hits, we begin pumping as fast as we can, clearing clean water from the system while checking the concentration regularly. The minute we get to about 2% glycol, we start flipping valves,” he says, to capture the high-concentration runoff in the storage tanks. “The runoff from the deicing pads collected in the storage tanks must be transported by truck to the recycling plant. During big storms, we run trucks throughout the storm and pump directly from the underground vault into the trucks,” says Wagoner. “When the storm gets too big and we can’t keep up, we start filling the aboveground tanks.” From there, he says, “It’s a race against time. The trick is to have enough storage and enough transport capacity to handle a pretty nasty storm.” Brinkel says the recycling process starts immediately. “We have 7.6 million gallons of surge storage a half mile from the airport. Obviously, we can’t process the glycol as fast as it’s being collected, so it all gets mixed together, which gives us our average concentration.”

TURNING UP THE HEAT

As the tankers arrive at the processing facility, samples from each transport are collected and sent to EQ’s lab for on-the-spot analysis. There, a gas chromatography assay determines the “final” propylene glycol concentration. At this stage, the effluent is screened for contamination with ethylene glycol, which the airport prohibits. Once the material has been screened, it is introduced to a high-efficiency evaporator, which removes the bulk of the water, resulting in an effluent consisting of about 50% to 60% propylene glycol, 40% to 50% water, plus the additives. During the second stage of the procedure, a vacuum distillation process removes the rest of the water and distills the propylene glycol. Brinkel says the impurities, such as suspended solids, the mineral content of the water, and the ADF additives, are left behind in what is called “the heel.” The product of the distillation process—99.5% pure propylene glycol—is ready for market.

Brinkel estimates that during the winter of 2004–2005, the recycling program collected 888,000 gallons of pure deicing fluid that otherwise would have required treatment at the POTW. “I believe our program saves the airport $2 to 3 million per year in BOD surcharges, while netting a valuable commodity that can be reused.”

DOING IT SMALL

Todd Brinkel says EQ, while managing glycol collection at DTW, also manages ADF collection for nearby Willow Run Airport, which serves mainly cargo traffic. Brinkel says EQ has one tractor-mounted GRV stationed at the airport that “we operate during storm events only. Once the material is loaded on tanker trucks, it can be brought to the recycling plant at DTW.”

REUSING THE MOLECULE

For recycling to work well, Brinkel says, “Everybody needs to be on the same page: the airlines, the airports, and the contractors. Furthermore, “Everybody needs to be working toward the same goal of not just recycling, but staying in compliance with their environmental permits.”

“When it can work,” Brinkel explains, “the recycling program is obviously better for everybody—you’re actually reusing the molecules and saving resources.” He acknowledges, “There are some cases when destruction of the molecule is the most cost-effective way to go, but we’d like to see everybody who can recycle, do so.”

Author’s Bio: David C. Richardson is a journalist based in Baltimore, MD.

To read more about EQ and aircraft de-icing visit Stormwater online at www.stormh2o.com.
Contaminated sediments are a major concern in the Great Lakes Basin. Although toxic discharges have been greatly reduced over the last 20 years, high concentrations of contaminants in sediments are still a major concern. EQ is helping to reduce these contaminants by being involved in a large remediation project. The EQ Industrial Services Midwest Remediation Division (MRD) began the project in July, which will take as long as 2 years.

The project involves remediation of over 50,000 tons of the most impacted PCB contaminated sediment observed anywhere in the United States. The project location is from within and surrounding 4.2 miles of a small creek in eastern Wisconsin. EQ and its subcontractors will install 40 temporary dams and divert the river, excavate, dewater and dispose of the sediment, then restore the area. EQ will also have an opportunity to remediate the next section of the river.

With the help of one of the most respected restoration companies in the nation, EQ will restore 1.75 acres of land with native plant species for every acre that is damaged during the remediation process. Over 9 acres of high quality wetland habitat will be created, leaving the area in better shape than when EQ began the project.

“This project shows the strength of our remediation team at EQ,” said Tom Schuck, Executive Vice President of EQ. “Using innovative solutions, we were able to propose a value-added package that will ultimately lead to the restoration of a natural habitat.”
In May, EQ launched its EQ Sustainable Solutions Pack Back Program for the safe and compliant handling and recycling of all fluorescent lamps.

We have added new product lines to the Pack Back Recycling Program. These additions include:

- 4' and 8' fluorescent lamp recycling boxes with foil-lined “EnviroBag” for maximum protection
- 0.6 gallon, 1.25 gallon and 3.5 gallon pails for battery recycling
- 1.25 gallon bucket for compact fluorescent lamp recycling.
- 3.5 gallon bucket for non-PCB lighting ballast recycling.

As easy as a click of a few buttons on the website, a bucket or box will be delivered directly to a household or business. When the box is full and securely taped with the return shipping label exposed, simply place it where the designated shipper normally picks up your packages. The container will be delivered back to an EQ location for proper recycling. All orders, shipping records and boxes can be tracked through EQ’s online system.

**Pack Back Recycling Program includes:**

- Global Coverage
- 24/7 Online Ordering
- All Paperwork and Shipping Documents
- Illustrated Instructions
- Certificates of Recycling Available Upon Request
- E-Mailed Receipts
- 24/7 Online Tracking Access
- Full Compliance with State and Federal Waste Regulations

To order today! Please visit our website at www.eqonline.com or call 800-592-5489.