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Civil Engineering

SNOW AND ICE CONTROL

OPR: HQ AFCESA/CEOM
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This instruction provides guidelines and procedures for the Snow and Ice Control (S&IC) program. It implements AFPD 32-10, *Air Force Installations and Facilities.* Major Commands (MAJCOM), Air Force Reserves (HQ AFRC) and Air National Guard (NGB/CF) may supplement this instruction as necessary.

SUMMARY OF REVISIONS

This revision updates and clarifies previous guidance on snow and ice control, and emphasizes environmental impact. It expands the criteria for applicable installations (paragraph **1.1.1.**); notes references to aircraft deicing/anti-icing (paragraph **1.1.2.**); specifies Allowance Standards (paragraph **1.5.**); defines roles and responsibilities for additional organizations (paragraph **2.1.**); substantially reorganizes paragraph **2.2.**; defines responsibilities of the Base Civil Engineer (paragraph **2.2.3.**) and the Environmental Flight Chief (paragraph **2.2.4.**); expands responsibilities of the Operations Flight Commander or Chief (paragraph **2.2.5.6.**); includes training requirement on chemical use and environmental impact (paragraph **3.1.1.3.**); requires compliance with Federal Clean Water Act (CWA) stormwater provisions (paragraph **3.4.1.**); includes additional provisions for protection of airfield lighting (paragraph **3.4.3.**); recommends use of Mobile Pavement Temperature Sensors (paragraphs **3.6.2.** and **4.2.5.1.**); permits contracting the disposal of bulk snow (paragraph **4.1.13.**); includes guidance on tracking requirements for chemical use (paragraph **4.2.**); includes precautions regarding introduction and use of chemicals (paragraphs **4.2.3.**, **4.2.5.2.**, **4.2.5.3.**, and **4.3.**); recommends use of potassium acetate (paragraph **4.2.4.**); gives additional guidance on dispensing chemicals (paragraphs **4.2.6.1.1.**, **4.2.6.1.3.**, and **4.2.6.2.**), anti-icing procedures (paragraph **4.2.7.**), and use of abrasives complying with Federal Aviation Administration (FAA) standards (paragraphs **4.2.9.** and **4.3.4.2.**); requires use of P2/BMPs (paragraph **5.1.**); includes a requirement to track chemical consumption (paragraph **5.4.**); includes a list of references and supporting information (**Attachment 1**); provides guidance for use of non-urea alternative chemicals (**Attachment 2**); and includes information for Society of Automotive Engineers (SAE) Aerospace Material Specification (AMS) certification of chemicals (paragraphs A2.1 and A2.2).

Chapter 1

KEY INSTRUCTIONS

1.1. Applying the Snow and Ice Control Program:

1.1.1. Ground Support. Installations with over 150 millimeters (six inches) average annual snowfall maintain a Snow and Ice Control Plan (S&ICP) and form a Snow and Ice Control Committee (S&ICC). Installations with less than 150 millimeters average annual snowfall, Air Force stations, and small units such as surveillance sites and radar stations, will create plans and committees to meet their specific needs.

1.1.2. Aircraft Support. Specific deicing/anti-icing procedures for aircraft maintenance are maintained in the technical orders for each type of aircraft. A forum similar to the S&ICC should be used to coordinate the aircraft deicing/anti-icing program. **NOTE:** Aircraft deicing/anti-icing agents and general procedures are listed in Technical Order (TO) 42C-1-2, *Anti-Icing, Deicing and Defrosting of Parked Aircraft*.

1.2. Using Snow and Ice Control Core Principles. Start runway snow and ice control operations just prior to, or at the onset of, snowfall or icing conditions to provide continuous bare pavement. The Snow Control Center (SCC), command post, airfield management, and control tower must keep in close touch at all times.

1.3. Supporting the Mission. Maintain continuous mission capability by removing snow and ice from airfield and base pavements. Judge the success of the program by the safe movement of aircraft and vehicles in inclement winter weather.

1.4. Prioritizing Snow Removal. For safe operation of vehicles and equipment, establish a primary access route to and from the runway. Establish priorities in accordance with the following guidelines:

1.4.1. Priority 1:

1.4.1.1. Primary runways and overruns.

1.4.1.2. Primary runway accesses to taxiways and alert facilities.

1.4.1.3. Apron accesses to taxiways.

1.4.1.4. Aircraft crash fire equipment lanes.

1.4.1.5. Access roads to special weapons, ammunition storage, refueling points, and other primary mission facilities.

1.4.1.6. For safe operations establish primary access routes to and from the runway, navigational aids (NAVAIDS) for the primary instrument runway and to emergency facilities; i.e., hospital, fire department(s).

1.4.2. Priority 2:

1.4.2.1. Secondary runways, overruns, and taxiways.

1.4.2.2. Aircraft parking aprons and remaining aircraft movement areas.

1.4.2.3. Access roads to secondary mission facilities and primary base streets.

1.4.2.4. Covers NAVAIDS for those runways not covered in Priority 1.

1.4.3. Priority 3: All other areas.

1.5. Using References and Resources. All S&IC activities that affect the environment must comply with AFPD 32-70, *Environmental Quality*. Allowance Standards (AS) 464 and 019 help you determine the type and amount of equipment authorized for snow and ice control. FAA Advisory Circular (AC) 150/5200-30A, *Airport Winter Safety and Operations*, and AC 150/5220-20, *Airport Snow and Ice Control Equipment*, are available free from the FAA on their home page at http:www.faa.gov/arp/arphome.htm, or by writing the U.S. Department of Transportation, General Services Section, M-443.2, Washington DC 20590. Guidance on Pollution Prevention/Best Management Practices (P2/BMP) is available from HQ USAF/ILEVQ, and the Air Force videotape entitled "The Environmental Impacts of Deicing/Anti-icing Activities" is available from PRO-ACT (800-233-4356). Installations that receive more than 900 millimeters (36 inches) average annual snowfall, as stated in the Surface Observation Climatic Summary maintained by the Base Weather Station (for entire reporting period), will earn a manpower variance for S&IC, reference Operations Flight AFMS 44E0. You can use this earned manpower to hire extra workers. Installations may also use service contracts to augment their snow removal team, as approved by the BCE.

Chapter 2

MANAGEMENT RESPONSIBILITIES

2.1. Administration Responsibilities and Roles:

2.1.1. Secretary of the Air Force (SAF):

2.1.1.1. Deputy Assistant Secretary of the Air Force for Acquisition (Science, Technology, and Engineering). SAF/AQR will provide Single Managers (Weapon System Single Managers and Aircraft Single Managers) guidance on their roles and responsibilities for coordinating issues involving airfield deicing/anti-icing agents.

2.1.2. HQ USAF:

2.1.2.1. The Civil Engineer (HQ USAF/ILE):

2.1.2.1.1. Maintains overall responsibility for airfield deicing/anti-icing and assigns operational management responsibilities to the Air Force Civil Engineer Support Agency.

2.1.2.1.2. Advocates for airfield deicing/anti-icing program funding requirements through the Planning, Programming, and Budgeting System (PPBS) process.

2.1.2.2. The Director of Maintenance (HQ USAF/ILM). HQ USAF/ILM advocates for weapon system deicing/anti-icing program funding requirements through the PPBS process.

2.1.3. Air Force Civil Engineer Support Agency (AFCESA):

2.1.3.1. Recommends procedures for administering the Snow & Ice Control Program for the Air Force.

2.1.3.2. Assists ILE in developing and testing new deicing technologies.

2.1.3.3. Provides technical assistance to the MAJCOMs and keeps them abreast of new deicing technologies.

2.1.4. MAJCOMs:

2.1.4.1. Review Installation requests for use of particular airfield deicing/anti-icing agents and forward that request to the Lead Command for the affected aircraft, or if they are the Lead Command (for the affected aircraft), forward the request to the appropriate Aircraft Single Manager (ASM) for approval.

2.1.4.2. Where an agent is approved by one ASM and disapproved by another ASM on the same installation, the host MAJCOM takes the lead and works the issue to resolution with the respective ASMs.

2.1.4.3. Validate, prioritize, and submit airfield deicing/anti-icing program funding requirements to HQ USAF/ILE.

2.1.4.4. Validate, prioritize, and submit weapon system deicing/anti-icing program funding requirements to HQ USAF/ILM.

2.1.4.5. Advise the ASM of airfield deicing/anti-icing agents being used at non-Air Force owned installations.

2.1.5. Installations:

2.1.5.1. Creating the Snow and Ice Control Plan (S&ICP). Each installation creates an S&ICP following the format of this instruction. The S&ICP may include procedures from this instruction, but should be tailored to meet local needs. Attach snowfall history, equipment and attachment inventory, equipment plowing patterns, team composition, materials and parts levels, and color-coded maps. The Wing Commander (installation commander at Air Force stations and small units) gives final approval to the base S&ICP. Review the S&ICP annually and revise it as necessary.

2.1.5.2. Paragraph **2.2.** lists the positions of representatives who make up the S&ICC membership. Select additional representatives from major tenant organizations as required.

2.1.5.3. Each installation is responsible for holding at least two committee meetings each year. Conduct a pre-season meeting between 1 September and 15 October and a post-season meeting between 15 April and 31 May. The S&ICC will review:

2.1.5.3.1. Snow removal priorities.

2.1.5.3.2. Organizational responsibilities.

2.1.5.3.3. Problems encountered during the previous seasons.

2.1.5.3.4. Contract needs for emergency snow and ice control.

2.1.5.3.5. Levels of spare parts, materials, and deicing chemicals.

2.1.5.3.6. Manning and augmentee requirements.

2.1.5.3.7. Status of snow equipment fleet.

2.1.5.3.8. Off-seasons rebuild program.

2.1.5.3.9. Annual depot repair needs.

2.1.5.3.10. Chemical consumption and impacts on aircraft, airfield infrastructure, and the environment.

2.1.5.4. The chairperson may form an internal S&ICC working group to coordinate details on issues not requiring approval by the entire S&ICC.

2.1.5.5. Before using any airfield deicing/anti-icing agents, the installation will obtain approval for their Primary Aircraft Authorization (PAA) from the appropriate ASM(s). If there are more than one PAA at a particular installation, approval is required from each PAA ASM. Requests will be routed through the appropriate MAJCOM for review and action and the S&ICP committee will ensure that tenant aircraft are considered in the request.

2.1.6. Non-Air Force owned Installations (Other Services, Commercial, Non-CONUS). Units with aircraft based at non-Air Force owned installations will advise the MAJCOM of the airfield deicing/anti-icing agents being used (since the unit will have no input as to the deicing/anti-icing agent being used).

2.1.7. Air Force Research Laboratory (AFRL), Materials, and Manufacturing Directorate:

2.1.7.1. Conducts research and development (R&D) on aircraft and airfield deicing/anti-icing agents in support of Weapon System Single Managers and HQ AFCESA.

2.1.7.2. Provides engineering support in the form of consultation and testing on airfield and aircraft deicing and anti-icing agents and their impact on generic weapon system materials.

2.1.7.3. Participates and coordinates with Society of Automotive Engineers (SAE) Committee G-12, Aircraft Ground Deicing, for the purpose of:

2.1.7.3.1. Integration of military aircraft requirements into appropriate aircraft and airfield deicing/anti-icing specifications.

2.1.7.3.2. Maintaining awareness of any proposed changes to current aircraft and airfield deicing/anti-icing specifications.

2.1.8. Weapon System Single Managers (includes ASMs):

2.1.8.1. Evaluate impact of desired/requested airfield deicing/anti-icing agents on systems' performance for which they are responsible.

2.1.8.2. Identify to MAJCOMs the funding needs associated with the analysis and testing required to evaluate the impact of desired/requested airfield deicing/anti-icing agents.

2.1.9. Aircraft Single Managers:

2.1.9.1. Upon receipt of a MAJCOM request for approval to use an airfield deicing/anti-icing agent, the ASMs will become the focal point for coordination. They will act as single interface to the MAJCOM and coordinate the approval and/or requirements for all other weapon system components used on the aircraft to include those components managed by different Single Managers (e.g., landing gear, electronic countermeasure pods, navigational pods, weapons).

2.1.9.2. Upon notification from a MAJCOM of airfield deicing/anti-icing agents being used at a non-Air Force owned installation, ASMs will:

2.1.9.2.1. Advise any Weapon System Single Managers whose components are used on their aircraft of the airfield deicing/anti-icing agents being used.

2.1.9.2.2. Work with the respective Weapon System Single Managers to adjust maintenance activities and/or inspection intervals, or impose operational restrictions to mitigate if possible, any impact of the airfield deicing/anti-icing agents.

2.2. Committee Members. Working with the Snow and Ice Control Committee (S&ICC). The following individuals compose the S&ICC membership and will perform the described functions at Air Force stations and small units.

2.2.1. Wing Commander. The Wing Commander forms and chairs the S&ICC and appoints additional members as needed.

2.2.2. Support Group Commander. The Support Group Commander activates the S&ICP when needed.

2.2.3. Base Civil Engineer:

2.2.3.1. Coordinates installation snow and ice control activities.

2.2.3.2. Requests a manpower variance when necessary.

2.2.3.3. Approves requests for snow removal service contracts when justified.

2.2.3.4. Approves S&IC equipment for multiple uses (paragraph **4.3.5.2.**) and ensures new construction complies with paragraph **3.5.**

2.2.4. Environmental Flight Commander or Chief:

2.2.4.1. Briefs S&ICC on environmental impacts of aircraft and airfield deicing chemicals at the pre- and post-season meetings.

2.2.4.2. Provides storm water (SW) management to minimize potential impact of aircraft and airfield deicing chemicals. Programs for Environmental Compliance (EC) projects that will contain, control, and potentially treat SW runoff.

2.2.4.3. Must review siting of snow dumps for environmental impacts at chosen location, flow of runoff, monitoring requirements, annual maintenance, and chemical usage.

2.2.4.4. Ensures guidance on P2/BMPs is disseminated effectively to personnel conducting airfield deicing.

2.2.4.5. Performs annual evaluation of implementation status and effectiveness of P2/BMPs and recommends to the S&ICC actions to improve effectiveness.

2.2.5. Operations Flight Commander or Chief:

2.2.5.1. Provides adequate facilities, equipment, materials, and trained personnel for the S&ICP.

2.2.5.2. Prepares the S&ICP.

2.2.5.3. Provides recommended changes as necessary to the snow removal fleet and S&ICP to the S&ICC.

2.2.5.4. Implements S&ICC changes to fleet and S&ICP.

2.2.5.5. Inspects airfield infrastructure for corrosion or deterioration caused by deicing chemicals. Will report findings and recommendations to the S&ICC.

2.2.5.6. Coordinates chemical use and application locations with the environmental flight.

2.2.6. Chief of Heavy Repair:

2.2.6.1. Prepares for, performs, and follows up on S&IC activities.

2.2.6.2. Complies with the instructions in chapters**Chapter 3**, **Chapter 4**, and **Chapter 5** of this instruction.

2.2.6.3. Plans the S&ICC meetings and publishes minutes.

2.2.7. Chief of Security Forces:

2.2.7.1. Enforces BCE restricted parking notices during snow and ice control operations.

2.2.7.2. Removes portable restricted area boundaries to allow efficient plowing.

2.2.7.3. Sets up entry control procedures for snow removal personnel and equipment entering "restricted" areas.

2.2.8. Chief of Services. The Chief of Services provides box meals for S&ICC personnel whose duty hours or locations prevent their use of the dining facilities.

2.2.9. Communications Officer:

2.2.9.1. Provides land mobile radio (LMR) communications for S&IC operations.

2.2.9.2. Reviews requests for LMR equipment according to AFI 33-106, *Managing High Frequency Radios, Land Mobile Radios, Cellular Telephones, and the Military Affiliate Radio System.*

2.2.9.3. Repairs LMRs for S&IC operations using established priority repair lists in unit or base directives.

2.2.10. Operations Group Commander. The Operations Group Commander sets snow removal priorities for flying operations, and provides timely weather information for snow and ice control operations.

2.2.11. Chief of Command Post:

2.2.11.1. Develops aircraft parking plans to use during snow and ice control operations.

2.2.11.2. Directs maintenance activities to:

2.2.11.2.1. Clears all removable items that are not in use, such as tools, fire extinguishers, wheel chocks and aerospace ground equipment, from parking ramps to a designated area.

2.2.11.2.2. Clears snow from around ramp telephones or other permanently installed flight line equipment in the vicinity of the aircraft.

2.2.11.2.3. Removes aircraft from areas to be cleared, when feasible.

2.2.12. Chief of Airfield Management:

2.2.12.1. Gives priority to S&IC to allow aircraft operations to continue.

2.2.12.2. Conducts periodic runway friction readings in accordance with TO 33-1-23 when there is snow, ice, or slush on the airfield. Once the readings are taken and compiled, they will be forwarded to the S&IC center to support efficient and effective ice control and removal with minimal chemical use.

2.2.12.3. Passes runway vehicle clearance control to the snow supervisor when requested during operations.

2.2.12.4. Publishes orders and instructions concerning:

2.2.12.4.1. Flight line licensing for snow removal equipment operators.

2.2.12.4.2. Vehicular traffic and communication procedures used in and around airfield areas.

2.2.12.4.3. Minimum runway condition readings for departure and arrival of particular aircraft.

2.2.13. Chief of Weather Operations:

2.2.13.1. Notifies the SCC when forecasts predict snow or ice accumulation.

2.2.13.2. Notifies the SCC of significant changes to a previous forecast.

2.2.13.3. Provides information on request by the SCC or BCE.

2.2.13.4. Provides necessary data for pavement temperature forecasts at installations where runway ice detection systems operate.

2.2.14. Logistics Group Commander. The Logistics Group Commander briefs the S&ICC on actual and potential impacts of deicing chemicals on aircraft and weapon systems, and reports on maintenance activities conducted to mitigate these impacts.

2.2.15. Contracting Officer:

2.2.15.1. Administers contracts for emergency equipment rental or repair.

2.2.15.2. Promptly procures parts and supplies for snow and ice control operations.

2.2.15.3. Sets up emergency procurement procedures for abnormal duty hours.

2.2.16. Chief of Transportation:

2.2.16.1. Develops and runs a post-season rehabilitation program for snow and ice control equipment.

2.2.16.2. Sets up and runs a maintenance and repair program for all snow and ice control vehicles. The program includes immediate repair of all breakdowns that occur during snow and ice removal operations. Coordinates the start and end dates for this priority response with civil engineering.

2.2.16.3. Establishes minimum stock levels of vehicle parts for snow and ice control vehicles.

2.2.17. Chief of Supply:

2.2.17.1. Promptly procures requested equipment and supplies for snow and ice control.

2.2.17.2. Provides minimum special levels of spare parts for snow and ice control equipment.

2.2.17.3. Provides around-the-clock refueling for equipment during snow and ice control operations.

2.2.17.4. Provides fuel for equipment on site when the base fuel pumps are not near the operations.

2.2.18. Chief of Safety:

2.2.18.1. Reviews the S&ICP to make sure that planned operations are safe (in accordance with paragraph **3.1.2.**).

2.2.18.2. Publicizes snow and ice hazard information and the precautions to take when encountering snow and ice control equipment.

2.2.18.3. Evaluates effectiveness of S&IC activities at maintaining or rapidly reestablishing runway conditions required for safe flying operations. Will report recommendations to the S&ICC.

Chapter 3

SNOW AND ICE CONTROL PREPARATIONS

3.1. Readying the Snow Team:

3.1.1. Training. Give higher priority to training after winters with below-average snowfall. Provide:

3.1.1.1. Formal classroom lectures, training films, and discussion periods.

3.1.1.2. Ensure operator hands-on training for all snow and ice control equipment. Perform practice runs with the equipment using typical operation scenarios. Substitute water for liquid deicers to reproduce realistic operations.

3.1.1.3. Furnish formal instruction on effective and efficient anti-icing and deicing with minimal chemical use. Instruction must cover chemical usage issues, including P2/BMPs, environmental impact, and impact on aircraft, weapon systems, and airfield infrastructure.

3.1.1.4. Tabletop exercises using miniature equipment on airdrome layouts to simulate operations and to reduce training costs.

3.1.1.5. Operator maintenance responsibilities, including fuel, fluid, supply locations, repair techniques, and heavy equipment maintenance reporting procedures.

3.1.1.6. Instruct the operators on communication procedures and right-of-way information.

3.1.1.7. Details of the S&ICP, emphasizing the order of priorities.

3.1.1.8. An airfield and base familiarization tour highlighting locations where problems are likely. Conduct a night tour for night shift employees.

3.1.1.9. Duty location, duty hours, duty uniform, shift schedules, and notification procedures.

3.1.1.10. Allow for periodic attendance at technology sharing seminars and workshops with other military bases and governmental agencies (i.e., the snow symposium in Buffalo, New York).

3.1.2. Safety and Health:

3.1.2.1. Units must comply with all vehicle licensing, personal protective equipment, and medical requirement policies. All equipment operators, military or civilian, must meet minimum training hour requirements before licensing. Employ overhires early enough to allow time for their training and medical examinations.

3.1.2.2. S&IC operations and working conditions are hazardous. Anticipate damage to snow equipment and attachments because of hidden obstructions but damage can be minimized by educating operators ahead of time on these hidden hazards. Ensure all personnel comply with established safety procedures when operating deicing equipment.

3.2. Readying the Snow Equipment. All equipment must be mechanically sound and operational by 1 September. Equipment status must be available for the pre-season meeting. Use heated storage to lengthen the equipment life, reduce maintenance costs, and ensure rapid response.

3.2.1. Perform pre-season operational checks including dry runs that will resemble winter use as closely as possible.

3.2.2. Install and inspect radios early.

3.2.3. Begin daily run-up and operational checks when the temperature drops below freezing.

3.2.4. Adjust and calibrate all S&IC equipment attachments precisely. Load ballast and install tire chains prior to S&IC operations.

3.2.5. Equip each unit with required support materials such as first aid kit, tow cables, shovels, shear pins, ice scrapers, and tool kits as required.

3.2.6. Use wear-resistant tungsten carbide cutting edges to reduce maintenance. Caution: tungsten carbide cutting edges may be incompatible with some in-pavement lighting fixtures.

3.2.7. Replenish broom cores with steel or poly bristles or a combination of both. Loss of steel bristles increases foreign object damage (FOD) potential, so minimize loss by trying various brands and storing the snow brooms indoors.

3.2.8. Put vehicle call signs, base and airfield maps, spreader settings, operator's manuals, and snow removal priorities in the vehicle for the operator's convenience.

3.3. Obtaining Materials and Parts. The Chief of Heavy Repair procures adequate shop stocks of S&IC supplies by 15 September each year. Establish minimum levels for each item, arrange for on-call items, and identify shortages by 31 May each year.

3.4. Protecting Air Force Property. The Chief of Heavy Repair specifies "safety zones" around key assets and includes this information in the S&ICP. Snow removal vehicles will not operate within these safety zones.

3.4.1. Environment. The Chief of Heavy Repair will work cooperatively with the base environmental flight to ensure application of deicing agents are in accordance with local, state, and Federal CWA stormwater provisions.

3.4.2. Infrastructure. Heavy Repair crews mark all obstructions that could damage or be damaged by snow and ice control equipment. The marking crew emphasizes drainage culverts, catch basins, manhole covers, fire hydrants, airfield lighting, electrical/electronic equipment enclosures and drop-offs during pre-season inspections.

3.4.3. Airfield Lighting. Non-metal markers may be used to identify taxiway lights. FAA AC 150/5345-5A, *Airport Lighting Equipment Certification Program*, provides the name and address of marker manufacturers (these manufacturers do not supply markers suitable for identifying taxiway lights buried in snow). If you experience excessive damage to in-pavement taxiway lights, consider purchasing "snowplow resistant" lighting. Also watch for corrosion and deterioration of underground cables that may result from long-term or excessive use of non-urea ice control chemicals.

3.4.4. Facilities. S&IC equipment operators maintain sufficient clearance around facilities to prevent damage. Operators must observe the safety zone.

3.5. Streamlining Operations. Civil engineering personnel should guard against snow removal physical constraints. Excessive bumper blocks, elevated utility manholes in pavements, congested or enclosed parking arrangements, lack of road shoulders, and dead-end or cul-de-sac streets severely hamper operations. Minimize these adverse conditions through better communications. BCE construction manage-

ment personnel should coordinate maintainability checklists and drawings for upcoming projects with Operations Flight S&IC equipment operators.

3.6. S&IC Monitoring Systems:

3.6.1. Reviewing Runway Ice Detection Systems (RIDS):

3.6.1.1. Using Sensors. Sensors embedded in the pavement measure surface conditions. These devices precisely measure the pavement temperature, indicate the presence of water or ice, and provide information to choose the most appropriate S&IC strategy.

3.6.1.2. Influencing Factors. Many factors influence the formation of ice on pavements including pavement temperature, surface color and composition, wind, humidity, solar radiation, traffic, and residual deicing chemicals. Air temperature is not an accurate gauge of pavement surface conditions. Knowing the direction and rate of change of pavement temperature lets you predict ice formation. Sensors are particularly valuable in timing anti-icing applications of chemicals. When ice or compacted snow accumulates on pavements, knowing the pavement temperature helps you choose the right chemicals and know how much to use to get the most effect with the least amount of material.

3.6.1.3. Pre-season Checking. Check systems before the season starts to make sure that routine maintenance was done and that systems work. Replace all required filters and clean the sensor pins.

3.6.2. Mobile Pavement Temperature Sensors. There are several different models of mobile temperature sensors used for ice control. Some instruments mount to the underside of the vehicle and scan the pavement as the vehicle passes over it. Another model can be mounted to the mirror bracket and gives both pavement and outside air temperatures. These systems are equipped with a dash-mounted LED display presenting continuous readings of the surrounding conditions.

3.7. Establishing the Snow Control Center (SCC). The SCC is a focal point for all S&IC activities. Equip the SCC with:

3.7.1. At least two class “A” telephone extensions for recalling off-base personnel.

3.7.2. No less than one radio transceiver or remote. Use a dedicated net for snow removal communications when possible.

3.7.3. Dispatch boards displaying vehicle registration numbers, nomenclature, vehicle status, vehicle dispatched location, operator, radio call sign, and comments.

3.7.4. Appropriate layout maps with color-coded priorities, status, and runway surface conditions.

3.7.5. All required publications including this Instruction and the S&ICP.

3.7.6. Personnel rosters showing duty status and recall information.

3.7.7. Charts identifying current weather conditions and the forecast.

3.7.8. Alternate sources of equipment and personnel to support contingencies. Include instructions for renting equipment or DoD mutual support agreements with regional active or reserve units.

Chapter 4

SNOW AND ICE CONTROL OPERATIONS

4.1. Removing Snow from the Airfield:

4.1.1. Basic Guidelines. The severity of the snowstorm determines the size of the area on which you focus. Follow these basic guidelines:

4.1.1.1. Reduce operations and concentrate on keeping the center of the runway and taxiways open when snow accumulation prevents clearing an entire area.

4.1.1.2. Use snowplows in tandem to move snow into a windrow that can be cast over the edge lights by a snow blower. Include the overruns with the runway plow patterns.

4.1.1.3. Clear enough area to leave room for aircraft wings and engines clearance. Determine permissible snow depth beyond the shoulders for the most demanding aircraft at the base.

4.1.1.4. Glide slope critical areas require specific snow depths to prevent signal loss. Reduce profile height to help in future operations. Keep runway and taxiway lights uncovered.

4.1.2. Maintaining Communications. All snow removal units operating in the aircraft movement area must maintain radio contact with the control tower or be under the control of a supervisor with control tower communications. Work out, in advance, ways of communicating with base operations when the radio signal is lost. You may need to install radios equipped with headsets to offset the high noise levels generated by snow removal equipment. Requests to clear the runway must allow enough time for the snow team supervisor to physically check the entire runway.

4.1.3. Determining Right-of-Way. Snow removal techniques are necessarily high speed and cannot always comply with airfield speed limits. Control tower personnel, other vehicle operators, and aircraft ground maintenance personnel should understand this and yield to snow and ice control equipment.

4.1.4. Following General Procedures. While conditions at individual bases vary widely and may require special S&IC techniques and equipment, follow general procedures as closely as possible. Wind speed and direction will determine your actual clearing pattern. For normal operations:

4.1.4.1. Start at the center of the runway and work outward to the shoulders.

4.1.4.2. Use snow brooms throughout the snowfall to keep the middle of the runway down to bare pavement, regardless of the rate of snowfall.

4.1.4.3. Broaden snow removal efforts to include the entire primary runway during light-to-moderate snowfall. Use displacement plows and snow blowers to remove the windrows accumulated by the sweepers.

4.1.4.4. Concentrate all efforts on keeping the center portion of the runway open during heavy snowfall.

4.1.5. Managing Vehicle Flow. Keep a safe distance between vehicles operating in a snow removal pattern to avoid accidents due to loss of view.

4.1.5.1. Time equipment movements for orderly turnaround and safe reentry at start of the next pass.

4.1.5.2. Reduce unrelated radio traffic on the snow control frequency during runway snow removal operations. Snow removal transmissions must have priority on a multiple-user net.

4.1.6. Operating During Calm and Parallel Wind Conditions. Snow removal starts at the end of the runway, to one side of the centerline and works toward the shoulders. When the windrows of snow from the sweeping operation become too heavy, use a displacement snowplow to continue the windrow.

4.1.7. Operating During Crosswind Conditions:

4.1.7.1. Start clearing the snow from the upwind side of the runway.

4.1.7.2. Let the wind help you move the snow across the runway if time and aircraft operations permit. After you begin the clearing pattern, continue it for the entire width of the runway to avoid obscuring the runway centerline or leaving a windrow on the runway.

4.1.7.3. Advise the tower and airfield management before beginning crosswind snow removal.

4.1.7.4. Call the control tower's attention to hazards such as windrows, snow banks, slush, and so on if you must stop clearing operations before finishing the entire runway width.

4.1.8. Clearing Runway Edge Lights. Keep runway edge lights clear to give runway clearance for aircraft movements. Use the air blast from the rotary snow broom to clear runway lights of dry snow. You may use detail personnel to keep lights uncovered.

4.1.9. Removing Snow from Semi-Flush, In-Pavement Lights. Operators should be careful when operating a snowplow over these lights. Adjust steel blades to clear the top of the lights. When possible, use snowplows equipped with polymer or rubber blades or a snow broom. Polymer blades may reduce collateral damage, but aren't economical for all plowing conditions.

4.1.10. Clearing Snow From the Aircraft Arresting Systems (AAS) Area. Before you begin clearing the snow, deactivate AAS and remove the pendant and barrier. Remove enough snow to allow full use of the AAS. Include specific techniques in the S&ICP. Use portable snow blowing equipment and manual labor around the AAS. Use AAS maintenance or augmentee personnel for this work.

4.1.11. Clearing Snow from the NAVAIDs Instrument Landing System (ILS) Area. Snow removal operations in ILS area will be directed by Airfield Management. All snow removal personnel will be accompanied by at least one NAVAIDS maintenance individual that monitors and ensures adequate snow removal in the antenna and field detector areas. Include specific procedures in the S&ICP for snow removal around navigational aids.

4.1.12. Clearing Other Airfield Areas. The facility occupant, manager, or office of primary responsibility oversees snow removal that requires hand shoveling, small rotary blowers, or small tractor-mounted plows. This includes removing snow from areas around aircraft hangars and shelters, grounding points, parked aircraft (within defined safety zone), navigational aids, arresting system building, and other areas that you cannot safely clear using snow removal equipment. Clear snow from the face of all signs.

4.1.13. Disposing of Bulk Snow. Haul snow to a disposal site if there is not enough storage space near the areas being cleared. Before winter arrives, choose a readily accessible site where the snow pile will not interfere with aircraft operations. Coordinate with environmental and other appropriate base agencies when planning disposal sites. Avoid excessive chemical loading of nearby drainage

areas. As a last resort, installations may use service contracts to dispose of bulk snow off base if needed.

4.1.14. Creating Temporary Airfield Markings. Use locally purchased sea dye (yellow-orange) to mark runway and taxiway guidelines, hazardous temporary windrows, or banks that you cannot immediately remove. The airfield manager or flight safety office should tell you where to put the markings.

4.2. Removing and Controlling Ice on the Airfield. Icy pavements are dangerous and jeopardize the mission of the base. The BCE will select specific individuals in the S&IC chain of command to make airfield pavement deicing decisions. Selection will be based on duty position, experience, and environmental awareness. Base the decision to use ice control chemicals on the weather forecast, flying schedule, and environmental considerations. The SCC should carefully monitor both use and issue of ice control chemicals and log the quantities and locations used. Refer to paragraph **5.4.**

4.2.1. Knowing How Ice Forms. Snow and ice control teams must know the various conditions that cause ice to form. Freezing rain, frozen water vapor and fog, freezing surface water, compacted snow, and the thawing and re-freezing of snow all may lead to hazardous pavement surfaces. Do not use chemicals during the early stages of dry snowfall or while snow is blowing since the melting ability of these chemicals may actually increase ice formation.

4.2.2. Controlling Ice Mechanically. Using S&IC monitoring systems, anti-icing methods, and the "bare pavement" concept for the runway should minimize ice accumulation. When ice forms:

4.2.2.1. Use under-body scrapers or graders for scraping ice to less than 3.2 millimeters (1/8 inch) before using deicing chemicals.

4.2.2.2. Remove slush or soft ice with rubber cutting edges.

4.2.2.3. Use serrated cutting edges to cut longitudinal grooves in hard ice to help hold chemicals and improve traffic control.

4.2.2.4. Use caution with rotary snow brooms on hard packed snow and ice. In some cases, the snow broom may glaze or "polish" the ice and further reduce traction. Steel snow broom bristles help cut ice; poly bristles are best for "flipping" snow.

4.2.3. Using Ice Control Chemicals. For airfield pavements, use only chemical anti-icing and deicing agent must not result in an increase in environmental, safety, or occupational risk. deicing agents described in **Attachment 2** of this AFI. The selection of any airfield anti-icing or Approval for chemical use must be obtained from the installation Environmental Protection Committee.

Once the committee has deemed the candidate agents do not increase environmental, safety, or occupational health risks, they must receive the ASM approval.

4.2.4. Storing Ice Control Chemicals. Store ice control agents in enclosed shelters when possible. Properly storing deicing and anti-icing chemicals reduces product degradation caused by exposure to the weather. Storing solids or abrasives under shelter prevents moisture absorption that may freeze the stockpile in cold weather. Liquid ice control chemicals stored in tanks must comply with AFI 32-7080, *Pollution Prevention Programs.* Store potassium acetate chemicals in polyethylene or stainless steel tanks. Use of potassium acetate as an anti-icier is recommended as an excellent means of reducing total chemical usage (refer to paragraph **4.2.7.**).

4.2.5. Impacting the Environment. Minimize use of ice control chemicals to protect the environment, aircraft and weapon systems, and airfield infrastructure, and to control the cost of airfield deicing activities.

4.2.5.1. If available, use runway ice detection systems and Mobile Temperature Sensors so teams can use anti-icing techniques rather than deicing.

4.2.5.2. Minimize use of glycols and urea-based products. Rely on alternatives that are safer for the environment; such as potassium acetate, sodium formate, and sodium acetate. Excessive glycol and urea use could degrade waterways.

CAUTION: Ensure potassium acetate is used as recommended by the manufacturer. There are documented cases of potassium acetate adverse effects on underground electrical circuits where the insulation is in less than good condition.

4.2.5.3. Some deicers may cause light scaling of Portland cement concrete (PCC) by physical action related to the chemical concentration gradient in the pavement. If it can be avoided, do not apply ice control chemicals to new PCC pavements for the first year.

4.2.6. Dispensing Deicing and Anti-icing Chemicals:

4.2.6.1. Solid Chemicals:

4.2.6.1.1. Use suitable dispenser. For uniform coverage on the airfield, material spreaders with capacities between five and seven cubic yards are needed to accurately dispense chemicals. The dispenser must apply a uniform pattern at various density settings and speeds. Caution should be taken with some non-urea solids, such as sodium formate, which tend to form clumps; these should be applied with equipment designed to break-up these clumps.

4.2.6.1.2. Use waterproof coverings to prevent the chemical from absorbing moisture.

4.2.6.1.3. Use solid chemical dispensers with pre-wetting capability when possible. Pre-wetting solid deicers with approved liquid deicers is much more effective at low temperatures and prevents the solid deicers from being blown away by high winds. The recommended application rate in pre-wetting is 10.4 liters per 1,000 kilograms (1.25 gallons per 1,000 pounds) of deicer.

4.2.6.2. Liquid Chemicals. Computer controlled and calibrated sprayer units should be used whenever possible to minimize chemical usage while maximizing the chemical's effect. Trucks equipped with tanks and spray bars can be used to dispense liquid chemicals. The spray bar and nozzles should cover well without runoff. Portable towed tanks and water distributors may also be used, but these will require flushing if used for multiple activities. Ensure spreaders are capable of accurately dispensing liquid chemicals while traveling at various speeds. Installations using large quantities of chemicals should consider procuring precision application equipment to improve the effectiveness and efficiency of chemicals applied. Contact your MAJCOM POC for guidance on procurement of airfield deicing chemical application equipment.

4.2.7. Anti-Icing Procedures. Whenever possible, snow and ice control teams should emphasize anti-icing rather than deicing, especially on installations that have runway ice detection systems. Direct the primary ice control efforts toward keeping ice from bonding to pavements. Anti-icing requires applying liquid deicing chemicals at a rate of 1.2 liters per 100 square meters (0.3 gallons per 1,000 square feet) just before freezing conditions occur. Chemicals in liquid form are most effective

for anti-icing. Dry, solid chemical applied to a cold, dry surface will not stick, and surface winds or aircraft may scatter it, severely reducing its effectiveness and impacting the environment. Solid chemicals may be used as an anti-icier, but must be pre-wet with a liquid to enhance bonding action between the chemical and the pavement.

4.2.8. Deicing. Deicing may require up to five times the quantity of chemical as anti-icing. After applying the deicer, the chemical must be allowed to react and take effect. After the chemical begins its brine action, remove the ice and snow with rotary snow brooms or snowplows.

4.2.9. Using Abrasives. Use abrasives only in emergency conditions to improve traction on airfield surfaces. The FAA guidance (AC 150/5200-30A) in paragraphs **4.2.9.1.** and **4.2.9.2.** is the standard for abrasives.

4.2.9.1. Friction improving material applied to airfield pavements will consist of washed granular particles free of stones, loam, clay debris, and chloride salts or other corrosive substances. The pH of the water solution containing the material must be approximately neutral (pH 7). Material must meet the following gradation using U.S.A. standard sieves conforming to ASTM E11-95, *Standard Specification for Wire Cloth and Sieves for Testing Purposes.*

Table 4.1. U.S.A. Standard Sieve Designation.

Sieve Designation	Percent by Weight Passing
04	100
8	97-100
16	30-60
50	0-10
80	0-2

4.2.9.2. It is highly recommended that each base coordinate with the local airframe manager to ensure that the proper grade material is used for the aircraft in your area.

4.2.10. Grooving Pavement. Cutting grooves into the pavement is an option that will aid in trapping deicing chemical, reduce loss, and prolong the melting action. Grooving also helps drain melted water and reduce re-freezing.

4.3. Controlling Snow and Ice on Roadways, Parking Lots, Housing, and Other Areas. Remove snow from these areas to allow normal base activity to proceed with minimum delay. When possible, work during non-peak hours to avoid congestion.

CAUTION: Agents not authorized for use on runways must not be used on any roadways within 90 meters (300 feet) of runways, taxiways, or parking aprons to prevent tracking these agents onto surfaces used by aircraft.

NOTE:

All chemical agents used on roadways must conform to the local environmental standards. To ensure environment compliance, coordinate with and obtain approval from the Environmental Flight Chief.

4.3.1. Clearing Roads and Streets. Plow from the center of the road, pushing the windrow to the shoulder. In heavy accumulation regions, use rotary snow blowers to clear shoulders and sidewalks.

4.3.2. Clearing Parking Lots. The Chief of Heavy Repair, Security Police, and Facility Managers decide when parking lots will close for snow removal. If required, the S&ICP should address the need for temporary parking areas. Use local media to publicize parking arrangements.

4.3.3. Clearing Housing and Other Areas. The S&ICP will specify the snow removal responsibilities of the occupant and facility manager for sidewalks, entrances, fire hydrants, and loading ramps.

4.3.4. Removing and Controlling Ice:

4.3.4.1. Using Chlorides. Store chlorides properly to prevent contamination. As with all deicers, use as little as possible. Environmental contamination is most likely at storage sites. Keep chloride deicers dry to prevent ground or surface water contamination. Use chlorides as follows:

4.3.4.1.1. Use sodium chloride (rock salt) and calcium chloride to de-ice non-airdrome areas. Because they are corrosive, use them away from aircraft movement areas.

4.3.4.1.2. Use sodium chloride (with or without added liquid calcium chloride) to de-ice base areas. It is cheap and effective.

4.3.4.1.3. Use calcium chloride instead of sodium chloride at lower temperatures. Pre-wetting makes it even more effective. You may use chloride-based deicers with corrosion inhibitors on bridges or other structures.

4.3.4.2. Using Abrasives. Use sand, cinders, and fly ash to increase vehicle traction. You can add between 5 and 15 percent chloride by weight to sand to improve traction and help melt ice. Although abrasives may improve traction on icy pavements, heavy applications can insulate the ice and keep it from melting. It may degrade air quality in windy locations and lead to drainage problems. Routinely clear drainage inlets in order to avoid flooding when the ice and snow melt. Abrasives also can degrade stream quality and cause exceedances for total suspended solids (TSS) in discharges to streams and waterways. Solids are the main pollutants in our bodies of water.

4.3.5. Using Snow Removal Equipment:

4.3.5.1. On the Base. Use dump trucks with reversible plows, road graders, loaders with buckets or plows, deicing chemical dispensers, and attachments to other equipment. Use caution in assigning any airfield equipment to base streets. Assign rollovers and towed snow brooms to base areas only in emergencies. Supervise them closely and use them only during low traffic periods.

4.3.5.2. Other Uses. Ideally, you will use snow and ice control equipment only for snow and ice removal. However, the Base Civil Engineer may authorize using snow removal equipment for non S&IC activities, such as snow brooms for runway rubber removal operations, as long as you take normal precautions and the operation does not damage the snow removal equipment.

Chapter 5

POST-SEASON ACTIONS

5.1. Implementing Lessons Learned. The BCE Operations Flight Chief reviews the activity logs at the end of the snow season, determines the problems and successes, and incorporates improvements into the revision of the S&ICP. Use P2/BMPs proactively to minimize or eliminate problems. Begin preparing for the next snow removal season at the end of the current season.

5.2. Reconditioning Snow Removal Equipment. The Chief of Heavy Repair or designee thoroughly inspects, repairs, and stores all snow and ice control equipment as soon as possible. Identify all required replacement parts and order them immediately. The Vehicle Control Officer or NCO will brief the staff on the status of snow removal equipment at commander's update briefings.

CAUTION: Exercise care when using steel bristles on snow brooms. Corrosion can cause the bristles to fail prematurely and become potential source of FOD.

5.3. Repairing Real Property. Complete normal end-of-season activities such as storing snow fences and snow markers. Inspect all pavement surfaces for damage caused by snow removal equipment. Survey other property for possible damage, such as airfield lighting, aircraft arresting systems, base signs, grounds, and security fences. Schedule repairs based on local priorities.

5.4. Tracking Chemical Consumption. Each installation is responsible for tracking the consumption of deicing chemicals and abrasives used on their airfields, streets, parking lots, and sidewalks. Airfield and street consumption should be accounted for separately. This information should be available at all times for use by the base environmental office, MAJCOM, or higher agencies. The following information is required when collecting this data:

5.4.1. Each type of deicer and/or abrasive used.

5.4.2. Quantity of each deicer and/or abrasive used.

5.4.3. Unit of issue.

5.4.4. Unit price.

5.4.5. Method of procurement.

5.4.6. Total inches of snowfall for the past winter.

5.4.7. Total number of ice events/storms.

5.4.8. Total square yards of airfield.

5.4.9. Total square yards of street and parking lot pavement.

5.4.10. Total number of sorties flown.

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Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

Air Force Publications

AFPD 32-70, *Environmental Quality*

AFI 32-7080, *Pollution Prevention Programs*

AFI 33-106, *Managing High Frequency Radios, Land Mobile Radios, Cellular Telephones, and the Military Affiliate Radio System*

TO 33-1-23, Procedures for Use of Decelerometer to Measure Runway Friction

TO 42C-1-2, *Anti-Icing, Deicing, and Defrosting of Parked Aircraft*

AFMS 44EO, *Operations Flight*

Federal Aviation Administration

AC 150/5200-30A, *Airport Winter Safety and Operations*

AC 150/5220-20, *Airport Snow and Ice Control Equipment*

AC 150/5345-53A, *Airport Lighting Equipment Certification Program*

American Society for Testing and Materials

E11-95, *Standard Specification for Wire Cloth and Sieves for Testing Purposes*

Society of Automotive Engineers

AMS 1426C, *Fluid, Deicing/Anti-Icing, Runways and Taxiways Glycol Base*

AMS 1431A, *Compound, Solid Deicing/Anti-Icing Runaways and Taxiways*

AMS 1435, *Fluid, Generic, Deicing/Anti-Icing Runways and Taxiways*

Other

Federal Specification TT-I-735A, *Isopropyl Alcohol*

Abbreviations and Acronyms

AAS—Aircraft Arresting System

AC—Advisory Circular

AFMS—Air Force Manpower Standard

AFRL—Air Force Research Laboratory

AMS—Aerospace Material Specification

AS—Allowance Standard

ASM—Aircraft Single Manager

ASTM—American Society for Testing and Materials

BCE—Base Civil Engineer

CWA—Clean Water Act

DoD—Department of Defense

EC—Environmental Compliance

FAA—Federal Aviation Administration

FOD—Foreign Object Damage

HQ USAF/ILE—Office of the Civil Engineer

HQ AFCESA—Headquarters Air Force Civil Engineer Support Agency

HQ USAF/ILEVQ—Office of the Civil Engineer, Environmental Division, Quality Branch

HQ USAF/ILM—Office of the Director of Maintenance

LED—Light-Emitting Diode

LMR—Land Mobile Radio

MAJCOM—Major Command

NAVAID—Navigational Aid

Non-CONUS—Outside the Continental United States

P2/BMP—Pollution Prevention/Best Management Practices

PAA—Primary Aircraft Authorization

PCC—Portland Cement Concrete

PFS—Porous Friction Surfaces

POC—Point of Contact

PPBS—Planning, Programming, and Budgeting System

PRO-ACT—Air Force Environmental Information Clearing House

R&D—Research and Development

RIDS—Runway Ice Detection System

S&ICC—Snow and Ice Control Committee

S&ICP—Snow and Ice Control Plan

S&IC—Snow and Ice Control

SAE—Society of Automotive Engineers

SCC—Snow Control Center

SW—Storm Water

TO—Technical Order

TSS—Total Suspended Solids

Attachment 2

USING ICE CONTROL CHEMICALS ON AIRFIELD PAVEMENTS

A2.1. Solid Anti-Icing and Deicing Chemicals. All solid chemicals for airfield use (other than urea) must be certified to SAE AMS 1431, *Compound, Solid Deicing/Anti-Icing, Runways and Taxiways*.

A2.1.1. Urea. Shotted or prilled urea performs well down to –9.4 degrees Celsius (15 degrees Fahrenheit). Carefully monitor urea usage, since its overuse can lead to environmental degradation. See **Table A2.1.** for application rates. As an example, apply no more than 11.2 kilograms of urea per 100 square meters on ice less than 0.8 millimeters thick, when pavement temperature is –3.9° C.

Table A2.1. Urea — Kilograms Per 100 Square Meters (Pounds Per 1,000 Square Feet).

	Pavement Temperature		
Ice Thickness	**-1.1 °C (30 0F)**	**-3.9°C (25 0F)**	**-6.7°C (20 °F)**
Less than 0.8 mm (1/32")	7.8 (16)	11.2 (23)	29.3 (60)
0.8 mm to 3.2 mm (1/32" to 1/8")	14.6 (30)	29 (60)	61 (125)
3.2 mm to 6.4 mm (1/8" to 1/4")	61 (125)	85.4 (175)	134 (275)

A2.1.2. Sodium Formate. More environmentally friendly than urea, this product has been effective at temperatures as low as –15 degrees Celsius (5 degrees Fahrenheit) with an application rate half that of urea. It requires 90 percent less oxygen than urea to biodegrade, making it far less polluting than urea. See **Table A2.2.** for application rates.

Table A2.2. Sodium Formate — Kilograms Per 100 Square Meters (Pounds Per 1,000 Square Feet).

	Pavement Temperature		
Ice Thickness	**-1.1 °C (30 °F)**	**-3.9 °C (25 °F)**	**-6.7 °C (20 °F)**
Less than 0.8 mm (1/32")	3.9 (8)	5.4 (11)	14.2 (29)
0.8 mm to 3.2 mm (1/32" to 1/8")	6.8 (14)	14.2 (29)	30.3 (62)
3.2 mm to 6.4 mm (1/8" to 1/4")	30.3 (62)	42 (86)	65.9 (135)

A2.1.3. Sodium Acetate. Another more environmentally friendly product, sodium acetate will effectively melt ice at temperatures as low as –12.2 degrees Celsius (10 degrees Fahrenheit). It requires 63 percent less oxygen than urea to biodegrade, making it far less polluting than urea. See **Table A2.3.** for application rates.

Table A2.3. Sodium Acetate — Kilograms Per 100 Square Meters (Pounds Per 1,000 Square Feet).

	Pavement Temperature		
Ice Thickness	**-1.1 °C (30 °F)**	**-3.9°C (25 °F)**	**-6.7 °C (20 °F)**
Less than 0.8 mm (1/32")	4.9 (10)	7.3 (15)	18.1 (37)
0.8 mm to 3.2 mm (1/32" to 1/8")	8.8 (18)	18.1 (37)	38.1 (78)
3.2 mm to 6.4 mm (1/8" to 1/4")	38.1 (78)	53.7 (110)	85 (174)

A2.2. Liquid Anti-Icing and Deicing Chemicals. All liquid chemicals for airfield use (other than Isopropyl Alcohol and Propylene Alochol) must be certified to SAE AMS 1435, *Fluid, Generic, Deicing/ Anti-Icing Runways and Taxiways*.

CAUTION: Do not allow any mixing or blending of deicing products from different manufacturers in storage and dispensing tanks. This could affect the chemistry of the originally certified products. Product would then require re-testing to ensure it satisfies AMS 1435.

A2.2.1. Potassium Acetate. Potassium acetate deicers conforming to required specifications are currently the most environmentally acceptable agents. However, potassium acetate may cause increased corrosion of certain aircraft and weapon system components and airfield infrastructure. Electrical conductivity is also a concern if potassium acetate is over-applied. It has been implicated as a contributing factor in electrical shorting in aircraft and airfield electrical systems.

Table A2.4. Potassium Acetate — Kilograms Per 100 Square Meters (Gallons Per 1,000 Square Feet (See Note).

	Pavement Temperature		
Ice Thickness	**-1.1 °C (30 °F)**	**-3.9 °C (25 °F)**	**-6.7 °C (20 °F)**
Less than 0.8 mm (1/32")	0.44 (0.9)	0.59 (1.2)	0.88 (1.8)
0.8 mm to 3.2 mm (1/32" to 1/8")	0.59 (1.2)	0.88 (1.8)	1.46 (3.0)
3.2 mm to 6.4 mm (1/8" to 1/4")	0.88 (1.8)	1.32 (2.7)	2.93 (6.0)

NOTE:

When freezing conditions are expected, potassium acetate may be used as an anti-icier at the rate of 2 liters per 100 square meters (0.5 gallons per 1,000 square feet).

A2.2.2. .Ethylene Glycol. Ethylene glycol will not be used for any deicing activities because of its highly toxic nature.