

Possible Airport Deicing Analytical Approaches

Preliminary analyses by Engineering and Analysis Division staff,
not reviewed by senior management, and subject to change.

1. Aircraft Deicing

Feb 27, 2008 DRAFT

- Each approach has two components: Airplane Deicing Fluid (ADF) Collection System + Treatment (end-of-pipe limitation for chemical oxygen demand (COD), concentration-based)
 - If the wastewater is sent offsite to contractor or Publicly Owned Treatment Works, the Treatment component of the approach would not apply.
 - Demonstration of collection and treatment:
 1. ADF collection: airport would conduct a mass-balance study (one time) identifying the disposition of all sprayed ADF; then periodically certify that same operating conditions are maintained.
 2. Treatment: periodic discharge monitoring (end-of-pipe sampling and analysis).
- a. Possible technology approaches for existing sources
- Collect 60% of sprayed ADF + Treatment
 - " 40% + "
 - " 20% + "
 - Combinations of above based on amount of ADF used.
- b. Possible approach for new sources - collect 60% of sprayed ADF + Treatment.
- c. Pretreatment - at present staff is not planning to evaluate any pretreatment approaches.

2. Airfield Pavement Deicing

Possible technology approaches for existing sources

- No use of urea for airfield pavement deicing, or
- Effluent limitation for ammonia.

The ammonia limit would require periodic discharge monitoring.

Technology basis for above approaches

60% ADF capture	Deicing pads
40% " "	Block & Pump & Glycol Recovery Vehicle (GRV)
20% " "	GRV only
Treatment	Biological treatment system (anaerobic fluidized bed)
Urea usage limitation	Product substitution (potassium acetate or other airfield deicers)

To: EPA Staff Coordinating Development of Airport Deicing Operations ELG
From: Air Transport Association (ATA) and
Airports Council International-North America (ACI-NA)
Re: Mass-Balance Study Technical Variables
Date: April 2, 2008

EPA currently is developing options for a proposed effluent limitation guideline for aircraft and airfield deicing operations (Deicing ELG). Airport and airline representatives met with EPA on March 7, 2008 to discuss elements the Agency is considering for the proposed ELG as outlined in a paper shared by the Agency in advance of the meeting entitled *Possible Airport Deicing Analytical Approaches (February 27, 2008)* (Possible Approaches Paper). During the March 7th meeting several issues were raised and discussed regarding the “possible approaches,” one of which was the possibility of imposing an “ADF Collection Standard,” which would require collection of a specified percentage of sprayed ADF and, to demonstrate compliance, “conduct [of] a mass-balance study (one time) identifying the disposition of all sprayed ADF; then periodically certify that same operating conditions are maintained.” The attached overview paper responds to a specific request from the Agency for more detail on our views regarding a narrow aspect of the ADF Collection Standard element outlined in EPA’s paper: the technical variables that we believe must be accounted for in a viable mass-balance study. We welcome the opportunity to provide additional details on how this concept can be computationally implemented.

During the meeting, several important technical variables in conducting a mass-balance study were discussed. EPA confirmed that the collection standard would apply to sprayed ADF that is “available for collection.” This raises the issue of how the amount of ADF that is “available for collection” is determined and affected by factors such as facility characteristics, local climate conditions, pollution prevention techniques, and other factors. Furthermore, these same factors can also substantially affect the fraction of “available for collection” ADF that is actually collected by the collection system at an airport.

At the close of the meeting, EPA requested that industry representatives provide a more robust description of the technical variables that we believe must be accounted for in a viable mass-balance study. The attached overview paper is a joint effort by ACI-NA and ATA to respond to that request concerning this narrow aspect of the ADF Collection Standard element EPA is considering. This response is offered in the spirit which has defined our on-going efforts to further the Agency’s understanding of our industry as it develops the Deicing ELG. We recognize that the ADF Collection Standard as described in the Possible Alternatives Paper is part of a “preliminary analyses by Engineering and Analysis Division staff” which has “not [been] reviewed by senior management” and is “subject to change.” Similarly, the Agency should recognize that this response is provided under time constraints requested by EPA, does not attempt to identify or discuss other issues relevant to implementation of the ADF Collection Standard or any of the other concepts or elements presented in the Possible Alternatives Paper and does not represent an endorsement of any concepts or elements included in that paper.¹

¹ At the March 7 meeting, industry participants identified a number of other issues that we consider critical to reasonable implementation of the ADF Collection Standard. These issues included: (1) whether and under what circumstances collection technologies identified by EPA can reliably achieve the corresponding capture percentages currently under consideration; (2) other factors that could be taken into consideration in establishing tiers for collection standard requirements (e.g., ADF usage, deicing operations, deicing days, deicing season precipitation type and volume, physical constraints, and collection infrastructure already in place at an airport); (3) the period and process for any “certification” that the “same operating conditions are maintained;” (4) the definition of “same operating conditions;” and (5) the need to evaluate and understand the interrelationships among any “collection standard” and any other elements of the Deicing ELG. In addition, ACI-NA and ATA identified a number of general concerns and concerns about other elements outlined in the paper. These included the need (1) for applicability criteria under which certain facilities would be exempt from the Deicing ELG (such criteria may reflect a variety of considerations, including airport size, ADF usage, airport type, climate, infrequency of deicing events,

Accordingly, the attached paper is technical in nature and focused exclusively on the variables relevant to conducting a mass-balance study that we believe the Agency should consider in the event it decides to pursue incorporation of the ADF Collection Standard in the Deicing ELG. The conceptual approach described in this paper attempts to address what fraction of applied ADF is "available" for collection under various typical circumstances, as well as the impact on collection of various practices that may reduce ADF usage.

ACI-NA and ATA welcome the opportunity to hold a conference call with EPA staff at their earliest availability to discuss this conceptual approach and offer additional details on the formulation for calculating the mass balance.

etc.); (2) for technical infeasibility criteria which may exempt certain facilities from certain requirements or subject them to less stringent requirements; and (3) to ensure the ability to use urea within limited circumstances.

Concept Overview: Mass Balance Element of ADF Collection Standard

Summary

The fraction of applied ADF available for collection is determined by a variety of factors that, in sum, result in a certain quantity of that applied ADF ultimately being unavailable for collection (uncollectible). These factors include:

- ADF that remains on the aircraft
- ADF that adheres to, and soaks into pavement surfaces
- ADF droplets carried away as wind drift or via jet blast
- ADF that is tracked out of the area on the tires of aircraft and ground support equipment
- ADF lost to evaporation, biodegradation, etc.

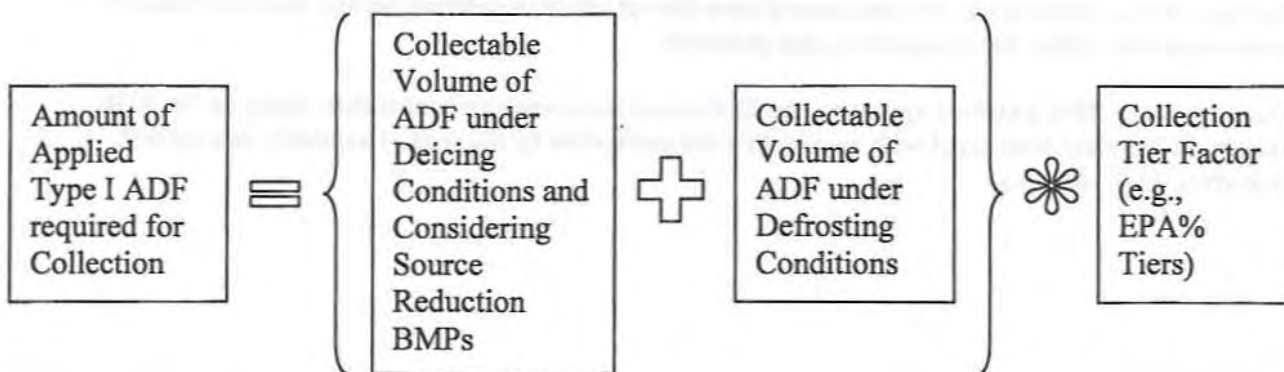
EPA has stated that the Agency is considering a single pair of constraints to reflect the amount of ADF that is available for collection: 80% of applied Type I ADF would be defined as available for collection, and 10% of applied Type IV ADF would be defined as available for collection.

We believe to the contrary that the amount of ADF that is ultimately available for collection varies greatly by airport, depending on the weather type, collection system configuration, deicing operation (e.g., defrosting versus deicing) and other site specific factors. For example, the use of a constant fraction does not accurately account for significant differences in the amounts and fate of ADF applied during deicing versus defrosting operations, which may constitute very different portions of a total ADF application across different airports and different seasons.

Furthermore, a generalized constant does not consider reductions in the amount of applied Type I ADF available for collection that occurs with implementation of Best Management Practices (BMPs) that reduce overall ADF application. This oversight penalizes airports that have aggressively pursued pollution prevention alternatives, and fails to reward airports for pursuing such alternatives in the future.

Hence, in this paper we suggest for EPA's consideration an alternative conceptual approach that would be available on a site-specific basis for those airports that believe they would be substantially misrepresented by EPA's universally applied factors for collectible ADF. This approach includes calculating site specific collection requirements that directly acknowledge differences in deicing operations (deicing versus defrosting) and ADF volume reductions associated with implementation of source reduction BMPs.

In general, we believe that the quantity of "available" ADF for use in a percent collection ELG scheme could be calculated as follows:



Collectable ADF applied during defrosting operations

The fraction of ADF applied during defrosting operations that can be collected is far smaller than the fraction of ADF applied during deicing operations that is collectable. Mass balance data and empirical observations demonstrate that the very little runoff is generated when defrosting operations occur, and the fraction of applied defrosting ADF that is available for collection is very low at between 0% and 20%. Specifically, defrosting operations typically result in limited areas of damp pavement under a defrosted aircraft which dries within a few hours. Both of these conditions result in a very limited amount of ADF available for collection either immediately after a defrosting operation or during subsequent precipitation events. The fraction of defrosting ADF that is collectable is heavily dependent on local conditions, especially climate. The impact of this phenomenon on an airport's ability to collect ADF can be significant when a large portion of overall ADF usage is associated with defrosting operations. For this reason, it is recommended that separate collection calculations be conducted on ADF used for defrosting and on ADF used for deicing. For defrosting operations, 10% is a reasonable default value. Several airports have assembled data on their ADF usage separately during defrosting and deicing operations, and we can provide this information to EPA.

Reduction in collectable ADF as a result of source reduction

The General Mitchell International Airport's WPDES permit provides a successful model for explicitly adjusting glycol collection targets as a function of source reduction BMPs. This approach is based on the principle that these BMPs reduce "excess" ADF, which makes a smaller fraction of ADF available for collection. It is recommended that a modified version of the computational method in the General Mitchell International Airport's permit be employed to calculate a conservation factor that can be used to adjust the percentage of Type I fluid assumed to be collectable so as to reflect the source reduction BMPs that have been implemented. The result is the explicit incorporation of a conservation credit for pollution prevention.

Concept Approach

Our preferred conceptual approach to estimating the fraction of applied ADF that is available for collection has separate deicing and defrosting components. The defrosting component applies a default value (e.g., 10%) for potentially collectable ADF applied during defrosting. The deicing component utilizes a default value for the percentage of applied Type I fluid which is collectable (e.g., EPA proposed 80%) and incorporates a conservation credit for source reduction BMPs associated with deicing operations that adjusts the collectable value accordingly. The overall fraction of total ADF that is defined as collectable would thus reflect a particular airport's relative volumes of ADF applied for defrosting vs. deicing purposes. These relative volumes can vary substantially across airports and across years that have differing mixes of weather conditions. Although default values may be assigned to the collectable fractions of each component, airports should have the option of calculating facility-specific values to more accurately reflect local conditions and practices.

Consistent with EPA's current approach, the ELG compliance requirement is then based on the ADF Collection Standard associated with an airport's tier multiplied by the sum of available deicing and defrosting ADF volumes.



Air Transport Association



April 28, 2008

Via Electronic Mail

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Director

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RE: Aviation Industry Thoughts Regarding EPA's Possible Deicing Effluent Limitations Guidelines Rulemaking Options

Dear Mary:

Airports Council International – North America (ACI-NA) and the Air Transport Association (ATA) appreciate your recent telephone inquiries regarding the Associations' reactions to regulatory options that you and your staff shared with us on March 7, 2008. You indicated that you were preparing to brief EPA's senior management regarding possible regulatory options. We believe it will be helpful for us to summarize our thoughts in writing to share directly with your senior management.

As an initial matter, both Associations appreciate the opportunities to meet with you, your staff, and Ephraim King over the nearly three and one-half years that your office has been collecting information, studying the aviation industry, and developing regulatory options. As you have discovered, the industry's infrastructure and operations are very complex and subject to variables such as traffic mix, climate, site hydrology and physical constraints that vary greatly across airport sites. Ours, we would assert, is unlike any other industry for which EPA previously has developed effluent guidelines. Recognizing that the Agency must understand and account for numerous factors unique to deicing operations in the commercial aviation industry, our Associations have worked hard both to respond to specific Agency inquiries and, following receipt of EPA's March 7 concept paper, to volunteer information on key issues with the potential to dramatically affect regulatory alternatives that you are considering.

Specifically, we have provided extensive comments designed to improve the quality of information gathered by EPA's questionnaires for airports and for airlines, invited staff to

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participate in conferences devoted to deicing issues, and met with you several times to exchange information and ideas on possible regulatory outcomes. You and your staff have been professional and accommodating in our interactions. With the exception of our initial response to the March 7 concept paper, however, this interaction has been general in nature, and not focused on issues affecting the integrity of any specific regulatory structure. Nonetheless, we trust that the Agency has benefited from the experience and knowledge our members are uniquely qualified to provide. For our part, we believe that a continuing investment in this exchange of information is critical to EPA management's assessment of any regulatory proposal for this unique and complicated industry.

While we have worked collaboratively to answer EPA's questions and provide input, we remain skeptical that a nationally-applicable effluent guideline is the best approach or indeed is even appropriate to control discharges associated with highly variable deicing operations in the aviation industry. The structural challenges facing EPA in developing such a regulation are no less than daunting. For example:

- Climatological conditions dictate both the intensity of deicing activities and the capacity of collection systems to capture spent materials. These conditions vary tremendously not only from airport-to-airport, but from storm-to-storm and from year-to-year.
- Significant differences in operational characteristics among airport facilities also affect deicing needs and practices. Such differences include fleet mixes, service type (passenger vs. freight service, domestic vs. international operations), carrier business models (hub-and-spoke vs. point-to-point) and the role of the airport in the national airspace system (hub vs. feeder/reliever facility). The difficulty of accounting for these differences is compounded by the constantly changing operational models that airlines must adopt to survive in the volatile aviation market.
- Airports have infrastructure configurations and physical constraints (e.g., varying from large and capacious to extremely limited and constrained), which create essentially site-specific cost considerations and variability associated with constructing and implementing similar technologies at different airports.

These factors alone call into question whether norms, which can plausibly be termed "national," can be developed regarding wastestreams, the performance of candidate technologies, or even the availability of technologies. Indeed, the prospect of developing a legally-sustainable rulemaking that imposes any meaningful uniformity on these activities seems remote. When the site-specific nature of infrastructure financing at airports and the far reaching effects of ELG-related costs and flight delays on the already fragile economics of the aviation industry are added to the picture, it is clear why we in the industry continue to struggle to envision a "deicing ELG"

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that meets the statutory mandates of the Clean Water Act while achieving the goal of national uniformity.

Nevertheless, we have worked with you in your effort to identify and account for these critical factors. Specifically, you and your staff recently shared with the industry EPA's initial and relatively simplified regulatory approach to further regulating aircraft deicing runoff. As we understand it, the March 7th concept paper suggested imposition of a tiered collection efficiency standard (assigning airports to tiers on a yet-to-be-determined basis; imposing tier-specific collection standards; and then confirming compliance with the collection standard by means of a calculated mass-balance for each airport and periodic certifications of as-yet-to-be-determined content), and a separate, nationally-applicable end-of-pipe concentration limitation for any discharge of deicing fluids that are collected to achieve the collection standard. When the specifics of the March 7 framework were made clear by your staff, industry representatives immediately identified a number of issues that the industry asserts are critical and must be addressed by EPA. At the close of the meeting, you sought our feedback with respect to those issues.

The industry immediately began to assess and analyze the regulatory approach that you and your staff outlined. Within a few weeks, the industry was able to conduct a relatively detailed analysis of the factors that would need to be addressed for the "mass balance" element of the March 7 framework to reflect practical limitations on collectability while not serving as a disincentive to the use of pollution prevention practices. A concise summary of that analysis was provided to you and your staff, a copy of which is attached to this letter for your reference. As you can see from that document, we believe that the mass-balance issue alone is significantly more complex than EPA originally envisioned.

This example, however, illustrates the level of analysis that we believe is necessary to responsibly address each of the many complexities EPA is confronted with in this rulemaking effort.¹ This more disciplined analysis will be required regardless of whether EPA intends to use the March 7 framework as the basis for a proposal or the Agency is considering more innovative ELG or non-ELG approaches to this industry. The Associations are prepared to commit resources and work to similar levels of sophistication with the Agency in order to achieve an appropriate outcome from the ELG effort.

Moreover, we have discussed in our many prior meetings several issues that could significantly affect the deicing ELG rulemaking, but for which you have not yet indicated EPA's preferred approach. We believe that the complexity of each of these issues must be recognized and taken into account by senior management in order for EPA to make a well-reasoned and appropriate decision regarding any deicing ELG for the aviation industry. Some examples include:

¹ For example, we are only beginning to assess the factors that will determine whether the Agency's tentative selection of a single model treatment technology for the entire industry is appropriate. Already, however, there are significant questions about the feasibility of that approach for which we cannot find ready answers.

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- Whether and how EPA may subcategorize the industry within any final ELG;
- Whether EPA is considering a de minimis cutoff below which airports should continue to operate under a different ELG standard or remain subject to Best Professional Judgment permitting;
- Whether and under what circumstances EPA may consider exempting airports with unique situations that do not fit within any ELG rulemaking; and
- How EPA will assess and analyze the economics of the industry for purposes of assessing costs, benefits, and the cost-effectiveness of any final rule.

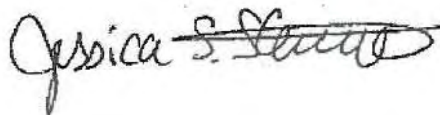
In addition, it also is worth pointing out that, of its own volition, the aviation industry has taken many steps over the years to help further protect the environment from the deicing operations that are vital to ensure safe air travel. Pollution prevention practices, continuing improvement of the environmental characteristics of aircraft deicing fluids themselves, and more sophisticated collection and treatment techniques have developed rapidly over the period of the Agency's data collection for this rulemaking. As a result, a further challenge facing the Agency is the need to fashion a regulation that accounts for this continuing voluntary reduction in pollutant discharges, and that does not burden an already fragile industry with large capital expenditures designed to manage a wastestream that may be radically reduced by the time newly mandated systems can come on line.

To reiterate, we very much appreciate the professional relationship that we have developed with you and your staff, and the exchange of important information that already has resulted in improved decision making by EPA. Our message here is that the same level of analysis is needed on a host of other issues as this process continues. While we recognize that the Agency is subject to resource restrictions and schedule constraints, we are convinced that this kind of in-depth information exchange is essential for developing a regulation whose sophistication matches that of this challenging and unique industry. Our Associations stand ready to engage in that information exchange, and look forward to discussing with you and, as appropriate, with EPA senior management, the means by which that can be accomplished.

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April 28, 2008

Thank you for inviting our input to EPA's senior management. Should you or they have questions or like additional input, please let us know.

Sincerely,



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