

FACT SHEET

Fact Sheet Update - May 1998



PERO-ACT

A Base-level Pollution Prevention Resource sponsored by HQ Air Force Center for Environmental Excellence



Air Force Aircraft and Airfield Deicing/Anti-icing

The Role of Deicing and Anti-icing in the Air Force

Anti-icing is the prevention of snow, frost, and ice accumulation on surfaces. Deicing is the removal of snow, frost, and ice from surfaces. Even small amounts of snow and ice on airframes and airfoils can significantly degrade the lifting properties and control of an aircraft. This poses a great safety risk, especially during the take-off and climb-out portions of a flight. Therefore, it is critical that ice and snow are prevented from accumulating (anti-icing) or are removed (deicing) from aircraft as close to departure time as possible. Snow and ice build-up prevention (anti-icing) and removal (deicing) from airfields (runways, taxiways, and roadways) is also essential for flight safety. Actual or predicted weather conditions are the trigger for anti-icing and deicing activities.

Aircraft and airfield anti-icing and deicing operations often involve the use of chemical agents, which can be a significant source of stormwater pollution. As part of the overall pollution prevention strategy of the Air Force, a number of changes to traditional anti-icing and deicing agents and procedures have been made or are expected in the near future. These changes are aimed at minimizing the environmental impact of anti-icing and deicing operations without jeopardizing aircraft safety or the Air Force mission.

Types of Deicing and Anti-icing Agents

Aircraft

Aircraft deicing/anti-icing agents are glycol-based. Two separate and independent standards, military and commercial, are used to designate aircraft deicing/anti-icing agents. The military specification covering these agents is "Anti-icing and Deicing-Defrosting Fluids," MIL-A-8243D, which specifies two classifications: Military Type I deicing/anti-icing fluids that are propylene glycol-based, and Military Type II deicing/anti-icing fluids that are ethylene glycol-based (three parts ethylene glycol to one part propylene glycol). Propylene glycol-based fluids are the only aircraft deicing/anti-icing agents approved for purchase and use by Air Force activities.

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These military "Type" designations should not be confused with the commercial Society of Automotive Engineers (SAE) "Type" designations pertaining to aircraft deicing/anti-icing fluids. The SAE designations, which meet Aerospace Material Specifications (AMS), classify aircraft deicing/anti-icing agents based on their viscosity or "holdover" properties. The SAE designations do not distinguish between ethylene glycol- or propylene glycol-based agents. The chemical makeup of these agents is not a factor in the SAE designation, as is the case with the military designation. SAE Type I fluids (AMS 1424) are low viscosity and used primarily for deicing aircraft. SAE Type II fluids (AMS 1428) are higher viscosity and are used primarily as aircraft anti-icing agents. SAE Type II anti-icing agents are applied prior to icing conditions to prevent ice formation on the aircraft and must adhere to the aircraft longer than deicing agents.

Aircraft anti-icing requires a smaller volume of chemical, but requires specialized training and different application equipment than deicing agents. Additionally, application of anti-icing agents on military aircraft may require special training or procedures due to their unique coatings as compared to commercial aircraft,

The Air Force recently adopted use of the SAE/AMS fluid designations. Air Force Technical Order (T.O.) 42C-1-2, "Anti-icing, Deicing and Defrosting of Parked Aircraft," provides information on the use of anti-icing and deicing fluids. According to its custodian, Mr. Gus Zachariades, Product Engineering, San Antonio Air Logistics Center (SA-ALCSFTT), T.O. 42C-1-2 is being revised to reflect the SAE/AMS fluid designations.

(NOTE: Use of a specific deicing/anti-icing fluid on a particular aircraft is ultimately determined by the aircraft's Single Manager and will be addressed in applicable Technical Orders.)

Environmental Impacts of Glycols

Ethylene glycol, historically a standard component of common antifreeze and deicing/anti-icing products, is a highly water-soluble chemical and exerts a very high biochemical oxygen demand (BOD) on receiving waters. The effect of increased BOD is to deplete dissolved oxygen levels in the water and deprive aquatic life of oxygen. Ethylene glycol is also toxic to aquatic and mammalian organisms, even at relatively low concentrations. Additionally, it is a hazardous air pollutant as defined under the Clean Air Act, and is categorized as a hazardous substance under the Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA). The use of this material is also subject to storage and release reporting requirements under the Emergency Planning and Community Right-To-Know Act (EPCRA).

Propylene glycol exerts a greater BOD effect than ethylene glycol on receiving waters. It remains in the environment longer than ethylene glycol, and will consume more oxygen while it is being broken down. However, propylene glycol is far less toxic to aquatic and mammalian organisms and is listed as a common additive in cosmetics, medical products, soft drinks, and pet foods. Unlike ethylene glycol, propylene glycol is not subject to hazardous substance regulation.

Approved Deicing/Anti-icing Agents

Only propylene glycol-based deicing/anti-icing agents are approved for purchase and use on aircraft by Air Force activities. Propylene glycol-based agents are currently the deicing/anti-icing agents of choice and must be used unless the Single Manager determines an ethylene glycol-based solution is required. According to the HQ USAF/LGSS message, "Disposition of Ethylene Glycol-based Deicing Chemicals," April 1994, existing stocks of ethylene glycol-based Military Type II deicing/anti-icing agents may be used until supplies are depleted, but additional quantities cannot be purchased by the Air Force.

Approved Stock Listed Agents

National Stock Numbers (NSNs) for approved deicing/anti-icing agents for aircraft are provided in the following tables (all are propylene glycol-based):

Anti-icing		
<u>Specification</u>		
SAE Type I/AMS 1428 (high vis.)	6850-01-435-6470	5-gallon can
SAE Type I/AMS 1428 (high vis.)	6850-01-435-6469	55-gallon drum
SAE Type I/AMS 1428 (high vis.)	685-01-435-6466	Bulk

Deicing		
<u>Specification</u>	<u>NSN</u>	<u>Container</u>
Military Type I	6850-01-281-0340	5-gallon can
Military Type I	6850-01-281-0338	55-gallon drum
Military Type I	6850-01-281-0339	Bulk
SAE Type I/AMS 1424 (low vis.)	6850-01-435-6468	5-gallon can
SAE Type I/AMS 1424 (low vis.)	6850-01-435-6465	55-gallon drum
SAE Type I/AMS 1424 (low vis.)	6850-01-435-6471	Bulk

Airfields

A greater variety of deicing/anti-icing agents are available for use on airfields than for aircraft. These agents include glycols, urea, alcohol, and other new formulations such as sodium formate, sodium acetate, and potassium acetate. Each agent, including its environmental impact, is discussed below:

Glycol, Alcohol and Urea

Glycols are no longer generally used for airfield deicing/anti-icing. Ethylene glycol specifically is not approved for Air Force use on airfields. The high BOD associated with glycols can cause significant ground-water or stream water degradation from stormwater runoff when spread over wide areas of pavement.

Grade B isopropyl alcohol has also been used for airfield deicing/anti-icing. Isopropyl alcohol use is operationally limited due to its high volatility, which may result in vapors that can be carried inside aircraft on the airfield and create a fire hazard.

Urea has been commonly used for airfield deicing/anti-icing in pellet form. Like glycol agents, urea requires a relatively high BOD for degradation. It also degrades to ammonia, which is toxic to aquatic organisms and accelerates the formation of algal blooms. To reduce urea's toxic effects, tertiary treatment is required for airfield runoff water containing ammonia nitrogen-rich compounds. Many conventional POTW/FOTWs do not have this level of treatment. In addition, urea products are not effective deicing/anti-icing agents at temperatures much below 25°F. The latest revisions to Air Force Instruction 32-1045, "Snow and Ice Control," direct installations to minimize the use of urea on airfields in favor of other new formulations. Additionally, HQ USAF/CE letter, "Alternate Airfield Pavement Deicing/Anti-Icing Chemicals," 13 September 1996, recommends the purchase of urea be discontinued in favor of newer agents discussed below.

New Formulations

The Air Force advocates the use of three new formulations for airfield deicing/anti-icing. These agents are potassium acetate, sodium acetate, and sodium formate. All have been used in Europe and Canada.

gal staff concerning the disposal of lead based paint-containing debris.

TI 16843 - List of Hazardous Materials

PRO-ACT responded to a request for base level guidance concerning the types of hazardous materials that must be tracked through the HAZMAT Pharmacy. Specifically, the customer requested this information in order to develop a base-specific list for items that require the completion of an Air Force Form 3952.

PRO-ACT contacted Ms. Beth Davis, Environmental Quality Directorate, Headquarters Air Force Center for Environmental Excellence (HQ AFCEE/EQP). Ms. Davis stated there is no specific list of hazardous products/materials that require tracking by HAZMAT Pharmacies, however, Air Force Instruction (AFI) 32-7086, "Hazardous Materials Management," does provide a definition of hazardous materials.

PRO-ACT reviewed AFI 32-7086, Attachment 1, "Glossary of References, Abbreviations, Acronyms, and Terms," which defines a hazardous material as:

1. Any item or chemical which is a health hazard or physical hazard as defined by the Occupational Safety and Health Administration (OSHA) in Title 29 CFR Part 1910.1200, "Hazard Communication;"
2. Any item or chemical which has a reportable or potentially reportable quantity or is notifiable as inventory under the reporting requirements of the Hazardous Chemical Reporting: Community Right-to-know Act (Title 40 CFR Part 370) or as an environmental release under the reporting requirements of the Toxic Chemical Release Reporting: Community Right-to-know Act (Title 40 CFR Part 372);
3. Any item or chemical which, when being transported or moved, is a risk to public safety or is an environmental hazard and is regulated as such; or
4. The item or chemical is a special nuclear source, or by-product material, or is regulated or referred to as radioactive.

Under Title 29 CFR 1910.1200, "Hazard Communication," OSHA has defined a hazardous chemical as any chemical which is a physical hazard or a health hazard. A chemical is a physical hazard when there is scientifically valid evidence it is a combustible liquid, compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable, or water-reactive. A chemical is a health hazard when it causes either chronic or acute health effects in ex-

posed employees. These include carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes. It is the responsibility of the chemical manufacturer (or importer) to conduct the required scientific testing to determine if a chemical poses a physical or health hazard. OSHA has also established criteria for hazardous chemicals in mixtures. Products which contain a hazardous chemical at concentrations greater than one percent by weight (or 0.1 percent by weight for carcinogens) are regulated as hazardous chemicals. The chemical or product manufacturer has the responsibility to provide a material safety data sheet (MSDS) for all hazardous chemicals or products. The MSDS provides information on potential hazards and safe handling procedures. If the manufacturer determines the product is exempt from the regulatory requirements of the OSHA Standard, a MSDS is not required. Chemicals meeting the criteria listed below are exempt from the regulatory requirements of OSHA's "Hazard Communication" standard:

1. Hazardous wastes as defined and regulated under the Resource Conservation and Recovery Act (RCRA);
2. Hazardous substances when subject to regulation under the Comprehensive Environmental Response, Compensation, and Liability Act;
3. Tobacco or tobacco products;
4. Wood or wood products;
5. Retail foods, alcoholic beverages, or food for personal consumption by employees;
6. Drugs in final, solid form, or drugs for personnel consumption by employees;
7. Cosmetics packaged for retail sale;
8. Nuisance particles that pose no hazard;
9. Radiation and biological hazards;
10. Consumer products used in a duration and frequency of exposure not greater than what consumers experience when using the product; and
11. Articles, which are manufactured items (not fluid or particle) formed to a specific shape or design during manufacture (where shape or design is integral to their use), and which do not release more than trace amounts of hazardous chemicals during normal use.

PRO-ACT also provided the customer with a list of National Stock Numbers (NSN) requiring classification as Issue Exception (IEX) code M, Ozone Depleting Substances (ODS), which is contained in "Use of Issue Exception (IEX) code M," HQ USAF/LGSP, December 1994, the guidance document for assigning

IEX code M. The installation Bioenvironmental Engineering Section can provide additional information on the IEX program, including a list of all products assigned IEX code 8 and IEX code 9.

The final authority for reviewing and revising the list of HAZMAT Pharmacy controlled items rests with the installation's Hazardous Materials Management Process (HMMP) Team in accordance with AFI 32-7086, paragraph 2.6.1.3. PRO-ACT recommended that, at a minimum, all products meeting the definition of a hazardous material in either AFI 32-7086 or Title 29 CFR 1910.1200; all products containing extremely hazardous substances as listed in Title 40 Code of Federal Regulations (CFR), Part 355, Appendix A; and those items coded IEX 8, IEX 9, or IEX M be tracked by the HAZMAT Pharmacy. PRO-ACT coordinated this response with Ms. Davis who agreed with our recommendation.

PRO-ACT also provided the customer with a copy of the PRO-ACT Information Packet (PIP) "HAZMAT Pharmacy," which contains detailed information on designing, establishing, staffing, and operating a typical Air Force HAZMAT Pharmacy. In discussions with Ms. Davis, she stated that the Environmental Management Information System (EMIS) is a tool that can be used to help track hazardous materials in the HAZMAT Pharmacy. This system contains individual programs that serve as a life-cycle management tracking tool for hazardous materials and hazardous wastes. The system is capable of importing bar code generated information into a database. Ms. Davis indicated EMIS maintains a Help Desk, (800) 484-9178, ext. 3647, which provides technical assistance to EMIS users. Detailed information on the EMIS management tool is found in four brochures: 1) AF-EMIS and Hazardous Material and Hazardous Waste Management; 2) AF-EMIS and The Supply Technician; 3) AF-EMIS and the Environmental Manager; and 4) AF-EMIS and the Bioenvironmental Engineer. (NOTE: These brochures are available from PRO-ACT.)

While it is not possible for PRO-ACT to provide a list of specific products or NSNs that require tracking by the HAZMAT Pharmacy, as a general rule, the following Federal Stock Classes (FSC) typically contain hazardous materials:

FSC Title

6810 Chemicals
6820 Dyes
6830 Gases: Compressed and Liquefied
6840 Pest Control Agents and Disinfectants
6850 Miscellaneous Chemical Specialties

7930 Cleaning and Polishing Compounds and Preparations
8010 Paints, Dopes, Varnishes, and Related Products
8030 Preservative and Sealing Compound
8040 Adhesives
9110 Fuels, Solid
9130 Liquid Propellants and Fuels, Petroleum Base
9135 Liquid Propellants, Fuels, and Oxidizers, Chemical Base
9140 Fuel Oils
9150 Oils/Greases: Cutting, Lubricating, and Hydraulic
9160 Miscellaneous Waxes, Oils and Fats

In summary, there is no single listing of materials that must be tracked by the HAZMAT Pharmacy. It is our recommendation to, at a minimum, track all chemicals or products which meet the criteria listed in the definition of a hazardous material or an extremely hazardous substance, and to also include all substances that are coded IEX 8, 9, or M. The final authority for reviewing and revising the list of HAZMAT Pharmacy controlled items rests with the installation's Hazardous Materials Management Process (HMMP) Team in accordance with AFI 32-7086, paragraph 2.6.1.3.

TI 16955 - Hazardous Materials Management

A PRO-ACT customer requested information concerning whether or not purchases of hazardous materials (cleaning supplies) from a State-operated office supply store at his installation are required to be tracked through the HAZMAT Pharmacy.

In response to this request, PRO-ACT reviewed Air Force Instruction (AFI) 32-7086, "Hazardous Materials Management," 1 August 1997, Chapter 2, "Air Force HAZMAT Pharmacy Program (HPP)." According to Chapter 2, an on-base, State-operated supply store would be considered a Source of Supply (SOS), and therefore is required to identify and report HAZMAT use through the base HAZMAT Pharmacy. AFI 32-7086 further defines a SOS as all Air Force controlled supply organizations and other SOSs operating on an installation. Examples of other SOSs include, but are not limited to, a contractor-operated civil engineer supply store, a government-operated civil engineer supply store, a base maintenance contractor, a contractor-operated parts store, and products purchased with non-appropriated funds. Paragraph 2.6.5 of AFI 32-7086 requires all Air Force-controlled and other SOSs operating on an installation to participate in the Hazardous Material Management Process (HMMP). This requires a SOS to manage the receipt, storage, issue, inspection, and distribution of their hazardous materials as outlined in the AFI. It also requires the SOS, at intervals established by the HMMP Team, to maintain and update their HAZMAT data fields on the Defense Environmental Security Corporate Information Management

(DESCIM) HAZMAT tracking system, or DESCIM-approved interim program, (i.e., AF-EMIS).

PRO-ACT coordinated this response with Mr. Bill Kivela, Environmental Quality Directorate, Headquarters Air Force Center for Environmental Excellence (HQ AFCEE/EQP). Mr. Kivela indicated the citations noted above do not require a SOS to purchase their hazardous materials through the HAZMAT Pharmacy, however, it does require they routinely provide the Pharmacy with information on all HAZMAT purchases. This is necessary to update the DESCIM tracking system and allow for accurate reporting of the total amount and type of hazardous materials purchased and used on the installation.

TI 16685 - Product Substitution for Underground Cable Sealant

A PRO-ACT customer inquired about the availability of an EPA 17 chemical-free substitute product for 3M Scotch Kote® sealant (NSN 5970-00-962-3335). The customer was using the Scotch Kote® to coat underground electrical cable splice joints. The customer stated the Scotch Kote® contained methyl ethyl ketone (MEK) which is an EPA 17 chemical. The customer was not aware of any technical orders or military specifications governing the intended use of this coating product.

PRO-ACT searched the Hazardous Materials Information System (HMIS) for NSN 5970-00-962-3335. The search revealed seven products from three companies for this entry. A review of the associated Material Safety Data Sheets (MSDS) indicated all of the products contain MEK.

PRO-ACT next searched the General Services Administration (GSA) Spring 1997 catalog for potential sealing compounds and identified 11 stock listed products supplied by 149 companies. In a detailed review of the MSDSs associated with these products, PRO-ACT found only the following 2-part products to be free of EPA 17 chemicals:

1. NSN 8030-00-180-6201, Sealing Compound, Parts 1 & 2, Permagile Industries Incorporated, (800) 645-7546; and
2. NSN 8030-00-965-6704, Sealing Compound, Parts 1 & 2, Dow Coming Corporation, (517) 496-6000.

These two products are designed for sealing, potting, and encapsulating electronic connectors at temperatures ranging from -80 degrees to +400 degrees Fahrenheit. Several companies supply products to each of the above two NSNs; however, PRO-ACT found **only** the manufacturers listed above offer EPA 17 chemical-free products. In order to comply with Air Force

P2 efforts to reduce or eliminate the use of products containing EPA-17 chemicals, PRO-ACT recommended that purchasers of either of the two products listed above accomplish a sole source justification requesting the EPA 17 chemical-free products.

PRO-ACT also recommended coordinating the use of any new product with the installation Bioenvironmental Engineering Flight and the base Environmental Management Office before implementation in order to address possible occupational health and environmental concerns.

TI 16762 - IMPAC Card Purchases

PRO-ACT responded to a customer request for guidance regarding hazardous material purchases with the International Merchant Purchase Authorization Card (IMPAC), including the policies or procedures for purchasing hazardous materials (HAZMATs) with the IMPAC. The customer also wanted to know the requirements for obtaining Material Safety Data Sheets (MSDSs) for items purchased with the IMPAC.

PRO-ACT reviewed Air Force Instruction (AFI) 32-7086, "Hazardous Materials Management" for guidance. Chapter 2, "Air Force HAZMAT Pharmacy Program (HPP)," states that the HAZMART supervisor will "process all Base Supply and HAZMART HAZMAT transactions (to include IMPAC card and AF Form 9, 'Request for Purchase') through the tracking system to provide HAZMAT order, receipt, and issue data." The AFI further states that the Contracting Squadron will "ensure local IMPAC procedures include the requirement that all purchases of HAZMAT using IMPAC require prior approval using the process described in paragraph 2.3.4 (HAZMAT Authorization Process) and reporting to the HAZMART (see paragraph 2.6.4.12)."

The HAZMAT Authorization Process described in paragraph 2.3.4 requires Air Force Form 3952, "Chemical/Hazardous Material Request/Authorization" be used to initiate a request for HAZMATs. Part 1 of each AF Form 3952 must be reviewed by representatives from Bioenvironmental Engineering (BE), Safety, and Civil Engineering, who must complete part 2, "Material Authorization." As part of this review, BE personnel will typically consult the product's MSDS to aid in determining specific health hazards and precautions for use.

PRO-ACT also reviewed AFI 91-301, "Air Force Occupational and Environmental Safety, Fire Protection, and Health (AFOSH) Program." According to this AFI, Bioenvironmental Engineering is required to maintain a MSDS file for all hazardous materials used in indus-

trial facilities on the installation, regardless of how the HAZMAT was purchased.

PRO-ACT also contacted Ms. Beth Davis, Program Assistance Division, Environmental Quality Directorate, Headquarters Air Force Center for Environmental Excellence (HQ AFCEE/EQP), for additional information. Ms. Davis stated that a product's MSDS should be obtained before purchase to allow for a review of the potential occupational/environmental hazards.

Recycling Workshop in September

The National Recycling Coalition (NRC) 17th Annual Congress presents the **DOD Combined Services Recycling Workshop** 13-16 September 1998 in Albuquerque, New Mexico. Join DOD and Federal Recyclers to find out what's hot in Recycling and Buying Recycled -share ideas, experiences, and knowledge. Whatever your interest-policy, procurement, markets, collection/processing, education, source reduction, professional development - you are sure to find it at the NRC! For updated information on registration, speakers, agenda, hotel information, Albuquerque information, etc., visit the DOD Combined Services Workshop World Wide Web (WWW) site at www.afcee.brooks.af.mil and click on "Events." POCs at DOD include Major Joe Wilson, HQ USAF/ILEVQ, DSN 327-0194 or e-mail wilsonje@af.pentagon.mil and Nancy Carper, HQ AFCEE/EQT, DSN 240-4964, or e-mail nancy.carper@hqafcee.brooks.af.mil. The Coast Guard POC is Catherine Johnson, e-mail catherine.johnson@ost.dot.gov.

AFMC ESH Cost Analysis Guide

The draft Air Force Materiel Command (AFMC) Environmental Safety and Health (ESH) Cost Analysis Guide is now available on the WWW at <http://afmc.wpafb.af.mil/HQ-AFMC/DR/dri-home/wsp2/cost.htm>. The Guide has been prepared as an AFMC discretionary document for use by members of ESH, Engineering, and Financial Management Communities that need to identify, treat or use ESH costs in system decision making. The Guide was distributed 6 February 1998 to AFMC Financial, Environmental, Safety, and Health Communities for final review and comment. Publication of the Guide is expected after April 1998.

Dyess AFB Eliminates 10 Environmental Permits!

According to environmental professionals at Dyess Air Force Base, Texas, almost every type of environmental permit can be eliminated or reduced without jeopardizing an installation's compliance record. Permit elimination is accomplished by using pollution prevention strategies to minimize, reduce, or eliminate discharges of pollutants to the environment, and therefore, the permits they require. Source reduction is an example of one of the most successful permit elimination strategies used at Dyess AFB. By eliminating or substantially reducing sources of pollution, the base was able to eliminate the following permits: Individual NPDES, Industrial Wastewater, RCRA Part B, Bioreclamation Beds, Title V Air Permit, and UST Registration. Techniques used to achieve source reduction included plugging floor drains, changing processes, reducing hazardous waste generation, and removing underground storage tanks.

Other permit elimination/reduction strategies used at Dyess AFB include negotiation/partnering with regulators at all levels, seeking alternate disposal methods, streamlining operations, and product substitution. For more information and cost savings data contact Teresa Clouse, 7th CES/CEV, (915) 696-5619, DSN 461-5619, e-mail ClouseT@cea7.dyess.af.mil.

Clarification

In reference to the article "MoorDri-100TM Absorbent for Chemical Spills," published in CrossTalk 43 (December 1997) PRO-ACT wishes to clarify a couple of points on behalf of Robins AFB.

It was stated in the article that MoorDri-100TM absorbent can be disposed of (after use) as non-hazardous waste or as regular trash. This may be accurate in certain instances when the product is used to absorb petroleum, oils, and lubricants (POLs); however, each installation is responsible for managing any spent absorbent, including the MoorDri-100TM product, as "spill response material," regardless of the contaminants absorbed. Management includes conducting appropriate testing, as necessary, to determine the character of the waste and disposing of the spent absorbent in compliance with all applicable regulations.

Although Robins AFB uses MoorDri-100TM, they do not endorse or promote the product.

PRO-ACT regrets any confusion or misunderstanding that may have resulted from the original article.

Anti-icers prevent ice from forming or adhering to aircraft or pavement and may reduce the need to deice, a process that typically requires more fluids than anti-icing. However, anti-icers are only effective immediately before the start of icing conditions. Therefore, close coordination with weather offices is required to ensure that the application of anti-icing agents corresponds as closely as possible with the onset of icing conditions.

Aircraft

Several options can be considered to reduce the need for applying deicing/anti-icing agents to aircraft.

By monitoring current and predicted weather conditions and adjusting flight schedules, the number of aircraft requiring deicing can be reduced. In certain areas and seasons, freezing conditions are limited to early morning hours and deicing can be avoided entirely by delaying flights by a few hours. Combat and aircrew readiness, customer requirements, environmental pollution, and safety are all important factors in determining how much flexibility can be exercised in flight schedules. Routine training missions may be the most amenable to delay. Because icing interferes with maintenance operations, as well as flight safety, schedule maintenance for non-icing periods or at southern tier bases to avoid the need for deicing altogether. This pollution prevention strategy requires communication and cooperation with weather offices, command and control operations, and the Base Environmental Protection Committee.

It may also be possible to reduce the number of aircraft requiring deicing by placing aircraft where icing will be minimized. Hangar storage is ideal, if available, and hangars can be used for thermal deicing. In many cases, aircraft located outdoors can be oriented to take advantage of natural melting from the sun and to minimize engine icing caused by prevailing winds.

Where aircraft icing conditions cannot be avoided, it may be important to rely on more than just chemical agents. Brooms, squeegees, ropes, and forced air blasters may be used to mechanically clear as much snow and ice from aircraft as possible before chemical agents are used. To keep the aircraft runoff from becoming unnecessarily diluted (and less amenable to recycling), remove snow and ice from beneath the aircraft before applying deicing/anti-icing agents.

(NOTE: Aircraft T.O.s may not permit use of mechanical snow and ice removal techniques on aircraft. Consult with the T.O. or the aircraft's Single Manager before attempting to implement these techniques. Hot water deicing is not authorized per T.O. 42C-1-2.)

Airfields

Mechanical means should always be used first to control snow and ice on airfields. Using snow plows and brushes reduces the amount of chemical deicers needed on airfields.

(NOTE: It is important to understand the limitations on these methods of snow and ice removal. Mechanical brushes may polish ice and worsen pavement conditions if not used correctly.)

The less snow and ice present on the airfield, the less chemical deicer is needed and the more effective it will be. The anti-icing of airfields requires liquid agents (e.g., potassium acetate), and works best where runway icing detection systems are in place.

For additional information on deicing/anti-icing procedures or chemicals, or if you need copies of any referenced documents, please contact PRO-ACT at DSN 240-4214.

Points of Contact for Deicing/Anti-icing Information

1. Senior Master Sergeant Jeffery Barrows, Vehicle Program Manager, DSN 523-6386, Headquarters Air Force Civil Engineer Support Agency (HQ AFCESA).
2. Mr. Gus Zachariades, DSN 945-7613, San Antonio Air Logistic Center (SA-ALC/SFTT), Product Engineering Division. Manages the aircraft deicing Technical Order (T.O.) 42C-1-2 and Operational Supplement 42C-1-2S-1.
3. Mr. Jay Shah, DSN 227-3361, Headquarters United States Air Force (HQ USAF/ILEVQ), Environmental Quality Division. Air Staff Civil Engineering Program Manager for wastewater management/policy.
4. 1Lt Dennis O'Sullivan, Project Officer, DSN 523-6293, HQ AFCESA, Environmental Technical Development Branch.
5. Mr. Myron Anderson, Wastewater Program Manager, DSN 523-6345, Headquarters Air Force Civil Engineer Support Agency (HQ AFCESA).
6. Mr. Tom Moreland, DSN 240-5303, Headquarters Air Force Center for Environmental Excellence (HQ AFCEE). Regulatory compliance and pollution prevention technical assistance.

Document References

1. "Disposition of Ethylene Glycol-based Deicing Chemicals," HQ USAF/LGSS Message, April 1994
2. "Snow and Ice Control," Air Force Instruction 32-1045, 7 March 1994.
3. "Interim Guidance on Pollution Prevention & Best Management Practices (P2/BMP) for Aircraft and Airfield Deicing/Anti-icing Operation," HQ USAF/CEVQ, December 1996.
4. "Anti-icing, Deicing and Defrosting of Parked Aircraft," Air Force Technical Order 42C-1-2.
5. "Anti-icing and Deicing-Defrosting Fluids," Military Specification MIL-A-8243D, 26 October 1985
6. "Requirements Analysis for Deicing," Final Report, Air Force HSC, Development Planning Directorate, 23 October 1996.
7. 40 CFR Part 122, EPA Administered Permit Programs, The National Pollutant Discharge Elimination System.
8. 40 CFR Part 123, State Program Requirements.
9. "Water Quality Compliance," Air Force Instruction (AFI) 32-7041, 13 May 1994.
10. "Alternative Airfield Pavement Deicing/Anti-Icing Chemicals," HQ USAF/CE, 13 September 1996.

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