Ted Stevens Anchorage International Airport
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Ted Stevens Anchorage International Airport

2014 MASTER PLAN UPDATE

APPENDIX C - AIRCRAFT DEICING FLUID MANAGEMENT STRATEGIES

FINAL
DECEMBER 2014

RS&H
IN ASSOCIATION WITH:
HDR
DOWL HKM
RIM Architects
ATAC

Photo credit: Vanessa Bauman

TED STEVENS ANCHORAGE INTERNATIONAL AIRPORT MASTER PLAN UPDATE

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December 2014

FINAL

Prepared for:
Ted Stevens Anchorage International Airport
State of Alaska Department of Transportation & Public Facilities

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PREFACE

The Ted Stevens Anchorage International Airport (Airport) Master Plan Update (Master Plan Update) provides Airport management and the Alaska Department of Transportation & Public Facilities (DOT&PF) with a strategy to develop the Ted Stevens Anchorage International Airport. The intent of the Master Plan Update is to provide guidance that will enable Airport management to strategically position the Airport for the future by maximizing operational efficiency and business effectiveness, as well as by maximizing property availability for aeronautical development through efficient planning. While long-term development is considered in master planning efforts, the typical planning horizon for the Master Plan Update is 20 years.

The Federal Aviation Administration provides guidance for Master Plan development in *FAA Advisory Circular 150 / 5070-6B, Airport Master Plans*. Although not required, the Advisory Circular strongly recommends airports prepare a Master Plan. Funding for the Master Plan Update is provided primarily by the Federal Aviation Administration through an Airport Improvement Program grant.

A comprehensive Master Plan Update was last prepared in 2002 and a partial update was undertaken between 2006 and 2008. This Master Plan Update was initiated in June 2012 and concluded in December 2014. The DOT&PF entered into a contract with the firm RS&H to lead this effort. The Master Plan Update included a robust public and stakeholder involvement program.

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Appendix C - Aircraft Deicing Fluid Management Strategies

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Acronyms and Abbreviations

ACRP	Airport Cooperative Research Program
ADEC	Alaska Department of Environmental Conservation
ADF	Aircraft Deicing Fluid
Airport	Ted Stevens Anchorage International Airport
APDES	Alaska Pollutant Discharge Elimination System
AWWU	Alaska Water and Wastewater Utility
BAT	Best Available Technology
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
BOS	Logan International Airport, Boston
CDP	Centralized Deicing Pad
CLE	Cleveland Hopkins International Airport
COD	Chemical Oxygen Demand
CWA	Clean Water Act
DEN	Denver International Airport
DO	Dissolved Oxygen
DOT&PF	Alaska Department of Transportation and Public Facilities
ELGs	Effluent Limitation Guidelines
FBO	Fixed-Base Operator
FC	Fecal Coliform
GPD	Gallons Per Day
GRV	Glycol Recovery Vehicle
Master Plan Update	Ted Stevens Anchorage International Airport Master Plan Update
MOA	Municipality of Anchorage
MS4	Municipal Separate Storm Sewer Systems
MSGP	Multi-Sector General Permit
MPU	Master Plan Update
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPD	National Pollutant Discharge
NPD-X	National Pollutant Discharge Outfall, Basin A-E
NPDES	National Pollutant Discharge Elimination System
POTW	Publicly Owned Treatment Works
SIC	Standard Industrial Classification
SLC	Salt Lake City International Airport
SWPPP	Stormwater Pollution Prevention Plan
USEPA	U.S. Environmental Protection Agency

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SECTION 1
INTRODUCTION

Winter operations at Ted Stevens Anchorage International Airport (the Airport) require deicing of aircraft and airfield pavement to ensure the safety of passenger and cargo flights. This report will focus on aircraft deicing and anti-icing operations at the Airport, conducted by air carriers and operators, and the management of winter stormwater, conducted by the Airport. This report does not cover operations at the Lake Hood Airport, which is located adjacent to the Airport.

Aircraft deicing fluid (ADF) is a glycol-based fluid used to remove and prevent ice and snow buildup on aircraft surfaces prior to departure. Airports must plan for ahead for potential changes to regulations concerning management of ADF-contaminated stormwater runoff as they will impact airport operation and capital spending. The goal of this report is to document the current stormwater drainage network and current aircraft deicing practices at the Airport, and to assist in planning for future aircraft deicing activities and management of ADF-contaminated stormwater runoff at the Airport to meet future regulatory requirements.

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SECTION 2
REVIEW OF STORMWATER DRAINAGE NETWORKS

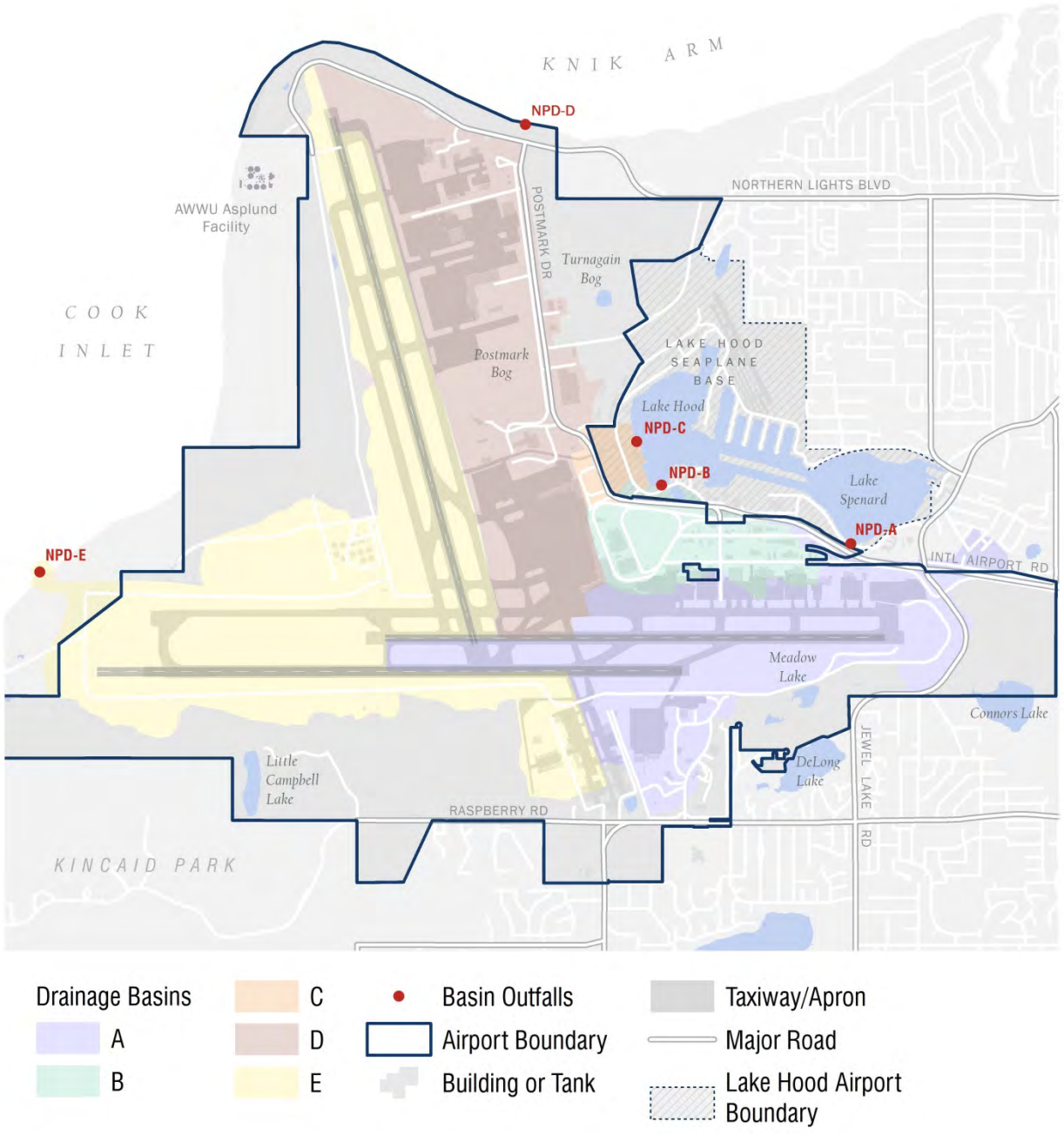
2.1 CURRENT DRAINAGE SYSTEM

The Airport's drainage area covers approximately 4,600 acres and includes five basins. The five basins are designated as A, B, C, D, and E and direct stormwater to separate discharge points in Lake Spenard, Lake Hood, Knik Arm, and Cook Inlet. The basins are shown in **Figure 1** along with each outfall designated as National Pollutant Discharge (NPD) A–E associated with each basin. Each basin is hydraulically isolated and not impacted by stormwater from the surrounding areas[1]. Below is a brief description of the basins, receiving waters, and deicing activities at the Airport:

- Basin A captures stormwater runoff from the east airfield and eastern portion of the south airfield and drains to Lake Spenard via NPD-A. Aircraft deicing and snow management activities occur in this basin.
- Basin B captures stormwater runoff from the South Terminal, parking area, and East Airpark and drains to Lake Hood via NPD-B. Aircraft deicing and snow management activities occur in this basin.
- Basin C captures stormwater runoff from the North Terminal and general aviation area and drains to Lake Hood via NPD-C.
- Basin D captures stormwater runoff from the North Airpark and all airfield facilities east of Taxiway R and drains to Knik Arm via the Postmark Drive outfall via NPD-D. Aircraft deicing and snow management activities occur in this basin.
- Basin E captures stormwater runoff from all airfield facilities west of Taxiway R including Runway 15-33, the West Airpark, and the western portion of the South Airpark and drains to Cook Inlet via NPD-E. Aircraft deicing and snow management activities occur in this basin.

[1] Ted Stevens Anchorage International Airport watershed webpage, updated 2011: http://www.dot.state.ak.us/ anc/business/environmental/watershed.shtml

Figure 1
Current Drainage Basins and Locations of Stormwater Outfalls at the Airport



Source: HDR, 2014.

2.2 RECEIVING WATERS

The Airport is bounded by the Knik Arm and Cook Inlet, which are both receiving waterbodies of stormwater runoff from the Airport. Receiving waterbodies found on or adjacent to the Airport property, include:

- Cook Inlet
- Knik Arm
- Lake Spenard
- Lake Hood

Waterbodies found on Airport property that do not receive stormwater runoff, and are therefore not the focus of this report, include:

- Turnagain Bog
- Little Campbell Lake
- South Airpark Pond (known also as Sullivan Pond)
- Delong Lake
- Meadow Lake
- Connors Bog

This report focuses on the receiving waterbodies that are directly affected by ADF-laden runoff from aircraft deicing activities and snow management activities, including Knik Arm, Cook Inlet, Lake Hood, and Lake Spenard.

Lake Hood and Lake Spenard were placed on the Alaska 303(d) list of impaired waterbodies in 1992 for non-attainment of fecal coliform (FC) bacteria and in 2002 / 2003 for low dissolved oxygen (DO)[2]. Water quality concerns in these two lakes over the years have been attributed to high FC, hydrocarbon contamination, and low DO. FC in the lakes was generally attributed to the concentration of waterfowl found on or around the lakes. As per Alaska Department of Environmental Conservation's (ADEC's) *Final 2010 Integrated Report, Waterbody Categories 2 through 5*, the lakes meet the FC bacteria standard. This report also notes that the data indicated that there were no persistent violations of hydrocarbon contamination. Pollution sources associated with the Airport include runoff from aircraft and pavement deicing operations that mix with snowmelt and drain into the lakes. The drop in DO was

[2] Alaska Department of Environmental Conservation (ADEC), *Alaska's DRAFT Integrated 2012 Integrated Water Quality Monitoring and Assessment Report*, August 7, 2012: http://dec.alaska.gov/water/wqsar/waterbody/docs/2012finalIntegratedReport.pdf.

attributed to high biochemical oxygen demand (BOD) resulting from decomposition of glycol-based ADF[3].

In 2004, a Water Body Recovery Plan was developed to reverse the negative impacts on the DO in the lakes. One aspect of the near-term control was seasonal diversion of runoff containing ADF and pavement deicer from the lakes. Since implementation of the plan in 2005, the water quality of Lakes Hood and Spenard has steadily improved. As of 2012, the lakes meet or exceed ADEC's standard for DO levels[4, 5].

2.3 RECENT DRAINAGE SYSTEM IMPROVEMENTS

Spurred by the decline in water quality and the Water Body Recovery Plan of 2004, the Airport has completed several upgrades to the catchment basins and improved drainage infrastructure at airfield facilities east of Taxiway R, which discharges runoff to Lakes Hood and Spenard, to reduce the discharge of stormwater containing ADF.

Basin C underwent a permanent drainage diversion which reduced the size of the basin and reduced BOD loading in Lake Hood. The basin originally comprised airfield facilities surrounding the terminals east of Taxiway R. This area experienced the majority of aircraft deicing activities around the North and South Terminals, and prior to the changes was the source of large amounts of ADF-contaminated runoff entering Lake Hood. The permanent diversion redirects the airside stormwater runoff to basin D and ultimately into Knik Arm via NPD-D.

In basin D, improvements to the overnight parking positions just east of Taxiway R include pavement regrading and stormwater conveyance system upgrades. The size of basin D was increased following the diversion at basin C, and it now experiences the majority of aircraft deicing. The pavement regrade allows for collection of ADF applied at the terminals to be captured locally, with some modifications, and could minimize mixing with stormwater by creating smaller subbasins with dedicated drainage systems for each subbasin. The new piped network currently is tied to the existing drainage system and discharges stormwater with ADF to Knik Arm, but could in the future be connected to a separate system and routed to a storage facility.

In 2013, the Airport finished construction on two stormwater drainage projects. Basin A was upgraded to capture stormwater discharges in a new system, which will be pumped to basin D and the Postmark Drive outfall NPD-D (to Knik Arm). The East Airpark storm drainage extension consists of 1.7 miles of new storm drain. The federally funded project also constructed a new pump station and modified an existing

[3] Ted Stevens Anchorage International Airport, *Airtimes*, winter 2012 newsletter: http://dot.alaska.gov/anc/business/communityRelations/newsletters/Winter12Newsletter.pdf

[4] Ted Stevens Anchorage International Airport, *Airtimes*, winter 2012 newsletter.

[5] ADEC, *Alaska's DRAFT Integrated 2012 Integrated Water Quality Monitoring and Assessment Report*, August 7, 2012.

lift station. The project involved three horizontal drillings under road crossings, a gravity storm sewer, a force main, storm sewer abandonment, and roadway and parking area pavement replacement. A separate state-funded project repaired or replaced approximately 2,000 feet of corrugated polyethylene storm drain pipe along Postmark Drive. Both projects are aimed at continuing to reduce runoff entering Lakes Hood and Spenard[6].

[6] Personal communication between Ted Stevens Anchorage International Airport environmental manager Scott Lytle and HDR planner Leslie Robbins on December 20, 2012, Anchorage, Alaska.

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SECTION 3
DEICING FLUID MANAGEMENT

3.1 ADF USE

Air carriers and operators at the Airport report an average use of 891,000 gallons of ADF per deicing season over the past 4 years, which is the applied diluted volume containing glycol, water, and proprietary chemical mixtures. Currently, both propylene- and ethylene-based glycol ADFs are used at the Airport as either Type I or Type IV. According to operators, approximately 75% of the ADF used at the Airport is propylene-based and the remaining 25% is ethylene-based. Due to environmental toxicity concerns surrounding ethylene-based ADF, the trend in recent years has been moving toward using the less toxic propylene-based ADF. However, several carriers continue to use ethylene-based ADF[7]. Both ethylene- and propylene-based ADFs are available as either Type I or Type IV, and their use is determined by current weather conditions. Type I fluid tends to be less viscous than Type IV and is more likely to drip off the aircraft surface and mix with precipitation and stormwater on airfield pavement surfaces. Type I ADF is used to deice and defrost aircraft and is typically heated and diluted with water to a 50 / 50 mixture. Type IV fluid is an anti-icing agent applied in dilution at ambient temperature, and tends to be thicker and more viscous to prevent ice and snow from accumulating on surfaces of the aircraft. Based on the fluid viscosities, the U.S. Environmental Protection Agency (USEPA) estimates that 75% of Type I and 10% of Type IV fluid applied to aircraft will fall to the pavement and mix with precipitation and stormwater[8]. Both of these primary types of fluid are referred to as ADF in this report.

The majority of deicing operations occur at the apron east of Taxiway R near the terminals and the FedEx and UPS facilities at the North Airpark in basin D, at areas indicated in **Figure 2.** Minor amounts of deicing occur at the East and South airparks, in basins A and E, respectively. Application of ADF is by standard aircraft deicing vehicles spraying premixed glycol deicing or anti-icing fluid onto the aircraft. The applied ADF typically consists of a 50 / 50 mixture of glycol and water[9,10], though the mixture can change depending on current weather conditions.

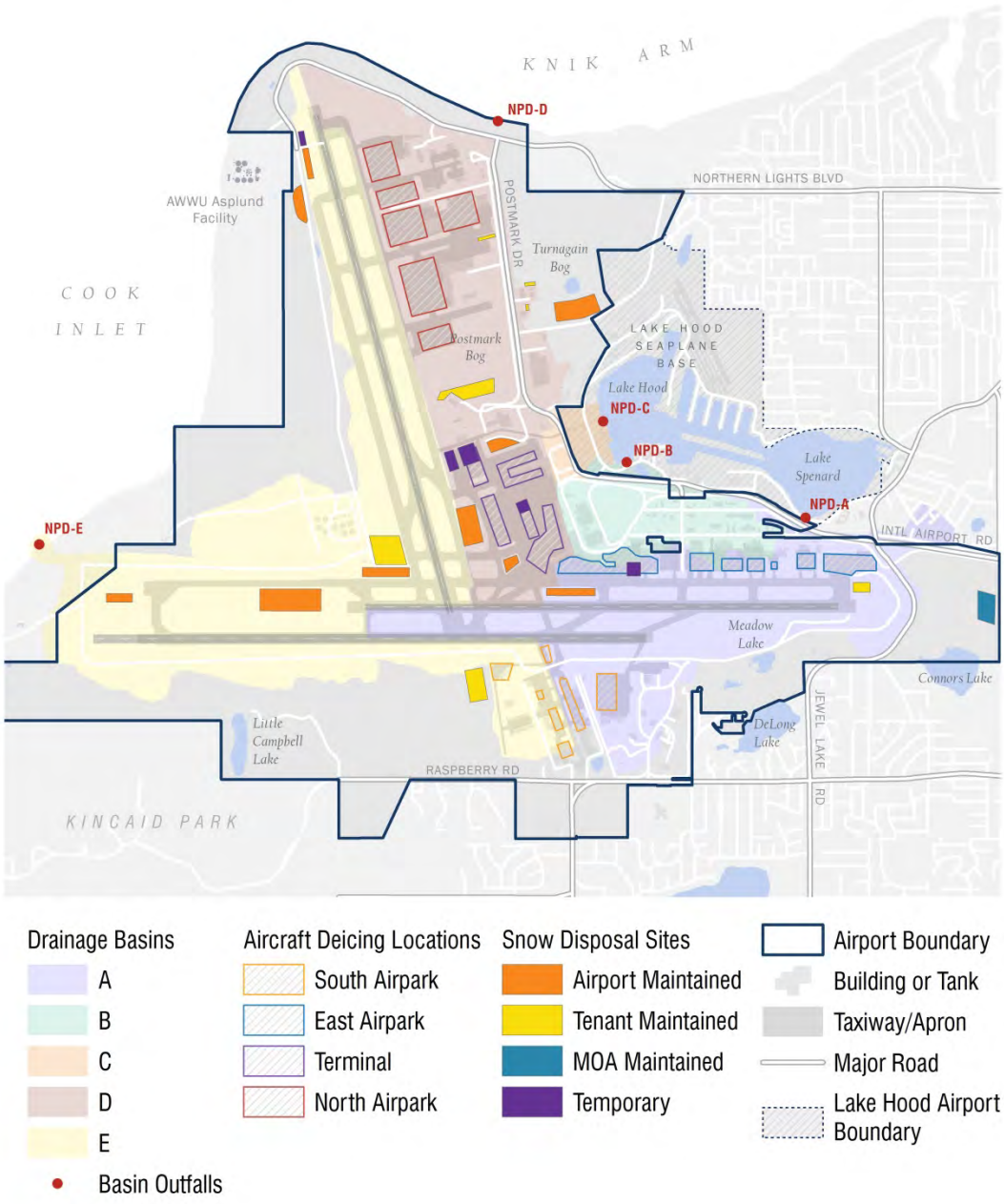
[7] Personal communication between Pegasus Aviation Services Vice President of Operations Joseph Zerck, Clariant Corporation US Account Manager for Aviation John Woodrum and HDR staff Wescott Bott and Bailey Johnston, July 30, 2013, Anchorage, Alaska.

[8] Federal Register (40 CFR Parts 9 and 449), *Effluent Limitations Guidelines and New Source Performance Standards for the Airport Deicing Category*, Final Rule, Vol. 77, No. 95, p. 29168-29205, May 16, 2012.

[9] Personal communication between Ted Stevens Anchorage International Airport environmental manager Scott Lytle and environmental technician Tracy Mitchell and HDR staff Wescott Bott, Bailey Johnston, and Karen Nichols, April 16, 2013, Anchorage, Alaska.

[10] Ted Stevens Anchorage International Airport, *Deicing Management Program Plan*, 2004, Anchorage, Alaska.

Figure 2
Current Deicing Activity Locations and Snow Disposal Sites



Source: HDR, 2014.

3.2 SPENT ADF COLLECTION AND DISPOSAL

The Airport currently operates a single glycol recovery vehicle (GRV) to collect spent ADF, as well as stormwater and snow. The GRV collects the ADF-laden mixture from basin A in the East Airpark and, when time permits, from the ramp areas of the South Terminal. Currently, the ADF-laden mixture is disposed of at the airside snow disposal site on the west end of the airport in basin E, just south of Taxiway K and just east of the end of Runway 7L-25R. Snow disposal sites are discussed in the next section. A majority of spent ADF is not collected with the GRV due to the limited operational area. Uncollected spent ADF mixes with precipitation and is directed into the stormwater drainage system.

3.3 SNOW REMOVAL AND STORAGE

The Airport manages the collection and storage of removed snow through the segregation of airside snow and landside snow. Airside snow has the potential to be mixed with spent ADF and other contaminants generally found around the terminals and areas experiencing deicing activities. Landside snow is generally free of major contaminants and originates from street and parking lot plowing on the landside of the Airport. Snow disposal sites are selected for infiltration capacity and, for airside disposal sites, the natural bio-degradation of ADF that can occur prior to meltwater entering the stormwater drainage system. Airside snow disposal sites are located in **Figure 2**. These sites are managed to minimize the release of ADF into receiving waters[11]. The primary landside snow disposal site is located just south of Turnagain Bog (see **Figure 2**). Current snow management practices for both landside and airside snow storage are under review and may be modified to address operations and regulatory issues and concerns[12].

[11] Ted Stevens Anchorage International Airport, *Snow Removal Plan 2012/2013 Winter Season*, 2012: http://dot.alaska.gov/anc/business/airfieldMaintenance/SnowRemovalPlan2013.pdf

[12] Personal communication between Ted Stevens Anchorage International Airport environmental manager Scott Lytle and environmental technician Tracy Mitchell and HDR staff Wescott Bott, Bailey Johnston, and Karen Nichols, April 16, 2013, Anchorage, Alaska.

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SECTION 4
REGULATORY CONSIDERATIONS

The USEPA requires the Airport to have a National Pollutant Discharge Elimination System (NPDES) multi-sector general permit (MSGP) for stormwater discharges associated with industrial activities. The permit applies to discharges from Airport facilities into U.S. waters, streams, and wetlands within and adjacent to the Airport. The Airport is classified as an air transportation facility under Standard Industrial Classification (SIC) code 4581, and as such is regulated under Sector S of the NPDES stormwater discharge program. The State of Alaska, ADEC, Division of Water, received primacy over the discharge permit program in 2005 and issues Alaska Pollutant Discharge Elimination System (APDES) permits. The Airport has an ADEC MSGP permit (Permit No. AKR05CC00), which was issued on May 15, 2009, expired on September 29, 2013, and has been administratively extended (refer to **Appendix C-1**).

4.1 STORMWATER DISCHARGE PERMITS

4.1.1 MULTI-SECTOR GENERAL PERMIT

The current MSGP requires the Airport to meet both the general requirements of the permit and the specific requirements of Sector S for air transportation facilities. In addition to the overarching requirements of the permit, the MSGP requires the Airport to implement pollutant control measures and a Stormwater Pollution Prevention Plan (SWPPP), and to conduct site evaluations and sector-specific monitoring. In accordance with Section 8.S.4, a SWPPP for the Airport was first certified in April 1993 and received a major update in March 2009. The SWPPP is intended to integrate Airport environmental compliance programs to minimize stormwater pollution and to meet requirements of the Airport's APDES stormwater discharge permit. "Regulated" facilities are those areas of Airport industrial activity that have been identified as areas where pollutants might mix with stormwater[13, 14]. Section 8.S.6 of the MSGP calls for the Airport to monitor quarterly for four water quality parameters: chemical oxygen demand (COD), BOD, pH, and ammonia as nitrogen. Results from monitoring data are compared to Benchmark Monitoring Concentration, yet exceedance of the benchmark concentrations is not considered a permit violation (**Section 6.2.1**; refer to **Appendix C-2**). Exceedance requires a review of the selection, design, installation, and implementation of the control measures in place to determine if modifications are necessary.

[13] Ted Stevens Anchorage International Airport, *Storm Water Pollution Prevention Plan*, March 2009, Anchorage, Alaska.
[14] U.S. Environmental Protection Agency, "Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (MSGP)," National Pollutant Discharge Elimination System (NPDES), May 27, 2009.

4.1.2 INDIVIDUAL DISCHARGE PERMIT

The Airport applied for an individual NPDES stormwater discharge permit from the USEPA in 2004. Obtaining an individual discharge permit could include specific best management practices (BMPs), mixing zone designations, or even changes to the monitoring benchmarks or regulatory limits specific to the Airport site conditions. This application for an individual permit was transferred to ADEC in 2005 when ADEC replaced the USEPA as the primary permit issuer in Alaska[15].

4.1.3 MUNICIPAL SEPARATE STORM SEWER SYSTEMS PERMIT

The Airport is operated by the Alaska Department of Transportation and Public Facilities (DOT&PF). The Municipality of Anchorage (MOA) and DOT&PF are joint holders for the ADEC Municipal Separate Storm Sewer Systems (MS4) permit (AKS052558), which regulates stormwater runoff discharges from the Anchorage urbanized area. The MS4 permit states that it pertains specifically to areas that drain to public storm drains. However, the drainage system at the Airport is specific for the Airport with unique outfalls not associated with the MS4 outfalls. Because of this, the Airport is only under the jurisdiction of the MSGP.

4.2 USEPA EFFLUENT LIMITATION GUIDELINES

The USEPA recently issued effluent limitation guidelines (ELGs) under the Clean Water Act (CWA) for discharges from airport deicing operations. The ELGs were originally proposed in 2009, followed by an extensive comment period. The final ELGs were released in 2012. Both publications are described in this section.

4.2.1 PROPOSED ELG

The USEPA published proposed ELGs on August 28, 2009 that would have applied to all existing primary airports and any new construction of runways at those airports[16]. The proposed ELGs contained numerous provisions regarding discharges of waste from deicing operations to which the Airport would have had to comply. In the proposed ELGs, the Airport would have been required to collect and treat 60% of applied ADF prior to discharge into receiving waterbodies, and numeric limits would have been imposed for COD of the discharged stormwater runoff. Airfield deicing operations would have had to discontinue use of urea-based pavement deicers or meet numeric effluent limits for ammonia as nitrogen.

[15] Personal communication between Ted Stevens Anchorage International Airport environmental manager Scott Lytle and environmental technician Tracy Mitchell and HDR staff Wescott Bott, Bailey Johnston, and Karen Nichols. April 16, 2013. Anchorage, Alaska.
[16] 40 CFR Parts 9 and 449.

4.2.2 FINAL ELG

The final ruling, published May 16, 2012 is less prescriptive than the proposed rule. The final rule states that existing airports will need to discontinue use of urea-based pavement deicers or meet numeric effluent limits for ammonia as nitrogen. Aircraft deicing operations must comply with effluent limitations represented by the application of best available technology (BAT) economically available. The definition of BAT requirements is based on site-specific conditions, best professional judgment, and the discretion of the permit writer[17]. The Airport has implemented a new Snow Management Plan and was set to comply with the final ELGs by discontinuing urea use beginning with the 2013 / 2014 winter season.

[17] 40 CFR Parts 9 and 449.

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SECTION 5
OPERATIONS AT OTHER COLD WEATHER AIRPORTS

During the preparation of the Ted Stevens Anchorage International Airport Master Plan Update (Master Plan Update), interviews were held with personnel from other cold-weather airports to discuss existing permitting conditions, existing ADF management practices, future planning, and construction projects to address ADF regulatory requirements. Below is a summary of the conversations, with detailed records in **Appendix C-3**. These airports operate under Individual NPDES permits issued by state regulating agencies, making the discharge permit requirements different from the APDES MSGP regulations to which the Airport is held.

5.1 LOGAN INTERNATIONAL AIRPORT

Logan International Airport (BOS) is located in Boston and is surrounded on three sides by Boston Harbor. The receiving waters have classifications with DO water quality standards. BOS serves about 29 million passengers, provides 355,000 aircraft operations, and moves 250,000 tons of cargo[18], with an average snowfall of 41 inches per year. During the 2012 / 2013 deicing season, air carriers applied the highest recorded amount of Type I and Type IV ADF, totaling about 1.6 million gallons. BOS operates under an Individual NPDES permit issued jointly by EPA and the State of Massachusetts, with 27 co-permittees. Co-permittees are named based on conducting activities related to air transportation activities including fueling, deicing, maintenance, and sanitary services. The discharge permit was applied for in 1992, issued in 2007, and expired in 2012. The renewal application was submitted in 2010. BOS also has an Individual Permit for fire fighting facility discharges. No violations have been issued.

BOS currently does not collect, store, or treat stormwater runoff containing ADF or airfield deicing fluids. One tenant has a GRV; however, it is utilized during dry weather to minimize slip-and-fall hazards. Limited by space—the airport is located on 2,500 acres and surrounded by water—the airport conducted a study that indicated areas required to collect, store, and treat stormwater runoff containing deicing compounds would require filling in areas of Boston Harbor. The study indicated that such action would not be permitted.

The discharge permit requires hydraulic modeling of the stormwater runoff from the airport, modeling of the mixing of the discharged stormwater with the receiving water, and toxicity testing of specific marine species. Modeling efforts supported the determination that the discharge of runoff during the deicing season would not adversely lower the DO of the receiving water.

[18]Airport Council International, *2012 North American Top 50 Airports*, Airport Traffic Reports, 2013: http://www.aci-na.org/content/airport-traffic-reports.

BOS takes a leadership role in managing the permit compliance activities and assists co-permittees by providing the following documents:

- SWPPP Template
- Annual reporting templates
- Training materials and reporting forms
- Annual certification forms

In addition, BOS conducts quarterly site audits and inspections, coordinates deicing sub-committee meetings, and conducts sampling on the four major outfalls and over 40 internal outfalls. Current efforts to locate bacteria sources led to bacteria source tracking analysis that was determined to be inconclusive and has since been terminated. Extensive evaluations of illegal and illicit drainage connections conducted by BOS continue to reveal sanitary cross-connections to the storm drain system. This effort to eliminate bacteria from discharges is due to the location of outfalls near beaches and sensitive mudflats (clam) habitat.

5.2 CLEVELAND HOPKINS INTERNATIONAL AIRPORT

Cleveland Hopkins International Airport (CLE) serves about 8.5 million passengers, provides 163,000 aircraft operations, and moves 181,000 tons of cargo[19], with an average snowfall of 57 inches per year. Last year the air carriers applied about 1 million gallons of Type I and Type IV ADF. CLE operates under an Individual NPDES permit issued by the Ohio Environmental Protection Agency, dated March 1, 2013. The permit has monitoring and sampling requirements, but no effluent limits. The City MS4 stormwater permit covers construction activities for landside projects. CLE has three co-located industrial facilities. CLE received two Notices of Violation, which led to consent orders (1992 and 2000); they are currently closing out the 2000 modified consent order.

CLE constructed two centralized deicing pads. Pad 1 is about 90 acres with entry points and queuing and can accommodate eight aircraft. Pad 2 is smaller and used by regional jets and smaller planes as needed. A single fixed-base operator (FBO) is contracted with the air carriers to apply ADF. The FBO uses conventional ADF application vehicles and has tested heated forced air deicing practices. About 90% of all aircraft deicing activities occur on Pad 1, with the remaining occurring on Pad 2 and at the UPS facility, located on the west side of the airport. Collection systems convey the spent ADF to underground and aboveground vaults and tanks. CLE has chosen to construct storage (about 17 acre-feet) utilizing vaults and tanks, with provisions for portable temporary storage tanks, due to the unavailability of surface land at the airport and potential bird attraction. The storage is managed such that low-concentration spent ADF is segregated and discharged to

[19] Airport Council International, *2012 North American Top 50 Airports*.

the publicly owned treatment works (POTW); the higher concentration spent ADF is treated by a recycle plant. CLE also contracts with a private operator to run a fleet of 15 GRVs. They are used extensively to remove standing spent ADF, yet are also available for spill response. The recycle plant is privately operated and contracted directly with CLE. The plant generally operates into late June to treat all stored spent ADF. The plant operators sell the recycled glycol product to lavatory trucks and other users. To date, the plant has recycled 340,000 gallons of spent ADF.

CLE is currently working on modifications to their diversion vault with automatic actuators so that the collected stormwater can be automatically diverted to storage in the winter and to receiving waters in the non-deicing season. The CLE Master Plan has the provision for two additional underground storage vaults, which may be added in the future. CLE is currently investigating a growth of biofilm in the receiving waters and trying to determine its cause, nature, and extent.

5.3 DENVER INTERNATIONAL AIRPORT

Denver International Airport (DEN) serves about 52 million passengers, provides 613,000 aircraft operations, and moves 237,000 tons of cargo[20], with an average snowfall of 57 inches per year. Last year the air carriers applied about 1.4 million gallons of Type I and Type IV ADF. The airport was constructed in 1995, with deicing management a consideration in the planning and design of stormwater collection, storage, and treatment facilities. The City MS4 stormwater permit covers landside activities. DEN operates under an individual discharge permit issued by the Colorado Department of Public Health and Environment, due to expire in 2014. The discharge permit covers fueling and deicing activities. DEN has three co-located industrial facilities. DEN received a Notice of Violation in 2001 due to the release of collected spent ADF from a pond. The release occurred during a 3-day storm event, during which the available storage was filled and the need to empty a pond, without treatment, was determined appropriate.

DEN publishes a 69% target ratio of ADF applied to collected. In 2001, they reported a collection of 71% of spent ADF, with 72% of the collected amount recycled, and 28% discharged to the POTW. Air carriers also utilize some hybrid ADF application vehicles to reduce the amount of ADF applied. DEN has six centralized pads available for deicing activities. Limited deicing can occur at gates for safe travel to the central pads. Application at the gates is limited to 25 gallons (neat), and the resulting runoff is collected by slot drains that are located about 250 feet away from the gates. This runoff, generally of low concentration, is collected and directly discharged to the POTW. Collection systems convey the spent ADF to multiple ponds with a storage capacity of about 175 acre-feet. The storage is managed such that low-concentrated

[20] Airport Council International, *2012 North American Top 50 Airports*.

spent ADF is segregated and discharged to the POTW, and the higher concentrated spent ADF is treated by a recycle plant. The recycle plant is privately operated and contracted directly with DEN. The plant has about 6 acre-feet of tank storage, and there is a provision that the contractor can bring on portable temporary storage tanks to add to storage, if necessary. DEN is currently working on plans to add storage. Past additions of new deicing areas did not include storage areas, and "if they pave it, they will deice on it" was a comment received. Plans for a future runway will incorporate new facilities, including new storage.

5.4 SALT LAKE CITY INTERNATIONAL AIRPORT

The Salt Lake City International Airport (SLC) serves about 21 million passengers, provides 330,000 aircraft operations, and moves 167,000 tons of cargo[21], with an average snowfall of 56 inches and 34 snow days per year. SLC operates under an Individual Utah Pollutant Discharge Elimination System permit issued by the Utah Division of Water Quality, which expired and is under consideration for renewal. The discharge permit covers deicing activities and the airport monitors monthly at five outfalls. SLC has not received a Notice of Violation.

SLC has four centralized pads available for deicing activities located on aprons. They are constructing three new end of runway pads that will accommodate six to eight planes. The new pads are shaped like bathtubs to increase collection efficiency. Two air carriers and a FBO conduct aircraft deicing activities. One air carrier utilizes hybrid ADF application vehicles, with various spray nozzle patterns and the ability to blend ADF and water, based on climate conditions. This has shown to reduce the amount of applied ADF to 10% under certain weather conditions. Collection systems convey the spent ADF to three ponds. The storage capacity is managed such that low-concentrated spent ADF is segregated and stored for later land application, and the higher concentrated spent ADF is treated by a recycle plant. SLC operates one GRV, usually in early winter and late spring. They use the GRV to remove spent ADF from temporary deicing locations and for spill response. The recycle plant is privately operated and contracted directly with SLC since the late 1990s. The plant can produce 99% pure glycol. SLC will assume operation of the plant next year.

SLC has been active on the USEPA sub-committee working on effluent guidelines. SLC is currently working on increasing collection efficiency. Coordination with air carriers and operators to assess source reduction and permit renewal negotiations are key activities currently underway.

[21] Airport Council International, *2012 North American Top 50 Airports*.

SECTION 6
FUTURE PLANNING AND MANAGEMENT

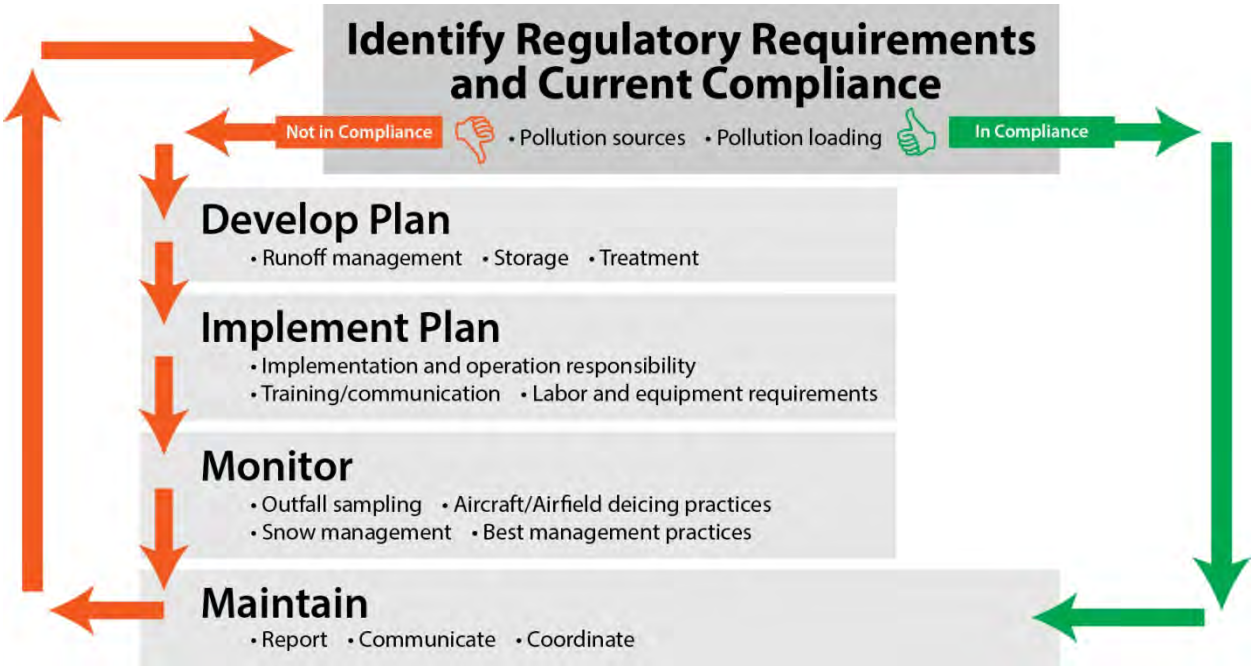
The USEPA's final 2012 ELGs, to which the Airport is obligated and set to comply, apply only to pavement deicing activities and do not directly affect aircraft deicing operations or ADF-contaminated runoff management. However, as the Master Plan Update looks to the next 20 years, future management of ADF-contaminated runoff will be conducted to meet future regulatory requirements. This section will review compliance activities and suggest runoff management strategies for planning purposes.

6.1 REGULATORY COMPLIANCE ACTIVITIES

As previously discussed, there are several future regulatory-driven scenarios that could affect the Airport's management of runoff. However, whether the Airport maintains the current general permit or operates under an individual permit, general permit compliance activities, which will most likely follow current compliance activities, can be identified.

General discharge permit activities are based on meeting regulatory requirements. Currently, the Airport conducts activities to meet the existing MSGP for discharges associated with air transportation activities. As indicated in **Figure 3**, the evaluation of current regulatory requirements and the assessment of compliance to the requirements is an initial step in the process.

Figure 3
Regulatory Compliance Activity Flow Chart



Source: HDR, 2014.

If the Airport determines it is meeting the regulatory requirements, monitoring and reporting is conducted to maintain compliance. If the Airport (or regulating agency) determines the Airport is not meeting permit requirements, the process of identification of pollution sources, and development and implementation of a plan to address pollution sources, may be required to meet permit objectives. Adaptive management strategies—that is, the iterative process of monitoring and assessment to meet objectives—may be incorporated formally or informally in the permitting cycle.

Future discharge regulations that may result in management and compliance activities could come directly or indirectly to the Airport. Potential regulatory drivers could include:

- A new MSGP could be issued to the Airport and be more prescriptive regarding stormwater runoff monitoring and management.
- The Airport may pursue the individual APDES permit applied for in 2004, which could result in specific permit conditions such as BMP implementation, effluent water quality discharge analysis to show no impact to receiving waterbodies, or effluent and/or action limits for discharges.
- Future industry ELGs from the USEPA could be promulgated that resemble the original 2009 proposed ELGs and be based on collection standards.
- The existing and future designations of receiving waters as critical habitat could play a role in shaping future compliance activities.

6.2 AIRCRAFT DEICING FLUID MANAGEMENT

Due to the uncertain future regulatory framework, it is in the Airport's interest to plan ahead for potential future regulatory changes and consider advancing efforts to work with air carriers and operators toward implementation of aircraft deicing and deicing runoff management strategies. These strategies include source control practices, increasing collection efficiencies, onsite storage, and management or recycling (glycol processing) options for spent ADF. Often, multiple strategies are implemented to best suit engineering, operations, safety, and maintenance.

This section explores future planning and management strategies for aircraft deicing operations at the Airport with respect to ADF-contaminated stormwater and snow management. The following strategies presented assume the Airport will:

- Work with air carriers and operators to continue to evaluate the feasibility and effectiveness of aircraft deicing and ADF collection and disposal practices

- Continue to include deicing management practices and infrastructure improvements as future expansion occurs
- Set aside land for future storage requirements and potential pre-treatment or treatment facilities

The Airport Cooperative Research Program (ACRP) Report 14published a document identifying deicing planning guidelines and practices, identifying fact sheets for specific individual management practices. [22] While ACRP Report 14 identifies more than 41 individual practices, the following sections focus on the four broad strategies that may be implemented individually or integrated into a broad management structure to meet any future regulatory requirements.

These strategies include source controls, collection and storage of ADF-contaminated runoff, and management or treatment of the stored runoff. The following assumptions are made to facilitate the comparison of strategies:

Collection: The 20-year projected increase in aircraft traffic at the Airport is 30%. This projection was used to linearly extrapolate the annual average volume of ADF used at the Airport. Collection of spent ADF is based on available ADF, which is defined by the USEPA in 40 CRF Parts 9 and 449 as the ADF that falls from aircraft immediately following deicing. Available ADF is based on the viscosity of the fluid and is assumed to be 75% of Type I fluid applied and 10% of Type IV applied.

Storage: Preliminary sizing of storage facilities was done at a planning level, based on recommendations and criteria from the ACRP Report 81 and from collection efficiencies specified by the USEPA[23]. Sizing of the basins was determined from the estimated annual amount of ADF used at the Airport and annual snowfall (10% water content) in Anchorage, and a 10% factor of safety. The storage basins described in the strategies are designed as either an open pond or closed tank. Although several types of closed storage basin designs are feasible, for simplicity this report assumes a closed tank design. Both the basin and the tank achieve the same end goal of ADF storage, yet the basin would capture excess precipitation and should be sized accordingly. The closed tank design provides flexibility; tanks can be completely buried and allow for open land above the tank to be used for future vehicle and small aircraft parking. Once spent ADF is captured, treatment would be required prior to discharge into receiving waterbodies.

Treatment and Discharge: Treatment and discharge could be achieved onsite, or offsite treatment could be an option. Scenarios are described

[22] Airport Cooperative Research Program (ACRP), *Deicing Planning Guidelines and practices for Stormwater Management Systems.* Transportation Research Board Report 14, 2009.
[23] 40 CFR Parts 9 and 449.

for each strategy. Methods for onsite treatment of spent ADF include operations of a treatment facility to either treat and discharge the effluent or recycle the glycol for reuse. Implementation of a recycling operation would require carriers and operators performing deicing operations at the Airport to use only propylene-based ADF, as propylene- and ethylene-based ADF cannot be economically separated in the recycling process. Other treatment methods include onsite pre-treatment prior to discharge to an offsite treatment facility.

Management and Discharge: Runoff management and discharge includes the collection of runoff from frequent deicing areas and storage for restricted discharge directly to receiving waters. Areas with infrequent deicing activities would be allowed to discharge directly to receiving waters. Discharges to receiving waters would be based on discharge outfall analysis.

6.2.1 SOURCE CONTROLS

Currently, when ADF is applied to an aircraft some of it falls to the pavement surface. The drainage infrastructure at the Airport then collects and conveys the mixture of ADF and stormwater to receiving waterbodies. Improvements to spent ADF management practices begin with the application of ADF during deicing events, known as source controls. Implementation of application strategies will influence the potential collection, storage, and treatment strategies as the Airport continues to expand. Modifications to current ADF application practices at the Airport could include source control techniques as recommended in the ACRP Reports 14 and 45[24] [25] to optimize ADF usage. These source control techniques include:

- Integrating real-time weather monitoring of current ambient air temperatures to determine the optimum mixing ratio of ADF and water for aircraft deicing requirements
- Implementing deliberate and targeted spot deicing to limit the amount of ADF used during frost events when no active precipitation is present
- Using air-assisted deicing techniques, which mix moisture-laden air at high temperatures with small amounts of ADF to mechanically remove snow and ice from aircraft surfaces
- Using air-only deicing techniques, which eliminate ADF use by using only moisture-laden air at high temperatures to mechanically remove snow and ice from aircraft surfaces
- Implementing the use of non-glycol-based freeze point depressants to replace standard ADF, as many glycol-free fluids

[24] ACRP, *Deicing Planning Guidelines and practices for Stormwater Management Systems.*
[25] ACRP, *Optimizing the Use of Aircraft Deicing and Anti-Icing Fluids.* Transportation Research Board Report 45, May 12, 2011: http://www.trb.org/Publications/Blurbs/165328.aspx.

have been formulated to achieve the same level of aircraft deicing abilities as standard glycol-based fluids

Technologies for ADF application that have historically been, or are currently, used by operators at the Airport include air-assisted deicing and real-time weather monitoring. In addition, some of the existing deicing vehicles at the Airport use both technologies. These hybrid ADF vehicles have been tested by operators and carriers, including FedEx, and shown to reduce the amount of ADF applied when compared to standard ADF application vehicles[26]. End of taxiway deicing is another method to centralize and control the application of ADF. The Airport conducted a modeling exercise in 2003 / 2004 to investigate the feasibility of end of taxiway (end of runway) deicing stations for aircraft deicing just prior to takeoff. This source control measure would reduce the amount of ADF used through centralized and more efficient collection, yet the model showed that aircraft traffic backups would affect departure schedules at the Airport [27].

6.2.2 STRATEGY 1: ADF RUNOFF COLLECTED AND TREATED FROM DISPERSED APPLICATION AREAS

Collection

Strategy 1 is to capture stormwater impacted by all aircraft deicing at the Airport including areas experiencing frequent and infrequent deicing activities. Increasing the collection of spent ADF could be accomplished by implementing drainage improvements to capture stormwater impacted by deicing operations. No specific deicing areas would be designated and the current deicing operations at dispersed locations could continue without change. Infrastructure improvements would be needed anywhere deicing activities occur, and could include updating the existing drainage network and directing runoff during the deicing season into a collection and conveyance network separate from the network used for summer runoff. A storage basin would be constructed to hold the runoff captured during the deicing season. The drainage network would be upgraded to route all winter runoff to the storage basin, which could include pump stations and valves for the seasonal diversion. The Airport has already improved the drainage system around apron E, which would allow for easier transition for future collection and conveyance of ADF-laden stormwater to a storage basin, and could implement further drainage improvements in areas experiencing high deicing activity. As the Airport expands in the future, all additional parking and tech stop locations would need the drainage capability to collect and direct runoff to a storage basin. **Figure 4** shows locations where deicing activities currently occur and where future expansion

[26] Personal communication between Ted Stevens Anchorage International Airport environmental manager Scott Lytle and environmental technician Tracy Mitchell and HDR staff Wescott Bott, Bailey Johnston, and Karen Nichols. April 16, 2013. Anchorage, Alaska.
[27] Ibid.

would necessitate construction of additional drainage networks. Details for this strategy include:

- Impacted by deicing activities during the winter season; these areas consist of up to 170 acres of paved aprons and parking positions, including future expansion scenarios
- No implementation of any dedicated deicing areas at the Airport that would allow aircraft traffic to continue without interruption or rerouting prior to being deiced
- Seasonal diversion of stormwater to a storage basin or stormwater outfall, depending on ADF use or concentration of ADF in effluent
- Installation of lift stations and pumps in the drainage network to route all stormwater runoff to a storage basin during the winter season

Storage

Storage requirements for capturing precipitation and spent ADF from 170 acres of paved surface would require a capacity of 108 acre-feet, or just over 35 million gallons. The large storage volume requirements would necessitate an open pond design for a storage basin. Land requirements could be upwards of 28 acres for an open pond design, depending on final site-specific design. The basin could be placed in the vacant land north of Lake Hood and east of Postmark Drive. **Figure 4** illustrates a potential location and land requirements for the storage basin. The following guidelines and assumptions form the basis for the basin sizing options:

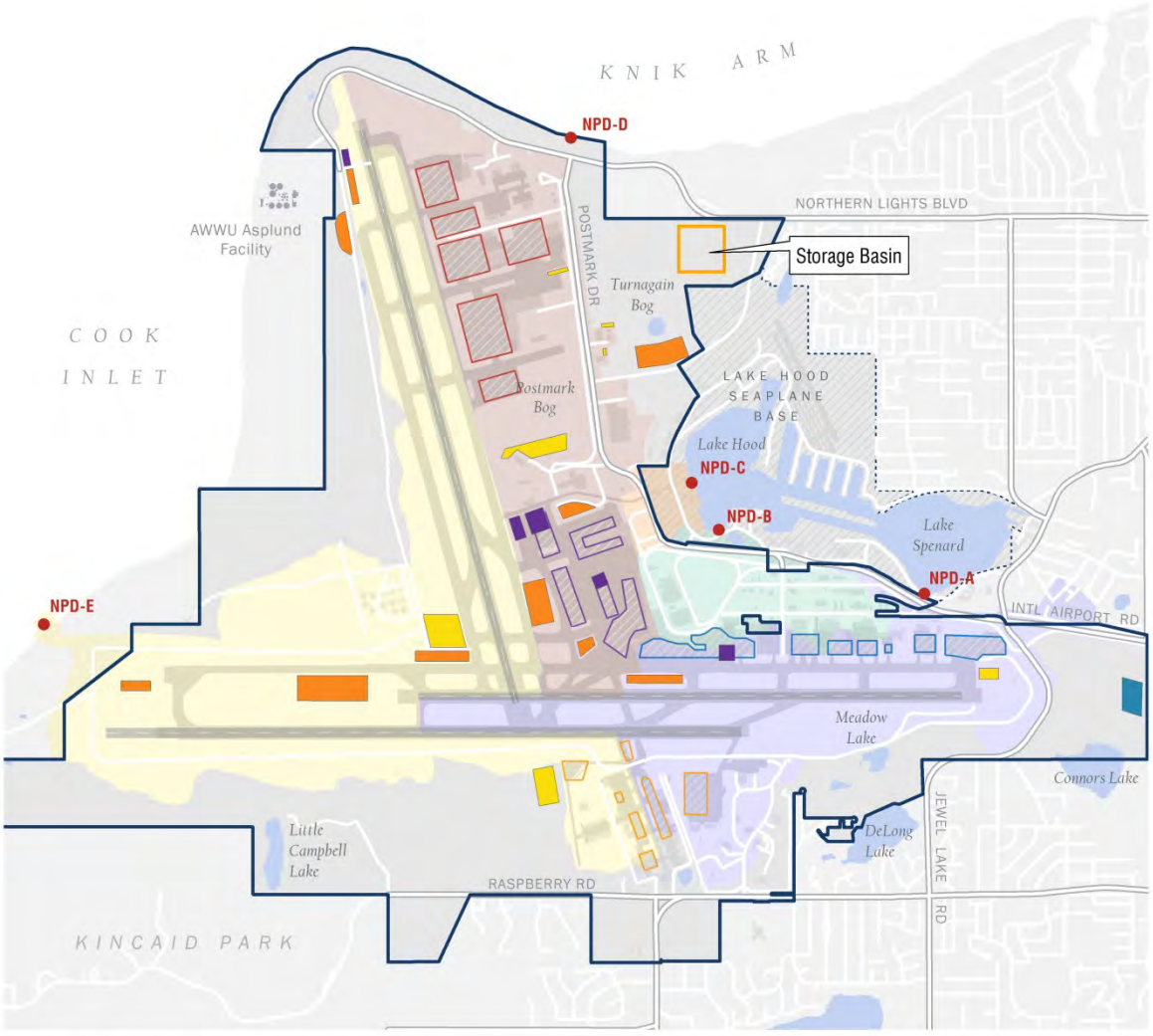
- All available ADF is assumed to be captured with no reduction in ADF volume due to snow plowing operations, evaporation, or fugitive transport of spent ADF to other zones.
- All precipitation (snow or rain) that falls in the aircraft deicing zones during the winter months is assumed to be captured and directed to the storage basin. This calculation assumes 100% capture and does not account for snowplowing operations in deicing areas, evaporation, fugitive transport, or runoff entering aircraft deicing zones from outside the specified zone.
- The open design of the storage basin will capture falling precipitation throughout the winter and has been designed to accommodate the extra 1.1 million gallons of water.

Treatment and Discharge

Aeration would be required in an open pond design to reduce the odor associated with the aerobic degradation of the ADF. The reduction in BOD from aeration would also aid in the pretreatment for the stormwater. The large volumes of water needing treatment could require a treatment facility capable of treating up to 100,000 gallons per day (GPD). Treatment could be accomplished either onsite or offsite. Onsite treatment would necessitate planning for land requirements, which

could be between 2 and 3 acres, as well as the costs associated with operating the facility. Onsite treatment would then be discharging up to 100,000 GPD to a receiving water body. Offsite treatment could include a constant-rate discharge of the ADF-laden stormwater to the local POTW. However, the current capabilities of Anchorage Water and Wastewater Utility's (AWWU's) John M. Asplund Wastewater Treatment Facility do not meet the demands of the potential BOD loading from ADF contaminated runoff. Future improvements to the facility could expand its capabilities and make this a feasible option for stormwater disposal. Offsite treatment could require pretreatment and legal agreement between the Airport and AWWU.

Figure 4
Deicing Activity Locations and the Associated Open Pond Storage Basin



Source: HDR, 2014.

6.2.3 STRATEGY 2: ADF RUNOFF COLLECTION AND TREATMENT FROM CONSOLIDATED DEICING PADS

Collection

Strategy 2 is to construct consolidated deicing pads (CDPs). Constructing and using CDPs would reduce the area impacted by deicing activities and reduce the volume of stormwater captured in the collection process. This reduction in stormwater captured would result in a higher concentration of ADF, attributed to the increased collection efficiency, and reduce the storage volume requirements. A CDP is a hydraulically isolated basin that seasonally captures only ADF and precipitation that falls within the perimeter of the CDP, and establishes a focused area for the application and collection of ADF. Each CDP would require connection to the drainage network to seasonally direct all captured precipitation and spent ADF to a storage basin. CDPs could be constructed at all high-use parking and tech stops that experience deicing activities and can be scaled in size to best suit the area of construction. This strategy assumes the smallest construction for each CDP to accommodate the largest aircraft serviced at the Airport, at roughly 1 acre each. Currently, the configuration of the Airport would necessitate the construction of 16 CDPs, including three for air carriers at the North Airpark at the existing parking positions between Taxiway P and U, just north of Postmark Bog. As the Airport expands in the future, CDPs could be constructed for each additional tech stop or parking position, which could include upwards of 13 additional CDPs. In addition to the CDP construction, the drainage piping network would be upgraded to route winter runoff to a storage basin or tank, which could include pump stations and valves for the seasonal diversion of ADF-laden stormwater. **Figure 5** illustrates a general layout of CDPs for current and future design strategies. Details for this strategy include:

- Planning for future capacity, designating up to 29 CDPs would be required at high-use deicing areas, including tech stops and parking positions, around apron E, the North and South Terminals, and between Taxiway P and U for the cargo facilities at the North Airpark, including FedEx and UPS.
- Each CDP would be sized to accommodate the largest aircraft serviced at the Airport, which currently is the Boeing 747-400, and is assumed to be 1 acre in size, resulting in collection of runoff from up to 29 acres.
- Each CDP would require a connection to the drainage network to direct all captured ADF and stormwater to a storage basin or tank.
- Aircraft traffic could require taxiing or repositioning prior to being deiced, depending on the number and locations of CDPs.

Storage

Storage requirements for capturing precipitation and spent ADF from 29 CDPs, totaling 29 acres of drainage area, would require a capacity of 21 acre-feet, or 7 million gallons. The storage volume requirements could be met with either an open pond or closed tank design. An open pond storage basin could require up to 6 acres of land. The basin could be placed in the vacant land north of Lake Hood and east of Postmark Drive. Many types of closed storage systems exist, though a general design for a concrete storage tank would be cylindrical, with a diameter of 278 feet and a height of 15 feet. A tank with these dimensions would occupy 1.4 acres of land; however, concrete tanks of this design could be completely buried, providing the potential for parking or open space over the tank. A buried tank could be placed directly north of the North Terminal and Taxiway V near Postmark Drive and allow for open parking areas above the tank.

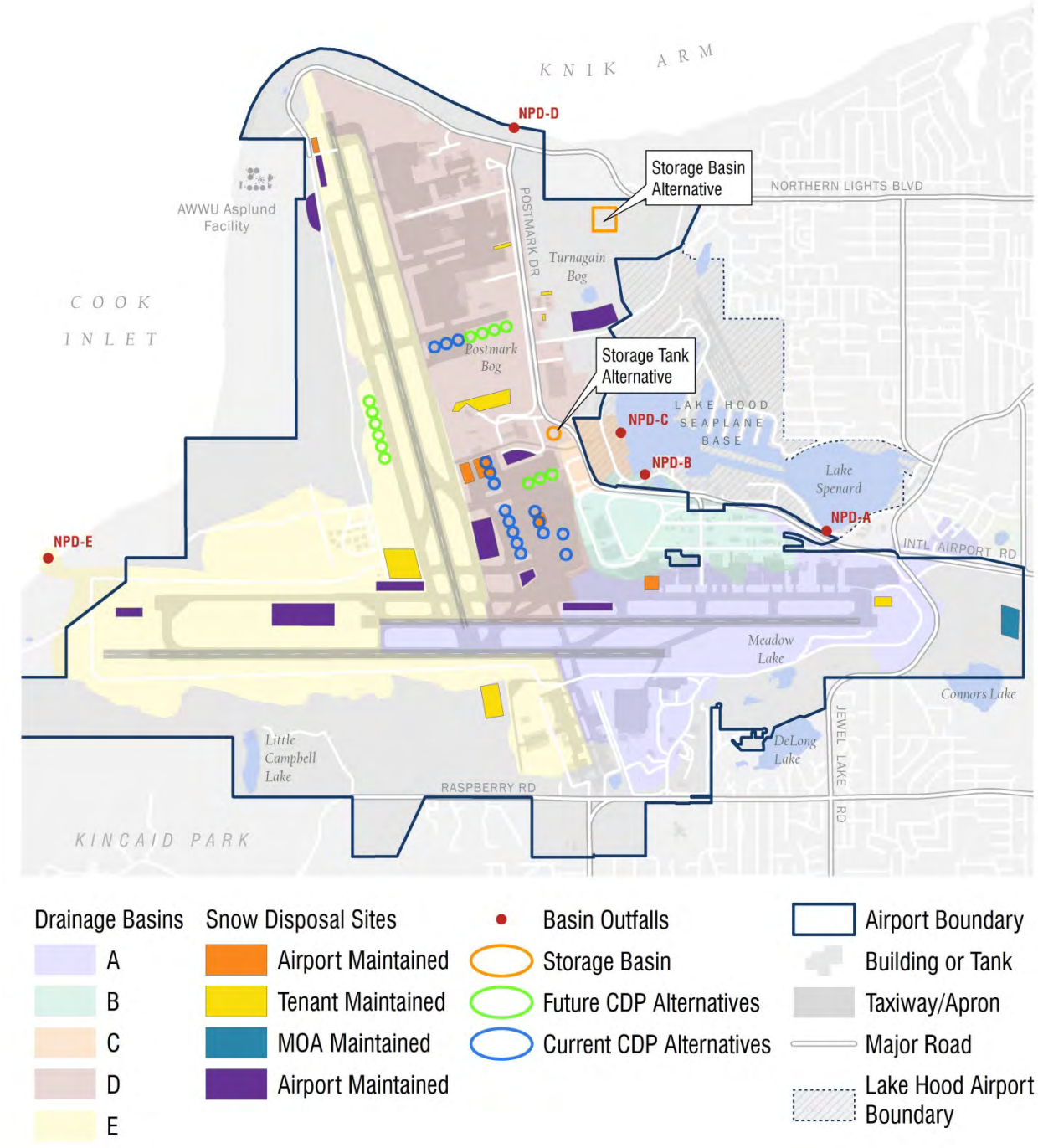
Figure 5 illustrates potential locations for the storage basins. The following guidelines and assumptions form the basis for sizing either a basin or a tank:

- All precipitation (snow or rain) that falls in the CDP basins during the winter months is assumed to be captured and directed to the storage basin or tank. This calculation assumes 100% capture and does not account for snowplowing operations in CDPs, evaporation, fugitive transport, or runoff entering from outside the CDP boundary.
- The open storage basin design includes storage capacity for capturing up to 258,000 gallons of precipitation, which would fall directly into the 6-acre basin over the winter.
- All aircraft deicing fluid that would be applied to aircraft is assumed to be done within the CDPs specified above, and spent ADF would be captured within the same areas. There would be no reduction in ADF volume due to snow plowing operations, evaporation, or fugitive transport of spent ADF to other zones.

Treatment and Discharge

Treatment for ADF-laden stormwater collected via CDPs could be accomplished onsite or offsite. The increased collection efficiency, and higher ADF concentration, increases the options for treatment. An onsite treatment facility for the fluid collected could include either recycling or typical wastewater treatment, while offsite treatment would require the runoff to be sent to the local POTW.

Figure 5
Potential CDP Locations with the Associated Storage Strategies



Source: HDR, 2014.

An open pond storage basin would require aeration to reduce the odor associated with the aerobic degradation of the ADF. The reduction in BOD from aeration would also aid in the pretreatment for the stormwater. Onsite wastewater treatment facilities would require planning for land needs for the facility and consideration of the costs associated with operating the facility. Land requirements for an onsite wastewater treatment facility would be between 1.5 and 2 acres, which would be capable of treating up to 20,000 GPD. Offsite treatment could include metering the ADF-laden stormwater to the local POTW. However, the current capabilities of AWWU's John M. Asplund Wastewater Treatment Facility do not meet the demands of the potential BOD loading from ADF-contaminated runoff. Future improvements to the facility could expand its capabilities and make this a feasible option for stormwater disposal. Offsite treatment could require pretreatment and an agreement between the Airport and AWWU.

Closed tank storage would allow for either onsite or offsite treatment. The higher concentration of ADF in the stormwater could allow for alternative methods of treatment onsite, including recycling the glycol in spent ADF. Recycled glycol could be reused at the Airport or different industries as coolant, refrigerant, or to create recycled ADF for use on aircraft. As new technology becomes available, the potential for recycled ADF to meet aircraft grade requirements is possible. Feasibility and market availability would need to be investigated further prior to implementation. All deicing activities occurring at the Airport would be required to use propylene-based ADF exclusively to maintain economic feasibility. Additional land would also need to be set aside for the treatment facility and storage of recycled material to be held onsite prior to reuse or distribution; this could require up to 2 acres and include an additional 400,000-gallon storage tank, consisting of a 0.08-acre footprint. An onsite wastewater treatment facility could also be used and would have the same requirements as the open pond facility described above.

6.2.4 STRATEGY 3: TARGETED ADF COLLECTION AND MANAGEMENT

Collection

Strategy 3 would implement operational changes to snow management and GRV operations at the Airport to collect spent ADF from targeted deicing application areas. This targeted collection with GRVs could include the areas of most frequent deicing activities as indicated in **Figure 6**. Changes include employing targeted snow removal practices and expanding GRV operations at parking positions used for deicing. Improvements to the drainage network that could be implemented include upgrades for plug and pump capabilities to minimize spent ADF discharging to storm drains. This strategy calls for increasing the number of GRVs operating at the Airport and would create a coordinated schedule of snow removal, aircraft deicing, and GRV cleanup of spent ADF. Snow removal would be targeted to clear parking

positions prior to aircraft arrival to reduce the amount of precipitation contaminated by the deicing process. A GRV would follow immediately behind aircraft deicing activities to collect spent ADF. Coordination of additional snow removal and GRV operations could be accomplished simultaneously with the scheduling of aircraft deicing.

The efficiency of spent ADF collection depends on several factors, including precipitation present at the parking positions prior to aircraft arrival, precipitation rates during the time the aircraft is parked and deiced, and the collection capabilities of the GRVs. This strategy would not collect all spent ADF at the Airport, as fugitive transport is expected to enter the drainage system. Current assumptions are 40% of available ADF would be collected, and up to 60% of available ADF would discharge into receiving water bodies[28]. During times of high departure volume or lack of available GRVs, plug and pump systems could be employed to reduce ADF discharge into receiving waterbodies. With plug and pump implementation, the percent of available ADF discharged would decrease. This strategy would require increased staffing to operate the snow removal and GRV equipment, though minimal drainage infrastructure upgrades would be required. No significant changes to current deicing locations would be required, as GRVs are highly mobile. Details for this strategy include:

- Coordinated ADF application and collection of spent ADF would be required.
- Detailed operational changes would include removing snow from parking positions prior to aircraft arrivals and GRV collection of spent ADF immediately following aircraft departures from locations where deicing occurred, from approximately 170 acres.
- No major changes would be required to aircraft traffic routing to accomplish deicing.

Storage

Storage requirements for capturing precipitation and spent ADF exclusively with GRVs from targeted areas would require a capacity of 12 acre-feet, or 3.8 million gallons. The volume calculations for storage are based on assumptions made in the collection of spent ADF. The storage volumes required could be met with a closed tank design. Potential locations for the storage tank would be similar to those in Strategy 2, as shown in **Figure 5**. The following guidelines and assumptions form the basis for sizing the basin:

[28] Personal communication between Pegasus Aviation Services Vice President of Operations Joseph Zerck, Clariant Corporation US Account Manager for Aviation John Woodrum, and HDR staff Wescott Bott and Bailey Johnston, July 30, 2013, Anchorage, Alaska.

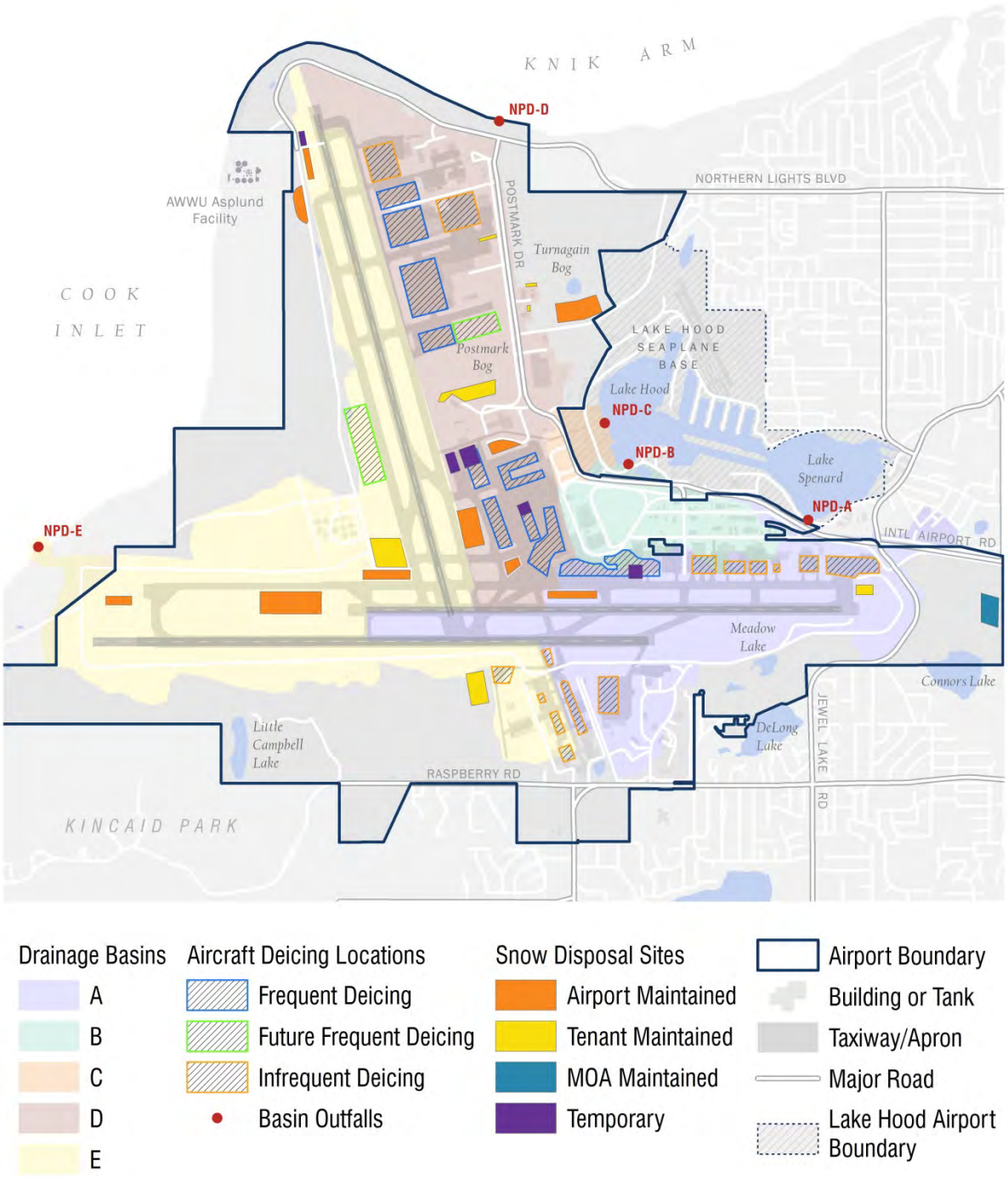
- All ADF applied to aircraft is assumed to be done on impervious aprons and parking positions, and GRVs would be dispatched to collect spent ADF within the same areas.
- GRVs will collect 40% of available ADF from deicing locations and will also collect stormwater. The final concentration of the ADF and water mixture is assumed to be 12% due to current collection efficiencies. The volume of water collected and needing storage can then be back calculated.
- Continued snow management would occur with the goal of minimizing snow contamination with ADF in deicing areas, as specified above.

A general design for a closed tank storage basin would be cylindrical, with a diameter of 172 feet and a height of 15 feet. A tank with these dimensions would occupy 0.53 acre of land. However, concrete tanks of this design could be completely buried, providing the potential for parking or open space over the tank. A buried tank or other underground storage system could be placed directly north of the North Terminal and Taxiway V near Postmark Drive, and allow for open parking areas above the tank, as specified for the tank in Strategy 2.

Management

The storage facility would allow for either onsite or offsite management. For this strategy, direct discharge from the storage facility to the receiving water would be conducted based on outfall and receiving water quality analyses. Management of the stored runoff may include aeration or other pre-treatment technology to reduce the waste load to the receiving water. The discharge from the storage facility may be restricted to various rates depending on water quality analysis.

Figure 6
Deicing Locations and Frequency of Use



Source: HDR, 2014.

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SECTION 7
RECOMMENDATIONS

The regulatory environment is unstable and will likely change within the 20-year master plan horizon. The following recommendations are made to enable the Airport to maintain an effective deicing management plan through the next two decades of operations.

- The Airport should continue compliance activities to ensure discharge permit conditions are met.
- The Airport should reserve adequate land for storage basins and treatment facilities as the Airport continues to grow. As discussed in **Section 6.2**, Aircraft Deicing Fluid Management, it is recommended that 28 acres is reserved, as shown in **Figure 4**, for an open pond storage facility. This is anticipated to be the largest land area necessary to meet fluid storage needs should an open pond be needed.
- The Airport should conduct a feasibility study to evaluate potential collection, storage, treatment and disposal, and management options.
- The Airport should continue to investigate operations at other cold weather airports and consider the feasibility of adopting alternative deicing management practices.
- A Deicing Coordination Committee could facilitate the continued evaluation of feasibility and effectiveness of aircraft deicing operations and spent ADF collection practices. This would ensure stakeholders are consulted prior to implementation of future infrastructure or operational updates.
- As the Airport expands, new apron areas that will be used for deicing activity should be constructed with the ability to capture or manage ADF-laden runoff and direct it to a storage and treatment facility prior to discharge into receiving water bodies. Management of ADF-laden runoff should continue to be a design consideration.
- The Airport should monitor regulatory changes and assess impacts to Airport operations and stakeholders. As new regulations are promulgated and new permit conditions imposed, operating plans and procedures should be adjusted accordingly to ensure continued compliance.

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Appendix C-1

Multi-Sector General Permit Notice of Intent

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NPDES FORM 3510 -6

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460
NOTICE OF INTENT (NOI) FOR STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY UNDER THE NPDES MULTI-SECTOR GENERAL PERMIT

Form Approved.
OMB No. 2040-0086

Submission of this completed Notice of Intent (NOI) constitutes notice that the operator identified in Section B of this form requests authorization to discharge pollutants to waters of the United States from the facility or site identified in Section C under EPA's NPDES Stormwater Multi-Sector General Permit (MSGP) for industrial stormwater. Submission of this NOI constitutes your notice to EPA that the facility identified in Section C of this form meets the eligibility conditions of Part 1.1 of the MSGP. Please read and make sure you comply with all eligibility requirements, including the requirement to prepare a stormwater pollution prevention plan. Refer to the instructions at the end of this form to complete your NOI.

A. Permit Number: AKR050000 (see Appendix C of the MSGP for the list of eligible permit numbers)

Tracking Number (EPA Use Only): AKR05CC00

B. Facility Operator Information

1. Name: STEVENS ANCHORAGE INTL AIRPORT

2. IRS Employer Identification Number (EIN): 92 – 6001185

3. Mailing Address:

a. Street: P.O. BOX 196960, 4600 POSTMARK

b. City: ANCHORAGE c. State: AK d. Zip Code: 99519-

e. Phone: 907-266-2467 f. Fax (optional): 907-266-2622 g. E-mail: SHANE_SERRANO@DOT.STATE.AK.US

C. Facility Information

1. Facility Name: TED STEVENS ANCHORAGE INTERNATI

2. Have stormwater discharges from your site been covered previously under an NPDES permit? ☑ YES ☐ NO

a. If yes, provide the Tracking Number if you had coverage under EPA's MSGP 2000 or the NPDES permit number if you had coverage under an EPA individual permit. AKR05A516

b.1 If no, was your facility in operation and discharging stormwater prior to October 30, 2005? ☐ YES ☐ NO

b.2 If no to C.2.b.1, did your facility commence discharging after October 30, 2005 and before January 5, 2009? ☐ YES ☐ NO

3. Location Address:

a. Street 4600 POSTMARK DRIVE

b. City: ANCHORAGE

c. County or similar government subdivision: ANCHORAGE d. State: AK e. Zip Code: 99502-

f. Latitude: (use any one of the three formats provided.)
1. ___ ___° ___ ___′ ___ ___″ N (degrees, minutes, seconds)
2. ___ ___° ___ ___. ___ ___′ N (degrees, minutes, decimal)
3. 61.1776° N (degrees decimal)

g. Longitude: (use any of these 3 formats)
1. ___ ___ ___° ___ ___′ ___ ___″ W (degrees, minutes, seconds)
2. ___ ___ ___° ___ ___. ___ ___′ W (degrees, minutes, decimal)
3. 149.9790° W (degrees decimal)

h. Lat/Long Data Source: ☐ USGS topographic map ☑ EPA web site ☐ GPS ☐ Other: _____

If you used a USGS topographic map, what was the scale? _____

4. Estimated area of industrial activity at your site exposed to stormwater: 1593 (acres)

5. Is this a federal facility? ☐ YES ☑ NO

6. Is your facility located on Indian Country lands? ☐ YES ☑ NO

If yes, name of reservation, or if not part of a reservation, put "Not Applicable:" _____

D. Discharge information

1. Does your facility discharge stormwater into a Municipal Separate Storm Sewer System (MS4)? ☐ YES ☑ NO

If yes, name of MS4 operator: ______________________________

2. Receiving Waters and Wetlands (**Note**: If additional space is needed for this question, fill out Attachment 1.)

a. What is the name(s) of your receiving water(s) that receive stormwater directly and/or through an MS4)? If your receiving water is impaired then identify the name of the impaired segment, if applicable, in parentheses following the receiving water name.	b. Are any of your discharges directly into any segment of an "impaired" water?	If you answered yes to question D.2.b, then answer the following three questions:		
		b.1. What pollutant(s) are causing the impairment?	b.2. Are the pollutant(s) causing the impairment present in your discharge?	b.3. Has a TMDL been completed for the pollutant(s) causing the impairment?
Lakes Hood and Spenard	☑ YES ☐ NO	Fecal Coliform	☐ YES ☑ NO	☐ YES ☑ NO
Lakes Hood and Spenard	☑ YES ☐ NO	Dissolved Oxygen	☑ YES ☐ NO	☐ YES ☑ NO
Cook Inlet	☐ YES ☑ NO		☐ YES ☐ NO	☐ YES ☐ NO
	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO
	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO
	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO
	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO
	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO
	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO
	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO

3. Water Quality Standards (for new dischargers only)

a. Are any of your discharges into any portion of a receiving water designated by the state or tribal authority under its antidegradation policy as a Tier 2 (or Tier 2.5) water (water quality exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water)? ☐ YES ☐ NO

b. Has the receiving water(s) been designated by the state or tribal authority under its antidegradation policy as a Tier 3 water (Outstanding Natural Resource Water)? ☐ YES ☐ NO

4. Federal Effluent Limitation Guidelines and Sector-Specific Requirements

a. Are you requesting permit coverage for any stormwater discharges subject to effluent limitation guidelines? ☐ YES ☑ NO

b. If yes, which effluent limitation guidelines apply to your stormwater discharges?

40 CFR Part/Subpart	Eligible Discharges	Affected MSGP Sector	Check if Applicable
Part 411, Subpart C	Runoff from material storage piles at cement manufacturing facilities	E	☐
Part 418 Subpart A	Runoff from phosphate fertilizer manufacturing facilities that comes into contact with any raw materials, finished product, by-products or waste products (SIC 2874)	C	☐
Part 423	Coal pile runoff at steam electric generating facilities	O	☐
Part 429, Subpart I	Discharges resulting from spray down or intentional wetting of logs at wet deck storage areas	A	☐
Part 436, Subpart B, C, or D	Mine dewatering discharges at crushed stone mines, construction sand and gravel mines, or industrial sand mines	J	☐
Part 443, Subpart A	Runoff from asphalt emulsion facilities	D	☐
Part 445, Subparts A & B	Runoff from hazardous waste and non-hazardous waste landfills	K, L	☐

c. If you are a Sector S (Air Transportation) facility, do you anticipate using more than 100,000 gallons of glycol-based deicing/anti-icing chemicals and/or 100 tons or more of urea on an average annual basis? ☑ YES ☐ NO

5. Identify the 4-digit Standard Industrial Classification (SIC) code or 2-letter Activity Code that best represents the products produced or services rendered for which your facility is primarily engaged, as defined in MSGP:

Primary SIC Code: 4512 OR Primary Activity Code ☐☐

6. Identify the applicable sector(s) and subsector(s) of industrial activity, including co-located industrial activity, for which you are requesting permit coverage:

a. Sector ☐☐ Subsector ☐ b. Sector ☐☐ Subsector ☐ c. Sector ☐☐ Subsector ☐

d. Sector ☐☐ Subsector ☐ e. Sector ☐☐ Subsector ☐ f. Sector ☐☐ Subsector ☐

7.a. Is your site presently inactive and unstaffed? ☐ YES ☑ NO

b1. If yes, is your site expected to be inactive and unstaffed for the entire permit term? ☐ YES ☐ NO

b2. If you select "no" in 7.b1 above, then indicate the length of time that you expect your facility to be inactive and unstaffed ______________________

E. Stormwater Pollution Prevention Plan (SWPPP) Contact Information

1a. SWPPP Contact Name:

b. Phone: ___ - ___ - ____ Ext. ___ c. E-mail: shane.serrano@alaska.gov

2. URL of SWPPP (if applicable): _____

F. Endangered Species Protection

1. Using the instructions in Appendix E of the MSGP, under which criterion listed in Part 1.1.4.5 are you eligible for coverage under this permit?

☐ A ☐ B ☐ C ☐ D ☑ E ☐ F

2. If you select criterion E from Part 1.1.4.5:

a. What federally-listed species or federally-designated critical habitat are in your "action area?" Beluga Whale

b. List the pollutants expected to be present in your discharge _____

c. If you are an existing discharger, do you have effluent monitoring data from EPA's MSGP 2000, or another previous NPDES permit? ☑ YES ☐ NO

c.1 If no, why not? ☐ No monitoring required for my sector ☐ Inactive/unstaffed site ☐ Other _____

c.2 Do you have any other data characterizing pollutants in your stormwater (describe)? _____

c.3 If you have benchmark monitoring data, did you exceed any of the applicable benchmarks? ☑ YES ☐ NO

c.4 Did you exceed any applicable effluent limitation guideline or cause or contribute to an exceedance of a State or Tribal water quality standard? ☑ YES ☐ NO

c.5 If you answered "yes" to either question F.2.c.3 or F.2.c.4 above, for what pollutant(s)? Ammonia (as N); Biochemical Oxygen Demand (BOD); Chemical Oxygen Demand (COD); pH; Total Suspended Solids (TS

d. Attach documentation supporting criterion E eligibility. Documentation should address species and habitat listed in F.2.a and the potential effects of pollutants listed in F.2.b (including any monitoring data for these pollutants) on the listed species and habitat.

3. If you select criterion F from Part 1.1.4.5, provide the operator's NPDES Tracking Number under which you are certifying eligibility: _____

G. Historic Preservation

Using the instructions in Appendix F of the MSGP, under which criterion listed in Part 1.1.4.6 are you eligible for coverage under this permit?

☐ A ☑ B ☐ C ☐ D

H. Certifier Name and Title

I certify under penalty of law that I meet the eligibility conditions of this permit and that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I certify that I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Print Name: CHRISTINE KLEIN

Title: ANC

Signature: CHRISTINE KLEIN Date: 05/15/09

E-mail: CHRISTINE.KLEIN@ALASKA.GOV

NOI Preparer (Complete if NOI was prepared by someone other than the certifier)

Prepared by:

Organization:

Phone: ___ - ___ - ____ Ext. ___ E-mail: _____

Attachment 1. (Fill in as necessary if more space is required for D.2 a-e)

a. What is the name(s) of your receiving water(s) that receive stormwater from your facility (directly and/or through an MS4)? If your receiving water is impaired then identify the name of the impaired segment, if applicable, in parentheses following the receiving water name.	b. Are any of your discharges directly into any segment of an "impaired" water?	If you answered yes to question D.2.b, then answer the following three questions:		
		b.1. What pollutant(s) are causing the impairment?	b.2. Are the pollutant(s) causing the impairment present in your discharge?	b.3. Has a TMDL been completed for the pollutant(s) causing the impairment?
	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO
	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO
	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO
	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO
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	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO
	☐ YES ☐ NO		☐ YES ☐ NO	☐ YES ☐ NO

NOI Submittal Deadlines/Discharge Authorization Dates		
Category	**NOI Deadline**	**Discharge Authorization Date[1]**
Existing Dischargers - in operation as of October 30, 2005 and authorized for coverage under MSGP 2000.	No later than January 5, 2009.	30 days after EPA posts your NOI. Your authorization under the MSGP 2000 is automatically continued until you have been granted coverage under this permit or an alternative permit, or coverage is otherwise terminated.
New Dischargers or New Sources - have commenced discharging between October 30, 2005 and January 5, 2009.	As soon as possible but no later than January 5, 2009.	30 days after EPA posts your NOI.
New Dischargers or New Sources - commence discharging after January 5, 2009.	A minimum of 60 days prior to commencing operation of the facility, or a minimum of 30 days if your SWPPP is posted on the Internet during this period and the Internet address (i.e., URL) to your SWPPP is provided on the NOI form.	If you post your SWPPP on the Internet, 30 days after EPA posts your NOI. Otherwise, 60 days after EPA posts your NOI.
New Owner/Operator of Existing Discharger - transfer of ownership and/or operation of a facility whose discharge is authorized under this permit	A minimum of 30 days prior to date that the transfer will take place to the new owner/operator.	30 days after EPA posts your NOI.
Other Eligible Dischargers - in operation prior to October 30, 2005 but not covered under the MSGP 2000 or another NPDES permit.	Immediately, to minimize the time discharges from the facility will continue to be unauthorized.	If you post your SWPPP on the Internet, 30 days after EPA posts your NOI. Otherwise, 60 days after EPA posts your NOI.

[1] Based on a review of your NOI or other information, EPA may delay your authorization for further review, notify you that additional effluent limitations are necessary, or may deny coverage under this permit and require submission of an application for an individual NPDES permit, as detailed in MSGP Part 1.6. In these instances, EPA will notify you in writing of the delay or the request for submission of an individual NPDES permit application. EPA will post these NOIs on its website at www.epa.gov/npdes/enoi.

Who Must File a Notice of Intent with EPA?

Under section 402(p) of the Clean Water Act (CWA) and regulations at 40 CFR Part 122, stormwater discharges associated with industrial activity are prohibited to waters of the United States unless authorized under a National Pollutant Discharge Elimination System (NPDES) permit. You can obtain coverage under the MSGP by submitting a completed NOI if you operate a facility:

- that is located in a jurisdiction where EPA is the permitting authority, listed in Appendix C of the MSGP,
- that discharges stormwater associated with industrial activities, identified in Appendix D of the MSGP,
- that meets the eligibility requirements in Part 1.1 of the permit,
- that develops a stormwater pollution prevention plan (SWPPP) in accordance with Part 5 of the MSGP; and
- that installs and implements control measures in accordance with Part 2 to meet numeric and non-numeric effluent limits.

If you are unsure if you need an NPDES stormwater permit, contact your EPA or State NPDES stormwater permit program. Contacts are listed at www.epa.gov/npdes/stormwatercontacts.

One NOI must be submitted for each facility or site for which you are seeking permit coverage. You do not need to submit separate NOIs for each type of industrial activity present at your facility, provided your SWPPP covers all activities.

When to File the NOI Form

Do not file your NOI until you have obtained and thoroughly read a copy of the MSGP. A copy of the MSGP is located on the EPA website (www.epa.gov/npdes/stormwater/msgp). The MSGP describes procedures to ensure your eligibility, prepare your SWPPP, install and implement appropriate stormwater control measures, and complete the NOI form questions – all of which must be done before you sign the NOI certification statement attesting to the accuracy and completeness of your NOI. You will also need a copy of the MSGP once you have obtained coverage so that you can comply with the implementation requirements of the permit.

Where to File the NOI Form

EPA encourages you to complete the NOI form electronically via the Internet. EPA's Electronic Notice of Intent System (eNOI) can be found at www.epa.gov/npdes/enoi. Filing electronically is the fastest way to obtain permit coverage and help ensure that your NOI is complete. If you choose not to file electronically, you must send the NOI to one of the addresses listed below.

NOIs sent regular mail:
Stormwater Notice Processing Center (4203M)
USEPA
1200 Pennsylvania Avenue, NW
Washington, DC 20460

NOIs sent overnight/express mail:
Stormwater Notice Processing Center
EPA East Building, Rm. 7420
1201 Constitution Avenue, NW
Washington, DC 20004
202-564-9545

If you have questions, please contact EPA's Stormwater Notice Processing Center toll free at (866) 352-7755.

- If you file a paper NOI, please submit the original with a signature in ink – Do Not Send Copies. Also, faxed copies will not be accepted.
- Your SWPPP does not need to be submitted for review unless specifically requested by EPA or as otherwise required in Part 9 of the MSGP (State, Territory, and Tribal requirements). You must keep a copy of your SWPPP on-site or otherwise make it available to facility personnel responsible for implementing provisions of the permit.

Completing the NOI Form

To complete this form, type or print in uppercase letters in the appropriate areas only. Please make sure you complete all questions. Make sure you make a photocopy for your records before you send the completed original form to the address above. You may also use this paper form as a checklist for the information you will need when filing an NOI electronically via EPA's eNOI system.

Section A. Permit Number

Appendix C of the MSGP 2008 contains a list of geographic areas covered by the permit. If your facility is located in one of the listed areas, include the appropriate permit number in this section. (For example, if you facility is located in Massachusetts, and not on Indian Lands, you would write MAR050000 in this space.) If your facility is located in an area not covered by the MSGP, please contact your EPA Region, state or territorial NPDES stormwater coordinator (see www.epa.gov/npdes/stormwatercontacts for a list of contacts).

Section B. Facility Operator Information

1. Provide the legal name of the person, firm, public organization or any other public entity that operates the facility described in this application. An operator of a facility is a legal entity that controls the operation of the facility.
2. Provide the Employer Identification Number (EIN from the Internal Revenue Service (IRS)), commonly referred to as your taxpayer ID number. If the operator does not have an EIN, enter "NA" in the space provided.
3. Provide the operator's mailing address, telephone number, fax number (optional), and email address. Correspondence will be sent to this address.

Section C. Facility Information

1. Enter the facility's official or legal name. Unless the name of your facility has changed, please use the same name provided on prior NOIs or permit applications. You can use EPA's NOI Search website (www.epa.gov/npdes/noisearch) to view your previous NOI.

2. Indicate if industrial stormwater discharges from your facility were previously covered by an NPDES permit.

2a. If your facility was covered by EPA's MSGP-2000, please include the tracking number that you received in your confirmation letter or email from EPA's Stormwater Notice Processing Center. You can find the tracking number assigned to your previous NOI on EPA's NOI Search website (www.epa.gov/npdes/noisearch).

2b1. If your facility was not previously covered by an NPDES permit and discharged industrial stormwater, then indicate if it was in operation before October 30, 2005 and not covered under the MSGP 2000. If you select "yes" to this question then you have a 30 day waiting period before you are authorized to discharge.

2b2. If you select "no" in C.2.b.1, then indicate if your facility discharged stormwater between October 30, 2005 and January 5, 2009. If you select "yes" to this

question then you have a 30 day waiting period before you are authorized to discharge. If you select "no" to this question and you post your SWPPP on the Internet and provide EPA the URL in E.2, then you have a 30 day waiting period before you are authorized to discharge. If you select "no" to this question, but do not post your SWPPP on the Internet and therefore do not answer E.2, then you have a 60 day waiting period before you are authorized to discharge.

3.a-e. Enter the street address, including city, state, zip code, county or similar government subdivision of the actual physical location of the facility. Do not use a P.O. Box.

3.f-g. Provide the facility latitude and longitude in one of three formats: (1) degrees, minutes, seconds; (2) degrees, minutes, decimal; or(3) degrees decimal. You can obtain your facility's latitude and longitude though Global Positioning System (GPS) receivers, U.S. Geological Survey (USGS) quadrangle or topographic maps, and EPA's web-based siting-tools, among other methods. Refer to www.epa.gov/npdes/stormwater/msgp for guidance on the use of these methods. For consistency, EPA requests you take measurements from the location of your facility's stormwater outfall. Outfalls are locations where the stormwater exits the facility, including pipes, ditches, swales, and other structures that transport stormwater. If there is more than one outfall present, measure at the primary outfall (i.e., the outfall with the largest volume of stormwater discharge associated with industrial activity).

3.h. Identify the data source that you used to determine the facility latitude and longitude. If you did not use a USGS quadrangle or topographic map, the EPA website, or GPS receivers, then select "Other" and write the method used on the line provided. If you used a USGS quadrangle or topographic map, write the map scale on the line provided. Scale should be identified on the map.

4. Enter the estimated area of industrial activity at your site exposed to stormwater, in acres.

5. Indicate if the facility is considered a "federal facility" - Federal facilities include any buildings, installations, structures, land, public works, equipment, aircraft, vessels, and other vehicles and property, owned or leased by the federal government.

6. Indicate whether the facility is located in Indian Country, and, if so, provide the name of the reservation, if applicable.

Section D. Discharge Information

1. Indicate whether stormwater from your site will be discharged into a municipal separate storm sewer system (MS4). An MS4 is a conveyance or system of conveyances, including roads with drainage systems, municipal streets, catch basins, storm drains, curbs and gutters, ditches and man-made channels, owned or operated by a state, city, town, borough, county, parish, district, association or other public body, used to collect or convey stormwater. If you check "Yes" then identify the name of the MS4 operator on the line provided. If you are uncertain of the MS4 operator, contact your local government for that information. MS4s are different than combined sewers, which are designed to convey both stormwater and sanitary wastewater. Discharges to combined sewers do not require an NPDES permit but may be subject to other CWA requirements (contact the combined sewer operator for more information).

2. Enter information regarding your discharge. If additional space is needed fill out Attachment 1.

2a. Indicate in column "a" of the table the name(s) of the receiving water(s) into which stormwater from your facility will discharge. Also provide in parentheses the name of the impaired water (and segment, if applicable) into which your stormwater is discharged. If you identified more than on receiving water for your facility, indicate the first receiving water and complete question 2b and 2.b.1-3 (if applicable), before entering the next receiving water. The EPA's Water Locator Tool can help you identify the closest receiving water to your facility (www.epa.gov/npdes/msgp). Your receiving water may be a lake, stream, river, ocean, wetland or other waterbody, and may or may not be located adjacent to your facility. Your stormwater may discharge directly to the receiving water or indirectly via a storm sewer system, an open drain or ditch, or other conveyance structure. Do NOT list a man-made conveyance, such as a storm sewer system, as your receiving water. Indicate the first receiving water your stormwater discharge enters. For example, if your discharge enters a storm sewer system, that empties into Trout Creek, which flows into Pine River, your receiving water is Trout Creek, because it is the first waterbody your discharge will reach. Similarly, a discharge into a ditch that feeds Spring Creek should be identified as "Spring Creek" since the ditch is a manmade conveyance. If you discharge into a municipal separate storm sewer system (MS4), you must identify the waterbody into which that portion of the storm sewer discharges. That information should be readily available from the operator of the MS4.

2b. Indicate in column "b" of the table whether you discharge directly to an impaired water (lake, stream segment, estuary, etc), listed as "impaired" under section 303(d) of the Clean Water Act. Each state water quality agency maintains a list of waters that are impaired. Most state agencies publish these lists online. The EPA's Water Locator Tool may also help you identify if the nearest receiving water is impaired (www.epa.gov/npdes/msgp). If you discharge into a stream segment that is upstream of a listed impaired water but which is not itself on the State's impaired waters list, answer "no" to this question. In this case, requirements in the MSGP for discharges into impaired waters do not apply to you, unless notified otherwise by EPA.

Answer the following three questions only if you answered "Yes" to D 2.b:

2b1. Provide the pollutant(s) listed as causing the impairment in the water identified in D.2.b.1 above. Enter each pollutant individually on a separate row in the table.

2b2. Out of the pollutant(s) that you identified in D.2.b.1 above, indicate which pollutants you believe will be present in your discharge. If you do not expect the pollutant(s) to be in your discharge, then select "no."

2b3.Indicate the pollutant(s) that have a Total Maximum Daily Load (TMDL) for the impaired stream segment that you identified in D.2.b.2 above. Check with your state water quality agency for lists of waters with approved or established TMDLs. See www.epa.gov/npdes/msgp for more information.

3. Water Quality Standards

3a.If you selected "no" in C.2 indicating that stormwater discharges from your facility have not been previously covered under an NPDES permit, then you are considered a new discharger and must answer this question; otherwise you are considered an existing discharger and may skip this question. State water quality agencies are responsible for setting water quality standards for waters within the state's boundaries. Check EPA's website (www.epa.gov/npdes/msgp) to determine if the water(s) that you discharge into are designated as a "Tier 2 (or Tier 2.5) water" (See Appendix A of the MSGP 2008 for definitions of "Tier 2 water" and "Tier 2.5 water"). If you discharge into these waters, EPA may impose additional permit conditions to ensure that you do not violate the State's antidegradation policy.

3.b Idenitfy whether your receiving water is designated as a Tier 3 waterbody. Go to www.epa.gov/npdes/msgp for a list of Tier 3 waterbodies. Note that new discharges into designated Tier 3 waters are not eligible for coverage under the MSGP 2008.

4. Federal Effluent Limitation Guidelines and Sector-Specific Requirements

4.a-b. Depending on your industrial activities, your facility may be subject to effluent limitation guidelines which include additional effluent limits and monitoring requirements for your facility. Please review these requirements, described in Part 2.1.3 of the MSGP, and check any appropriate boxes on the NOI form.

4.c. For Sector S facilities (Air Transportation), indicate whether you anticipate that the entire airport facility will use more than 100,000 gallons of glycol-based deicing/anti-icing chemicals and/or 100 tons or more of urea on an average annual basis. If so, additional effluent limits and monitoring conditions apply to your discharge (see Part 8 Sector S of the MSGP 2008).

5. List the four-digit Standard Industrial Classification (SIC) code and/or two character activity code that best describes the primary industrial activities performed by your facility under which you are required to obtain permit coverage. Your primary industrial activity includes any activities performed on-site which are (1) identified by the facility's one SIC code for which the facility is primarily engaged; and (2) included in the narrative descriptions of 40 CFR 122.26(b)(14)(i), (iv), (v), or (vii), and (ix). See Appendix D of the MSGP for a complete list of SIC codes and activities codes.

6. If your site has co-located industrial activities that are not identified as your primary industrial activity, identify the sector and subsector codes that describe these other industrial activities. For a complete list of sector and subsector codes, see Appendix D of the MSGP.

7.a-b Indicate whether your facility is currently inactive and unstaffed. If so then indicate whether your facility will be inactive and unstaffed for the entire permit term, or if not, specify the specific length of time in units of days, weeks, months, or years (e.g. 3 months) that you expect the facility to be inactive and unstaffed.

Section E. Facility Contact Information and SWPPP Location

1.a-c. Identify the name, telephone number, and email address of the person who will serve as a contact for EPA on issues related to stormwater management at your facility. This person should be able to answer questions related to stormwater discharges, the SWPPP, and other issues related to stormwater permit coverage, or have immediate access to individuals with that knowledge. This person does not have to be the facility operator, but should have intimate knowledge of stormwater management activities at the facility.

2. If you are making your Stormwater Pollution Prevention Plan publicly available on a website provide the appropriate Internet URL address. (Please note that by posting your SWPPP on the web, you may qualify for a shortened authorization waiting period. See Table 1-2 of the MSGP for more information.)

Section F. Endangered Species Protection

1. Based on the instruction provided in Appendix E of the MSGP 2008, indicate which permit criterion (A,B,C,D,E, or F) listed in Part 1.1.4.5 you are using to satisfy your eligibility obligations for protection of endangered and threatened species, and designated critical habitat.

2.a. If you select criterion E (not likely to adversely affect), list those federally-listed endangered or threatened species and any federally-listed designated critical habitat expected to exist in proximity to your facility.

2.b List the pollutants that you expect to be present in your stormwater discharge. Include any pollutants that you may have included in D.2.b.3 above.

2.c If you selected "yes" in C.2 then you are considered an existing discharger and must answer all the questions in F.2.c.1--5; otherwise you are considered a new discharger and may skip the questions under F.2.c. If you are an existing discharger who was previously covered under the MSGP 2000, indicate whether you have any previous effluent monitoring data.

2.c1-2.If you select "No," to F.2.c then indicate why you don't have any data. Also indicate if you have any other data characterizing pollutants in your stormwater discharge.

2.c.3. If you select "Yes," to F.2.c then indicate whether you exceeded any benchmark.

2.c.4 Indicate whether you have exceeded any applicable effluent limitation guideline, or caused or contributed to an exceedance of state or tribal water quality requirement(s).

2.c.5. If you select "Yes" to F.2.c.3.and/or F.2.c.4 then indicate the pollutant parameters for which you exceeded the benchmark, applicable effluent limitation guideline, or State or Tribal water quality requirement(s).

2.d. Attach your supporting rationale for your determination of the applicability of Criterion E for your facility (applies to both new and existing dischargers). Your documentation should address species and habitat listed in F.2.a and the potential effects of pollutants listed in F.2.b on the listed species and habitat. This should include consideration of any available data characterizing pollutants in your stormwater discharge, or in the discharge of similar facilities if data for you facility is not available, that may be of concern to listed species.

3. If you select Criterion F (already addressed in another operator's valid certification), provide the tracking number that the operator received in their confirmation letter or email from EPA's NOI Processing Center (see Appendix E). You can find the tracking number assigned to your previous NOI on EPA's NOI Search website (www.epa.gov/npdes/noisearch). An example where criterion F may apply includes airports where several individual airlines have applied for coverage under the MSGP, and the entire airport also has applied for or obtained coverage. If the airport has already certified under Appendix E, and that certification addresses any potential impacts from the individual airlines, then the airlines may reference the airport's permit tracking number.

Section G. Historic Preservation

Based on the instruction provided in Appendix F of the MSGP 2008, indicate which permit criterion (A, B, C, or D) listed in Part 1.1.4.6 of the MSGP you used to satisfy your eligibility obligations for protection of historic properties.

Section H. Certification

Certification statement and signature (see Section B.11 of Appendix B of the MSGP for more information). Enter certifier's printed name, title and email address. Sign and date the form. (CAUTION: An unsigned or undated NOI form will prevent the granting of permit coverage.) Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means:

(i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or

(ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipal, State, Federal, or other public facility: by either a principal executive or ranking elected official.

If the NOI was prepared by someone other than the certifier (for example, if the NOI was prepared by the facility SWPPP contact or a consultant for the certifier's signature), include the name, organization, phone number and email address of the NOI preparer.

Paperwork Reduction Act Notice

Public reporting burden for this certification is estimated to average 3.7 hours per certification, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose to provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may increase or reduce this burden to: Director, Office of Environmental Information Services, Collection Services Division (2823), USEPA, 1200 Pennsylvania Avenue, NW, Washington, DC 20460. Include the OMB control number of this form on any correspondence. Do not send the completed NOI form to this address.

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Appendix C-2

Benchmark Monitoring Results

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Monitoring results as reported by the Airport. Outfalls are labled on the Airport Map (Appendix B). Storm event duration and magnitude are given for each sampling event.

NS=Not Sampled
BDL=Below Detection Limit
No Q = No Flow

9/22/2009	Quarter 2	Rainfall, 24h, .2in			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	55	11.3	71.4	1,260	12.1
COD (mg/L)	94	30	60	1,600	37
Ammonia (mg/L)	23	1	17	16	40
pH	6.65	6.57	6.93	6.37	6.75

10/28/2009	Quarter 3	Rainfall, 12hr, .09in			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	16.9	12	11.4	1,990	27.6
COD (mg/L)	34	26	36	1,600	44
Ammonia (mg/L)	7.1	0.57	3.1	5.9	2.8
pH	5.93	6.54	6.74	6.85	6.84

2/22/2010	Quarter 4	Rainfall/Snowmelt			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	5330	NS/Frozen	NS/Froxen	NS/Frozen	NS/Froxen
COD (mg/L)	27400	NS/Frozen	NS/Froxen	NS/Frozen	NS/Froxen
Ammonia (mg/L)	571	NS/Frozen	NS/Froxen	NS/Frozen	NS/Froxen
pH	7.35	NS/Frozen	NS/Froxen	NS/Frozen	NS/Froxen

4/29/2010	Quarter 1	Snowmelt			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	49.8	157	152	2,390	20.1
COD (mg/L)	130	410	300	2,100	BDL
Ammonia (mg/L)	25.7	19	27.2	81.8	20.3
pH	7.27	7	17	7.27	6.74

9/30/2010	Quarter 2	Rainfall, 17h, .09in			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	7	BDL	NS	350	BDL
COD (mg/L)	42	29	NS	740	44
Ammonia (mg/L)	41	7	NS	16	2.6
pH	6.98	6.45	NS	6.05	6.7

10/11/2010	Quarter 3	Rainfall, 12h, .08in			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	72	5.3	4	1,200	BDL
COD (mg/L)	130	40	43	1,800	40
Ammonia (mg/L)	18	4.4	6.9	4.2	0.28
pH	7	6.9	6.7	7.2	7.6

3/31/2011	Quarter 4	Snowmelt			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	639	320	NS/No Q	65.8	368
COD (mg/L)	1,100	660	NS/No Q	13,000	800
Ammonia (mg/L)	190	30	NS/No Q	220	210
pH	9.6	8.4	NS/No Q	9.2	9.4

TSAIA MSGP Industrial Discharge Monitoring Report

6/16/2011	Quarter 1	Rainfall, 48hr, .37in			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	20.1	2.2	10.6	46.5	6.7
COD (mg/L)	90.5	BDL	32.9	110	57.2
Ammonia (mg/L)	73.5	26.9	70.3	87.4	73.5
pH	7.3	7.2	7	NR	6.7

7/20/2011	Quarter 2	Rainfall, 72hr, .52in			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	4.6	0	0	47.9	3.3
COD (mg/L)	26.8	20.5	23.8	184	30.9
Ammonia (mg/L)	25.6	15	15.6	14.4	3.1
pH	7.27	7.08	7.88	7.1	6.2

10/18/2011	Quarter 3	Rainfall, 72h, .5in			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	10.2	3.7	BDL	49.4	BDL
COD (mg/L)	34.9	21.5	20.5	140	31.1
Ammonia (mg/L)	42.3	6.2	18.4	14.4	1.6
pH	6.8	7.3	7.4	6.8	6.3

4/10/2012	Quarter 4	Snowmelt			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	93.2	37.2	BDL	229	93.1
COD (mg/L)	885	166	14.6	1,400	482
Ammonia (mg/L)	194	13	1.4	262	209
pH	8.9	6.49	6.87	8.63	8.75

6/7/2012	Quarter 1	Rainfall, 72h, .28in			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	48	BDL	BDL	590	BDL
COD (mg/L)	160	21	15	890	44
Ammonia (mg/L)	27	16	16	14	22
pH	6.45	7.06	7.48	5.86	7.24

8/28/2012	Quarter 2	Rainfall, 72h, .5in			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	BDL	BDL	BDL	190	BDL
COD (mg/L)	26	17	19	350	28
Ammonia (mg/L)	21	7.9	12	7.5	1.7
pH	7.5	6.63	7.85	6.75	6.14

10/18/2012	Quarter 3	Rainfall, 72h, .1in			
Outfall	NPDA	NPDB	NPDC	NPDD	NPDE
BOD (mg/L)	28	7.6	7.8	240	11
COD (mg/L)	72	13	15	300	32
Ammonia (mg/L)	15	7.4	7.5	13	83
pH	6.8	6.2	6.7	6.6	7.4

Appendix C-3

Operations at Other Cold Weather Airports

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Telephone Record

Project:	TSAIA Master Plan Update- Deicing	Project No:	
Date:	May 21, 2013	Subject:	BOS – deicing management strategies
Call to:	Rosanne Joyce, Environmental Managmement, Permit Compliance	Phone No:	617.568.3516
Call from:	Karen Nichols	Phone No:	801.743.7834

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Discussion, Agreement and/or Action

Rosanne has been with Massport and specifically working at Logan for 21 years. Works under Brenda Enos, and with others to manage the stormwater discharge permit compliance at Logan International.

Last year highest usage Type I –1.2MG ; type IV –0.4 MG, total of 1.6MG of ADF
Normal range is about 1 MG (average 41 inches of snow, 355,000 aircrraft movements, 29M passengers)

PERMIT:
First IP issued in 1970's
Current IP with 25 co-permittees (all tenents that conduct activities related to air transportation), expired in 2012 (joint MA and EPA permit)
Orignial IP application (with co-permittees) was sumbitted in 1992, permit issued 2007
IP for fire fighting facility
No NOVs

Outfalls: 4 major outfalls, Boston Harbor, Inner Harbor, Mudflats (clams) and beach areas

Rosanne indicated having the tenants on board "is the way to go". Massport has taken the lead to "make it easy for them to comply". 95% of the tenants are on-board, they are the core tenents. Problems with some but…
Permit application went in with the co—permittees named, when the draft permit came out (15 years later) Massport held meetings with co-permittees to gain comments and input into the process.

Massport: Created a General SWPPP for the enitire airport
Created a site specific SWPPP template for co-permittees to fill out and update
Created a deicing SWPPP team with monthly reporting of ADF and runway usage (form to be filled out)
Developed training CD that co-permittees can use and form to document and report on
Updates SWPPP every other year
Conducts quarterly airport wide audits and relays findings back to Co-permittees
Created annual reporting and certificat form that gets submitted to Massport for submittal to agency

CURRENT PRACTICES:

Collection, storage and treatment --- NONE, airport is on 2500 acres, conducted study to collect, store and treat, space requirements would of involved filling portions of Boston Harbor, estimated costs in the billions and perceived to be not permittable.

Modeling—Logan has a SWMM (Stormwater Mangement Model) model for each major outfall basin (entier airport) that is calibrated to predict stormwater flows and discharges. She believes it is running both quality and quantity simulations (her collegue is in charge of that and they have CDM assisting).

Modeling, monitoring and the mixing analysis conducted on winter discharges from the major outfalls suppported the no effect determination.

Eliminated the use of Urea several years ago, using KAc and it is working well.
One tenant has a small GRV…that is used when they deice in dry weather. Used to prevent slip and fall hazards as the ADF on the pavement is slippery.

MONITORING--
WET (toxicity) monitoring of sea urchins and silveside… is problematic…will be looking to negotiate other sampling protocols/species with state/epa for new permit. Toxicity monitoring every other year…

Wet weather –problems with TTZ and nonyphenol polyethylene glycol ether…showing up in results (these are additives to the ADF)

4 major outfalls monitored monthly, 40 internal outfalls monitored…lots of sampling and reporting.

Currently a big effort is focused on source tracking of bacteria.
Illegal and Illicit investigation to eliminate cross connections (found one this year, new construction project where the contractor tied the sanitary sewer into the storm drain in 2011)
Tried BST (Bacteria Source Tracking) too costly, inconclusive…they discontinued that.
Will need to address this issue, due to outfall discharge into mudflats (Clam habitat) and beaches
Bacteria sampling/reporting required in permit

COMPLIANCE REPORTS-
Very active in documenting BMPs, tenents certifications, spill reporting, analytical data (they proactively collect data and conduct analysis to defend current best management practices

FUTURE PERMITTING/COMPLIANCE
Brenda Enos is actively involved in ACI.

Reapplicaiton submitted 2 years ago..awaiting draft permit

Concerned that BAT requirements (ELG) for the MSGP will be pulled into the IP for the airport.

Maybe able to work with other airports as an industry and implement a “banking” approach

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Telephone Record

Project:	TSAIA Master Plan Update- Deicing	Project No:	
Date:	May 30, 2013	Subject:	CLE – deicing management strategies
Call to:	Kim McGreal, Environmental Manager	Phone No:	216-265-6615
Call from:	Karen Nichols	Phone No:	801.743.7834

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Discussion, Agreement and/or Action

Last winter usage Type I –887000 gal ; type IV—150,000

To date they have recycled 340,000 and is continuing to recycled stored amounts through the summer

PERMIT: New IP 2013- Extensive sampling, large suite of constituents, no permit effluent limits
MS4 applies to landside areas for construction activities only
Received a Consent Order in 1992, required update of management plans and procedures which led to a modified consent order in 2000. They are getting set to close out the consent order…the new deicing pad is a result of the CO.
3 co-located industries

CURRENT PRACTICES:

Collection
Currently have two centralized deicing areas drianing to local tanks which drian to recycle tanks during winter or storm drain system in summer, manually operated
Pad 1—built in 2006, 90 acres, huge, 90% of all deicing occurs there
Pad 2 – for RJ and smaller plans
Air carriers contract with single FBO for application, has hot air truck that can be used under appropriate conditions
UPS, west side had own applicators and deicing areas
6- GRV airport contracted out; 3 GRUs (units) , 6 GRTs (tankers)

Storage
All storage in tanks, no ponds (land area limited and concerned about birds)
17 AF tank storage
Storage areas are managed: with low concentrations tanks will discharge to POTW

Treatment
Discharge low concentration to POTW
Recycle plant, airport contracts with, has 12 frac tanks to add to the other tank storage
Will sell a portion of the recycled glycol to lavoratory trucks so they don't freeze in the winter

FUTURE PRACTICES:
Working on a new diversion vault with automated accetuators
Master Plan has two additional valuts, she may not need both of them but they are in the plan
Will install direct discharge from UPS deicing area to POTW, current practice is to drain to vault, pump to GRV and haul to recycle plant.

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Telephone Record

Project:	TSAIA Master Plan Update- Deicing	Project No:	
Date:	May 21, 2013	Subject:	DEN – deicing management strategies
Call to:	Keith Pass, Environmental Manager	Phone No:	303.342.2689
Call from:	Karen Nichols	Phone No:	801.743.7834

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Discussion, Agreement and/or Action

Keith indicated Denver was constructed in 1995, deicing management huge consideration during design, currently 6 deicing pads, can handle 6 planes at one time. Limited Gate deicing Airport has 56 square miles of land.

Current usage Type I 84%; type IV 15% of ADF

In 1996-97 over 1MG ADF applied. Normal range is 1.2 MG to .684,000Gal applied, recently over 1.4 MG

PERMIT: IP will expire in 2014- for industrial discharges
MS4 applies to landside areas
Received an NOV in 2001, Ponds were full from a 3 day storm and had to release one pond to surface waters to have capacity for next storm
3 co-located industries

CURRENT PRACTICES:

Collection
Currently have six centralized deicing areas, with separate drianage system for collection
Can collect 70% of applied ADF

Allows limited gate deicing, (max 25 gal neat) to allow planes to safely taxi. They collect the first 250' with slot drains and discharge to POTW, normally low concentration, very diluted <1%.

Storage
175 AF max pond storage
Storage areas are managed: with low concentrations held in some basins
Has issues with

Treatment
Discharge to POTW
6 AF of tank storage prior to discharge to Recycle plant, contract out operation, recycle 72% of collected ADF, operator needs additional storage, has ability to bring frac tanks on-site for temp storage

FUTURE PRACTICES:
Doesn't have enough storage. New pavement areas constructed " if they pave it, they will deice on it". Requested money for new basins, not approved.
Planning for future r/w includes new storage capacity
Some carriers utilitzing hybrid trucks

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Telephone Record

Project:	TSAIA Master Plan Update- Deicing	Project No:	
Date:	May 20, 2013	Subject:	SLCIA – deicing management strategies
Call to:	Patty Nellis, Environmental Manager Kevin staples, Environmental Scientis	Phone No:	801.575.3472 801.575.3470
Call from:	Karen Nichols	Phone No:	801.743.7834

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Discussion, Agreement and/or Action

Patty- SLCIA has been very active with the EPA sub-committee on ELG

PERMIT: SLCIA has an individual UPDES permit, has had this for years, 5 outfalls
Conducting monthly sampling at the outfalls, 4 outfalls are pumped to Surplus Canal, 1 to City Drain
Permit expired and they are working with Utah DWQ through the revision process
DWQ is suggesting going MSGP, Patty is concerned about the Benchmark Concentrations
DWQ is suggesting a WLA process to determine effluent concentrations, receiving water is not impaired

CURRENT PRACTICES:

Collection
Currently have centralized deicing areas, with separate drianage system for collection
Under construction of three new end of r/w pads for 6 – 8 planes, will be sloped like a bathtub
Three major deiciers: DL, SW, and FBO for the others
Draiange system leads to 3 storage basins then to recycle plant

Has one GRV, uses it in earlywinter and late spring and for spills. Also when temporary deicing locations are set up, will use GRV to vacuum out the catch basins and dispose to on-site basins

Storage
Storage areas are managed: <1% is stored in low concentration pond, held until summer and land application
More concentrated is sent to recycle facility, waste stream to POTW

Treatment
Recycle plant can get to 99% pure glycol, managed by EQ, however SLCIA will be taking over operations next year, built in the 1990'

FUTURE PRACTICES:

Current efforts by Delta to use the hyrid deicing trucks, direct /gentle spray nozzles and ability to blend to temperature…Huge source reduction efforts, can get blended ADF down to 10% glycol under certain weather conditions. She sees this as a huge step forward, need to work with other air carriers and operators, DL seems to like the new trucks.

Continue with improving collection efficiency and sending it to recycle plant. Currently having some odor problems in SS trunck line from palnt.

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Appendix C-4

Open Pond Sizing for Storage Strategies

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Open Pond Sizing for Glycol Contaminated Runoff
Aircraft Deicing Fluid Management Strategies
20 Year Projected Increase in Aircraft Traffic

BASIN DIMENSIONS

	Storage Criteria	
Dimensions of Pond	**Alternative 1 170 Acre Drainage**	**Alternative 2 29 Acre CDP**
Top side length (b)	997 ft	455 ft
Bottom side length (a)	955 ft	413 ft
Surface Area	22.82 acres	4.75 acres
Depth	5 ft	5 ft
Accounting for precipitation into open basin		
Top side length (b)	1,112 ft	508 ft
Bottom side length (a)	1070 ft	466 ft
Surface Area	28.39 acres	5.92 acres
Discharge Rate		
Discharge rate for basin=	77 gpm	15 gpm
	190,068 gpd	36,693 gpd
Designed Holding Time		
	7 months	7 months

INPUT INFORMATION

Factor of Safety

10%

Conversion Factors

Square feet in an acre =	43,560	ft^2/acre
Inches in a foot=	12	in/ft
Gallons in a cubic foot=	7.48	gal/ft^3

Deicing Operations	170 Acre Drainage	29 Acre CDP
Area with ADF use=	170 acres	29 acres

Precipitation	**Snow**	**Snow Water Equivalent (SWE)**
Average Yearly Snowfall=	74.5 inches	7.45 inches

ADF Usage

Average Yearly Type I Usage=	1,030,203	gallons
Average Yearly Type IV Usage=	97,648	gallons
Type I Available for Capture=	75%	
Type IV Available for Capture=	10%	

40 CFR Parts 9 and 449, assumed maximum Type 1 ADF available for collection.

Open Pond Sizing for Glycol Contaminated Runoff
Aircraft Deicing Fluid Management Strategies
20 Year Projected Increase in Aircraft Traffic

CALCULATIONS

		170 Acre Drainage	29 Acre CDP
Available ADF volume (cubic feet)=		104,594	104,594
Water volume (cubic feet)=		4,597,395	784,262
Direct Precipitation Captured in Open Pond			
Water Volume (cubic feet)=		617,064	128,325
Total Volume			
(ADF + Water)	(cubic feet)	5,329,512	1,027,640
	(gallons)	39,867,520	7,687,283
	(acre-feet)	122	24

Equalization Basin

Basin design=	Partial Pyramid
Basin Depth=	5 ft
Freeboard=	2 ft
Side Slope=	3h:1v

Equations

Volume of a partial pyramid $\left\{ V = \frac{(b^2 + ab + a^2)}{3} \right.$

$$a = \left(\frac{V}{h} - 75\right)^{1/2} - 15 \qquad V = volume\ of\ basin \quad a = side\ length\ of\ bottom$$

$$b = a + 42 \qquad h = depth\ of\ basin \quad b = side\ length\ of\ top$$

ASSUMPTIONS

Deicing operational area is based on figures provided by the Airport and map analysis via GIS. This area was found to be 150 acres. No ground survey was completed to verify the true area impacted by aircraft deicing operations.

Given the forecasted mix of aircraft departures, sizing the deicing pads to accommodate the largest aircraft would provide the most flexibility for deicing operations. The design criteria assumes the area impacted by deicing activities would not extend beyond the wing-tip radius of the largest aircraft. The largest aircraft currently serviced at the Airport is the Boeing 747-400 with a 231 feet wing-tip diameter. Twenty nine (29) dedicated deicing areas sized for this aircraft would require 29 acres.

All aircraft deicing fluid that is applied to aircraft is done within the deicing zones specified by the Airport and spent ADF is captured within the same zones. There is no reduction in volume due to snow plowing operations, evaporation, or fugitive transport of spent ADF to other zones.

Open Pond Sizing for Glycol Contaminated Runoff
Aircraft Deicing Fluid Management Strategies
20 Year Projected Increase in Aircraft Traffic

All precipitation that falls (snow or rain) in the aircraft deicing zones will be captured and directed to the equalization basin. This calculation assumes 100% capture and does not account for snow plowing operations in deicing areas, evaporation, fugitive transport, or runoff entering aircraft deicing zones from outside the zone specified.

Snow water equivalent is assumed to be 10% of the snowfall as detailed in ACRP Report 81.

Available ADF is defined by the USEPA in 40 CRF Parts 9 and 449 as the ADF that falls from aircraft immediately following deicing. Available Type I glycol is 75% of what is applied. Available Type IV glycol is 10% of what is applied. These percentages are based on the viscosity of the fluid. Because the majority of the ADF used at the Airport is Type I, these calculations account for 75% of glycol applied to be available for collection.

Equalization basin design is based on a square partial pyramid structure recessed into the ground similar to an open pond structure. The side slopes will be at a 3h:1v ratio and the structure will not be greater than five (5) feet in depth. Two (2) feet of freeboard are included in the dimension calculations to account for larger storm surges or high-melt events.

Discharge rate is based on a seven (7) month emptying period, which would allow for runoff from an entire deicing season to be captured. The basin would discharge24 hours a day at a constant rate.

The projected increase in aircraft traffic at the Airport is 30%, which is based on projections from RS&H. This projection was used to linearly extrapolate the amount of ADF used at the Airport.

REFERENCES

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Alaska Climate Research Center, The (ACRC). Accessed May 21, 2013.
http://climate.gi.alaska.edu/Climate/Location/TimeSeries/Data/ancSn

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Appendix C-5

Tank Sizing for Storage Strategies

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Closed Tank Sizing for Glycol Contaminated Runoff
Aircraft Deicing Fluid Management Strategies
20 Year Projected Increase in Aircraft Traffic

BASIN DIMENSIONS

Dimensions of Tank	Alternative 2 29 Acre CDP	Alternative 3 Increase GRV Ops
Height=	15 ft	15 ft
Diameter=	276 ft	172 ft
Footprint of tank=	1.38 acres	0.53 acres
Designed Holding Time		
	7 months	7 months
Discharge Rate		
Discharge rate for basin=	22 gpm	9 gpm
	18,431 gpd	7,145 gpd

INPUT INFORMATION

Factor of Safety

10%

Conversion Factors

Square feet in an acre =	43,560	ft^2/acre
Inches in a foot=	12	in/ft
Gallons in a cubic foot=	7.48052	gal/ft^3

Deicing Operations	29 Acre CDP	Increase GRV Ops
Area with ADF use=	29 acres	Flexible

Precipitation	**Snow**	**Snow Water Equivalent (SWE)**
Average Yearly Snowfall=	74.5 inches	7.45 inches

ADF Usage

Type I=	1,030,164	gallons
Type IV=	97,648	gallons

Type I Available for Capture=	75%
Type IV Available for Capture=	10%

40 CFR Parts 9 and 449, assumed annual average ADF available for collection.

CALCULATIONS

(Calculations in cubic feet)	29 Acre CDP	Increase GRV Ops
Available ADF volume=	104,590	
Water volume=	784,262	
ADF Collected=		41,836
Volume at 12% ADF (ADF+Water)=		348,634

Closed Tank Sizing for Glycol Contaminated Runoff
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Total Volume		29 Acre CDP	Increase GRV Ops
(ADF + Water)	(cubic feet)	899,311	348,634
	(gallons)	6,727,311	2,607,960
	(acre-feet)	21	8

Equalization Basin

Basin design= Cylindrical Closed Tank
Basin Depth= 15

Equations

Volume of a cylindrical tank $V = \pi * r^2 * h$

$V = volume\ of\ basin \quad r = radius\ of\ tank \quad h = depth\ of\ basin$

ASSUMPTIONS

Deicing operational area is based on figures provided by the Airport and map analysis via GIS. This area was found to be 150 acres. No ground survey was completed to verify the true area impacted by aircraft deicing operations.

Given the forecasted mix of aircraft departures, sizing the deicing pads to accommodate three wide-body aircraft per hour would provide the most flexibility for deicing operations. The design criteria assumes the area impacted by deicing activities would not extend beyond the designated deicing area. The largest aircraft currently serviced at the Airport is the Boeing 747-400 with a 231 feet wing-tip diameter. Twenty nine (29) dedicated deicing areas sized for this aircraft would require 29 acres.

All aircraft deicing fluid that is applied to aircraft is done within the deicing zones specified by the Airport and spent ADF is captured within the same zones. There is no reduction in volume due to snow plowing operations, evaporation, or fugitive transport of spent ADF to other zones.

All precipitation that falls (snow or rain) in the aircraft deicing zones will be captured and directed to the equalization basin. This calculation assumes 100% capture and does not account for snow plowing operations in deicing areas, evaporation, fugitive transport, or runoff entering aircraft deicing zones from outside the zone specified.

Snow water equivalent is assumed to be 10% of the snowfall as detailed in ACRP Report 81.

Available ADF is defined by the USEPA in 40 CRF Parts 9 and 449 as the ADF that falls from aircraft immediately following deicing. Available Type I glycol is 75% of what is applied. Available Type IV glycol is 10% of what is applied. These percentages are based on the viscosity of the fluid. Because the majority of the ADF used at the Airport is Type I, these calculations account for 75% of glycol applied to be available for collection.

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Equalization basin design is based on a cylindrical tank with a height of 15 feet. The tank is closed at the top to prevent additional precipitation from entering. The tank design can be changed based on the needs of the Airport, but a concrete tank is capable of being buried to reduce the land required for installation.

Discharge rate is based on a seven (7) month emptying period, which would allow for runoff from an entire deicing season to be captured. The basin would discharge 24 hours a day at a constant rate.

The projected increase in aircraft traffic at the Airport is 30%, which is based on projections from RS&H. This projection was used to linearly extrapolate the amount of ADF used at the Airport.

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