U.S. Air Force Deicing Initiatives

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Great Lakes Regional Pollution Prevention Roundtable

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Overview

• Air Force Concerns
• Current Activities
• Future Air Force Direction
• Funding Avenues
• 2004 Deicing Working Group
• Summary
Air Force Concerns

- Federal, state and local EPA constraints on operations
- Environmental drivers
  - Clean Water Act Amendment 1990
  - EPA Effluent Limitation Guidelines 1999
  - BOD, toxins, significant water usage and waste stream
  - Permits and fines
  - Water conservation
  - Deicing materials, non-toxic, non-permitting, new formulations
- Cost
  - Deicing burdened cost: ~$3.00(s) for each dollar spent for fluid
Air Force Concerns (cont.)

• War Readiness
  – Stress on manpower and infrastructures

• Reforms
  – Modification of Military Specifications and Standards, where possible, to adopt Commercial Specifications
  – More aircraft launch requirements
  – Performance of deicing materials and testing for compatibility with unique Air Force aircraft materials
Current Activities

• Aircraft materials compatibility test program

• DoD Deicing Test Facility
  – Niagara Falls Air Reserve Station designated as test facility by DoD’s SERDP/ESTCP office

• Deicing and Anti-Icing Pollution Prevention Technology Roadmap

• Deicing website

• Investigating potential sources of integrated infrared heating for mobile unit
• Three non-propylene glycol based aircraft deicing fluids at various stages of evaluation - D3, ADF-2, Foster-Miller

• Ice detection system evaluation

• Icephobic coating evaluation

• Military Test Method Standard (MTMS)
  – Currently draft document
  – Process for acceptance of fluids/materials
Future Air Force Direction

- Research & Development effort to understand melting of snow, ice and frost
- Continue looking for non-fluid solution
- Continue work with ice detection system evaluation
- Continue work with icephobic coating evaluation
Future Air Force Direction (cont.)

• Annual Workshop
  – Teaming, Training, Equipment, etc.

• Update Aircraft Deicing Pollution Prevention Technology Roadmap

• Establish a stable fund line within Air Force for aircraft deicing efforts

• More effective workshops
Future Air Force Direction (cont.)

• Overall Strategy
  – Reduce cost
  – Ensure flight safety
  – Minimize use of fluids if practical
  – Reduce logistics footprint
  – Teaming
  – Adopt commercial specs/standards and procedures
• Potential funding sources for environmental initiatives
  – Pollution prevention funding
  – SERDP/ESTCP
  – Aircraft program Office funding
  – Small Business Innovative Research funding
  – Other(s)
2004 Deicing Working Group

- **Goal:** Provide flying capability to the operator, while maintaining environmental compliance

- **Primary objectives**
  - Promote information exchange among deicing stakeholders
  - Discuss problems
  - Identify potential courses of action
  - Create action plans

- **Focused on aircraft, runway, and inflight deicing**
  - Special emphasis on operational concerns, present practices, and emerging technologies
• Conducted 15-17 March 2004 in Las Vegas NV
• 84 attendees

• Diversity of group revealed different priorities, focuses and perspectives
  – Operational folks – mission readiness
  – System Program Offices – impacts to aircraft
  – Environmental – protect environment, ensure EPA does not effect base operations
  – FAA – experiences, commercial way of operating

• General consensus - Working Group was needed and successful
  – Intend to meet regularly (e.g., annually)
Summary

• Much activity underway to develop ways to mitigate/minimize environmental impacts and enhance safety
  – Training, equipment, definite requirements

• Future deicing chemicals and technologies must be approved by Program Manager

• Reduced manpower & funding with increased operations require more effective and efficient operations….faster, cheaper, less manpower
Air Force Deicing
Points of Contact

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- Alexei Lozada-Ruiz, ASC/YPVE, Aircraft Deicing,
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- Capt Tim Allmann, AFRL/MLSC, Research &
  Development of deicing technologies, (937) 656-5696

- Ben Curtis, WR-ALC/AFTLA, Deicing fluids/materials
  and applications, (937) 255-8039

- Don Tarazano, SAIC, Consultant for Air Force,
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Back Up Charts
Current/Future Activities
Materials Compatibility Test Program

• Compatibility of deicing materials identified as concern during winter of 1996-97

• Material compatibility test program performed 1997-98
  – Matrix of 104 materials and their associated applications
  – Tests of 5 runway deicers/anti-icers
  – Tests of 32 structural and electronic materials for compatibility
  – Results
    • Metals - Magnesium Corrosion
    • Composites - S2/AFR 700 Strength Loss
    • Elastomers and Sealants - Polysulfide Strength Loss
    • Infra-red Windows - Sodium Formate Damage
    • Electronics - Wet Arc Track Failures
    • Carbon Brakes - Loss of Hardness
Materials Compatibility Test Program

• Follow on material compatibility test programs
  – New deicing materials
    • Runway: RDF-2, potassium formate
    • Aircraft: ADF-2, D3, Foster-Miller
    • Same materials as previous program
  – New aircraft materials
    • Low observable materials
    • High-Velocity Oxygen Fuel (HVOF) coatings
    • Lubrications/sealants
    • Electrical connectors
    • Same deicing materials as previous program
  – New aircraft materials and new deicing materials
• Purpose / benefits of Military Test Method Standard (MTMS)
  – Ensure procurement of deicing materials compatible with unique materials
  – Prevent or reduce chance of damage to structural materials that are unique
  – To make Air Force aware that there may be a problem
Concerns/Challenges Identified

• Col Smith, Nellis AFB – “Speak with One Voice”
  – Multi-service effort
  – AF transformation impacting operations hourly

• Need to approve use of anti-icing fluid

• Process and time required to test and approve new runway and aircraft deicing/anti-icing products

• Clear identification of requirements by users

• Understanding of process implementation
Concerns/Challenges Identified

- Need standardized training program

- Deicing equipment deficiencies and standardization

- Currently solving problems by pieces instead of overall
2004 Deicing Working Group (cont.)
Concerns/Challenges Identified

• Moving toward commercial specs and standards resulting in limited performance testing by manufacturers

• SAE AMS aircraft deicing fluid specs may not be sufficient for qualification of currently developmental non-propylene glycol based fluids

• Market awareness: need a single POC for emerging technologies