Airport paving deicing and anti-icing have multiple competing objectives:
• Aircraft safety (and mobility)
• Environmental regulatory requirements
• Cost
• Materials compatibility
• Operational implementation viability

More than a decade of experience in the use of new PDP formulations suggested that they present new challenges:
• Traditionally, uric/glycol as the freezing point depressant
• Water quality concerns
• Alternatives: KAc, NaAc, NaFm, KFm

Corrosion impacts on aircraft components and C/C brakes
Damage to airfield pavements and other infrastructures

Potassium acetate and sand are most widely used for snow and ice control of airfield pavements in the U.S.

Catalytic oxidation of C/C composite brakes due to airfield PDPs has become a growing concern:
• More frequent pre-maintenance inspection activities ($$$)

More research is needed to better understand relations among brake design, AD treatment, and PDP contamination in catalytic oxidation of brake $K$ and $Na$ in modern PDPs contribute to the more rapid structural failures of C/C brakes observed in recent years.

Modern PDPs have been reported to affect aircraft components:
• Field reports increasingly suggest that the contact w/ modern PDPs promotes damage to C/C–plated components
• C: a near-ideal barrier/coating material
• Conductivity, low density, high acidity, solubility, galvanic compatibility w/ alloys, and non-volumetric expansion

Anecdotal evidence:
• There is a need to unravel the specific mechanisms by which alkali metal salts cause or promote ASR.

Modern PDPs have been reported to affect aircraft concrete pavement:
• More research is needed to better understand relations among aircraft component design, C/Cs used, and PDP contamination in metallic corrosion.

Modern PDPs could cause or accelerate ASR distress in PCC pavement:
• Lab studies suggested that modern PDPs could cause or accelerate ASR distress in PCC pavement
• Research sponsored by the IPRA implicates acetate/formate-based deicers in increased occurrence of ASR.

Standard test protocols were modified to evaluate the ASR susceptibility of PCC:
• ASTM standard test methods regarding ASR (C1260, C1293, C1587) were modified based on research by Clemson University.

Mitigation:
• Use stainless steel light fixtures
• Install new lighting cable and system and remold monitor them

There is still a need to establish a comprehen- sive PDP catalytic oxidation test protocol:
• Test protocol under development
• SAE G12 Deicing Committee Carbon Oxidation ASTM (G-12) was modified based on research by Clemson University.

There is still a need to establish a comprehen- sive metallic corrosion test protocol for PDPs:
• Test protocol under development
• Boeing initiated comprehensive testing (ASTM C1260, C1435 and C1436, C1567) were modified based on research by Clemson University.

Impact of Airport Pavement Deicing Products on Aircraft and Airfield Infrastructure

Authors: Xiaoming Shi, Alarmed Lunsford, Michael Akin, Joygan Fan, Steve Alber

Data from the 2006 EPA Questionnaire. 95 airports

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Data from the 2007 ACRP Survey

Effectiveness and environmental impacts are the two most important factors considered by airports for PDPs selection:

Modern PDPs have been reported to affect airfield asphalt pavement:
• Concerned to the use of acetate/formate-based deic- ers in the 1990s, asphalt pavement in Europe saw the increase in durability problems (asphalt emulsification, disintegration and shipping away in Nordic countries)
• No field evidence reported in North America (ACRP survey w/ limited responses)

There are no simple solutions to the competing, sometimes conflicting, objectives for PDPs selection

The ACRP survey provided a forum to describe knowledge about PDP use research in a multiple PDPs context. Two important themes were the challenge of needing environmentally benign deicers that are simultaneously safe for aircraft, pavements, and electrical systems.

This synthesis provided a holistic and objective perspective for the various stakeholder groups.

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