



MARYLAND AVIATION
ADMINISTRATION

Stormwater Pollution Prevention Plan (SWPPP) Update 2016

Baltimore/Washington International
Thurgood Marshall Airport
Maryland Department of Transportation
Aviation Administration

December 2016

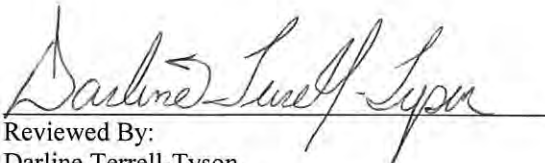
STORMWATER POLLUTION PREVENTION PLAN UPDATE

FOR THE

**BALTIMORE/WASHINGTON INTERNATIONAL
THURGOOD MARSHALL AIRPORT
MARYLAND**

**Managed by the
MARYLAND DEPARTMENT OF TRANSPORTATION'S
MARYLAND AVIATION ADMINISTRATION**

December 2016



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12-22-16
Date



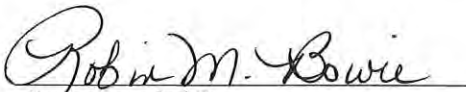
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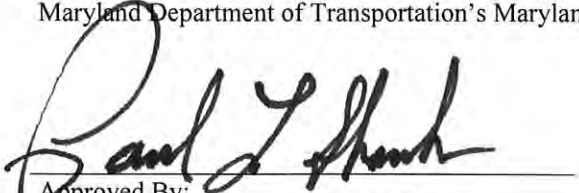
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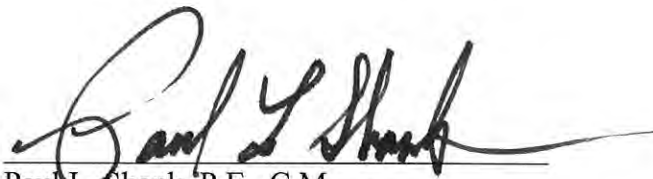
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CERTIFICATION

(Required by EPA Guidance)

I certify under penalty of law 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 gathered and evaluated 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, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing of violations.



Paul L. Shank, P.E., C.M.

Chief Engineer, Division of Planning and Engineering

Maryland Department of Transportation's Maryland Aviation Administration



Certification Date

STORMWATER POLLUTION PREVENTION PLAN (SWPPP) REVISIONS

<u>Revision</u>	<u>Date</u>	<u>Details</u>
Revision 00	April 2002	Update to Original 1993 SWPPP
Revision 01	October 2003	Update to April 2002 SWPPP
Revision 02	January 2005	Update to October 2003 SWPPP
Revision 03	April 2006	Update to January 2005 SWPPP
Revision 04	June 2009	Update to April 2006 SWPPP
Revision 05	December 2011	Update to June 2009 SWPPP
Revision 06	December 2016	Update to December 2011 SWPPP, including addition of the sweeper pit debris runoff as a non-stormwater discharge

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LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Airport Operations Center
AS	Activity-Specific
AST	Aboveground Storage Tank
BL	Baseline
BMP	Best Management Practice
BWI	Baltimore/Washington International
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COMAR	Code of Maryland Regulations
CRCF	Consolidated Rental Car Facility
CWA	Clean Water Act
FOD	Foreign Objects and Debris
ft	Foot or Feet
FRS	Fire and Rescue Services
HAZMAT	Hazardous Materials
I	Interstate
CP	Contingency Plan
IDDE	Illicit Discharge Detection and Elimination
JETS	Joint Environmental Tracking System
MAA	Maryland Department of Transportation Aviation Administration
MD	Maryland
MDE	Maryland Department of the Environment
MES	Maryland Environmental Service
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
OES	Office of Environmental Services
P2	Pollution Prevention
PPOA	Pollution Prevention Opportunity Assessment
RSA	Runway Safety Area
Rt.	Route

SHA	State Highway Administration
SPCC	Spill Prevention, Control, and Countermeasure
SS	Site-Specific
SWM	Stormwater Management
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
WI	Work Instruction

1. INTRODUCTION

1.1 BACKGROUND

In 1993, to comply with stormwater regulations of the 1990 Amendments to the Clean Water Act (CWA), the Maryland Department of Transportation Aviation Administration (MAA) developed a Comprehensive Stormwater Management Plan for the Baltimore/Washington International (BWI) Thurgood Marshall Airport. At that time, MAA contracted Maryland Environmental Service (MES) to develop the Stormwater Pollution Prevention Plan (SWPPP) for BWI Thurgood Marshall Airport. Since that time, MAA has tracked all improvements to stormwater management systems within the BWI Thurgood Marshall Airport watersheds.

BWI Thurgood Marshall Airport has undergone significant development and expansion since the original SWPPP was authored. In 2001, MAA updated the SWPPP to include the newest expansions and revised drainage areas covered by the airport. The task also included a survey of existing tenants and their activities that may impact stormwater discharged from the site. The SWPPP has been updated periodically since the April 2002 SWPPP update was issued, to document additional revisions to the drainage areas and expansions that have been completed at BWI Thurgood Marshall Airport.

EA Engineering, Science, and Technology, Inc., PBC has been retained to update the SWPPP to reflect recent developments at BWI Thurgood Marshall Airport, in accordance with the most recent National Pollutant Discharge Elimination System (NPDES) permit. This SWPPP has been prepared following U.S. Environmental Protection Agency (USEPA) guidance, *Developing Your Stormwater Pollution Prevention Plan: A Guide for Industrial Operators* (EPA 833-B-09-022, February 2009), *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-006, September 1992), and the USEPA Summary Guidance for the preceding document (EPA 833-R-92-002, October 1992).

Additional data and information have been used from the *2000 Maryland Stormwater Design Manual, Volume I & II*, which includes significant details on Best Management Practices (BMPs) and the stormwater requirements imposed by the State of Maryland, Department of the Environment (MDE).

1.2 THE NPDES PERMIT AND UPDATED REQUIREMENTS

The stormwater structures, systems, and conveyances at BWI Thurgood Marshall Airport constitute a large Municipal Separate Storm Sewer System (MS4), as defined in federal regulations under 40 Code of Federal Regulations (CFR) 122.26(b)(4). As the operator of a large MS4, BWI Thurgood Marshall Airport is required to have an individual NPDES permit issued by the State of Maryland. In addition, this permit includes additional requirements for stormwater discharges from industrial activities associated with Transportation Facilities, as defined under 40 CFR 122.26.

The BWI Thurgood Marshall Airport State Discharge Permit 10-DP-2546 (NPDES Permit Number MD0063371) became effective on 1 November 2013. This SWPPP revision has been

updated to meet the requirements of the 10-DP-2546 permit. NPDES Permit Number MD0063371 allows discharge from BWI Thurgood Marshall Airport via Outfalls 003, 006, and 007 to Stony Run (Outfall 003), Sawmill Creek (Outfall 007), and Cabin Branch (Outfall 006), which are protected for water contact recreation, fishing, aquatic life, and wildlife (Use I). The current permit is available in Appendix A.

At that time of permit renewal, MDE determined the potential discharge of total suspended solids, total nitrogen (TN) and total phosphorus (TP) from the facility was not significant, and therefore no limits were established at the time. To ensure the Chesapeake Bay and its tributaries are protected from discharges of sediments, nitrogen and phosphorus, the permit may be reopened in the future to implement any applicable requirements associated with the Chesapeake Bay Total Maximum Daily Load (TMDL) for Sediments, Nitrogen and Phosphorus.

1.3 APPLICABILITY AND DISTRIBUTION

USEPA has authority under the CWA to regulate certain high-priority stormwater sources. The issuance of stormwater discharge permits under the NPDES is a major part of USEPA's efforts to restore and maintain the Nation's water quality. Discharges of stormwater runoff from industrial facilities must be covered by a NPDES permit. MDE has been delegated authority by USEPA to issue NPDES permits for the State of Maryland.

The current BWI Thurgood Marshall Airport NPDES permit requires the development and implementation of a SWPPP. The SWPPP must address potential pollution sources of stormwater and the appropriate use of BMPs to prevent pollution to the receiving water body. This SWPPP addresses the NPDES permit requirements. The SWPPP has been signed and is maintained onsite in accordance with the NPDES permit. The SWPPP will be distributed to selected members of the BWI Thurgood Marshall Airport Pollution Prevention (P2) Team, described in Section 2. Updates to the SWPPP will also be distributed to selected team members as they are published.

The SWPPP supplements information in other related BWI Thurgood Marshall Airport plans, such as the BWI Thurgood Marshall Airport Hazardous Waste Contingency Plan (CP) and Spill Prevention, Control, and Countermeasure (SPCC) Plan. The CP describes the actions that should be taken in the event of a release of hazardous materials or a spill that threatens to enter the stormwater management system. The CP also includes emergency contacts and reporting procedures. This CP, and other applicable documents such as tenant-specific plans, should be considered when preparing for hazardous or emergency situations. In addition, a separate SPCC plan has been developed for BWI Thurgood Marshall Airport, in accordance with regulatory requirements, to help prevent a discharge of oil into navigable waters and includes an inventory of oil-containing tanks and structures onsite.

1.4 REVISIONS TO THE SWPPP

This SWPPP shall be amended when a significant change in design, construction, operation, or maintenance at BWI Thurgood Marshall Airport creates a potential for the discharge of pollutants to the waters of the State of Maryland, or if this SWPPP proves to be ineffective in achieving the general objectives of controlling pollutants in stormwater discharges associated

with industrial activities conducted at BWI Thurgood Marshall Airport. Conditions that might indicate a need for revisions to this SWPPP will be identified during periodic site inspections, as described throughout Section 5. As regulatory requirements evolve, the SWPPP may require significant updates.

2. BWI THURGOOD MARSHALL AIRPORT STORMWATER POLLUTION PREVENTION TEAM

The MAA has created a P2 Team that provides a forum for identifying and addressing stormwater pollution concerns, and to ensure that the SWPPP is appropriately implemented. The MAA P2 Team consists of MAA managers and supervisors who are responsible for activities that have the potential to directly impact stormwater quality at BWI Thurgood Marshall Airport. In addition, representatives of various airport tenant groups who conduct activities that may also impact stormwater participate on the P2 Team to address issues and concerns specific to their organizations and areas of operation. The P2 Team is responsible for the following:

- Supporting implementation of all NPDES permit and SWPPP requirements;
- Identifying any changes in airport operations, and determining whether any changes must be made to this SWPPP; and
- Maintaining clear lines of communication with tenants and airport management to ensure a cooperative partnership.

The P2 Team will meet at least annually to discuss stormwater-related problems, issues, or concerns. The Team Leader may call additional meetings, as needed, to address specific events or issues. Additional attendees, such as consultants, vendors, or representatives of other airport groups, may be invited to the meetings to provide perspective on stormwater pollution issues or input to solve complex site problems. The P2 Team will also ensure that the training described in Section 5.4 occurs annually, or as deemed necessary by the Team.

Table 1 identifies the members of the MAA P2 Team and their roles and responsibilities.

Table 1: BWI Thurgood Marshall Airport Pollution Prevention Team

BWI THURGOOD MARSHALL AIRPORT POLLUTION PREVENTION TEAM MEMBER ROSTER			
AIRPORT MANAGEMENT			
Name	Title/Organization	Phone Number	Roles/Responsibilities
Mark Williams TEAM LEADER	Manager, Environmental Compliance, MAA Office of Environmental Services	(410) 859-7448 (443) 250-1029	Coordinate P2 Team meetings; review and revise SWPPP, as necessary.
Jesse Dobson	Environmental Analyst, MAA Office of Environmental Services	(410) 859-7806	Contribute to implementation of SWPPP; identify areas for improvement.
Darline Terrell-Tyson	Manager, Environmental Programs, MAA Office of Environmental Services	(410) 859-7370	Contribute to implementation of SWPPP; identify areas for improvement.
Robin Bowie	Acting Director, MAA Office of Environmental Services	(410) 859-7103	Review and approve recommended revisions to the SWPPP based upon P2 Team meetings and feedback.
John Hurt	Acting Manager, MAA Environmental Planning Section	(410) 859-7384	Identify planning projects that would impact stormwater management.
Uday Gadhia	Environmental Engineer, Maryland Environmental Service	(410) 859-5816 Extension #13	Manage and conduct stormwater system inspections; identify areas for improvement.
Craig Peddicord	BWI Thurgood Marshall Airport Fire & Rescue Services/HAZMAT Team	(410) 859-7519	Contribute to implementation of SWPPP; identify areas for improvement.
Gregory Trusty	Manager, MAA Airfield, Grounds & Equipment Maintenance Section	(410) 859-7879	Attend meetings; report incidents and concerns; identify areas for improvement.
Ben Martinez	Airport Operations	(410)-859 7346	Attend meetings, report incidents and concerns, identify areas of improvements

Airport Tenants periodically attend P2 Team meetings based on availability.
As Airport Tenants' representatives are subject to change, their names have not been listed on this roster.

3. FACILITY DESCRIPTION

3.1 GENERAL

BWI Thurgood Marshall Airport encompasses an area of approximately 3,596 acres in Anne Arundel County, Maryland, approximately 4 miles south of the City of Baltimore and approximately 30 miles northeast of Washington, D.C. BWI Thurgood Marshall Airport is bounded on the north, east, and west by Aviation Boulevard (Maryland [MD] Route [Rt.] 170 and MD Rt. 162) and on the south by Dorsey Road (MD Rt. 176). Additional BWI Thurgood Marshall Airport facilities are located immediately west of MD Rt. 170. Interstate (I) 195 is a four-lane divided highway that serves as the primary access to the airport terminal area. Elm Road and Aviation Boulevard provide secondary access to the terminal and cargo facilities. The airport is also accessible by Amtrak, the MARC regional commuter rail system, and the Baltimore Light Rail system. The Title Sheet (Sheet No. 1) of the map series in Appendix B illustrates the airport location.

BWI Thurgood Marshall Airport is owned by the State of Maryland and is operated by MAA. The airport provides services for commercial airlines, commuter airlines, general aviation, and air cargo flights. The passenger terminal comprises 1.976 million square feet, including 5 concourses (4 domestic and 1 international wing), 68 jet gates, and 5 gates dedicated to commuter aircraft. During 2013, BWI Thurgood Marshall Airport served nearly 22 million passengers and handled more than 240 million pounds of mail and freight (BWI Thurgood Marshall Airport website, <http://bwiairport.com/en/about-bwi/factsfigures>, accessed 8 June 2016).

3.2 DRAINAGE SYSTEMS DESCRIPTIONS

BWI Thurgood Marshall Airport encompasses 23 drainage areas within 4 watersheds (refer to the Title Sheet located in Appendix B). The watersheds are identified by their primary receiving stream names:

- Cabin Branch
- Sawmill Creek
- Stony Run
- Piny Run.

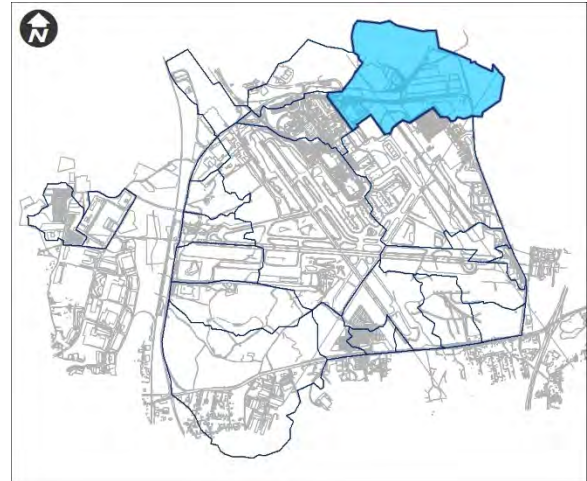
The airport drainage areas range in size from 8 acres to more than 700 acres. A variety of owner-occupied and commercial tenant buildings are located within each drainage area. The following subsections describe each watershed area, the drainage areas within each watershed, the tenants within the drainage boundaries, and their general activities. Each subsection includes the watershed name, drainage area, map reference sheet number, location map, and general drainage area characteristics.

3.2.1 Cabin Branch Watershed

Approximately 433 acres of the northeast section of BWI Thurgood Marshall Airport contribute to the Cabin Branch watershed. Only one drainage area, the Cabin Branch drainage area, is found within the Cabin Branch watershed.

3.2.1.1 Cabin Branch (Sheet Nos. 2, 5, 6, 7, 10, 11, and 12)

<i>Primary Activities:</i>	<i>Fueling, parking, cargo</i>
<i>Drainage Area:</i>	<i>419 acres</i>
<i>Imperviousness:</i>	<i>Moderate</i>
<i>Number of reported spills (2013-2016):</i>	<i>7</i>
<i>Largest reported spill (2013-2016):</i>	<i>30 gallons (fuel)</i>
<i>General Comments:</i>	<i>NPDES Outfall 006 and Monitoring Point 601</i>



The 433-acre Cabin Branch drainage area at the northeast corner of BWI Thurgood Marshall Airport includes private and commercial property. The Cabin Branch drainage area receives runoff from MAA facilities such as the Long Term A and Long Term B parking lots, the Runway Safety Area (RSA) at the north end of Runway 15L-33R, and a portion of the Employee Parking Lot east of Elm Road. Some cargo buildings and services that require runway access are also included within this drainage area, such as a Federal Express facility. Facilities that are not owned by MAA include a portion of MD Rt. 170, a fuel station and convenience store, office buildings, a portion of the light rail line, and some residences. The drainage area outlet exits the airport and passes through a culvert located just east of the intersection of Andover and Broadview Boulevard. Cabin Branch continues to Curtis Creek and enters the Patapsco River at Curtis Bay. Existing stormwater management (SWM) facilities include three retention ponds (P11, P18, and P19). NPDES Outfall 006 is located at the outlet to Basin P11 south of the Long Term B parking lot. Monitoring point 601 for this NPDES outfall is located at the upstream end of this basin.

3.2.2 Sawmill Creek Watershed

Approximately 1,162 acres of the east and southeast sections of BWI Thurgood Marshall Airport contribute to the Sawmill Creek watershed. The headwaters of four perennial streams originate in this region of the airport:

- Muddy Bridge Branch
- Fork Branch
- Phelps Branch
- Irving Branch.

The following ephemeral channels also originate on BWI Thurgood Marshall Airport:

- Southwest Branch
- Tributary of Southeast Corner
- Three unnamed tributaries of Sawmill Creek.

Sawmill Creek ultimately joins to Furnace Creek near the crossing of MD Rt. 2, then Curtis Creek, and enters the Patapsco River at Curtis Bay.

3.2.2.1 Muddy Bridge Branch (Sheet Nos. 10, 11, 12, 17, 18, 19, 25, and 26)

Primary Activities: Airfield, deicing, maintenance

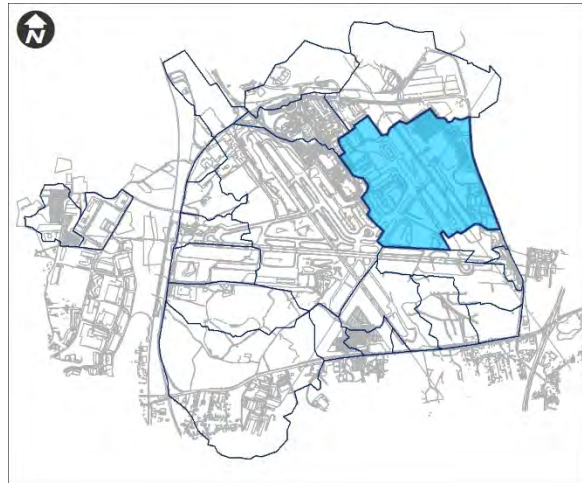
Drainage Area: 513 acres

Imperviousness: Moderate

Number of reported spills (2013-2016): 30

Largest reported spill (2013-2016): 900 gallons (fuel)

General Comments: NPDES Outfall 007



The 498-acre Muddy Bridge Branch drainage area on BWI Thurgood Marshall Airport contributes runoff to Sawmill Creek. The Muddy Bridge Branch drainage area is the second largest drainage area on the airport; it contains the eastern portion of the airfield and a portion of the main terminal (Piers C, D, and E). Airside facilities include most of Runway 15L-33R; Taxiways P, K, T, Q, O, S, B, C and U; a helipad; and aprons. Additional facilities in the drainage area include the General Aviation Complex, hangars, and maintenance and commercial buildings. The Muddy Bridge Branch drainage area also includes areas of maintained turf adjacent to the runways and taxiways, and forest conservation areas. Existing SWM facilities include three detention basins (Nos. P12, P14, and P15) and several infiltration trenches, catch basins, swales, and headwalls. A wetland mitigation site constructed by MAA and the State Highway Administration (SHA) provides water quality and quantity control. Twin culverts approximately 1,200 feet (ft) south of the entrance to the MAC Building convey drainage beneath Aviation Boulevard to Muddy Bridge Branch. NPDES Outfall 007 is located in this drainage area at the outlet to SWM facility No. P12.

The Muddy Bridge Branch drainage area includes two deicing pads (15-L Deicing and 28 Deicing) and a portion of a third deicing pad (C-pier Deicing) that are used during periods of inclement weather. One deicing pad is located near the General Aviation Complex adjacent to Runway 15L-33R, and the other is between Taxiway C and Runway 10-28. Also, a portion of the deicing pad for Pier C is within the Muddy Bridge Branch drainage area. According to MDE regulations, the deicing pads are considered hotspots during deicing activities, since they have the potential to generate higher than normal contaminant concentrations in stormwater. Due to this designation, waste collected from these areas requires pre-treatment prior to discharge. BWI Thurgood Marshall Airport collects deicing chemicals through glycol recovery infrastructure and

discharges to the Patapsco Wastewater Treatment Plant after pretreatment, in accordance with the requirements of MAA's Wastewater Discharge Permit issued by Baltimore County. When the deicing pads are not used, these areas are not considered stormwater hotspots. In this case, runoff from these surfaces is considered impervious surface runoff and receives conventional SWM.

3.2.2.2 Fork Branch (Sheet Nos. 30, 31, 36, 37, and 38)

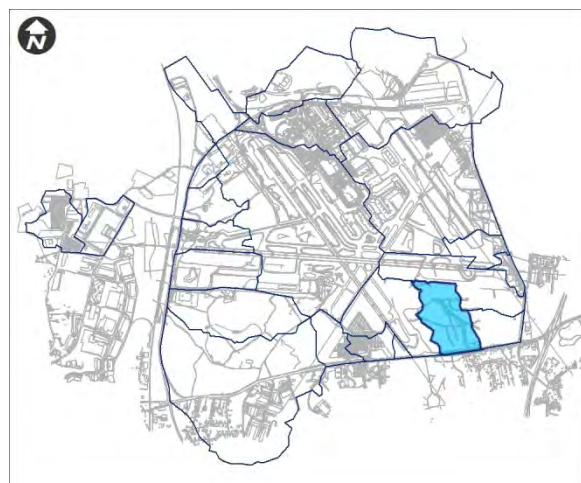
Primary Activities: Airfield, Staging, Training
Drainage Area: 162 acres
Imperviousness: Low
Number of reported spills (2013-2016): None
Largest reported spill (2013-2016): N/A
General Comments: None



The 162-acre Fork Branch drainage area contributes runoff to Sawmill Creek. The Fork Branch drainage area receives runoff from approximately 2,800 ft of the southern end of Runway 15R-33L and Taxiway D, and approximately 2,700 ft of the southeast end of the Apron. Maintained turf and forested areas east of Taxiway D are included, as well as a small portion of the Gold lot. The maintained turf area surrounding the south end of Runway 15R-33L was renovated to bring the RSA up to Federal Aviation Administration standards. A SWM infiltration trench is located east of the Gold lot. Twin culverts located approximately 3,400 ft east of the Gold lot entrance convey drainage beneath Dorsey Road (MD Rt. 176) to Sawmill Creek.

3.2.2.3 Phelps Branch (Sheet Nos. 31, 32, 37, and 38)

Primary Activities: Undeveloped
Drainage Area: 105 acres
Imperviousness: Low
Number of reported spills (2013-2016): None
Largest reported spill (2013-2016): N/A
General Comments: None

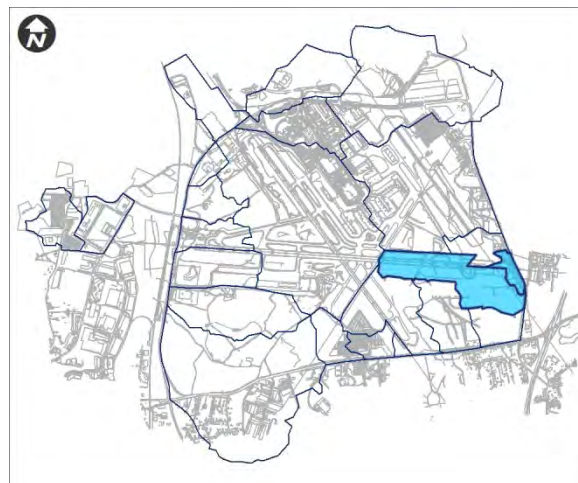


The 105-acre Phelps Branch drainage area contributes runoff from undeveloped areas in the southwest portion of BWI Thurgood Marshall Airport to Sawmill Creek. The Phelps Branch drainage area includes forested and cleared areas south of Runway 10-28 and east of

Runway 15R-33L. Twin culverts approximately 4,600 ft east of the Gold lot convey runoff from BWI Thurgood Marshall Airport beneath Dorsey Road to Sawmill Creek. No SWM facilities are present in this drainage area.

3.2.2.4 Irving Branch and Irving Branch Tributary (Sheet Nos. 25, 26, 27, 31, 32, and 33)

Primary Activities: Airfield
Drainage Area: Irving Branch: 164 ac.;
 Irving Branch Trib: 21 ac.
 (184 acres total)
Imperviousness: Low (combined and singly)
Number of reported spills (2013-2016): None
Largest reported spill (2013-2016): N/A
General Comments: None



The 164-acre Irving Branch drainage area contributes runoff to Sawmill Creek. The drainage area receives drainage from the south side of Runway 10-28, east of its intersection with Taxiway D and P. Approximately one-third of the drainage area is forested. Twin pipe arch culverts located approximately 1,600 ft north of the intersection of Dorsey Road and Aviation Boulevard convey drainage from the southeastern portion of BWI Thurgood Marshall Airport beneath the road to Sawmill Creek. Two infiltration trenches are present in this drainage area.

The 21-acre drainage area associated with the Tributary of Irving Branch receives runoff from the east end of Runway 10-28. The drainage area includes maintained turf area at the end of the runway, and some forested area. A culvert approximately 2,600 ft north of the intersection of Dorsey Road and Aviation Boulevard conveys the runoff beneath Aviation Boulevard to a broad flat area. Runoff from this outfall continues southward beneath an access ramp to I-97 and combines with runoff from the Irving Branch area described above. No SWM facilities are present in this drainage area.

3.2.2.5 Southwest Branch (Sheet No. 26 and 27)

Primary Activities: Airfield
Drainage Area: 52 acres
Imperviousness: Low
Number of reported spills (2013-2016): None
Largest reported spill (2013-2016): N/A
General Comments: None



The 52-acre drainage area associated with Southwest Branch contributes runoff to Sawmill Creek through Muddy Bridge Branch. This area receives drainage from the cleared turf areas at the south end of Runway 15L-33R; the north side of Runway 10-28; portions of Taxiways B, C, U, S, and Q. Runoff from this area passes through a culvert located approximately 1,700 ft south of the MAC Building and beneath Aviation Boulevard to Muddy Bridge Branch. Four infiltration trenches and one SWM facility (No. P13) are located in this drainage area.

3.2.2.6 Southeast Corner (Sheet Nos. 32, 33, 38, and 39)

Primary Activities: Undeveloped
Drainage Area: 56 acres
Imperviousness: Low
Number of reported spills (2013-2016): None
Largest reported spill (2013-2016): N/A
General Comments: None



The 56-acre Southeast Corner drainage area receives drainage from a forested area and drains from the southeast corner of BWI Thurgood Marshall Airport. A culvert located just west of the intersection of Dorsey Road and Aviation Boulevard conveys drainage from this portion of BWI Thurgood Marshall Airport to Sawmill Creek. No SWM facilities are present in this drainage area.

3.2.2.7 Tributary of Sawmill Creek (1, 2, and 3) (Sheet Nos. 30, 36, and 37)

<i>Primary Activities:</i>	<i>Parking, Staging, Undeveloped</i>
<i>Drainage Area:</i>	<i>Tributary 1: 56 acres Tributary 2: 39 acres Tributary 3: 9 acres (103 acres total)</i>
<i>Imperviousness:</i>	<i>Low (combined and singly)</i>
<i>Number of reported spills (2013-2016):</i>	<i>None</i>
<i>Largest reported spill (2013-2016):</i>	<i>N/A</i>



General Comments: Tributary 3 of Sawmill Creek does not have a positive drainage outlet.

Tributary 1 is a 56-acre portion of the Sawmill Creek drainage area on BWI Thurgood Marshall Airport, consisting primarily of the maintained turf associated with the RSA south of the Apron, and impervious surfaces associated with the Gold parking lot. A culvert just west of the entrance to the Gold lot conveys runoff from the airport and beneath Dorsey Road (MD Rt. 176) to Sawmill Creek. No SWM facilities are present in this drainage area.

Tributary 2, southwest of Runway 15R-33L, is a 39-acre drainage area that contributes runoff to Sawmill Creek. This drainage area includes most of the paved area associated with the Gold lot, which currently serves as a contractor staging area. This drainage area also includes a small portion of the extended portion of Runway 15R-33L. A culvert located approximately 1,800 ft east of the entrance to the Gold lot conveys runoff from airport property beneath Dorsey Road (MD Rt. 176) to Sawmill Creek. No SWM facilities are present in this drainage area.

Tributary 3 is a 9-acre drainage area associated with the tributary at the southern end of Runway 15R-33L. The drainage area receives runoff from the western side of the end of Runway 15R-33L, the western side of the RSA, and the grassy slope to the west of the runway. There does not appear to be a positive drainage outlet for this drainage area. Instead, runoff appears to collect and forms a pond near the runway. No culvert can be found crossing MD Rt. 176 at this location. No SWM facilities are present in this drainage area.

3.2.3 Stony Run Watershed

The portion of the Stony Run watershed on BWI Thurgood Marshall Airport property includes not only 2,104 acres east of Stony Run within and adjacent to the airfield (within the confines of the Aviation Boulevard/Dorsey Road loop), but also includes the 71-acre Consolidated Rental Car Facility (CRCF) west of Stony Run.

The following perennial streams and associated wetlands are located on the airport facility in this watershed:

- Clark Branch
- Hawkins Branch
- Signal Branch
- Bowden Branch
- King Branch, and the Tributary north of King Branch
- Kitten Branch
- Sachs Branch
- the Tributary of Sachs Branch
- Stony Run.

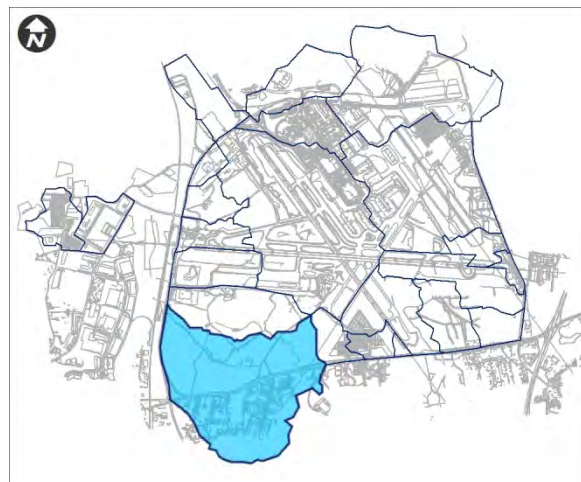
Ephemeral channels, jurisdictional wetlands, potentially jurisdictional wetlands, and non-jurisdictional wetlands are within the Stony Run Road Development Area. Stony Run ultimately drains directly into the Patapsco River east of Elkridge.

Wetland outlines shown on the maps in Appendix B are a compilation of multiple sources including the BWI Comprehensive Wetland Inventory and a wetland inventory maintained in MAA's AIRPortal.

3.2.3.1 Clark Branch (Sheet Nos. 28, 34, 35, 36, 40, 41, and 42)

<i>Primary Activities:</i>	<i>Soil stockpile, undeveloped</i>
<i>Drainage Area:</i>	<i>565 acres (includes offsite area)</i>
<i>Imperviousness:</i>	<i>Low</i>
<i>Number of reported spills (2013-2016):</i>	<i>None</i>
<i>Largest reported spill (2013-2016):</i>	<i>N/A</i>

General Comments: Clark Branch originates offsite and traverses airport property.



The 565-acre Clark Branch drainage area contributes runoff to Stony Run. An approximate 303-acre portion of this drainage area on BWI Thurgood Marshall Airport is undeveloped and almost entirely forested. The only cleared portions include interior roads, some of the soil stockpile, and a portion of the cleared RSA associated with the Apron. Runoff associated with the residential and commercial areas south of Dorsey Road (MD Rt. 176) passes through culverts beneath the road and flows through the portion of the drainage area on BWI Thurgood Marshall Airport. A culvert located approximately 4,000 ft south of the Stony Run Road interchange conveys runoff from airport property and beneath MD Rt. 170 to Stony Run. The runoff from the soil stockpiles in this area is managed by perimeter controls and sediment traps/basins.

3.2.3.2 Hawkins Branch (Sheet Nos. 28, 29, 30, 34, 35, and 36)

Primary Activities: Soil stockpile, fire-fighting training, parking, undeveloped

Drainage Area: 192 acres

Imperviousness: Low

Number of reported spills (2013-2016): None

Largest reported spill (2013-2016): N/A

General Comments: Includes fire-fighting training facility.



The 192-acre Hawkins Branch drainage area contributes runoff to Stony Run. The drainage area is composed of undeveloped areas south of Mathison Way that include forests, interior (paved and unpaved) roads, the overflow lot currently leased to Federal Express, and a portion of the soil stockpile area. A culvert located approximately 3,400 ft south of the Stony Run Road interchange conveys runoff from the airport and beneath MD Rt. 170 to Stony Run. SWM facilities (Nos. P8, P9, and P10) are located south of the Federal Express parking lot to treat runoff from that parking area. The fire-fighting training facility is also located in this area. The training facility includes a lined fire pit with waste fire-fighting training fluid, two fuel supply tanks, fire-fighting foam tanks, and collection tanks.

3.2.3.3 Signal Branch (Sheet Nos. 22, 23, 28, and 29)

Primary Activities: Airfield, staging

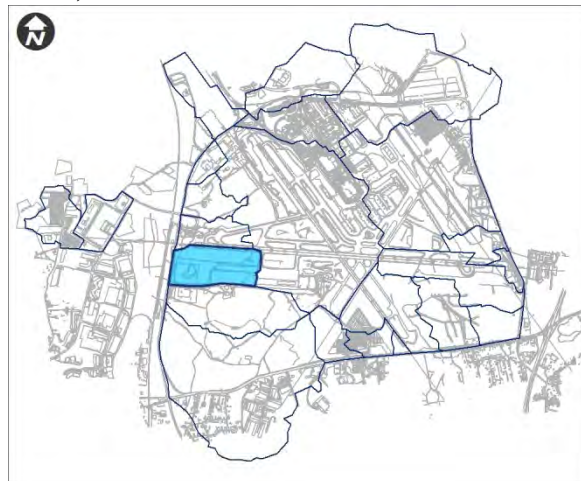
Drainage Area: 115 acres

Imperviousness: Low

Number of reported spills (2013-2016): None

Largest reported spill (2013-2016): N/A

General Comments: None



The 115-acre Signal Branch drainage area contributes runoff to Stony Run. This area receives drainage from the western portion of runway 10-28 (south side), a cleared area adjacent to the runway, and the area north of Mathison Way that is part of the Midfield Cargo Complex. A culvert located approximately 2,600 ft south of the Stony Run Road/MD Rt. 170 interchange conveys runoff from this drainage area off of BWI Thurgood Marshall Airport's property and beneath MD Rt. 170 to Stony Run. Existing SWM facilities include one detention basin (No. P6).

3.2.3.4 Bowden Branch (Sheet Nos. 22 and 23)

Primary Activities: Airfield
Drainage Area: 68 acres
Imperviousness: Low
Number of reported spills (2013-2016): None
Largest reported spill (2013-2016): N/A

General Comments: None



The 68-acre Bowden Branch drainage area contributes runoff from the western portion of BWI Thurgood Marshall Airport to Stony Run. Impervious surfaces include areas such as the western portion (north side) of Runway 10-28, the western portion of Taxiway F, a segment of MD Rt. 170, and the southern half of the MD Rt. 170/Stoney Run Road interchange. Unpaved areas include turf areas adjacent to the runway and taxiway, some scrub-shrub and forested areas north of Taxiway F, and the area within the southern half of the interchange. Twin culverts beneath MD Rt. 170 located within the southern portion of the Stoney Run Road interchange convey runoff from this drainage area off of airport property and beneath Aviation Boulevard to Stony Run. Existing SWM facilities include two detention basins (Nos. P4 and P5) and four infiltration trenches.

3.2.3.5 King Branch and the Tributary of King Branch (Sheet Nos. 8, 9, 15, 16, 22, and 23)

Primary Activities: Industrial
Drainage Area: King Branch: 62 ac.
Tributary of King Branch: 30 acres
(92 acres total)
Imperviousness: King Branch: Low
Tributary of King Branch: High
Number of reported spills (2013-2016): None
Largest reported spill (2013-2016): N/A



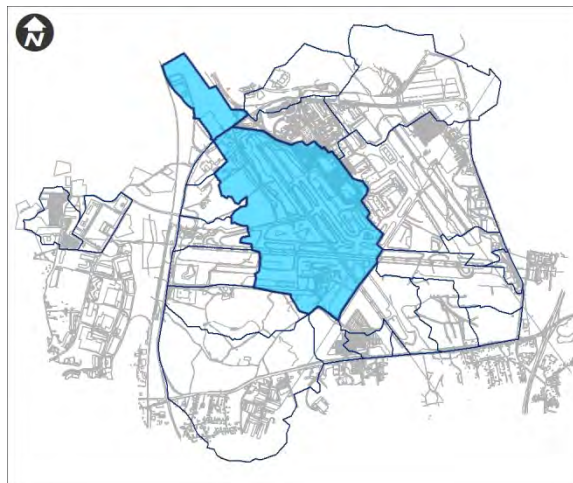
General Comments: Tributary of King Branch consists of multiple outlets, not a single outfall.

The 62-acre portion of the King Branch drainage area contributes runoff to Stony Run. The drainage area includes a portion of the Northrop Grumman facility and parking lot, and a designated forest conservation area. A culvert beneath MD Rt. 170 just north of the Stony Run Road overpass conveys runoff from the King Branch drainage area off of airport property. No SWM facilities are present in this drainage area.

The 30-acre drainage area associated with the Tributary of King Branch contributes runoff to the Stony Run watershed. The drainage area is composed almost entirely of impervious surface associated with the Northrop Grumman facility and its parking lots. A series of two culverts convey drainage beneath MD Rt. 170 to Stony Run. No SWM facilities are present in this drainage area.

3.2.3.6 Kitten Branch and Greater Kitten Branch (Sheet Nos. 1, 3, 4, 8, 9, 10, 16, 17, 18, 23, 24, 25, 29, 30, and 31)

<i>Primary Activities:</i>	<i>Industrial</i>
<i>Drainage Area:</i>	<i>Kitten Branch: 706 acres</i>
	<i>Greater Kitten Branch: 97 acres</i>
<i>Imperviousness:</i>	<i>Moderate</i>
<i>Number of reported spills (2013-2016):</i>	<i>52</i>
<i>Largest reported spill (2013-2016):</i>	<i>50 gallons (fuel)</i>



General Comments: NPDES Outfall 003 and monitoring points 304, 306, and 307.

The 706-acre Kitten Branch drainage area contributes runoff to Stony Run. The Kitten Branch drainage area is the largest drainage area on the airport; it contains the central portion of the airfield, which includes most of the main terminal (Pier A, Pier B, and most of Pier C), the hourly garage, daily garage, employee lot, and most of the terminal roadway. Airside facilities include most of Runway 15R-33L, a substantial portion of Runway 10-28, and many of the taxiways that connect these runways to one another. Other impervious surfaces include the Airport Rescue Fire-Fighting Station, and the developed portion of the Midfield Cargo Complex. Also inside the Kitten Branch drainage area adjacent to the midfield Cargo Complex is the Midfield Cargo Fuel Farm. The drainage area also includes maintained turf adjacent to the runways and taxiways and forest conservation areas west of Kitten Branch. Existing SWM facilities include, 28 infiltration trenches and basins, and 4 SWM facilities (Nos. P1, P2, P3, and P7). SWM facilities Nos. P3 and P7 were designed to provide water quantity and quality control functions, but basin Nos. P1 and P2 are former sediment traps that were not decommissioned following construction. NPDES Outfall 003 is located at the southern end of the stream running parallel to runway 15R. Monitoring for this outfall occurs in the Kitten Branch drainage area at monitoring points 304, 306, and 307. Additional monitoring for this outfall is required by the NPDES permit in the Sachs Branch drainage area at monitoring points 301, 302, and 303.

The Kitten Branch drainage area also contains three deicing areas that are used during periods of inclement weather. One deicing pad is located east of Runway 15R-33L north of Pier A. A collection system services Pier B and a third deicing collection area serves Pier C; however, only a portion of it is within the Kitten Branch drainage area. According to MDE regulations, the deicing pads are considered hotspots during deicing activities, and drainage from these areas requires pre-treatment prior to discharge. BWI Thurgood Marshall Airport discharges this deicing pad drainage to the Patapsco Wastewater Treatment Plant in accordance with the requirements of MAA's Wastewater Discharge Permit issued by Baltimore County. When the deicing pads are not used, these areas are not considered to be stormwater hotspots, and runoff from these surfaces is treated as impervious surface runoff through conventional SWM.

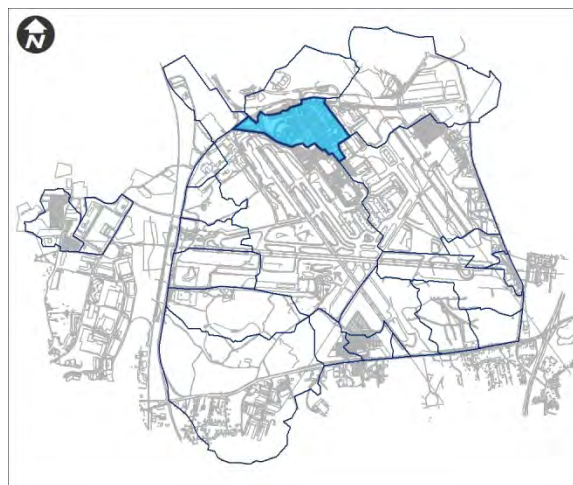
There is currently construction being performed on Taxiway C (adjacent to the 10-28 deicing pad). When complete, the construction in this area will accomplish the installation of new stormwater pipes that will connect SWM facility P14 from the new international pier (Pier E) to the SWM facility P15 adjacent to the 10-28 deicing pad.

The 97-acre Greater Kitten Branch drainage area is located directly northwest of the Kitten Branch drainage area. The Greater Kitten Branch drainage area is limited by site topography on the southwest side and bound by the Study Area of this SWPPP on the north and east sides. The Greater Kitten Branch drainage area does receive run-on drainage from the northeast, across I-195. Facilities within the Greater Kitten Branch drainage area are located outside the main airport site and are beyond MD Rt. 170. These are the Amtrak train station, MARC parking garage, and Building No. 155. There is an existing stormwater management facility maintained by SHA adjacent to the MARC parking garage.

3.2.3.7 Sachs Branch (Sheet Nos. 4, 5, 9, and 10)

Primary Activities: Fueling, maintenance, parking
Drainage Area: 118 acres
Imperviousness: Moderate
Number of reported spills (2013-2016): 5
Largest reported spill (2013-2016): 20 gallons (raw sewage)

General Comments: NPDES monitoring points 301, 302, and 303.
 The Four Points by Sheraton Hotel was demolished and the area remains vacant.



The 118-acre Sachs Branch drainage area contributes runoff to Kitten Branch, a larger tributary to Stony Run. This drainage area contains various aviation support buildings (Tenant Maintenance, MAA Vehicle Maintenance, and MAA Field Maintenance) and their associated parking areas, roadways, an empty landscaped lot where the Four Points by Sheraton Hotel used to be located, the daily lot, a portion of the BWI Express parking lot, the cell phone lot, a waste

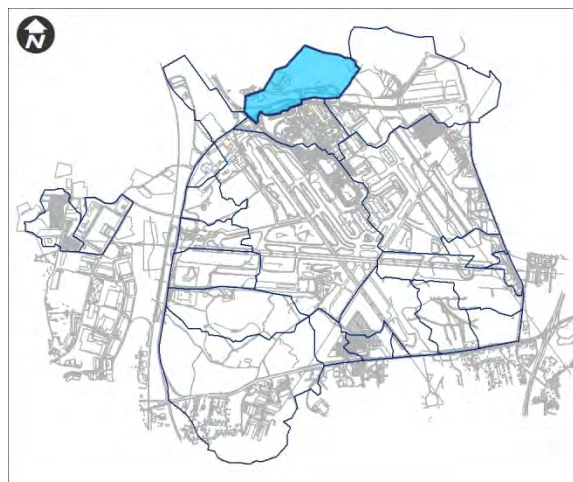
deicing fluid storage area, and the fuel farm. According to MDE regulations, the fuel farm is considered a stormwater hotspot because fueling operations in this area create the potential for higher than normal hydrocarbon concentrations in stormwater runoff. Stormwater from impervious surfaces at the fuel farm are currently treated using oil/water separators prior to discharge.

Also included in the drainage area, near Building 120, is a concrete storage area for sweeper dirt emptied from the four wet sweeper trucks that operate at BWI Thurgood Marshall Airport. The storage area has three four-foot-tall walls along the sides and back, a 6-inch tall asphalt berm in the front, and a canopy that covers the entire concrete structure. The floor of the storage area is sloped towards the back wall where a drain directs any process wastewater within the storage area to existing sanitary sewer piping. However, the debris within the storage area can block the drain to the sewer piping, causing process wastewater in the storage area to overtop the asphalt berm and flow into a stormwater swale nearby. NPDES monitoring points 301, 302, and 303 located in this drainage area are authorized to discharge stormwater runoff to Outfall 003 in Kitten Branch as discussed above.

A culvert beneath the eastbound ramp of MD Rt. 170 at the I-195 interchange conveys drainage to Kitten Branch. SWM for a portion of the drainage area is provided by a detention facility (No. P20) beneath the daily lot. Additionally, SWM facility P35 is located south of the BWI Express parking lot.

3.2.3.8 Tributary of Sachs Branch (Sheet Nos. 4, 5 and 9)

<i>Primary Activities:</i>	<i>Parking, Undeveloped</i>
<i>Drainage Area:</i>	<i>151 acres</i>
<i>Imperviousness:</i>	<i>Low</i>
<i>Number of reported spills (2013-2016):</i>	<i>None</i>
<i>Largest reported spill (2013-2016):</i>	<i>N/A</i>
<i>General Comments:</i>	<i>None</i>



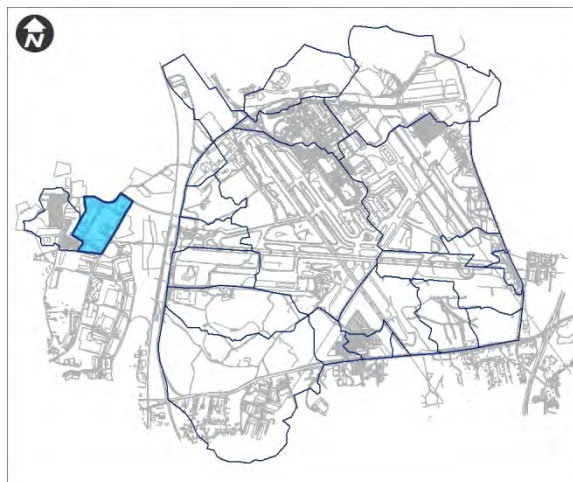
The 151-acre drainage area associated with the Tributary of Sachs Branch contributes runoff to the Stony Run watershed north of BWI Thurgood Marshall Airport. The drainage area includes defunct rental car facilities, a portion of the BWI Express parking lot, BWI shuttle parking, a BWI employee parking lot, and other areas not associated with MAA, such as the Elkridge Road Contractor Lot, which consists of parking lots, a Clark Construction staging area, and a taxi stand and staging area; the BWI Business Park light rail station; and portions of MD Rt. 170 and Elkridge Landing Road.

The BWI Express parking lot drains to a SWM facility (No. P35) adjacent to the terminal access road. Existing SWM facilities include two extended detention basins (Nos. P16 and P17) west

and east of the BWI Business Park light rail station. The outfall for this drainage area is through a culvert under the ramp from eastbound MD Rt. 170 to westbound I-195.

3.2.3.9 CRCF Site (Sheet Nos. 14 and 21)

<i>Primary Activities:</i>	<i>CRCF Site, Fueling, maintenance, parking</i>
<i>Drainage Area:</i>	<i>71 acres</i>
<i>Imperviousness:</i>	<i>High</i>
<i>Number of reported spills (2013-2016):</i>	<i>None</i>
<i>Largest reported spill (2013-2016):</i>	<i>N/A</i>
<i>General Comments:</i>	<i>CRCF has advanced pretreatment of stormwater.</i>



The 71-acre CRCF drainage area includes the MAA-owned CRCF in the area southeast of the intersection of Ridge and Stoney Run roads. The CRCF includes a large parking structure and several separate fueling/vehicle maintenance areas for various rental car companies. This area was isolated from the larger watershed because it is solely MAA-owned and is controlled by its own series of stormwater management facilities. SWM facilities associated with the CRCF include six SWM facilities (Nos. P28, P29, P30, P31, P32, and P33), five proprietary StormFilter® systems (SF1, SF2, SF3, SF4, and SF5), three underground storage vaults (US1 through US3), and fifteen proprietary Stormceptor systems.

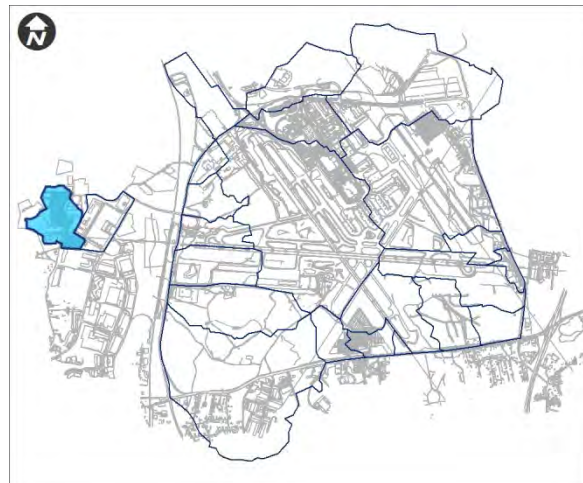
The headwaters of Stony Run originate approximately 6,000 ft south of Dorsey Road and west of MD Rt. 170. Stony Run flows north through some MAA-owned properties to its confluence with the Patapsco River, nearly 2 miles northwest of BWI Thurgood Marshall Airport. Wetlands associated with Stony Run are considered “wetlands of special state concern” (Code of Maryland Regulations [COMAR 26.23.06.01]); contain habitat for rare, threatened, and endangered species; and include a 100-ft buffer. Several wetlands on MAA-owned properties are associated with Stony Run.

3.2.4 Piny Run Watershed

The Piny Run watershed is a subarea to the larger watershed for Deep Run. The confluence of Piny Run and the main stem of the Deep Run watershed is located just west of the Baltimore-Washington Parkway (MD Rt. 295). Deep Run travels north and ultimately connects to the Patapsco River east of Elkridge, close to the confluence of Stony Run and the Patapsco River.

3.2.4.1 MAA Facilities–West (Sheet Nos. 13, 14, 20, and 21)

<i>Primary Activities:</i>	<i>Fueling, maintenance, parking</i>
<i>Drainage Area:</i>	<i>78 acres</i>
<i>Imperviousness:</i>	<i>Moderate</i>
<i>Number of reported spills (2013-2016):</i>	<i>None</i>
<i>Largest reported spill (2013-2016):</i>	<i>N/A</i>
<i>General Comments:</i>	<i>Bus Maintenance Facility has advanced pretreatment of stormwater.</i>



The 78-acre drainage area associated with the unnamed Tributary of Piny Run contains the off-airport area used to develop the new Tenant Parking Facilities and a Maintenance Support Facility. These two MAA facilities were identified as MAA Facilities–West for the purposes of segregating them from the overall Piny Run Watershed. The Maintenance Support Facility serves as the CRCF shuttle bus maintenance and washing area. Southwest of the CRCF is an area that serves as overflow parking for several rental car companies and directly south of the CRCF is a newly constructed maintenance and washing area for two additional rental car agencies. SWM facilities associated with the Tenant Parking Facilities include eight SWM facilities (P21, P22, P23, P24, P25, P26, P27, and P34) and a proprietary StormFilter® system (SF6).

3.3 STORM WATER DISCHARGES ASSOCIATED WITH NON-INDUSTRIAL ACTIVITY FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS

In accordance with the NPDES permit (Part I.U), BWI Thurgood Marshall Airport must develop a stormwater management plan for discharges associated with non-industrial activity, which addresses the following minimum control measures:

- Personnel Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Stormwater Runoff Control
- Post Construction Stormwater Management

- Pollution Prevention and Good Housekeeping.

The plan must include a schedule for BMP and stormwater management program implementation, a description of the entities that will implement the BMPs, and a fiscal analysis of the anticipated expenditures to implement the control measures.

A Stormwater Management Program Plan for Non-Industrial Stormwater Discharges at BWI Thurgood Marshall Airport has been developed to meet this permit requirement and is included in this SWPPP as Appendix C.

4. POLLUTANT SOURCE ASSESSMENT

4.1 POTENTIAL STORMWATER POLLUTION SOURCES

A tenant questionnaire conducted for the first update of this SWPPP identified tenant activities, general materials inventory, potential pollution sources, and general stormwater information. Subsequent reviews of tenants have indicated no significant changes in the general types of activities conducted by airport tenants, or the types and quantities of pollutant sources. An updated tenant questionnaire was distributed in August 2016 to approximately 135 BWI Thurgood Marshall Airport tenants listed in Appendix D. Of approximately 80 tenants deemed to have relevant site operations, 45 responded to the questionnaire. The respondents represented groups involved in potential pollution source activities, such as airlines, aircraft ground support, and public ground transportation. Follow-up interviews were conducted to clarify tenant responses, and to verify the information provided. Based on the results of this and previous tenant reviews, and field investigations performed for this plan update and previous site investigations, BWI Thurgood Marshall Airport has the potential to discharge pollutants from the following sources:

- Aircraft Apron Washdown
- Aircraft Fueling Activities at Terminal and General Aviation Areas
- Aircraft, Equipment, and Vehicle Washing, Painting, and Maintenance
- Aircraft and Runway Deicing Operations
- Automobile Rental Fueling and Service Areas
- Building Floor Washdown
- Bus Operations
- Chemical/Salt Storage Areas
- Construction Activities
- Equipment Storage
- Fire-Fighting Equipment Testing/Flushing
- Fuel Farm Vehicle Fueling Activities
- Aboveground Storage Tanks (ASTs) and Underground Storage Tanks (USTs)
- Raw Glycol Storage
- Solid Waste Debris and Litter
- Oil/Water Separators and Grit Traps
- Parking Area Runoff and Debris
- Pesticide/Herbicide Usage
- Potable Water Flushing
- Runway Derubberizing/Foreign Objects and Debris (FOD)
- Triturator/Lavatory Services
- Spills/Leaks.

The tenants conducting these activities have been grouped into generic categories and a matrix developed to identify which types of tenants conduct each of the activities listed above, as identified in Table 2. A summary of pollutant sources by tenant and drainage area is included in Appendix E.

Table 2: Tenant Groups and Their Potential Pollution Source Activities

Tenant Groups	Aircraft Apron Washdown	Aircraft & Equipment Fueling Activities	Aircraft, Equipment and Vehicle Washing	Aircraft, Equipment and Vehicle Painting and Maintenance	Automobile Rental and Service Areas	Building Floor Washdown	Bus Operations	Chemical/Salt Storage Areas	Construction Activities	Deicing Activities	Equipment Storage	Fire-Fighting Equipment Testing/Flushing	ASTs and USTs	Solid Waste Debris	Oil/Water Separators and Grit Trans	Paint Truck Discharges	Parking Area Runoff and Debris	Pesticide/Herbicide Usage	Potable Water Flushing	Runway Derubberizing/FOD	Tritulator/Lavatory Services	Spills/Leaks
Aircraft Ground Support Services	✓	✓	✓	✓		✓		✓	✓	✓	✓		✓	✓	✓		✓		✓		✓	✓
Airlines		✓	✓	✓		✓		✓	✓	✓	✓		✓	✓	✓		✓		✓		✓	✓
Construction Managers									✓		✓		✓									✓
Fire & Rescue Services						✓		✓				✓	✓						✓			✓
Fuel Farm Tenants		✓											✓									✓
Housekeeping						✓		✓						✓			✓					✓
MAA Building Maintenance	✓					✓		✓						✓							✓	✓
MAA Field Maintenance	✓	✓	✓	✓		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓
MAA Vehicle Maintenance		✓	✓	✓		✓		✓			✓		✓	✓	✓		✓					✓
Public Ground Transportation Tenants		✓	✓	✓	✓	✓	✓	✓			✓		✓	✓			✓					✓
Rental Car Tenants		✓	✓		✓	✓		✓					✓	✓								✓
Retail Tenants						✓								✓	✓							

One area that is a focus of the NPDES permit and requires special attention is the use of aircraft deicing chemicals (propylene glycol) and pavement deicing/anti-icing chemicals (sodium formate and potassium acetate). Records of the application of aircraft deicing chemicals are provided to and maintained by the MAA Office of Environmental Services (OES). Measures to prevent stormwater pollution from these sources are discussed in Section 5 of this SWPPP, and are described in further detail in the documents in Appendix F.

4.2 INVENTORY OF EXPOSED MATERIALS

The USEPA SWPPP Guidance defines “significant materials” under 40 CFR 122.26(b)(12) as substances related to industrial activities such as process chemicals, raw materials, fuels, pesticides, and fertilizers. An inventory of significant materials exposed to weather (i.e., located outdoors) was developed for this update. The exposed materials list represents a snapshot of the visual inspection on any given day, and the potential materials present at various facilities at BWI Thurgood Marshall Airport.

The majority of the significant exposed materials are located within five of the drainage areas, as summarized in Table 3.

Table 3: Significant Materials Exposed by Drainage Area

<u>Drainage Area</u>	<u>Significant Materials Exposed</u>
➤ Sachs Branch	Deicing Fluid, Alkaline Cleaner, Waste Oil, Fuel, Heating Oil
➤ Muddy Bridge Branch	Deicing Fluid, Waste Deicing Fluid, Waste Fuel
➤ Stony Run Watershed	Drums of Used Oil Filters, Detergents, Used Oil, and Waste Fuel
➤ Kitten Branch	Diesel Fuel, Drums of Detergents
➤ Piny Run	Drums of Solvents and Cleaners at the CRCF Site

Road salt is stored in an enclosed dome located near the MAA maintenance buildings in the Sachs Branch drainage area, as required by the NPDES permit (Part I.S.2.e). The potential exists for salt to enter stormwater runoff through spillage from the salt dome loading entrance.

4.3 RECORDS OF SPILLS/LEAKS

Due to the nature of the aircraft and vehicle fueling activities, the potential exists for fuel to be spilled during fueling operations and/or for leakage of fuel storage containers. USEPA has defined “significant spills” to include releases within a 24-hour period of hazardous substances in excess of reportable quantities under Section 311 of the CWA and Section 102 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Spills and leaks of oil or hazardous materials at BWI Thurgood Marshall Airport are documented through the following:

- Incident Reports prepared by BWI Thurgood Marshall Airport Operations Center (AOC) – Documentation of significant spills in the Airport Operations Log, typically those involving a response by the BWI Thurgood Marshall Airport Fire and Rescue Services (FRS).
- Records by the BWI Thurgood Marshall Airport FRS – Documentation for incidents that require FRS response.

Information about previous spills and leaks at BWI Thurgood Marshall Airport is available from these sources. A summary of spills/leaks from 2013–2016 is provided in Appendix G.

4.4 NON-STORMWATER DISCHARGE IDENTIFICATION

4.4.1 Methodology

During the 2016 survey of BWI Thurgood Marshall Airport tenants, tenants responded regarding their respective activities at individual locations and the associated potential for non-stormwater discharges. Additional sources of non-stormwater discharges were identified through interviews and discussions with various MAA staff and during the stormwater pollution prevention training sessions.

The 2010 Illicit Discharge Detection and Elimination (IDDE) Plan for BWI Thurgood Marshall Airport is currently in effect. The plan involves inspecting various outfalls annually during dry weather to identify illicit discharges. If a dry weather flow is detected, progressively more comprehensive inspections will be conducted to identify the potential cause and source of the illicit discharge. The current IDDE plan is included in Appendix H.

4.4.2 Findings

Non-stormwater discharges are defined as discharges resulting from activities other than those from storm-related surface runoff. Non-stormwater discharges occur primarily in the Sachs Branch, Stony Run Watershed, Cabin Branch, Kitten Branch, and Muddy Bridge Branch drainage areas. A number of non-stormwater related activities have the potential to discharge contaminants to the stormwater system. The following activities can contribute to non-stormwater discharges and stormwater pollution at BWI Thurgood Marshall Airport:

- | | |
|--|-----------------------------------|
| • Aircraft Apron Washdown | • Chemical Spills and Leaks |
| • Aircraft and Runway Deicing | • Solid Waste Debris and Litter |
| • Aircraft, Equipment and Vehicle Washing | • Potable Water Flushing |
| • Building Floor Washdown | • Vehicle Fueling and Maintenance |
| • Fire-Fighting Equipment Testing/Flushing | • Runway Rubber Removal. |

Table 4 summarizes potential non-stormwater discharges that were found during site inspections.

Table 4: Potential Non-Stormwater Discharges

Drainage Area	Activity
CRCF Site; Piny Branch Watershed	<ul style="list-style-type: none">• Runoff from CRCF Car Wash Facility• Runoff from CBMF Bus Wash Facility
Sachs Branch; Stony Run Watershed	<ul style="list-style-type: none">• Process wastewater runoff from sweeper pit debris storage area

4.5 EXISTING MONITORING

MES performs all NPDES-required outfall monitoring and reporting for MAA at BWI Thurgood Marshall Airport at the outfalls and monitoring points previously mentioned.

To accomplish deicing fluid discharge monitoring, MES has constructed automated monitoring stations at four locations as described in the latest Deicing Fluid Discharge Monitoring Plan included in Appendix I. Monitoring is required only during the deicing season, which is defined as the first day of glycol usage associated with a declared deicing event (snow, sleet, rain and/or freezing rain) and ending March 31st or two weeks after the last day of glycol usage during a precipitation-based deicing event (whichever is latest). Each of these stations is equipped with ISCO sampler(s), a flowmeter, and a solar panel powered battery-charging system. Field-testing is not required by the NPDES permit, but may be performed if needed. Further analytical testing is conducted by a qualified laboratory under contract with MES (split samples are sent to a different contract laboratory). Monitoring results are reported to MDE as required under BWI Thurgood Marshall Airport's NPDES permit. Because the sampling data are voluminous and frequently updated, they are not included in this SWPPP. Complete files of the stormwater sampling data for BWI Thurgood Marshall Airport are maintained by MES and can be reviewed as needed.

Monitoring results obtained during the calendar quarter are summarized on a Discharge Monitoring Report (Net DMR) and submitted electronically to MDE in accordance with the requirements of the permit.

Similarly, the existing Biomonitoring Study Plan evaluates the toxicity of the discharged water during deicing events for two monitoring points. The development of the Biomonitoring Study Plan is a requirement of the NPDES permit and is included in Appendix I. Both the current Biomonitoring Study Plan and the Deicing Fluid Discharge Monitoring Plan were updated after the NPDES permit renewal went into effect.

4.6 IDENTIFICATION OF NUTRIENT SOURCES

The NPDES permit (Part I.R) requires BWI Thurgood Marshall Airport to submit to MDE an inventory of all significant (greater than 50 lbs) TP and TN generating activities and chemical formulations used at the airport which contain TN and/or TP that may end up being discharged to waters of the State. A Nutrient Source Identification for Stormwater Runoff Associated with Industrial Activities was developed for BWI Thurgood Marshall Airport in March 2015, and a copy of the report and inventory is included in Appendix J.

5. BEST MANAGEMENT PRACTICES (BMPs)

USEPA categorizes BMPs into three groups, defined as follows:

- “Baseline” BMPs are relatively simple and inexpensive practices, applicable to a wide variety of industries and activities. Baseline BMPs are discussed in Section 5.1.
- “Activity-Specific” BMPs are practices related to airport operations and may occur at more than one location, such as vehicle washing or solid waste management. Activity-Specific BMPs are discussed in Section 5.2.
- “Site-specific” BMPs are practices applicable to specific locations, structures, or items of equipment at the airport. Site-specific BMPs are discussed in Section 5.3.

Based on the categories above, general BMP Fact Sheets were developed as applicable to general airport operations. These BMP Fact Sheets are identified in Table 5, organized according to the various tenants and activities that occur at BWI Thurgood Marshall Airport.

The BWI Thurgood Marshall Airport NPDES permit (Part I.S.2.b) requires the SWPPP to cover and provide an implementation schedule for best management practices, including the following BMPs for stormwater control:

1. Preventive Maintenance
2. Good Housekeeping
3. Spill Prevention and Response Procedures
4. Sediment and Erosion Prevention and Control
5. Management of Stormwater Runoff
6. Visual Inspections
7. Recordkeeping and Internal Reporting Procedures.

These seven BMPs are identified in the USEPA Guidance for developing SWPPPs, and are applicable to all types of industrial facilities. Specific measures for implementing these BMPs are described in subsequent sections of this SWPPP.

Table 5: BWI Thurgood Marshall Airport Tenant Groups and Relevant BMP Fact Sheets

Tenant Groups	Baseline (BL) BMPs			Activity Specific (AS) BMPs													Site-Specific (SS) BMPs
	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	
Aircraft Ground Support Services	●	●	●	●	●	●	●	●	●	●	●	●	●		●		●
Airlines	●	●	●	●	●	●		●	●	●	●	●	●		●		●
Construction Managers	●		●					●	●	●							
Fire & Rescue Services	●	●	●	●	●			●	●		●		●	●	●		
Fuel Farm Tenants	●	●	●		●			●	●								●
Housekeeping	●		●	●	●			●	●		●		●				
MAA Building Maintenance	●	●	●	●	●			●	●		●	●	●				
MAA Field Maintenance	●	●	●	●	●	●	●	●	●	●	●		●			●	●
MAA Vehicle Maintenance	●	●	●	●	●	●		●	●	●							●
Public Ground Transportation Tenants	●	●	●	●	●	●		●	●	●	●		●				●
Rental Car Tenants	●	●	●	●	●	●		●	●	●	●						●
Retail Tenants	●		●	●	●			●	●		●		●				●
Other	●		●	●	●			●	●		●		●				●

5.1 BASELINE BEST MANAGEMENT PRACTICES

The following Baseline BMP Fact Sheets applicable to general airport operations are included in Appendix F:

- BMP Sheet BL1 – Elimination of Non-Stormwater Discharges to Storm Drains
- BMP Sheet BL2 – Emergency Spill Cleanup Plans
- BMP Sheet BL3 – Stormwater Pollution Prevention Education.

5.1.1 Preventive Maintenance

A preventive maintenance program involves timely inspection and maintenance of stormwater management devices, as well as inspecting, and testing facility equipment and systems to uncover conditions that could cause breakdowns or failures that could potentially result in discharges of pollutants to surface waters. Any necessary repairs or modifications shall be made prior to the next wet weather event, or as expeditiously as practicable, to avoid leaks and other releases.

Maintenance manuals have been developed by MAA specifically for the types of stormwater management devices that are present at the BWI Thurgood Marshall Airport. These manuals were distributed to the various maintenance departments and contractors responsible for completing the structural maintenance requirements. Maintenance manuals have been created for each of the following devices:

- Infiltration Trenches
- Retention Ponds
- Detention Ponds
- Underground Storage Facilities
- Combined Detention/Filtration Systems
- Storm Filter Systems
- Catch Basins.

5.1.2 Good Housekeeping

Good housekeeping requires the maintenance of a clean, orderly facility. In particular, the BWI Thurgood Marshall Airport NPDES permit (Part I.T.4.a) specifies that good housekeeping measures be implemented with respect to:

- Aircraft, Ground Vehicle and Equipment Maintenance Areas
- Aircraft, Ground Vehicle and Equipment Cleaning Areas
- Aircraft, Ground Vehicle and Equipment Storage Areas
- Material Storage Areas
- Airport Fuel System and Fueling Areas
- Source Reduction (Deicing)
- Management of Runoff (Deicing).

Fact sheets for Activity-Specific BMPs addressing these areas have been created and are discussed in Section 5.2. The BMP Fact Sheets are included in Appendix F. Five of the fact sheets specifically address the above areas specified in the NPDES permit. These recommended BMPs are not limited to the areas listed above; their use is encouraged throughout all MAA maintenance shops. MAA has included such recommended practices in training all workers during their mandatory Hazardous Communications Training.

5.1.3 Spill Prevention and Response Procedures

Oil spills and spills of hazardous substances are reported to the AOC and to FRS. Notification, response, and reporting procedures are provided in the BWI Thurgood Marshall Airport CP, which incorporates the information required for BWI Thurgood Marshall Airport's SPCC Plan. In addition, some tenants, including airlines and tenants with operations at the Fuel Farm (such as Aircraft Service International Group), have developed individual SPCC Plans in accordance with USEPA requirements.

5.1.4 Sediment and Erosion Prevention and Control

Erosion concerns can be divided into two broad categories: erosion due to active construction projects, and chronic or nuisance erosion areas due to inadequate conveyance, steep slopes, erodible fill, etc. The first category of erosion potential is associated with different development projects being actively constructed or planned on airport property. For each project, an approved sediment and erosion control plan will need to be developed and approved by local or state regulatory agencies. These plans will identify the specific control measures that will be in place during construction to minimize erosion and sedimentation.

The airport is undergoing continual development of its terminal and auxiliary areas. MAA Facility Planning develops an Airport Layout Plan to document these future airport-wide developments. Based on the current Airport Layout Plan, the drainage areas listed in Table 6 are expected to be impacted by soil erosion due to construction activities currently underway or planned by 2020.

The second category of erosion or sedimentation concern involves areas that may experience nuisance erosion due to inadequate conveyance, steep slopes, or erodible fills. Any significant visible erosion found throughout the airport site was recorded during field inspections conducted for this plan update. Erosion in the majority of these areas appeared to be a result of roadway runoff or steep channel slopes, and was not necessarily due to activities related to airport operations. Onsite erosion findings are being addressed on an ongoing basis through regular inspections.

Table 6: Sites of Potential Future Construction-Related Erosion

Watershed & Drainage Area	Activity
Sawmill Creek Watershed	
Muddy Bridge Branch	<ul style="list-style-type: none"> • International Terminal Bag Screening Improvements (Approved/In Progress) • Concourse E 2 Gate Expansion (Phase I) • Second FBO (Phase I) • Airfield Lighting Vault (Phase I)
Stony Run Watershed	
Sachs Branch	<ul style="list-style-type: none"> • Terminal Response Fire Station (Phase I) • Demolition (Approved/In Progress)
Tributary of King Branch	<ul style="list-style-type: none"> • Vehicle Service Station (Phase I)
Kitten Branch	<ul style="list-style-type: none"> • Hotel and Parking (Approved/In Progress) • Hourly Garage Expansion (Approved/In Progress) • Aircraft Maintenance Facilities (Phase I) • Terminal and Concourse Expansions (Approved/In Progress) • Glycol Storage/Truck Staging (Phase I) • Vehicle Road Improvements (Phase I) • Triturator (Phase I)
Phelps/Irving Branch	<ul style="list-style-type: none"> • Fire Training Facility (Phase I) • Vehicle Road Improvements (Phase I)
Tributary of Sawmill Creek	<ul style="list-style-type: none"> • Snow Equipment Storage (Phase I)

5.1.5 Management of Stormwater Runoff

BWI Thurgood Marshall Airport maintains a complex system of devices and facilities to manage stormwater runoff, including catch basins and detention basins, infiltration trenches, swales, ponds, sediment traps, oil/water separators, and aircraft deicing pads. The various facilities and devices provide different types of stormwater quality and quantity management. For example, a typical stormwater basin may be designed to provide quantity management for attenuating peak discharges and targeting pollutants like sediment and phosphorus from paved areas, whereas an oil/water separator is utilized to remove petroleum from lower flows through the drainage systems in maintenance areas. Inspection records maintained by MES provide a complete inventory of the stormwater management structures at BWI Thurgood Marshall Airport.

These stormwater management practices and systems have been evaluated and were determined to be reasonable and appropriate in light of the potential of various sources at BWI Thurgood Marshall Airport to contribute pollutants to stormwater discharges. The principal stormwater pollutants of concern at BWI Thurgood Marshall Airport are petroleum products (oils, fuels, greases) and aircraft deicing fluid (chiefly propylene glycol). Oil/water separators, when properly maintained and appropriately designed for typical flow scenarios, are effective in capturing oil products that are entrained in stormwater runoff and preventing the release of these products into the environment. Oil/water separators are installed and functioning at BWI Thurgood Marshall Airport, and are maintained through periodic inspections and cleaning as described in Section 5.1.6. During field inspections, the locations of oil/water separators were noted and are shown on the maps in Appendix B.

Discharges of aircraft deicing fluid are minimized through the use of aircraft deicing pads with dedicated drainage systems for collection of waste glycol, and glycol recovery areas that recover residual deicing fluid from deicing operations conducted at terminal gates. Details of BWI Thurgood Marshall Airport's deicing fluid management program and associated BMP practices are provided in the BWI Thurgood Marshall Airport Deicing Management Program Plan, the Deicing Fluid Discharge Monitoring Plan, and BWI Thurgood Marshall Airport Tenant Directive 215.1, included as an appendix to the Deicing Management Program Plan, all of which are included in Appendix I.

To reduce pollutant runoff from the CRCF, several types of stormwater management methods and treatment systems are provided including conventional BMPs, hydrodynamic structures, and a stormwater filtration system. The StormFilter[®] system is designed to collect and filter the first flush of stormwater runoff from paved surfaces during and following a storm event. The control structure is designed so that large storms will pass through the structure and prevent flooding. The StormFilter[®] system consists of a sediment forebay and an underground vault with filter cartridges containing activated carbon to remove pollutants. The cartridges have to be removed and replaced periodically. Detailed maintenance requirements for the StormFilter[®] system are included in the maintenance manual for this system, as described in Section 5.1.1.

Table 7: Stormwater Management Facility Locations

Watershed & Drainage Area	Stormceptors®	Underground Storage Facilities	Combined Detention Pond & Underground	StormFilter® Systems	Retention Ponds	Detention Ponds	Infiltration Trenches
Cabin Branch Watershed							
Cabin Branch					3		9
Sawmill Creek Watershed							
Muddy Bridge Branch						3	30
Fork Branch							1
Phelps Branch							
Irving Branch							2
Irving Branch Tributary							
Southwest Branch						1	4
Tributary of Southeast Corner							
Sawmill Creek Tributary 1							
Sawmill Creek Tributary 2							
Sawmill Creek Tributary 3							
Stony Run Watershed							
Clark Branch							
Hawkins Branch					3		
Signal Branch						1	
Bowden Branch						2	4
King Branch							
King Branch Tributary							
Kitten Branch						4	27
Sachs Branch					1	2	
Sachs Branch Tributary						2	
Stony Run	15	3	6	5			
Piny Run Watershed							
Piny Run			5	1	2		
Totals	15	3	11	6	9	15	77

5.1.6 Visual Inspections

BWI Thurgood Marshall Airport's NPDES permit requires that qualified personnel inspect designated equipment and facility areas. Site inspections must be conducted annually by qualified personnel to verify that the description of potential pollutant sources is accurate, the drainage map has been updated to reflect current conditions, and the controls to reduce pollutants identified in the stormwater pollution plan are being implemented and are adequate. In particular, material handling areas must be inspected for evidence of, or the potential for, pollutants entering the drainage system. A tracking or follow-up procedure must be used to ensure that each inspection results in an appropriate response.

MAA has contracted with MES to conduct BMP Visual Inspections of stormwater management structures and practices. MES submits a summary report that includes an inspection log (i.e., checklist) for each inspection period. Currently, the inspections are conducted monthly at 10 areas:

1. Fuel Farm/Maintenance Area (Sach's Branch)
2. Outfall 003 Area (Kitten Branch)
3. Outfall 006 Area (Cabin Branch)
4. Outfall 007 Area (Muddy Bridge Branch)
5. Satellite Parking Areas (Sach's Branch, Cabin Branch, Kitten Branch, Sawmill Creek)
6. Parking Garage Areas (Kitten Branch, Sach's Branch)
7. Mid-Field Air Cargo Area (Kitten Branch, Hawkins Branch, Signal Branch)
8. General Aviation Area (Muddy Bridge Branch)
9. Air Cargo Area (Muddy Bridge Branch)
10. Terminal Area (Kitten Branch, Muddy Bridge Branch)
11. Parking Facilities Area (Stony Run).

The items addressed during these monthly inspections fulfill BWI Thurgood Marshall Airport's permit requirement for annual inspection to ensure that controls to reduce stormwater pollutants are being implemented and are adequate, and for inspection of evidence of, or the potential for, pollutants entering the drainage system. Drainage area maps and descriptions of pollutant sources are updated as needed to reflect changing conditions or activities at the airport.

Additionally, MES conducts a Stormwater Facilities Inspection of individual stormwater management physical structures on a periodic basis. The entire stormwater system is inspected on a 3-year cycle. Following each inspection, MES reports requirements for repairs or maintenance to MAA. Work orders for repair and maintenance are issued to and executed by an MAA contractor.

Oil/water separators are inspected by MES on a monthly, quarterly, or annual basis, depending on their capacity and location. Oil/water separators at the Fuel Farm that have been recently problematic will be inspected by MES monthly and the rest will be inspected quarterly or annually. Cleaning or maintenance needs for the separators are identified to MAA and carried out by an MAA contractor.

Inspections and maintenance of stormwater management structures and oil/water separators are documented and tracked through JETS and maintained by the MAA OES. Inspection data in JETS identifies the need for facilities maintenance to ensure proper function and maintain compliance with BWI Thurgood Marshall Airport's permit requirements. JETS permits access to the maintenance and inspection history for individual structures or selected structures within a geographic area. For oil/water separators, status reports can be generated to show which separators need repair, are being repaired, or have been repaired.

5.1.7 Recordkeeping and Internal Reporting Procedures

The following records are available and maintained at BWI Thurgood Marshall Airport:

- Inventory of Outfall Monitoring Data, as required by NPDES permit
- Discharge Monitoring Reports, as required by the NPDES permit
- Biomonitoring Reports, as required by the NPDES permit
- Regular inspection reports at respective facilities
- Spill reports from the AOC reporting system
- Stormwater Management Inspections and Maintenance Reports
- Records of the application of aircraft deicing chemicals and the Material Safety Data Sheets for these and other chemicals used at BWI Thurgood Marshall Airport

All records are maintained for a minimum of three years. Spills and other incidents are reported to the AOC. The AOC documents the details of the incident and notifies the appropriate MAA personnel, such as the MAA Environmental Compliance Manager or BWI Thurgood Marshall Airport FRS, depending on the nature of the incident. Incident reports are distributed to personnel within the AOC for evaluation of further action and to determine external reporting requirements. Incident reports are kept on file by the AOC. As described in Section 4.3, spills are also documented in records maintained by the FRS and the BWI Thurgood Marshall Airport Operations Log.

5.2 ACTIVITY-SPECIFIC BMPS

In addition to the baseline BMPs, each potential polluter of stormwater should consider their individual activities and the techniques that are available to reduce stormwater pollution. The following Activity-Specific (AS) BMPs are provided in a series of Fact Sheets in Appendix F:

- BMP Sheet AS1 – Aircraft, Vehicle, and Equipment Maintenance
- BMP Sheet AS2 – Aircraft, Vehicle and Equipment Fueling
- BMP Sheet AS3 – Aircraft, Vehicle, and Equipment Washing, Cleaning and Degreasing
- BMP Sheet AS4 – Aircraft Deicing/Anti-icing
- BMP Sheet AS5 – Outdoor Waste and Material Handling
- BMP Sheet AS6 – Outdoor Storage of Waste and Materials
- BMP Sheet AS7 – Building and Grounds Maintenance
- BMP Sheet AS8 – Lavatory Service Operations
- BMP Sheet AS9 – Outdoor Washdown/Sweeping
- BMP Sheet AS10 – Fire Fighting Foam Discharge

- BMP Sheet AS11 – Potable Water System Flushing
- BMP Sheet AS12 – Runway Rubber Removal.

The BWI Thurgood Marshall Airport Deicing Management Program Plan (Appendix I) describes the evaluation and implementation of best management practices for aircraft and runway deicing, including methods to reduce the quantities of chemicals used for both aircraft and runway deicing operations. At BWI Thurgood Marshall Airport, propylene glycol is used for all aircraft deicing in place of ethylene glycol, and runway deicing is accomplished with potassium acetate and sodium formate. These chemicals are less toxic to aquatic ecosystems than others that have been previously used (such as ethylene glycol and urea), thereby reducing the stormwater pollutant load from deicing activities. Details regarding control measures and BMPs for deicing operations are provided in the BWI Thurgood Marshall Airport Deicing Management Program Plan.

5.3 SITE-SPECIFIC AND STRUCTURAL BMPs

In some situations, special practices are necessary to prevent pollution, and are based on the specific stormwater management structure or a unique site design or practice. In general, the manufacturer of physical structures, such as sand traps and StormFilters®, can provide documentation for proper maintenance and recommended practices to prevent the release of pollutants to stormwater.

As previously described in Sections 5.1.3 and 5.1.6, BWI Thurgood Marshall Airport has installed a number of oil/water separators across the airport. Although oil/water separators are operated and maintained by contractors, a Site-Specific (SS) BMP Fact Sheet is included in Appendix F for reference. BMPs are also available for other stormwater management control structures. P2 Team members should continue to assess individual sites and processes to determine the need for additional BMPs. Further information regarding SS BMP selection is found in the *2000 Maryland Stormwater Design Manual, Volumes I & II* as well as the USEPA Guidance *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-006, September 1992). The USEPA Guidance specifically provides SS BMPs for the following items:

- | | |
|--|---|
| <ul style="list-style-type: none"> ➤ Flow Diversion Practices <ul style="list-style-type: none"> Stormwater Conveyances Diversion Dikes Graded Areas and Pavements ➤ Exposure Minimization Practices <ul style="list-style-type: none"> Containment Dikes Curbing Drip Pans Collection Basins Sumps Covering Vehicle Positioning | <ul style="list-style-type: none"> Loading/Unloading by Air Pressure/Vacuum ➤ Mitigative Practices <ul style="list-style-type: none"> Sweeping Shoveling Excavation Practices Vacuum/Pump Systems Sorbents Gelling Agents |
|--|---|

➤ **Sediment & Erosion Prevention Practices**

Vegetative Practices
Structural Erosion Prevention and
Sediment Control Practices

➤ **Other Preventive Practices**

Preventive Monitoring
Dust Control
Signs and Labels
Security
Area Control Procedures
Vehicle Washing
Salt Storage Piles
Waste, Garbage and Floatable Debris

➤ **Infiltration Practices**

Vegetated Filter Strips
Grassed Swales
Level Spreaders
Infiltration Trenches
Porous Pavements/Concrete Grids and
Modular Pavement.

Ensuring that maintenance and operations personnel are aware of maintenance and use requirements prior to installation is essential for the successful operation of these stormwater management structures. As needed, training on the correct use and maintenance of these structures will be included in the annual P2 training, or will be separately scheduled (see Section 5.1.7).

5.4 POLLUTION PREVENTION TRAINING

Training is necessary to ensure that airport employees are aware of their impact to stormwater, the content of the facility SWPPP, their responsibilities to prevent pollution, spill response and notification procedures, and methods to control such pollution release. Annual training is generally conducted in October, and is scheduled as multiple sessions to accommodate the needs of various groups. Training topics include the following:

- Spill response
- Good housekeeping practices
- Material management practices
- Other BMPs applicable to airport operations.

All training is organized and coordinated through the Environmental Compliance Manager and the P2 Team. The training is advertised to the applicable team members to encourage full participation in the training session.

Other training sessions will be held as needed for members of the P2 Team or others to address specific topics of interest. Topics for such training sessions may include basic Baseline BMP training for new P2 Team members; Site-Specific BMPs, including proper use and maintenance of stormwater management systems and structures; and conducting pollution prevention opportunity assessments (refer to Section 5.4) and Activity-Specific BMPs, such as deicing

training. Training on these topics will be scheduled on an as-needed basis by the P2 Team Leader in coordination with the P2 Team.

Training materials from previous stormwater pollution prevention training sessions for MAA workers are included in Appendix K.

5.5 POLLUTION PREVENTION OPPORTUNITY ASSESSMENTS

A pollution prevention opportunity assessment (PPOA) is a tool to help identify the nature and quantity of wastes and energy usage, to stimulate the generation of P2 and energy conservation opportunities, and to evaluate those opportunities for implementation. The resulting baseline assists in measuring pollution prevention progress and is, therefore, an integral part of a successful pollution prevention program. Members of the P2 Team conduct regular PPOAs within their work areas to identify processes and products that could be modified to reduce pollution and waste generation.

The results of PPOAs will assist the P2 Team members in developing and/or implementing additional Baseline, Activity-Specific, Site-Specific and/or Structural BMPs, as appropriate.

5.6 IMPLEMENTATION PROGRAM

5.6.1 Scheduling of Implementation

The information provided in this SWPPP is an update of the original Pollution Prevention Program instituted in 1993 and the updated SWPPPs issued in April 2002, October 2003, January 2005, April 2006, June 2009, and December 2011. A Summary of Changes between this SWPPP and the December 2011 Update is included in Appendix L.

Implementation of BMPs is ongoing and the P2 Team meets periodically to identify the need for new BMPs and implementation schedules. In addition, an internal audit program is being implemented to establish a process for conducting routine inspections at MAA, to ensure compliance with federal, state, and local regulations, as well as internal MAA policies and procedures. The frequency of field visits will be determined by the Environmental Compliance Manager, based upon environmental risk, third party audit results, and from environmental inspections findings. The audit program plan shall be stored within JETS, and the JETS Task Tracking Tool will also document scheduled field visits as individual tasks. The audit program plan will address the audit team selection and may consist of employees from MAA OES.

5.6.2 Monitoring Program

Activities such as stormwater management structure inspections are ongoing, and will continue as prescribed in this SWPPP update. Currently, MES combines inspections of the individual stormwater management devices with visual inspections of BMP implementation. Inspections are performed monthly as described in Section 5.1.3. Problem areas are identified on the MES inspection sheets. P2 Team members supplement these inspections by evaluating the effectiveness of BMPs in their work areas. In addition, environmental non-compliances that are identified by the internal audits will be assigned recommended corrective actions that will be

documented within the JETS Task Tracking Tool as “incidents” by MAA OES, and/or designated personnel. Each instance of non-compliance will be assigned a priority within JETS, requiring that corrective action be taken within a specific time frame.

The results of these inspections are reviewed and considered during periodic updates of this SWPPP.

6. DEFINITIONS

Average Effluent Concentration (monthly, quarterly, semi-annual, or annual): the value calculated by computing the arithmetic mean of all the daily determinations of concentration made during any calendar-month, 3-month, 6-month, or 12-month period respectively.

Berm: An earthen mound used to direct the flow of runoff around or through a structure.

Best Management Practice (BMP): Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control facility site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Buffer Strip or Zone: Strips of grass or other erosion-resistant vegetation between a waterway and an area of more intensive land use.

Bypass: The intentional diversion of wastes from any portion of a treatment facility.

By-product: Material, other than the principal product, which is generated as a consequence of an industrial process.

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act.

Composite Sample: A combination of individual samples obtained at least at hourly intervals over a time period. Either the volume of each individual sample is proportional to discharge flow rates or the sampling interval (for constant volume samples) is proportional to the flow rates over the time period used to produce the composite.

Concrete Apron: A pad of non-erosive material designed to prevent scour holes from developing at the outlet ends of culverts, outlet pipes, grade stabilization structures, and other water control devices.

Conveyance: Any natural or manmade channel or pipe in which concentrated water flows.

Culvert: A covered channel or a large-diameter pipe that directs water flow below the ground level.

CWA: Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972).

Daily Determination of Concentration: one analysis performed on any given sample representing flow during a calendar day, with one number in mg/l or other appropriate units as an outcome.

Daily Maximum Effluent Concentration: the highest reading of any daily determination of concentration.

Deicing Fluid Discharge: aircraft deicing and anti-icing fluids entrained in storm water discharges.

Dike: An embankment to confine or control water, often built along the banks of a river to prevent overflow of lowlands; a levee.

Discharge: A release or flow of stormwater or other substance from a conveyance or storage container.

Drip Guard: A device used to prevent drips of fuel or corrosive or reactive or other chemicals from contacting other materials or areas.

Emission: Pollution discharged into the atmosphere from smokestacks, process exhausts, other vents, and surface areas of commercial or industrial facilities and from motor vehicle, locomotive, or aircraft exhausts.

Erosion: The wearing away of land surface by wind or water. Erosion occurs naturally from weather or runoff, but can be intensified by land-clearing practices related to farming, residential or industrial development, road building, or timber-cutting.

Estimated Flow: a calculated volume or discharge rate which is based on a technical evaluation of the sources contributing to the discharge including, but not limited to, pump capabilities, water meters, and batch discharge volumes.

Excavation: The process of removing earth, stone, or other materials.

Fertilizer: Materials, such as nitrogen and phosphorus, which provide nutrients for plants. Commercially sold fertilizers may contain other chemicals or may be in the form of processed sewage sludge.

Filter Strip: Usually long, relatively narrow area of undisturbed or planted vegetation used to retard or collect sediment for the protection of watercourses, reservoirs, or adjacent properties.

Flowmeter: A gauge that shows the speed of water moving through a conveyance.

General Permit: A permit issued under the NPDES program to cover a certain class or category of stormwater discharges. These permits allow for a reduction in the administrative burden associated with permitting stormwater discharges associated with industrial activities. For example, EPA is planning to issue two general permits:

1. NPDES General Permits for Stormwater Discharges from Construction Activities that are classified as "Associated with Industrial Activity" and
2. NPDES General Permits for Stormwater Discharges from Industrial Activities that are classified as "Associated with Industrial Activities."

EPA is also encouraging delegated states that have an approved general permits program to issue general permits.

Grab Sample: an individual sample collected over a period of time not exceeding 15 minutes.

Grading: The cutting and/or filling of the land surface to a desired slope or elevation.

Hazardous Substance: 1) Any material that poses a threat to human health and/or the environment. Hazardous substances can be toxic, corrosive, ignitable, explosive, or chemically reactive. 2) Any substance required by EPA to be reported if a designated quantity of the substance is spilled in the waters of the United States or if otherwise emitted into the environment.

Hazardous Waste: A by-product of human activities that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity), or appears on special EPA lists.

Illicit Connection: Any discharge to a municipal separate storm sewer that is not composed entirely of stormwater except discharges authorized by an NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

Infiltration: 1) The penetration of water through the ground surface into sub-surface soil or the penetration of water from the soil into sewer or other pipes through defective joints, connections, or manhole walls. 2) A land application technique where large volumes of wastewater are applied to land, allowed to penetrate the surface, and percolate through the underlying soil.

Intermediate: A chemical compound formed during the making of a product.

Irrigation: Human application of water to agricultural or recreational land for watering purposes.

Lagoon: A shallow pond where sunlight, bacterial action, and oxygen work to purify wastewater.

Landfill: An area of land or an excavation in which wastes are placed for permanent disposal, and which is not a land application unit, surface impoundment, injection well, or waste pile.

Large and Medium Municipal Separate Storm Sewer System: All municipal separate storm sewers that are either:

- a) located in an incorporated place (city) with a population of 100,000 or more as determined by the latest Decennial Census by the Bureau of Census (these cities are listed in Appendices F and G of 40 CFR Part 122); or
- b) located in the counties with unincorporated urbanized populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships, or towns within such counties (these counties are listed in Appendices H and I of 40 CFR Part 122); or
- c) owned or operated by a municipality other than those described in paragraph (i) or (ii) and that are designated by the Director as part of the large or medium municipal separate storm sewer system.

Level Spreader: A device used to spread out stormwater runoff uniformly over the ground surface as sheetflow (i.e., not through channels). The purposes of level spreaders are to prevent concentrated, erosive flows from occurring and to enhance or facilitate infiltration.

Material Storage Areas: On-site locations where raw materials, products, final products, by-products, or waste materials are stored.

Measured Flow: any method of liquid volume measurement the accuracy of which has been previously demonstrated in engineering practice, or for which a relationship to absolute volume has been obtained.

NPDES: EPA's program to control the discharge of pollutants to waters of the United States. See the definition of "National Pollutant Discharge Elimination System" in 40 CFR 122.2 for further guidance.

NPDES Permit: An authorization, license, or equivalent control document issued by EPA or an approved state agency to implement the requirements of the NPDES program.

Oil and Grease Traps: Devices that collect oil and grease, removing them from water flows.

Oil Sheen: A thin, glistening layer of oil on water.

Oil/Water Separator: A device installed, usually at the entrance to a drain, which removes oil and grease from water flows entering the drain.

Outfall: The point, location, or structure where wastewater or drainage discharges from a sewer pipe, ditch, or other conveyance to a receiving body of water.

Permit: An authorization, license, or equivalent control document issued by EPA or an approved state agency to implement the requirements of an environmental regulation; e.g., a permit to operate a wastewater treatment plant or to operate a facility that may generate harmful emissions.

Pollutant: Any dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 [U.S.C. 2011 et seq.]), heat, wrecked or discharged equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water. It does not mean:

- 1) Sewage from vessels; or water, gas, or
- 2) other material that is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well used either to facilitate production or for disposal purposes is approved by the authority of the state in which the well is located,

and if the state determines that the injection or disposal will not result in the degradation of ground or surface water resources [Section 502(6) of the CWA].

Radioactive materials covered by the Atomic Energy Act are those encompassed in its definition of source, byproduct, or special nuclear materials. Examples of materials not covered include radium and accelerator-produced isotopes. See *Train v. Colorado Public Interest Research Group, Inc.*, 426 U.S. 1 (1976).

Porous Pavement: A human-made surface that will allow water to penetrate through and percolate into soil (as in porous asphalt pavement or concrete). Porous asphalt pavement is comprised of irregular shaped crush rock precoated with asphalt binder. Water seeps through into lower layers of gravel for temporary storage, then filters naturally into the soil.

Precipitation: Any form of rain or snow.

Preventive Maintenance Program: A schedule of inspections and testing at regular intervals intended to prevent equipment failures and deterioration.

Raw Material: Any product or material that is converted into another material by processing or manufacturing.

RCRA: Resource Conservation and Recovery Act.

Recorded Flow (or pH, temperature, etc.): any method of providing a permanent, continuous record including, but not limited to, circular and strip charts.

Residual: Amount of pollutant remaining in the environment after a natural or technological process has taken place; e.g., the sludge remaining after initial wastewater treatment, or particulates remaining in air after the air passes through a scrubbing or other pollutant removal process.

Retention: The holding of runoff in a basin without release except by means of evaporation, infiltration, or emergency bypass.

Retrofit: The modification of stormwater management systems in developed areas through the construction of wet ponds, infiltration systems, wetland plantings, stream bank stabilization, and other BMP techniques for improving water quality. A retrofit can consist of the construction of a new BMP in the developed area, the enhancement of an older stormwater management structure, or a combination of improvement and new construction.

Rill Erosion: The formation of numerous, closely spread streamlets due to uneven removal of surface soils by stormwater or other water.

Runoff: That part of precipitation, snow melt, or irrigation water that runs off the land into streams or other surface water. It can carry pollutants from the air and land into the receiving waters.

Sanitary Sewer: A system of underground pipes that carries sanitary waste or process wastewater to a treatment plant.

Sanitary Waste: Domestic sewage.

Scour: The clearing and digging action of flowing water, especially the downward erosion caused by stream water in sweeping away mud and silt from the stream bed and outside bank of a curved channel.

Secondary Containment: Structures, usually dikes or berms, surrounding tanks or other storage containers and designed to catch spilled material from the storage containers.

Sediment Trap: A device for removing sediment from water flows; usually installed at outfall points.

Sedimentation: The process of depositing soil particles, clays, sands, or other sediments that were picked up by flowing water.

Sediments: Soil, sand, and minerals washed from land into water, usually after rain. They pile up in reservoirs, rivers, and harbors, destroying fish-nesting areas and holes of water animals and cloud the water so that needed sunlight might not reach aquatic plants. Careless farming, mining, and building activities will expose sediment materials, allowing them to be washed off the land after rainfalls.

Sheetflow: Runoff which flows over the ground surface as a thin, even layer, not concentrated in a channel.

Significant Materials: Include, but are not limited to:

- 1) raw materials;
- 2) fuels;
- 3) materials such as solvents, detergents, and plastic pellets;
- 4) finished materials such as metallic products;
- 5) raw materials used in food processing or production;
- 6) hazardous substances designated under section 101(14) of CERCLA;
- 7) any chemical the facility is required to report pursuant to Section 313 of Title III of SARA;
- 8) fertilizers;
- 9) pesticides; and
- 10) waste products such as ashes, slag, and sludge that have a potential to be released with stormwater discharges [122.26(b)(12)].

Significant Spills: Include, but are not limited to: releases of oil or hazardous substances in excess of reportable quantities under Section 311 of the CWA (see 40 CFR 110.10 and CFR 117.21) or Section 102 of CERCLA (see 40 CFR 302.4).

Slag: Non-metal containing waste leftover from the smelting and refining of metals.

Sludge: A semi-solid residue from any of a number of air or water treatment processes. Sludge can be a hazardous waste.

Soil: The unconsolidated mineral and organic material on the immediate surface of the earth that serves as a natural medium for the growth of plants.

Spill Prevention Control and Countermeasures Plan (SPCC): Plan consisting of documentation of collection and conveyance structures, such as curbing and/or secondary containment, and action plans to prevent and respond to any discharge of oil into navigable waters or adjoining shorelines.

Storm Drain: A slotted opening leading to an underground pipe or an open ditch for carrying surface runoff.

Stormwater: Runoff from a storm event, snow melt runoff, and surface runoff and drainage.

Stormwater Discharge Associated with Industrial Activity: The discharge from any conveyance that is used for collecting and conveying stormwater and that is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program under 40 CFR Part 122. For the categories of industries identified in subparagraphs (i) through (x) of this subsection, the term includes, but is not limited to:

- 1) stormwater discharges from industrial plant yards;
- 2) immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility;
- 3) material handling sites;
- 4) refuse sites;
- 5) sites used for the application or disposal of process wastewaters (as defined at 40 CFR 401);
- 6) sites used for the storage and maintenance of material handling equipment;
- 7) sites used for residual treatment, storage, or disposal;
- 8) shipping and receiving areas;

- 9) manufacturing buildings;
- 10) storage areas (including tank farms) for raw materials, and intermediate and finished products; and
- 11) areas where industrial activity has taken place in the past and significant materials remain and are exposed to stormwater.

For the categories of industries identified in subparagraph (xi), the term includes only stormwater discharges from all the areas (except access roads and rail lines) that are listed in the previous sentence where material handling equipment or activities, raw materials, intermediate products, final products, waste material, by-products, or industrial machinery are exposed to stormwater. For the purposes of this paragraph, material handling activities include the:

- storage,
- loading and unloading,
- transportation, or
- conveyance of any raw material, intermediate product, finished product, by-product, or waste product.

The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with stormwater drained from the above described areas. Industrial facilities (including industrial facilities that are Federally, State, or municipally owned or operated that meet the description of the facilities listed in this paragraph (i)-(xi) include those facilities designated under the provision of 122.26(a)(1)(v). The following categories of facilities are considered to be engaging in "industrial activity" for purposes of this subsection:

- i. facilities subject to stormwater effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR Subchapter N (except facilities with toxic pollutant effluent standards which are excepted under category (xi) of this paragraph);
- ii. facilities classified as Standard Industrial Classifications 24 (except 2434), 26 (except 265 and 267), 28 (except 283 and 285), 29, 311, 32 (except 323), 33, 3441, 372;
- iii. facilities classified as Standard Industrial Classifications 10 through 14 (mineral industry) including active or inactive mining operations (except for areas of coal mining operations no longer meeting the definition of a reclamation area under 40 CFR 434.11(l) because the performance bond issued to the facility by the appropriate SMCRA authority has been released, or except for areas of non-coal mining operations which have been released from applicable State or Federal reclamation requirements after December 17, 1990, and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge stormwater contaminated by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts, or waste products located on the site of such operations; (inactive mining operations are mining sites that are not being actively mined, but which have an identifiable owner/operator; inactive mining sites do not include sites where mining claims are being maintained prior to disturbances associated with the extraction, beneficiation, or processing of mined materials, nor sites where minimal activities are undertaken for the sole purpose of maintaining mining claim);
- iv. hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under Subtitle C of RCRA;
- v. landfills, land application sites, and open dumps that receive or have received any industrial wastes (waste that is received from any of the facilities described under this subsection) including those that are subject to regulation under Subtitle D of RCRA;
- vi. facilities involved in the recycling of materials, including metal scrap yards, battery reclaimers, salvage yards, and automobiles junkyards, including but not limited to those classified as Standard Industrial Classification 5015 and 5093;
- vii. steam electric power generating facilities, including coal handling sites;
- viii. transportation facilities classified as Standard Industrial Classifications 40, 41, 42 (except 4221-25, 43, 44, 45, and 5171 which have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment

- cleaning operations, airport deicing operations, or which are otherwise identified under paragraphs (i)-(vii) or (ix)-(xi) of this subsection are associated with industrial activity.;
- ix. treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that are located within the confines of the facility, with a design flow of 1.0 mgd or more, or required to have an approved pretreatment program under 40 CFR 403. Not included are farm lands, domestic gardens, or lands used for sludge management where sludge is beneficially reused and which are not physically located in the confines of the facility, or areas that are in compliance with Section 405 of the CWA;
- x. construction activity including clearing, grading, and excavation activities except operations that result in the disturbance of less than five acres of total land area which are not part of a larger common plan of development or sale;
- xi. facilities under Standard Industrial Classification 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221-25, (and which are not otherwise included within categories (iii)-(x)).

Note: The Transportation Act of 1991 provides an exemption from stormwater permitting requirements for certain facilities owned or operated by municipalities with a population of less than 100,000. Such municipalities must submit stormwater discharge permit applications for only airports, power plants, and uncontrolled sanitary landfills that they own or operate, unless a permit is otherwise required by the permitting authority.

Sump: A pit or tank that catches liquid runoff for drainage or disposal.

Surface Impoundment: Treatment, storage, or disposal of liquid wastes in ponds.

Surface Water: All water naturally open to the atmosphere (rivers, lakes, reservoirs, streams, wetlands impoundments, seas, estuaries, etc.); also refers to springs, wells, or other collectors which are directly influenced by surface water.

Swale: An elongated depression in the land surface that is at least seasonally wet, is usually heavily vegetated, and is normally without flowing water. Swales direct stormwater flows into primary drainage channels and allow some of the stormwater to infiltrate into the ground surface.

Toxic Pollutants: Any pollutant listed as toxic under Section 501(a)(1) or, in the case of "sludge use or disposal practices," any pollutant identified in regulations implementing Section 405(d) of the CWA. Please refer to 40 CFR Part 122 Appendix D.

Treatment: The act of applying a procedure or chemicals to a substance to remove undesirable pollutants.

Tributary: A river or stream that flows into a larger river or stream.

Underground Storage Tanks (USTs): Storage tanks with at least 10 percent or more of its storage capacity underground (the complete regulatory definition is at 40 CFR Part 280.12).

Upset: the exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

Waste: Unwanted materials left over from a manufacturing or other process.

Waste Pile: Any non-containerized accumulation of solid, non-flowing waste that is used for treatment or storage.

Waters of the United States:

- a. All waters, which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
- b. all interstate waters, including interstate "wetlands;"
- c. all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands," sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:
- d. which are or could be used by interstate or foreign travelers for recreational or other purposes;
- e. from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
- f. which are used or could be used for industrial purposes by industries in interstate commerce;
- g. all impoundments of waters otherwise defined as waters of the United States under this definition;
- h. tributaries of waters identified in paragraphs (a) through (d) of this definition;
- i. the territorial sea; and
- j. "wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition), are not waters of the United States. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States.

Waterway: A channel for the passage or flow of water.

Wetlands: An area that is regularly saturated by surface or ground water and subsequently is characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions. Examples include: swamps, bogs, fens, marshes, and estuaries.

Wind Break: Any device designed to block wind flow and intended for protection against any ill effects of wind.

7. REFERENCES AND INFORMATION SOURCES

- Baltimore County Bureau of Utilities. 2015. BWI Thurgood Marshall Airport Wastewater Discharge Permit.
- Baltimore/Washington International (BWI) Airport. 2014. BWI Thurgood Marshall Airport website, <http://bwiairport.com/en/about-bwi/factsfigures>. Accessed 8 June 2016.
- Maryland Aviation Administration (MAA). 2011. Comprehensive Wetland Inventory, Baltimore/Washington International Airport, Anne Arundel County, Maryland. Available from MAA Facility Planning.
- Maryland Aviation Administration (MAA). 2015. BWI Integrated Contingency Plan. Available from MAA Office of Environmental Services.
- Maryland Aviation Administration (MAA). 2014. Airport Layout Plan. AECOM/ADCI.
- Maryland Aviation Administration (MAA). 2015. Spill Prevention, Control, and Countermeasure Plan. EA Engineering, Science, and Technology, Inc., PBC.
- Maryland Department of the Environment (MDE). 2009. *2000 Maryland Stormwater Design Manual, Volumes I & II*. 2009 Revisions.
- U.S. Environmental Protection Agency (USEPA). 2009. *Developing your Stormwater Pollution Prevention Plan: A Guide for Industrial Operators*. EPA 833-B-09-022.
- U.S. Environmental Protection Agency (USEPA). 1992. *Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices*. EPA 832-R-92-006.
- U.S. Environmental Protection Agency (USEPA). 1992. *Summary Guidance for Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices*. EPA 833-R-92-002.

APPENDICES

A. BWI NPDES PERMIT

Permit No. 10-DP-2546



MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101 • www.mde.maryland.gov

Martin O'Malley
Governor

Robert M. Summers, Ph.D.
Secretary

Anthony G. Brown
Lieutenant Governor

SEP 30 2013

CERTIFIED MAIL

Mark Williams, Environmental Compliance Manager
Maryland Aviation Administration
P.O. Box 8766
BWI Airport, MD 21240

Re: State Discharge Permit No. 10DP2546, NPDES Permit MD0063371

Dear Mr. Williams:

Enclosed is the issued discharge permit referenced above with the effective date indicated on the cover page. The permittee is responsible for complying with all permit conditions. You are therefore advised to read the permit carefully and become thoroughly familiar with the requirements.

Enclosed are (EPA No. 3320-1) Discharge Monitoring Report (DMR) forms, which must be completed for each reporting period and submitted to the Department in accordance with the requirements of the permit. Copies of these forms can also be downloaded from the Department's website (the shortcut is www.mde.state.md.us/assets/document/permit/newdmr.pdf). Using the latest version of Adobe Acrobat Reader, the DMR form can be completed from a keyboard and printed for mailing to the Department.

You will also find enclosed a copy of the Federal Register, Part 136 - "Guidelines Establishing Test Procedures for Analysis of Pollutants". Unless otherwise specified, these guidelines are to be used for the analyses required by this permit. The most current version of 40 C.F.R. Part 136 can be found online at EPA's website. The link is www.epa.gov/cpahome/cfr40.htm. Finally you'll also find enclosed a brochure for NetDMRs.

Please direct all future correspondence regarding permit compliance to the following address:

Attention: Discharge Monitoring Reports
Water Management Administration – Compliance Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 425
Baltimore, Maryland 21230-1708

If you have any questions, please do not hesitate to call Kevin Cookley, Industrial and General Permits Division, at 410-537-3630.

Sincerely,



Jay G. Sakai, Director
Water Management Administration

JGS:kd
Enclosures



MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Baltimore MD 21230

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Martin O'Malley
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Lieutenant Governor

STATE DISCHARGE PERMIT NUMBER	10-DP-2546	NPDES PERMIT NUMBER	MD0063371
EFFECTIVE DATE	November 1, 2013	EXPIRATION DATE	October 31, 2018
MODIFICATION DATE:	N/A	REAPPLICATION DATE	October 31, 2017

Pursuant to the provisions of Title 9 of the Environment Article, Annotated Code of Maryland, and regulations promulgated thereunder, and the provisions of the Clean Water Act, 33 U.S.C. § 1251 *et seq.* and implementing regulations 40 CFR Parts 122, 123, 124, and 125, the Department of the Environment, hereinafter referred to as the "Department," hereby authorizes

Maryland Aviation Administration
P.O. Box 8766
BWI Airport, Maryland 21240

TO DISCHARGE FROM

Baltimore/ Washington International Thurgood Marshall Airport (BWI)

LOCATED AT

Anne Arundel County, Maryland

VIA OUTFALL(S)

003, 006, and 007, as identified and described herein and other point sources of storm water associated with industrial activity referred to herein

TO

Stoney Run (Outfall 003) and Sawmill Creek (Outfall 007), and to Cabin Branch (Outfall 006) which are protected for (Use I) water contact recreation, fishing, aquatic life, and wildlife in accordance with the following special and general conditions and map(s) made a part hereof.



I. SPECIAL CONDITIONSA.1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the effective period of this permit, the permittee is authorized to discharge storm water runoff via Outfalls 003 and 007 (Maryland Coordinates East 893.7 E and 490.2 N).

As specified below, such discharge shall be limited and monitored by the permittee for Outfall 003 on Kitten Branch approximately 1,050 feet upstream of Maryland Route 170 and for Outfall 007 at the discharge from the final storm water management ponds prior to entering the headwaters of Muddy Bridge Branch.

PARAMETER	QUANTITY OR LOADING			QUALITY OR CONCENTRATION				FREQUENCY OF ANALYSIS	SAMPLE TYPE	NOTES
	MONTHLY AVERAGE	DAILY MAXIMUM	UNITS	MINIMUM	MONTHLY AVERAGE	DAILY MAXIMUM	UNITS			
Flow	Report	Report	GPD					1/Day	Measured	(1), (3)
Chemical Oxygen Demand					Report	Report	mg/l	1/Day	24-hour Composite	(1), (3)
Ethylene Glycol					Report	Report	mg/l	1/Day	24-hour Composite	(1), (3)
Propylene Glycol					Report	Report	mg/l	1/Day	24-hour Composite	(1), (3)
Total Glycol					Report	Report	mg/l	1/Day	24-hour Composite	(1), (3)
Oil and Grease						15	mg/l	1/Quarter	Grab	(2), (3)
Nitrogen, Total (as N)	Report ⁽⁴⁾	Report	lbs/day		Report ⁽⁴⁾	Report	mg/l	1/Quarter	Grab	(4) (5)(6)
Phosphorus, Total (as P)	Report ⁽⁴⁾	Report	lbs/day		Report ⁽⁴⁾	Report	mg/l	1/Quarter	Grab	(4)(6)

I. SPECIAL CONDITIONS

A.1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS – Continued from previous page

There shall be no discharge of floating solids or persistent foam in other than trace amounts. Persistent foam is foam that does not dissipate within one half-hour of point of discharge.

- (1) Monitoring required only during the deicing season. The deicing season is defined as the first day of glycol usage associated with a precipitation event (snow, sleet, rain and/or freezing rain) and ending March 31st or two weeks after the last day of glycol usage during a precipitation-based deicing event (whichever is latest).
- (2) Samples shall be conducted during storm water discharges.
- (3) In the event that severe weather occurs and prohibits safe access to the monitoring stations, the permittee shall make every attempt to resume sampling activities at the earliest possible time. In the event that severe weather reduces the ability of the automated sampling/flow equipment to perform properly, the permittee shall make every attempt to collect representative grab and/or time-proportioned composite samples in lieu of the discrete and/or flow proportioned composite samples. Severe weather can include, but is not limited to, flooding, ice storms, sub-freezing temperatures, heavy snowfall and blizzard conditions.
- (4) Report quarterly average instead of monthly average.
- (5) Total nitrogen is defined as the sum of total Kjeldahl nitrogen and (nitrite and nitrate) nitrogen. Individual concentrations of each constituent shall also be reported. Testing for all forms of nitrogen must be performed on the same sample.
- (6) After one year (4 values collected) the Department may reduce or eliminate the monitoring requirement upon written request by the permittee.

I. SPECIAL CONDITIONS**A.2. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

During the effective period of this permit, the permittee is authorized to discharge storm water runoff from the main fuel terminal via monitoring points 301, 302, and 303 and 304 to Outfall 003 (Maryland Coordinates East 893.7 E and 490.2 N).

As specified below, such discharge shall be limited and monitored by the permittee at: Monitoring Point 301, the 48" pipe located in the storm grate located between the Light Rail tracks and the Main Fuel Farm security fence, near the Elm Road and Old Elm Road intersection; Monitoring Point 302, a 15" pipe located between the Light Rail tracks and the Main Fuel Farm security fence, near the Deicing Fluid Storage Facility; and Monitoring Point 303, a 24" pipe located next to Monitoring Point 302; and Monitoring Point 304, a 24" pipe draining the Midfield Fuel Storage Facility.

PARAMETER	QUANTITY OR LOADING			QUALITY OR CONCENTRATION				FREQUENCY OF ANALYSIS	SAMPLE TYPE	NOTES
	Quarterly AVERAGE	DAILY MAXIMUM	UNITS	MINIMUM	Quarterly AVERAGE	DAILY MAXIMUM	UNITS			
Flow	Report	Report	GPD					1/Quarter	Measured	
Oil and Grease						15	mg/l	1/Quarter	Grab	(1)

There shall be no discharge of floating solids or persistent foam in other than trace amounts. Persistent foam is foam that does not dissipate within one half-hour of point of discharge.

(1) Samples shall be collected during storm water discharges.

I. SPECIAL CONDITIONS**A.3. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

During the effective period of this permit, the permittee is authorized to discharge storm water runoff from the passenger terminal complex, runway 15R and I-195 via monitoring points 306 and 307 to Outfall 003 (Maryland Coordinates East 893.7 E and 490.2 N).

As specified below, such discharge shall be limited and monitored by the permittee at Monitoring Point 306 (a 108" x 72" rectangular culvert) which discharges runoff from the main terminal to Kitten Branch, and Monitoring Point 307, the exit from a 54" pipe to Kitten Branch discharging runway and parking area drainage.

PARAMETER	QUANTITY OR LOADING			QUALITY OR CONCENTRATION			FREQUENCY OF ANALYSIS	SAMPLE TYPE	NOTES
	Quarterly Average	Daily Maximum	UNITS	Quarterly Average	Daily Maximum	UNITS			
Flow	Report	Report	GPD				1/Quarter	Measured	(1)(3)
Chemical Oxygen Demand				Report	Report	mg/l	1/Month	24-hour Composite	(1)(3)
Ethylene Glycol				Report	Report	mg/l	1/Month	24-hour Composite	(1)(3)
Propylene Glycol				Report	Report	mg/l	1/Month	24-hour Composite	(1)(3)
Total Glycol				Report	Report	mg/l	1/Month	24-hour Composite	(1)(3)
Oil and Grease				Report	Report	mg/l	1/Quarter	Grab	(2)

There shall be no discharge of floating solids or persistent foam in other than trace amounts. Persistent foam is foam that does not dissipate within one half-hour of point of discharge.

- (1) Monitoring required only during the deicing season, defined as the first day of glycol usage associated with a precipitation event (snow, sleet, rain and/or freezing rain) and ending March 31st or two weeks after the last day of glycol usage during a precipitation-based deicing event (whichever is latest).
- (2) Monitoring shall be conducted during storm water discharges.
- (3) Frequency of Analysis for Monitoring Point 307 shall be 1/Year.

I. SPECIAL CONDITIONS**A.4. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

During the effective period of this permit, the permittee is authorized to discharge storm water runoff from the general aviation fuel terminal via Outfall 006 (Maryland Coordinates East 893.7 E and 490.2 N).

As specified below, such discharge shall be limited and monitored by the permittee at Monitoring Point 601, the 6" pipe from the oil/water separator.

PARAMETER	QUANTITY OR LOADING			QUALITY OR CONCENTRATION				FREQUENCY OF ANALYSIS	SAMPLE TYPE	NOTES
	MONTHLY AVERAGE	DAILY MAXIMUM	UNITS	MINIMUM	MONTHLY AVERAGE	DAILY MAXIMUM	UNITS			
Flow	Report	Report	GPD					1/Quarter	Estimated	
Oil and Grease						15	mg/l	1/Quarter	Grab	(1)

There shall be no discharge of floating solids or persistent foam in other than trace amounts. Persistent foam is foam that does not dissipate within one half-hour of point of discharge.

(1) Samples shall be collected during storm water discharges.

I. SPECIAL CONDITIONS

B. DEFINITIONS

1. "Bypass" means the intentional diversion of wastes from any portion of a treatment facility.
2. "Composite sample" means a combination of individual samples obtained at least at hourly intervals over a time period. Either the volume of each individual sample is proportional to discharge flow rates or the sampling interval (for constant volume samples) is proportional to the flow rates over the time period used to produce the composite.
3. "Daily determination of concentration" means one analysis performed on any given sample representing flow during a calendar day, with one number in mg/l or other appropriate units as an outcome.
4. The "daily maximum" effluent concentration means the highest reading of any daily determination of concentration.
5. "Deicing fluid discharges" means aircraft deicing and anti-icing fluids entrained in storm water discharges.
6. "Estimated" flow means a calculated volume or discharge rate which is based on a technical evaluation of the sources contributing to the discharge including, but not limited to, pump capabilities, water meters, and batch discharge volumes.
7. "Grab sample" means an individual sample collected over a period of time not exceeding 15 minutes. Grab samples collected for pH and total residual chlorine shall be analyzed within 15 minutes of time of sample collection.
8. "Measured" flow means any method of liquid volume measurement the accuracy of which has been previously demonstrated in engineering practice, or for which a relationship to absolute volume has been obtained.
9. The "monthly, quarterly, semi-annual, or annual average" effluent concentration means the value calculated by computing the arithmetic mean of all the daily determinations of concentration made during any calendar-month, 3-month, 6-month, or 12-month period respectively.
10. "Oil and Grease" refers to the use of and results yielded from EPA Method 1664 (or any EPA approved revisions of this analytical test method approved for use with Clean Water Act monitoring programs).
11. "Recorded" flow, pH, temperature, etc., means any method of providing a permanent, continuous record including, but not limited to, circular and strip charts.
12. "Upset" means the exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

C. TOXIC POLLUTANT REPORTING

The permittee shall notify the Department as soon as it is known or suspected that any toxic pollutants which are not specifically limited by this permit have been discharged at levels specified in 40 CFR Part 122.42(a).

D. REMOVED SUBSTANCES

- I. Within 30 days after notification by the Department, the permittee shall provide information on the disposal of any removed substances, as defined by General Condition B.7, including the following information:
 - a. A suitable map showing all areas used for disposal of removed substances.
 - b. The physical, chemical, and biological characteristics, as appropriate; quantities of any removed substances; and the method of disposal.
 - c. If disposal is handled by persons other than the permittee, identification of the contractor or subcontractor, their mailing address, and the information specified in a and b above.
2. The Department's notification may also require the permittee to provide the above information prior to the use of new or additional disposal areas, contractors, or subcontractors.

E. ANALYTICAL LABORATORY

Within 30 days after the effective date of this permit, the permittee shall submit to the Department the name and address of the analytical laboratory (including the permittee's own laboratory) which is used to perform the monitoring required by this permit.

If the laboratory changes during the effective period of this permit, the permittee shall notify the Department of the new laboratory within 30 days after the change.

F. WASTEWATER OPERATOR CERTIFICATION – [Reserved]

G. FLOW MONITORING

In lieu of providing measured flow at and monitoring points 301, 302, 303, 304 and 601 (defined in the Special Conditions Definitions section), the permittee may estimate flows and submit the following information at the time of submission of the initial discharge monitoring report and/or upon any change in the methodology:

1. a description of the methodology used to estimate flow at each outfall where flow measurement equipment is not present;
2. documentation appropriate to the methodology utilized which provides information necessary to support the validity of the reported flow estimate. If actual measurements or observations are made, a description of typical sampling times, locations, and persons performing the measurements/observations should also be provided.

3. a description of the factors (e.g., batch discharges, intermittent operation, etc.) which cause flow at the outfall to fluctuate significantly from the estimate provided.

H. FLOW BASIS FOR ANNUAL DISCHARGE PERMIT FEE – [Reserved]

I. REAPPLICATION FOR A PERMIT

The Department is implementing a schedule for issuance of discharge permits grouped by geographical areas (watersheds). To implement the watershed-based schedule, the Department may revoke and reissue this permit concurrently with other permits in the watershed. Unless the Department grants permission for a later date, the permittee shall submit a renewal application by no later than **12 months prior to the expiration date** or notify the Department of the intent to cease discharging by the expiration date. In the event that a timely and sufficient reapplication has been submitted and the Department is unable, through no fault of the permittee, to issue a new permit before the expiration date of this permit, the terms and conditions of this permit are automatically continued and remain fully effective and enforceable.

J. PERMIT REOPENER FOR TOTAL MAXIMUM DAILY LOAD (TMDL)

This permit may be reopened as a major modification to implement any applicable requirements associated with a Total Maximum Daily Load (TMDL) issued or approved for this watershed (Stony Run, 02.13.09.06, Saw Mill Creek and Cabin Branch, 02.13.09.03) , including but not limited to: biological integrity.

At this time, the Department has determined the potential discharge of total suspended solids, total nitrogen and total phosphorus from the facility is not significant. This determination has been based on facility operations and/or discharge characteristics. Therefore no limits have been established at this time.

To ensure the Chesapeake Bay and its tributaries are protected from discharges of sediments, nitrogen and phosphorus, this permit may be reopened as a major modification to implement any applicable requirements associated with the Chesapeake Bay Total Maximum Daily Load (TMDL) for Sediments, Nitrogen and Phosphorus, approved December 29, 2010. The permittee may become subject to a Department-issued General Permit regarding the discharge of such pollutants.

K. BIOMONITORING PROGRAM

1. Within three months of the effective date of the permit, the permittee shall submit to the Department for approval a study plan to evaluate wastewater toxicity at monitoring points 306 and Outfall 007 by using biomonitoring.
2. The study plan should include a discussion of:
 - a. discharge and deicing material volume variability
 - b. sampling & sample handling
 - c. source & age of test organisms
 - d. source of dilution water
 - e. testing procedures/experimental design
 - f. data analysis
 - g. quality control/quality assurance
 - h. report preparation

- i. testing schedule/monitoring frequency
3. The study plan must include an analysis to identify representative events which would include an evaluation of glycol usage, precipitation events which are likely to produce deicing events, and an analysis of the recurrence frequencies of precipitation events during the deicing season
4. The testing program shall consist of two definitive acute testing events, taken during representative events. This testing shall be initiated during the next available deicing season following the Department's acceptance of the study plan and be repeated during each deicing season. Each of the two testing events shall include a 24-hour test using fathead minnow and a 24-hour test using a daphnid species.
5. The samples used for biomonitoring shall be collected at the same location as the samples analyzed for the effluent limitations and monitoring requirements for this outfall.
6. Testing shall be conducted in accordance with the procedures described in Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, August 1993, EPA/600/4-90/027F (as updated).
7. Test results shall be submitted to the Department within one month of completion of each set of tests.
8. Test results shall be reported in accordance with MDE/WMA "Reporting Requirements for Effluent Biomonitoring Data," 3/21/03.
9. If testing is not performed in accordance with MDE-approved study plan, additional testing may be required by the Department.
10. If the test results of any two consecutive valid toxicity tests for a given monitoring station conducted within any deicing period show acute toxicity ($LC\ 50 \leq 100\%$), the permittee shall provide the following information to MDE:
 - a. Written notice to MDE of receipt of "failed" test results within ten days of MAA receipt of the second consecutive "failed" test results.
 - b. Brief description of expected cause of "failure".
 - c. Climatic conditions of the event and precedent 72 hours (accounting for snow)
 - d. Summary of estimated daily (total) glycol use for the period
 - e. Summary of estimated daily (total) land deicing activities and materials for the period
 - f. Summary of glycol recovery efforts to include estimates of total volume collected
 - g. Description of remedial actions taken in response to the event
 - h. Description of remedial actions planned as a result of observed toxicity.
 - i. Plan and schedule to conduct "confirmatory" toxicity testing provided samples can be collected during the remainder of the deicing season. If "confirmatory" sampling cannot be conducted as a result of the cessation of deicing operations for that season, the first toxicity test results of the next deicing season shall constitute "confirmatory" testing.
11. If on the basis of this information (above), an upset has not occurred and acute toxicity is confirmed in accordance with section 10.i above, the permittee shall:
 - a. Eliminate the source of toxicity through operational changes as soon as possible, or

- b. Conduct a Toxicity Reduction Evaluation (TRE). If the permittee repeats the toxicity testing as stated above and the results of the repeat test do not confirm the acute toxicity, the permittee shall complete any remaining testing required.
 - c. Any actions taken to eliminate toxicity from monitoring point 306 shall be taken at monitoring point 307.
12. If operations change so that there is a significant change in the nature of the discharge, the Department may require the permittee to conduct a new set of tests.
13. Submit all Biomonitoring related materials to:

Maryland Department of the Environment
WMA – Compliance Program
1800 Washington Boulevard-STE 420
Baltimore, Maryland 21230-1708

L. TOXICITY REDUCTION EVALUATION

The permittee shall conduct a Toxicity Reduction Evaluation (TRE) as stated in Biomonitoring Condition 11 (above) or when a review of toxicity test data by the Department indicates unacceptable acute or chronic effluent toxicity. A TRE is a methodical, stepwise investigation conducted to identify the causative agents of effluent toxicity, identify and isolate the potential source(s), determine the effectiveness of control options, implement the necessary control measures and then confirm the reduction in toxicity. All technically reasonable actions taken to resolve toxicity issues such as alternative product evaluations and operational changes shall constitute TRE activities.

1. Within 90 days following “confirmatory” toxicity testing, or notification by the Department that a TRE is required, the permittee shall submit a plan of study and schedule for conducting a TRE. The permittee shall conduct the TRE study consistent with the submitted plan and schedule.
2. In that there is no existing guidance for conducting TREs for Storm Water Discharges, this plan should follow the framework presented in Generalized Methods for Conducting Industrial Toxicity Reduction Evaluations (EPA/600/2-88/070) *and Clarifications Regarding Toxicity Reduction and Identification Evaluations in the National Pollutant Discharge Elimination System Program* (March 27, 2001).
3. At a minimum, the plan of study shall evaluate aircraft and pavement deicing product formulations used during the sampled events, application practices during the events, and discharge mitigation measures employed during the events. Particularly, this includes an evaluation of the deicing and storm water pollution prevention practices.
4. Beginning 60 days following the date of the Department's acceptance of the TRE study plan and every 60 days thereafter, the permittee shall submit progress reports including all relevant test data to the Department. This shall continue until completion of the toxicity reduction confirmation.
5. Within 60 days following completion of the toxicity identification, or the source identification phase of the TRE, the permittee shall submit to the Department a plan and schedule for implementing those measures necessary to eliminate acute toxicity and/or reduce chronic toxicity to acceptable levels. The implementation of these measures shall begin as soon as

practicable with due consideration for deicing season and other State and Federal (i.e. FAA) requirements. Any changes shall also be reflected in Special Conditions H, N, and O as necessary.

6. Within 60 days after completing implementation of the control measures to eliminate or reduce toxicity, the permittee shall submit to the Department for approval a study plan to confirm the elimination or reduction of toxicity by using biomonitoring.
7. If, for any reason, the implemented measures do not result in compliance with the Department's toxicity limitations, the permittee shall continue the TRE.

M. MIXING ZONES AND POLLUTION PREVENTION – [Reserved]

N. PROTECTION OF WATER QUALITY

It is a violation of this permit to discharge any substance not otherwise listed under the permit's "Effluent Limitations and Monitoring Requirements" special conditions at a level which would cause or contribute to any exceedance of the numerical water quality standards in COMAR 26.08.02.03 unless the level and the substance were disclosed in writing in the permit application prior to the issuance of the permit. If a discharge regulated by this permit causes or contributes to an exceedance of the water quality standards in COMAR 26.08.02.03, including but not limited to the general water quality standards, or if the discharge includes a pollutant that was not disclosed or addressed in the public record for the permit determination, the Department is authorized to modify, suspend or revoke this permit or take enforcement action to address unlawful discharges of pollutants.

O. DEICING FLUID DISCHARGE MONITORING PLAN

Within 30 days after the effective date of this permit, the permittee shall submit to the Department for approval a Deicing Fluid Discharge Monitoring Plan. This plan shall describe specific activities to satisfy the monitoring requirements in this permit, including flow and water quality monitoring at Outfalls 003 and 007 and Monitoring Points 301, 302, 303, 304, 306, 307 and 601; and deicing discharge limitation I.P.1. Details described on the plan shall include methods, frequency, and periods of monitoring. The monitoring plan implemented during the previous deicing season shall apply in the interim pending Departmental approval of the new plan.

The permittee shall submit to the Department for approval any changes in the plan prior to their implementation.

P. DEICING FLUID DISCHARGES

1. The permittee shall implement and operate aircraft deicing fluid collection facilities and best management practices (BMPs) which reduce the total volume of aircraft deicing fluids discharged from the facility to 30% or less of the total volume of fluids applied at the facility on an annual basis, in accordance with the permittee's current approved Deicing Fluids Collection and Best Management Practices Plan.
2. The permittee shall perform monthly inspections, at a minimum, of deicing activities and BMPs throughout the airport, and maintain a log recording the results of each inspection and corrective actions required to ensure compliance with the permittee's current Deicing Fluids Collection and Best Management Practices Plan. The permittee shall incorporate into the plan

and implement a set of tracking and follow-up procedures to ensure that appropriate actions are taken in response to the inspections.

3. The permittee shall track and report to the Department the volume of aircraft deicing fluids applied at the facility and the volume of fluids which are discharged annually in accordance with the permittee's current approved Deicing Fluid Discharge Monitoring Plan.
4. The permittee shall conduct an annual review of new aircraft and pavement deicing and anti-icing product developments and shall evaluate their potential applicability for use at BWI. This evaluation shall consider potential environmental benefits, operational safety, operational feasibility, and economic feasibility. The results of each annual review, including all conclusions, supporting rationale, and revisions to the permittee's Deicing Fluids Collection and Best Management Practices Plan shall be submitted to the Department for approval by July 15 of each year.
5. The use of urea as a pavement deicer is prohibited.

Q. WATER TREATMENT CHEMICALS

1. The permittee is advised to obtain and review aquatic toxicity data (from the manufacturer or vendor) on any water treatment product that will discharge to waters of the State.
2. The permittee currently uses the following water treatment preparation in the wastewater discharge:

EcoFlo (deicing fluid)
3. If the permittee changes any of the water treatment products, before commencing the use of the new product, the permittee shall submit to the Department (Industrial and General Permits Division) aquatic toxicity data and manufacturer's information on the chemical composition of the product and the concentrations that will exist in the effluent. Based on this information, if the Department determines that new wastewater may cause aquatic toxicity, the Department may direct the permittee to perform additional bio-monitoring of the wastewater.

R. IDENTIFICATION OF NUTRIENT SOURCES

The permittee shall submit to the Department, no later than 4 months after the effective date of the permit, an inventory of all significant total phosphorus (TP) and total nitrogen (TN) generating activities and chemical formulations used at the facility which contain TN and/or TP that may end up being discharged to waters of the State. This inventory shall include an estimate (to the nearest 100 lbs/yr) of the annual quantity of TN and TP expected from each source/generating activity. This will require completing a TN and TP material balance for the entire facility.

The required submission to the Department shall also include a facility-wide summary report which totals the annual load of TN and TP being discharged to the waters of the state by source and by outfall. TN and TP coming in with the raw intake water from the Chesapeake Bay should not be included in the inventory. Sampling is recommended to be used, where appropriate, to validate TN and TP levels in both the influent and the effluent. This inventory shall be an estimate (to the nearest 100 lbs/yr) of the annual quantity of Total TN and TP expected from each source/generating activity. Thus an explanation of all estimation methodologies shall be included.

Minor sources (less than 50 lbs/yr for either TN or TP) are not required to be included. Potential sources to be evaluated shall include, but not be limited to, the following:

Possible total phosphorus and total nitrogen generating sources:

Sanitary wastewater
Scrubber wastewater
Demineralizer regenerate

Possible chemical additive/formulation sources:

Boiler operation
Cooling tower operation
Wastewater treatment
Anti-corrosion
Anti-scaling
Equipment cleaning

S. STORM WATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

The following requirements may be incorporated into the next annual update of the current Deicing Fluids Collection and Best Management Practices Plan (see Special Condition P) or be developed as a separate plan (which may then reference the deicing fluids plan). Only those portions of the facility that are involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling and lubrication), equipment cleaning operations or deicing operations are addressed below.

In addition to the following requirements, the permittee must also comply with the requirements listed in Special Condition R.

I. SWPPPs - General

The permittee shall have and implement a storm water pollution prevention plan. The storm water pollution prevention plan shall be prepared in accordance with sound engineering practices. The plan shall identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges associated with industrial activity from the facility.

In addition, the plan shall describe and ensure the implementation of practices which are to be used to reduce the pollutants in storm water discharges associated with industrial activity at the facility and to assure compliance with the terms and conditions of this permit.

- a. In developing this plan, the permittee may use as a reference "Storm Water Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices" (EPA Document #EPA832-R-92-006) or the "Summary Guidance" (EPA Document #EPA833-R-92-002). These documents can be obtained from the EPA Clearinghouse (phone: 1-800-490-9198) or the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161 (phone: 703-605-6000).
- b. The plan shall be signed in accordance with Part II.C.18 of this permit, and be retained on site in accordance with Part II.C.1 of this permit. The permittee shall make plans available upon request to the Department, and in the case of a storm water discharge

associated with industrial activity which discharges to a municipal separate storm sewer system with an NPDES permit, to the municipal operator of the.

- c. If the plan is reviewed by the Department, the Department will notify the permittee, at any time, that the plan does not meet one or more of the minimum requirements of this Part. After such notification from the Department, the permittee shall make changes to the plan to meet the objections of the Department and shall submit to the Department a written certification that the requested changes have been made and implemented. Unless otherwise provided by the Department, the permittee shall have 90 days after such notification to make the necessary changes.
- d. The permittee shall amend the plan whenever there is a change in design, construction, operation, or maintenance which creates a potential for the discharge of pollutants to the waters of the State or if the SWPPP proves to be ineffective in achieving the general objectives of controlling pollutants in storm water discharges associated with industrial activity. Amendments to the plan may be reviewed by the Department as described above.

2. SWPPP - Contents

The plan shall include, at a minimum, the following items:

- a. Each plan shall provide a description of potential sources which may be reasonably expected to add pollutants to storm water discharges. Each plan shall identify all activities and materials which may potentially be significant pollutant sources. Each plan shall include:
 - i. A site map indicating an outline of the drainage area of each storm water outfall; each existing structural control measure to reduce pollutants in storm water runoff; and surface water bodies, including drainage ditches and wetlands.
 - ii. A topographic map (or other map, if a topographic map is unavailable), extending one-quarter of a mile beyond the property boundaries of the facility. The requirements of this condition may be included in the site map required above, if appropriate.
 - iii. A narrative description of significant materials that have been treated, stored, or disposed in a manner which allowed exposure to storm water at anytime from three years prior to obtaining coverage under this permit until the time the present method of on-site storage or disposal was initiated; materials management practices employed to minimize contact of these materials with storm water runoff; materials loading and access areas; the location and a description of existing structural and non-structural control measures to reduce pollutants in storm water runoff; and a description of any treatment the storm water receives.
 - iv. For each area of the facility that generates storm water discharges associated with industrial activity with a reasonable potential for containing pollutants, a prediction of the direction of flow, and an estimate of the types of pollutants which are likely to be present in storm water discharges associated with industrial activity; and

- v. A summary of all existing sampling data describing pollutants in storm water discharges.
- b. The permittee shall develop a description of storm water management controls appropriate for the facility, and implement such controls. The appropriateness and priorities of controls in a plan shall reflect identified potential sources of pollutants at the facility. The description of storm water management controls shall address the following minimum components, including a schedule for implementing such controls:
 - i. A preventive maintenance program that involves timely inspection and maintenance of storm water management devices (cleaning oil/water separators, catch basins) as well as inspecting and testing plant equipment and systems to uncover conditions that could cause breakdowns or failures resulting in discharges of pollutants to surface waters.
 - ii. Good housekeeping that requires the maintenance of a clean, orderly facility.
 - iii. Spill prevention and response procedures shall be identified in the plan and made known to the appropriate personnel. The necessary equipment to implement a cleanup shall be available to the appropriate personnel.
 - iv. The plan shall prevent sediment and erosion by identifying areas which, due to topography, activities, or other factors, have a high potential for significant soil erosion, and identifying measures to limit erosion.
 - v. The plan shall contain a narrative consideration of the appropriateness of traditional storm water management practices (practices other than those which control the generation or source(s) of pollutants) used to divert, infiltrate, reuse, or otherwise manage storm water runoff in a manner that reduces pollutants in storm water discharges from the site. The plan shall provide that measures determined to be reasonable and appropriate shall be implemented and maintained. The potential of various sources at the facility to contribute pollutants to storm water discharges associated with industrial activity (see 2.a - description of potential pollutant sources) shall be considered when determining reasonable and appropriate measures. Appropriate measures may include: vegetative swales and practices, reuse of collected storm water (such as for a process or as an irrigation source), inlet controls (such as oil/water separators), snow management activities, infiltration devices, and wet detention/retention devices.
 - vi. Qualified plant personnel shall be identified to visually inspect designated equipment and plant areas. A site inspection shall be conducted annually by such personnel to verify that the description of potential pollutant sources required under 2.a is accurate, the drainage map has been updated to reflect current conditions, and the controls to reduce pollutants identified in the storm water pollution prevention plan are being implemented and are adequate. In particular, material handling areas shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. A tracking or follow-up procedure shall be used to ensure that each inspection results in an appropriate response.

- vii. Spills or other discharge incidents, and information describing the quality and quantity of storm water discharges shall be in the facility records. Maintenance activities shall be documented and recorded with inspection and discharge records. All records shall be maintained at the facility, for a minimum of three years. This period shall be automatically extended during the course of litigation, or when requested by the Department.
- c. Storm water management programs may include requirements for Spill Prevention Control and Countermeasure (SPCC) plans under Section 311 of the Clean Water Act or Best Management Practices (BMPs) programs otherwise required by any NPDES permit and may incorporate any part of such plans into the storm water pollution prevention plan by reference.
- d. Special Requirements for Storm Water Discharges Associated with Industrial Activity to Municipal Separate Storm Sewer Systems: Facilities covered by this permit shall comply with applicable requirements in municipal storm water management programs developed under State/NPDES permits issued for the discharge of the municipal separate storm sewer system that receives the facility's discharge, provided the municipal operator has notified the discharger of such conditions. These facilities shall make storm water pollution prevention plans available to the municipal operator of the system upon request.
- e. Storage piles of salt used for deicing or other commercial or industrial purposes shall be enclosed or covered to prevent exposure to precipitation.
- f. The description of the Storm Water Pollution Prevention Committee shall identify specific individuals within the plant organization who are responsible for developing the SWPPP and assisting the plant manager in its implementation, maintenance, and revision. The activities and responsibilities of the committee should address all aspects of the facility's SWPPP.
- g. Employee training programs shall inform personnel at all levels of responsibility of the components and goals of the storm water pollution prevention plan. Training should address topics, such as spill response, good housekeeping and material management practices. A pollution prevention plan shall identify periodic dates for such training.

3. SWPPP - Additional Requirements For Facilities Subject To SARA Title III, Section 313 Requirements

SWPPPs for facilities subject to reporting requirements under SARA Title III, Section 313 (42 U.S.C. § 11023) are required to include, in addition to the information required above, a discussion of the facility's conformance with the following (appropriate) guidelines:

- a. In areas where Section 313 water priority chemicals are stored, processed or otherwise handled, appropriate containment, drainage control and/or diversionary structures shall be provided. At a minimum, one of the following preventive systems or its equivalent shall be used:
 - i. Curbing, culverts, gutters, sewers or other forms of drainage control to prevent or minimize the potential for storm water runoff to come into contact with significant sources of pollutants; or

- ii. Roofs, covers, liners, or other forms of appropriate protection to prevent storage piles from leaching or exposure to storm water and wind.
- b. The SWPPP shall include a complete discussion of measures taken to conform with the following applicable guidelines, other effective storm water pollution prevention procedures, and applicable State rules, regulations and guidelines.
 - i. No tank or container shall be used for the storage of a Section 313 water priority chemical unless its material and construction are compatible with the material stored and conditions of storage, such as pressure and temperature, etc. Liquid storage areas for Section 313 water priority chemicals shall be operated to prevent discharges of Section 313 chemicals by means such as secondary containment for at least the entire contents of the largest single tank plus sufficient freeboard to allow for precipitation, a strong spill contingency and integrity testing plan, and/or other equivalent measures.
 - ii. Truck and rail car loading and unloading areas for liquid Section 313 water priority chemicals shall be operated to prevent discharges of Section 313 water priority chemicals by means such as the placement and maintenance of drip pans (including the proper disposal of materials collected in the drip pans) where spillage may occur (such as hose connections, hose reels and filler nozzles) for use when making and breaking hose connections; a strong spill contingency and integrity testing plan; and/or other equivalent measures.
 - iii. In plant areas where Section 313 water priority chemicals are transferred, processed or otherwise handled, piping, processing equipment and materials handling equipment shall be designed and operated so as to prevent discharges of Section 313 chemicals, and be composed of materials that are compatible with the substances handled. Additional protection, such as covers or guards to prevent wind blowing, spraying or releases from pressure relief vents from causing a discharge of Section 313 water priority chemicals to the drainage system shall be provided, as appropriate, to control the releases.
 - iv. Discharges from secondary containment areas.
 - (a) Drainage from secondary containment shall be restrained by valves or other positive means to prevent a spill or other excessive leakage of Section 313 water priority chemicals into the drainage system. After a visual inspection of the storm water and determination that no product is present, containment areas may be emptied by pumps or ejectors; however, these shall be manually activated.
 - (b) Flapper-type drain valves shall not be used to drain containment areas. Valves used for the drainage of containment areas shall be of manual, open-and-close design.
 - (c) Records of the frequency and estimated volume (in gallons) of discharges from containment areas shall be kept at the facility for a minimum of three years.

(d) In lieu of facility drainage engineered as described above, the final discharge of all in-facility storm sewers shall be equipped with a diversion system that could, in the event of an uncontrolled spill of Section 313 water priority chemicals, return the spilled material to the facility.

(e) Areas of the facility [those not addressed in paragraphs (a), (b), (c) or (d)], from which runoff which may contain Section 313 water priority chemicals or spills of Section 313 water priority chemicals and which could cause a discharge shall incorporate the necessary drainage or other control features to prevent discharge of spilled or improperly disposed material and ensure the mitigation of pollutants in runoff or leachate.

- c. Facilities shall have the necessary security systems to prevent accidental or intentional entry which could cause a discharge or disrupt treatment. Security systems shall be described in the plan and address fencing, lighting, vehicular traffic control, and securing of equipment and buildings.
- d. The SWPPP shall assess the potential of various sources at the plant to contribute pollutants to storm water discharges associated with industrial activity. The plan shall include an inventory of the types of materials handled. Facilities shall include in the plan a description of releases to land or water of SARA Title III water priority chemicals that have occurred at any time after July 1, 1989. Each of the following shall be evaluated for the reasonable potential for contributing pollutants to runoff: loading and unloading operations; outdoor storage activities; outdoor manufacturing or processing activities; significant dust or particulate generating processes; and on-site waste disposal practices. Factors to consider include the toxicity of chemicals; quantity of chemicals used, produced, or discharged; the likelihood of contact with storm water; and history of significant leaks or spills of toxic or hazardous pollutants.

T. STORM WATER POLLUTION PREVENTION PLAN ADDITIONAL REQUIREMENTS

1. Airport Tenants

If the airport's tenant has a Storm Water Pollution Prevention Plan (SWPPP) for discharges from their own areas of the airport, that SWPPP must be integrated with the plan for the entire airport. Tenants of the airport facility include air passenger or cargo companies, fixed based operators, and other parties who have contracts with the airport authority to conduct business operations on airport property and whose operations result in storm water discharges associated with industrial activity.

2. Drainage Area Site Map.

Identify where any of the following may be exposed to precipitation/surface runoff: aircraft and runway deicing operations; fueling stations; aircraft, ground vehicle, and equipment maintenance/cleaning areas; storage areas for aircraft, ground vehicles, and equipment awaiting maintenance.

3. Potential Pollutant Sources.

Include in the airport's inventory of exposed materials a description of the potential pollutant sources from the following activities: aircraft, runway, ground vehicle and equipment maintenance and cleaning; aircraft and runway deicing operations (including apron and

centralized aircraft deicing stations, runways, taxiways and ramps). If the airport uses deicing chemicals, it must maintain a record of the types (including the Material Safety Data Sheets [MSDS]) used and the monthly quantities, either as measured or, in the absence of metering, as estimated to the best of its knowledge. This includes all deicing chemicals, not just glycols, urea or potassium acetate (urea alternate). Tenants or other fixed-based operations that conduct deicing operations must provide the above information to the airport authority for inclusion in any comprehensive airport SWPPPs.

4. Good Housekeeping Measures.

- a. Aircraft, Ground Vehicle and Equipment Maintenance Areas. Describe and implement measures that prevent or minimize the contamination of storm water runoff from all areas used for aircraft, ground vehicle and equipment maintenance (including the maintenance conducted on the terminal apron and in dedicated hangers). Consider the following practices (or their equivalents): performing maintenance activities indoors; maintaining an organized inventory of material used in the maintenance areas; draining all parts of fluids prior to disposal; preventing the practice of hosing down the apron or hanger floor; using dry cleanup methods; and collecting the storm water runoff from the maintenance area and providing treatment or recycling.
- b. Aircraft, Ground Vehicle and Equipment Cleaning Areas. Clean equipment only in the areas identified in the SWPPP and site map and clearly demarcate these areas on the ground. Describe and implement measures that prevent or minimize the contamination of storm water runoff from cleaning areas.
- c. Aircraft, Ground Vehicle and Equipment Storage Areas. Store all aircraft, ground vehicles and equipment awaiting maintenance in designated areas only. Consider the following BMPs (or their equivalents): storing aircraft and ground vehicles indoors; using drip pans for the collection of fluid leaks; and perimeter drains, dikes, or berms surrounding the storage areas.
- d. Material Storage Areas. Maintain the vessels of stored materials (e.g., used oils, hydraulic fluids, spent solvents, and waste aircraft fuel) in good condition, to prevent or minimize contamination of storm water. Also plainly label the vessels (e.g., "used oil," "Contaminated Jet A," etc.). Describe and implement measures that prevent or minimize contamination of precipitation/runoff from these areas. Consider the following BMPs (or their equivalents): storing materials indoors; storing waste materials in a centralized location; and installing berms/dikes around storage areas.
- e. Airport Fuel System and Fueling Areas. Describe and implement measures that prevent or minimize the discharge of fuel to the storm sewer/surface waters resulting from fuel servicing activities or other operations conducted in support of the airport fuel system. Consider the following BMPs (or their equivalents): implementing spill and overflow practices (e.g., placing absorptive materials beneath aircraft during fueling operations); using dry cleanup methods; and collecting storm water runoff.
- f. Source Reduction. Continue to consider alternatives to the use of urea and glycol-based deicing chemicals to reduce the aggregate amount of deicing chemicals used and/or lessen the environmental impact. Chemical options to replace ethylene glycol, propylene glycol, and urea include: potassium acetate, magnesium acetate, calcium acetate, and anhydrous sodium acetate.
 - i. Runway Deicing Operation: Continue to evaluate, at a minimum, whether over-application of deicing chemicals occurs by analyzing application rates and adjusting as necessary, consistent with considerations of flight safety. Describe how the permittee has already considered or implemented these BMP options (or their equivalents): metered application of chemicals; pre-wetting dry chemical constituents prior to application; installing a runway ice detection system; implementing anti-icing operations as a preventive measure against ice buildup.

- ii. Aircraft Deicing Operations: Determine whether excessive application of deicing chemicals occurs and adjust as necessary, consistent with considerations of flight safety. The Department intends for this evaluation to be carried out by the personnel most familiar with the particular aircraft and flight operations in question (versus an outside entity such as the airport authority). Describe how the permittee has considered or implemented the use of alternative deicing/anti-icing agents as well as containment measures for all applied chemicals.
- g. Management of Runoff. Where deicing operations occur, describe and implement a program to control or manage contaminated runoff to reduce the amount of pollutants being discharged from the site. Describe how the permittee has considered or implemented the following BMP options (or their equivalents): dedicated deicing facilities with runoff collection/recovery systems; using vacuum/collection trucks; storing contaminated storm water/deicing fluids in tanks and releasing controlled amounts to a publicly owned treatment works; collecting contaminated runoff in a wet pond for biochemical decomposition (be aware of attracting wildlife that may prove hazardous to flight operations); directing runoff into vegetative swales or other infiltration measures; recovering deicing materials when these materials are applied during non-precipitation events (e.g., covering storm sewer inlets, using booms, installing absorptive interceptors in the drains, etc.) to prevent these materials from later becoming a source of storm water contamination. Used deicing fluid should be recycled whenever possible.

U. STORM WATER DISCHARGES ASSOCIATED WITH NON-INDUSTRIAL ACTIVITY FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS

The following requirements may be incorporated into the next annual update of the current SWPPP (see Special Condition R) or be developed as a separate plan. Only non-industrial portions of the facility are addressed below.

1. Storm Water Management Plan-General

The permittee shall have and implement a storm water management plan. The plan shall be prepared in accordance with sound engineering practices. The plan shall identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges associated with non-industrial activity from the facility.

The plan shall include the following:

- a. The best management practices (BMPs) to be implemented and the measurable goals to be used for each of the minimum control measures;
- b. A schedule for BMP and storm water management program implementation;
- a. A description of the entities that will implement the BMPs and the storm water management program components to satisfy each of the minimum control measures under P.2 below; and
- c. A fiscal analysis of the anticipated expenditures to implement the minimum control measures.

2. Minimum Control Measures

The permittee shall ensure that the following minimum control measures are implemented in the areas associated with non-industrial storm water. The permittee shall define appropriate BMPs and develop measurable goals for each measure. Additionally, a list of entities responsible for BMP implementation and a schedule for each control measure shall be developed.

Any of these measures may be implemented by the permittee or another entity operating at the facility. If the permittee will rely on another entity to satisfy one or more of the following minimum control measures, the permittee remains responsible for compliance with all conditions of this permit.

a. Personnel Education and Outreach.

Permittee shall implement and maintain a personnel education and outreach program to help reduce the discharge of pollutants caused by storm water runoff. Personnel education and outreach can be coordinated with other portions of the permittee's storm water management program, developed independent of other pollution control efforts, or implemented by an entity other than the permittee. At a minimum, the personnel education program shall contain information about the impacts of storm water discharges on receiving waters, why controlling these discharges is important, and what the personnel can do to reduce pollutants in storm water runoff.

b. Public Involvement and Participation.

Permittee shall implement and maintain a public involvement and participation program. The permittee shall, at a minimum, comply with all State and federal public notice requirements in actions or decisions made having to do with storm water management.

c. Illicit Discharge Detection and Elimination.

Permittee shall develop, implement, and maintain a program to identify and eliminate illicit storm drain system connections and non-storm water discharges to the maximum extent practicable. The program developed to satisfy this minimum control measure shall contain elements to field screen storm drain system outfalls, inspect the storm drain system for the purpose of identifying the source of any illicit discharges, and eliminate any illegal connection or illicit discharge to the storm drain system. The illicit discharge program shall also contain components to address illegal dumping and spills.

This minimum control measure may be implemented and maintained by the permittee or by another responsible entity. If the responsibilities for complying with this minimum control measure are to be shared between the permittee and another responsible entity, the relationship and specific duties of all participating entities shall be outlined in the storm water management plan.

At a minimum, a program developed to implement illicit discharge detection and elimination to satisfy this control measure shall contain the following:

1. A map showing the extent of the storm drain system;
2. The legal means to provide for entering onto private property to investigate and eliminate illicit storm drain system discharges;
3. Procedures to field screen storm drain outfalls on a consistent basis;
4. Inspection procedures for identifying the source of any suspected illicit discharges to the storm drain system;
5. Enforcement and penalty procedures;

6. Procedures to address spills and illegal dumping;
7. Means to inform public employees, businesses, and the general public of illegal discharges and improper waste disposal; and
8. Any other components deemed necessary to ensure that non-storm water discharges to the municipal separate storm sewer system are either permitted by MDE under NPDES or eliminated.

The permittee shall cooperate regarding discharges entering or leaving its jurisdictional boundaries or Waters of the State. The intent of this program is to control non-storm water discharges to and from municipal separate storm sewer systems.

d. Construction Site Storm water Runoff Control

The Environment Article, Title 4, Subtitle 1, Annotated Code of Maryland establishes a statewide erosion and sediment control program to control construction site runoff. This statute, coupled with the Code of Maryland Regulations (COMAR), specifies the requirements for any construction activity that disturbs five thousand (5,000) square feet or more of earth or involves 100 cubic yards or more of earth movement. Because Maryland has an erosion and sediment control program in place that regulates more earth disturbing activities than the NPDES storm water program, MDE considers compliance with the State statute to be compliance with this minimum control measure, this permit, and CFR.

COMAR contains procedures for approving proposed construction drawings and erosion and sediment control plans prior to the start of any development. State regulations also define erosion and sediment control plan review and enforcement responsibilities. Typically, erosion and sediment control plans are reviewed and approved by MDE for State and federal construction projects. Enforcement of approved erosion and sediment control plans statewide is MDE's responsibility.

Permittee shall comply with all State and federal laws, regulations, ordinances, and procedures relating to erosion and sediment control. Permittee shall clearly state how this minimum control measure will be implemented in the storm water management plan.

e. Post Construction Storm water Management

The Environment Article, Title 4, Subtitle 2, Annotated Code of Maryland establishes a statewide storm water management program. This statute, coupled with COMAR, requires that storm water management for new development and redevelopment be addressed for any proposed project that disturbs five thousand (5,000) square feet or more of earth. Because Maryland has a storm water management program in place that regulates new and redevelopment projects, MDE considers compliance with the State statute to be compliance with this minimum control measure, this permit, and CFR.

COMAR contains procedures for approving proposed construction drawings and storm water management plans prior to the start of any development. State regulations also define storm water management plan review and enforcement responsibilities. Typically, storm water management plans are reviewed and approved by MDE for State and federal construction projects. Enforcement of approved storm water management plans statewide is MDE's responsibility.

Permittee shall comply with all State and federal laws, regulations, ordinances, and procedures relating to storm water management. Additionally, permittee must implement and comply with

the principles, methods, and practices found in the "2000 Maryland Storm Water Design Manual, Volumes I & II."

f. Pollution Prevention and Good Housekeeping.

Permittee shall implement and maintain pollution prevention and good housekeeping techniques and procedures to reduce pollutants from all facility operations. Components of this minimum control measure shall include employee training materials to prevent and reduce pollutant discharges to the storm drain system, runoff controls geared toward fleet yard and building maintenance activities, and ensuring all facility activities are properly permitted under NPDES or any other appropriate State or federal water pollution control program. Permittee shall develop pollution prevention or good housekeeping procedures themselves or rely on another responsible entity to comply with this minimum control measure.

3. Monitoring, Recordkeeping, Reporting, and Program Review

a. Monitoring

Permittee shall use any means thought to be necessary to evaluate the effectiveness of the programs and BMPs implemented to comply with this permit. Careful consideration must be given to the information, BMPs, and measurable goals specified in the storm water management plan. This information shall be submitted in an annual report.

b. Recordkeeping

Permittee shall keep records under this permit for at least three (3) years after termination of this permit. Records shall be submitted to MDE only when permittee is specifically asked to do so. The permittee shall make its records and its storm water management program information available to the public at reasonable times during regular business hours.

c. Reporting

Annually, the permittee shall submit a report to MDE with the Annual Deicing Review by July 15 of each year. The annual reporting form will be consistent with the form provided in Appendix E of the NPDES General Permit for Discharges from State and Federal Small Municipal Separate Storm Sewer Systems and shall include:

1. The status of compliance with permit conditions, an assessment of the appropriateness of the identified BMPs, and the progress toward achieving the identified measurable goals for each of the minimum control measures;
2. Results of information collected and analyzed, including monitoring data, if any, during the annual reporting period;
3. A summary of the storm water activities the permittee plans to undertake during the next annual reporting period;
4. A change in any identified measurable goals that apply to the minimum control measures;
5. A description of the coordination efforts with other agencies regarding the implementation of the minimum control measures including the status of any MOU or other agreement executed between the permittee and another entity; and
6. A fiscal analysis of capital and operating expenditures to implement the minimum control measures. The fiscal analysis shall include only those expenditures by the agency seeking coverage under this general permit and not those for minimum

control measures implemented by other entities.

d. Program Review

In order to assess the effectiveness of the permittee's NPDES program for eliminating non-storm water discharges and reducing the discharge of pollutants to the maximum extent possible, MDE will review program implementation and annual reports. Procedures for the review of local erosion and sediment control and storm water management programs exist in Maryland's sediment control and storm water management laws. Additional periodic evaluations may be conducted to determine compliance with permit conditions.

II. GENERAL CONDITIONS

A. MONITORING AND REPORTING

1. REPRESENTATIVE SAMPLING

Samples and measurements taken as required herein shall be taken at such times as to be representative of the quantity and quality of the discharges during the specified monitoring periods.

2. REPORTING-MONITORING RESULTS SUBMITTED QUARTERLY

Monitoring results obtained during the calendar quarter shall be summarized on a Discharge Monitoring Report form (EPA No. 3320-1). For each effluent characteristic monitored at a frequency of once per month or less and not limited as a monthly average, the results obtained during the reporting period shall be summarized on a single report form for each quarter. More frequently monitored effluent characteristics and effluent characteristics limited as a monthly average shall be reported on a separate form for each calendar month of the reporting period. Results shall be submitted to the Department postmarked no later than the 28th day of the month following the end of the reporting period. Calendar quarter reporting periods end on the last day of the following months: March, June, September and December.

The reports shall be submitted to:

Maryland Department of the Environment
Water Management Administration
Compliance Program
1800 Washington Boulevard
Baltimore, Maryland 21230-1708

3. SAMPLING AND ANALYSIS METHODS

The analytical and sampling methods used shall conform to procedures for the analysis of pollutants as identified in Title 40 CFR Part 136 - "Guidelines Establishing Test Procedures for the Analysis of Pollutants" unless otherwise specified.

4. DATA RECORDING REQUIREMENTS

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- a. the exact place, date, and time of sampling or measurement;
- b. the person(s) who performed the sampling or measurement;
- c. the dates and times the analyses were performed;
- d. the person(s) who performed the analyses;
- e. the analytical techniques or methods used; and
- f. the results of all required analyses.

5. MONITORING EQUIPMENT MAINTENANCE

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation to insure accuracy of measurements.

6. ADDITIONAL MONITORING BY PERMITTEE

If the permittee monitors any pollutant, using approved analytical methods as specified above, at the locations designated herein more frequently than required by this permit, the results of such monitoring, including the increased frequency, shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report form (EPA No. 3320-1).

7. RECORDS RETENTION

All records and information resulting from the monitoring activities required by this permit, including all records of analyses performed, calibration and maintenance of instrumentation, and original recordings from continuous monitoring instrumentation shall be retained for a minimum of three years. This period shall be automatically extended during the course of litigation, or when requested by the Department.

B. MANAGEMENT REQUIREMENTS

1. CHANGE IN DISCHARGE

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit at a level in excess of that authorized shall constitute a violation of the terms and conditions of this permit. The permittee shall report any anticipated facility expansions, production increases, or process modifications which will result in new, different or an increased discharge of pollutants by submitting a new application at least 180 days prior to the commencement of the changed discharge except that if the change only affects a listed pollutant and will not violate the effluent limitations specified in this permit, by providing written notice to the Department. Following such notice, the permit may be modified by the Department to include new effluent limitations on those pollutants.

2. NONCOMPLIANCE WITH EFFLUENT LIMITATIONS

If, for any reason, the permittee does not comply with or will be unable to comply with any daily maximum or daily minimum effluent limitation specified in this permit, the permittee shall notify the Inspection and Compliance Program by telephone at (410) 537-3510 within 24 hours of becoming aware of the noncompliance. Within five calendar days, the permittee shall provide the Department with the following information in writing:

- a. a description of the non-complying discharge including its impact upon the receiving waters;
- b. cause of noncompliance;
- c. anticipated time the condition of noncompliance is expected to continue or if such condition has been corrected, the duration of the period of noncompliance;
- d. steps taken by the permittee to reduce and eliminate the non-complying discharge;
- e. steps to be taken by the permittee to prevent recurrence of the condition of noncompliance; and
- f. a description of the accelerated or additional monitoring by the permittee to determine the nature and impact of the noncomplying discharge.

3. FACILITIES OPERATION

All treatment, control and monitoring facilities, or systems installed or used by the permittee, are to be maintained in good working order and operated efficiently.

4. ADVERSE IMPACT

The permittee shall take all reasonable steps to minimize or prevent any adverse impact to waters of the State or to human health resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. BYPASSING

Any bypass of treatment facilities necessary to maintain compliance with the terms and conditions of this permit is prohibited unless:

- a. the bypass is unavoidable to prevent a loss of life, personal injury or substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources;
- b. there are no feasible alternatives;
- c. notification is received by the Department within 24 hours (if orally notified, then followed by a written submission within five calendar days of the permittee's becoming aware of the bypass). Where the need for a bypass is known (or should have been known) in advance, this notification shall be submitted to the Department for approval at least ten calendar days before the date of bypass or at the earliest possible date if the period of advance knowledge is less than ten calendar days; and
- d. the bypass is allowed under conditions determined by the Department to be necessary to minimize adverse effects.

6. CONDITIONS NECESSARY FOR DEMONSTRATION OF AN UPSET

An upset shall constitute an affirmative defense to an action brought for noncompliance with technology-based effluent limitations only if the permittee demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence, that:

- a. an upset occurred and that the permittee can identify the specific cause(s) of the upset;
- b. the permitted facility was at the time being operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures;
- c. the permittee submitted a 24-hour notification of upset in accordance with the reporting requirements of General Condition II.B.2 above;
- d. the permittee submitted, within five (5) calendar days of becoming aware of the upset, documentation to support and justify the upset; and
- e. the permittee complied with any remedial measures required to minimize adverse impact.

7. REMOVED SUBSTANCES

Wastes such as solids, sludges, or other pollutants removed from or resulting from treatment or control of wastewaters, or facility operations, shall be disposed of in a manner to prevent any removed substances or runoff from such substances from entering or from being placed in a location where they may enter the waters of the State.

8. POWER FAILURE

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

- a. provide an alternative power source sufficient to operate the wastewater collection and treatment facilities or,
- b. halt, reduce or otherwise control production and all discharges upon the reduction, loss, or failure of the primary source of power to the wastewater collection and treatment facilities.

C. RESPONSIBILITIES

1. RIGHT OF ENTRY

The permittee shall permit the Secretary of the Department, the Regional Administrator for the Environmental Protection Agency, or their authorized representatives, upon the presentation of credentials to:

- a. enter upon the permittee's premises where an effluent source is located or where any records are required to be kept under the terms and conditions of this permit;
- b. access and copy, at reasonable times, any records required to be kept under the terms and conditions of this permit;

- c. inspect, at reasonable times, any monitoring equipment or monitoring method required in this permit;
- d. inspect, at reasonable times, any collection, treatment, pollution management, or discharge facilities required under this permit; and
- e. sample, at reasonable times, any discharge of pollutants.

2. TRANSFER OF OWNERSHIP OR CONTROL OF FACILITIES

In the event of any change in ownership or control of facilities from which the authorized discharge emanates, the permit may be transferred to another person if:

- a. the permittee notifies the Department in writing, of the proposed transfer;
- b. a written agreement, indicating the specific date of proposed transfer of permit coverage and acknowledging responsibilities of current and new permittees for compliance with the liability for the terms and conditions of this permit, is submitted to the Department; and
- c. neither the current permittee nor the new permittee receive notification from the Department, within 30 calendar days, of intent to modify, revoke, reissue or terminate the existing permit.

3. REAPPLICATION FOR A PERMIT –[Reserved]

4. AVAILABILITY OF REPORTS

Except for data determined to be confidential under Section 308 of the Clean Water Act, 33 U.S.C. § 1318, all submitted data shall be available for public inspection at the offices of the Department and the Regional Administrator of the Environmental Protection Agency.

5. PERMIT MODIFICATION

A permit may be modified by the Department upon written request of the permittee and after notice and opportunity for a public hearing in accordance with and for the reasons set forth in 40 CFR § 122.62 and 122.63.

6. PERMIT MODIFICATION, SUSPENSION, OR REVOCATION

After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked and reissued in whole or in part during its term, in accordance with the provisions set forth in COMAR 26.08.04.10, for causes including, but not limited to, the following:

- a. violation of any terms or conditions of this permit;
- b. obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;
- c. a change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; or

- d. a determination that the permitted discharge poses a threat to human health or welfare or to the environment and can only be regulated to acceptable levels by permit modification or termination.
- e. upon a final, unreviewable determination that the permittee lacks, or is in violation, of any federal, state, or local approval necessary to conduct the activities by this permit.

7. TOXIC POLLUTANTS

If a toxic effluent standard or prohibition (including any schedule of compliance specified in such toxic effluent standard or prohibition) is established by the U.S. Environmental Protection Agency, or pursuant to Section 9-314 of the Environment Article, Annotated Code of Maryland, for a toxic pollutant which is present in the discharges authorized herein and such standard is more stringent than any limitation upon such pollutant in this permit, this permit shall be revoked and reissued or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified. Any effluent standard established in this case for a pollutant which is injurious to human health is effective and enforceable by the time set forth in the promulgated standard, even absent permit modification.

8. OIL AND HAZARDOUS SUBSTANCES PROHIBITED

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibility, liability, or penalties to which the permittee may be subject under Section 311 of the Clean Water Act (33 U.S.C. § 1321), or under the Annotated Code of Maryland.

9. CIVIL AND CRIMINAL LIABILITY

Except as provided in permit conditions on "bypassing," "upset," and "power failure," nothing in this permit shall be construed to preclude the institution of any legal action nor relieve the permittee from civil or criminal responsibilities and/or penalties for noncompliance with Title 9 of the Environment Article, Annotated Code of Maryland or any federal, local, or other State law or regulation.

10. PROPERTY RIGHTS/COMPLIANCE WITH OTHER REQUIREMENTS

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, State or local laws or regulations.

11. SEVERABILITY

The provisions of this permit are severable. If any provisions of this permit shall be held invalid for any reason, the remaining provisions shall remain in full force and effect. If the application of any provision of this permit to any circumstances is held invalid, its application to other circumstances shall not be affected.

12. WATER CONSTRUCTION AND OBSTRUCTION

This permit does not authorize the construction or placing of physical structures, facilities, or debris, or the undertaking of related activities in any waters of the State.

13. COMPLIANCE WITH WATER POLLUTION ABATEMENT STATUTES

The permittee shall comply at all times with the provisions of the Environment Article, Title 7, Subtitle 2 and Title 9, Subtitle 3 of the Annotated Code of Maryland and the Clean Water Act, 33 U.S.C. § 1251 et seq.

14. ACTION ON VIOLATIONS

The issue or reissue of this permit does not constitute a decision by the State not to proceed in administrative, civil, or criminal action for any violations of State law or regulations occurring before the issue or reissue of this permit, nor a waiver of the State's right to do so.

15. CIVIL PENALTIES FOR VIOLATIONS OF PERMIT CONDITIONS

In addition to civil penalties for violations of State water pollution control laws set forth in Section 9-342 of the Environment Article, Annotated Code of Maryland, the Clean Water Act provides that any person who violates Section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act or in a permit issued under Section 404 of the Act, is subject to a civil penalty not to exceed \$37,500 per day for each violation.

16. CRIMINAL PENALTIES FOR VIOLATIONS OF PERMIT CONDITIONS

In addition to criminal penalties for violations of State water pollution control laws set forth in Section 9-343 of the Environment Article, Annotated Code of Maryland, the Clean Water Act provides that:

- a. any person who negligently violates Section 301, 302, 306, 307, 308, 318, or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act, or in a permit issued under Section 404 of the Act, is subject to a fine of not less than \$2,500 nor more than \$25,000 per day of violation, or by imprisonment for not more than one (1) year, or by both.
- b. any person who knowingly violates Section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act, or in a permit issued under Section 404 of the Act, is subject to a fine of not less than \$5,000 nor more than \$50,000 per day of violation, or by imprisonment for not more than three (3) years, or by both.
- c. any person who knowingly violates Section 301, 302, 306, 307, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act, or in a permit issued under Section 404 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, is subject to a fine of not more than \$250,000 or imprisonment of not more than 15 years, or both.
- d. any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with or renders inaccurate any monitoring device or method required to be maintained under the Act, is subject to a fine of not more than \$10,000 or by imprisonment for not more than two (2) years, or by both.

17. DUTY TO PROVIDE INFORMATION

The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

18. SIGNATORY REQUIREMENTS

All applications, reports, or information submitted to the Director shall be signed and certified as required by 40 CFR 122.22.

19. REOPENER CLAUSE FOR PERMITS

This permit shall be modified, or alternatively, revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under Sections 301, 304, and 307 of the Clean Water Act [33 USCS §§ 1311, 1314, 1317] if the effluent standard or limitation so issued or approved:

- a. contains different conditions or is otherwise more stringent than any effluent limitation in this permit or
- b. controls any pollutant not limited in this permit. This permit, as modified or reissued under this paragraph, shall also contain any other requirements of the Act then applicable.

D. AUTHORITY TO ISSUE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS

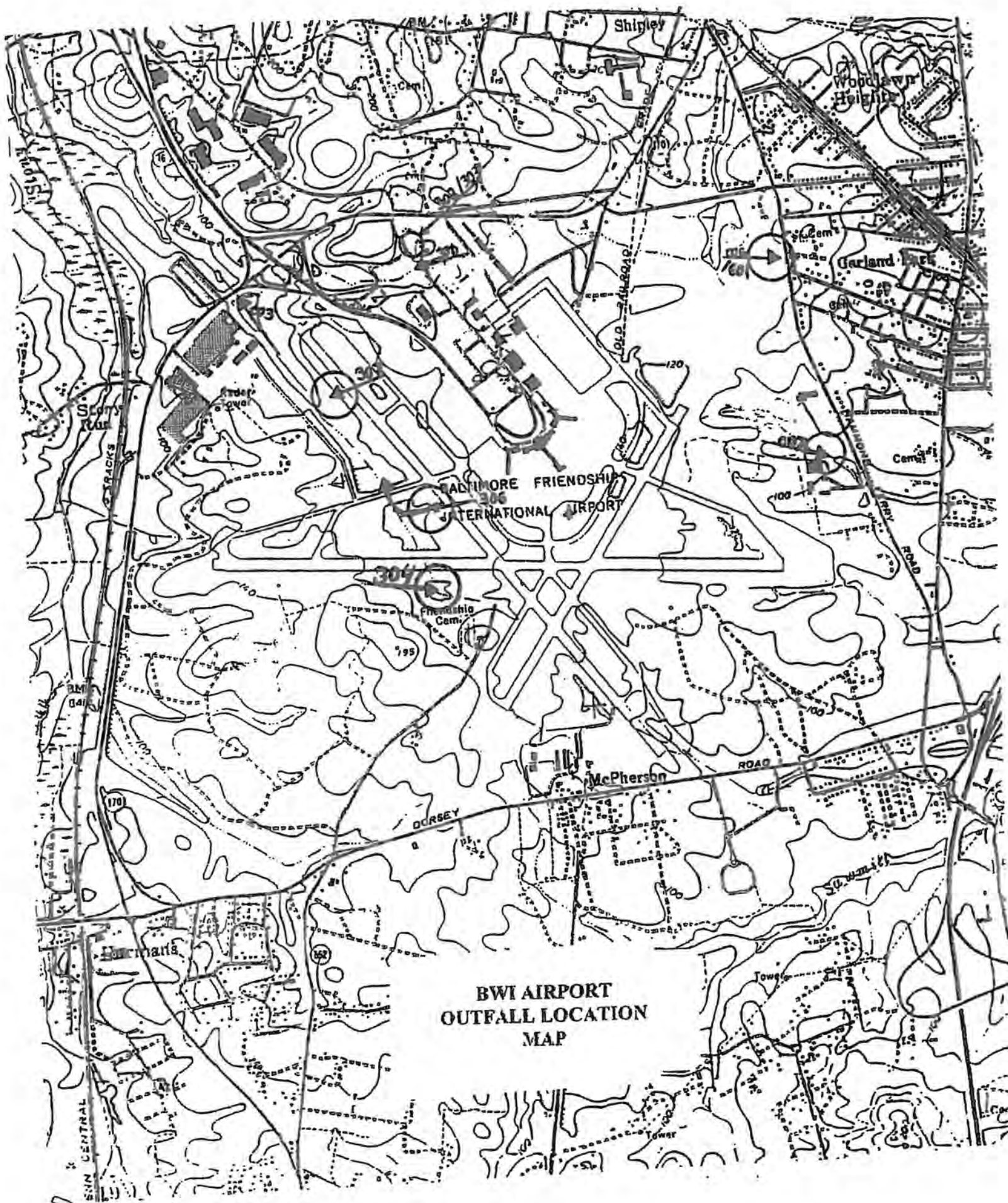
On September 5, 1974, the Administrator of the U.S. Environmental Protection Agency approved the proposal submitted by the State of Maryland for the operation of a permit program for discharges into navigable waters pursuant to Section 402 of the Clean Water Act, 33 U.S.C. Section 1342.

Pursuant to the aforementioned approval, this discharge permit is both a State of Maryland discharge permit and a NPDES permit.

This permit and the authorization to discharge shall expire at midnight on the expiration date. The permittee shall not discharge after that date unless a new application has been submitted to the Department in accordance with the renewal application provisions of this permit.

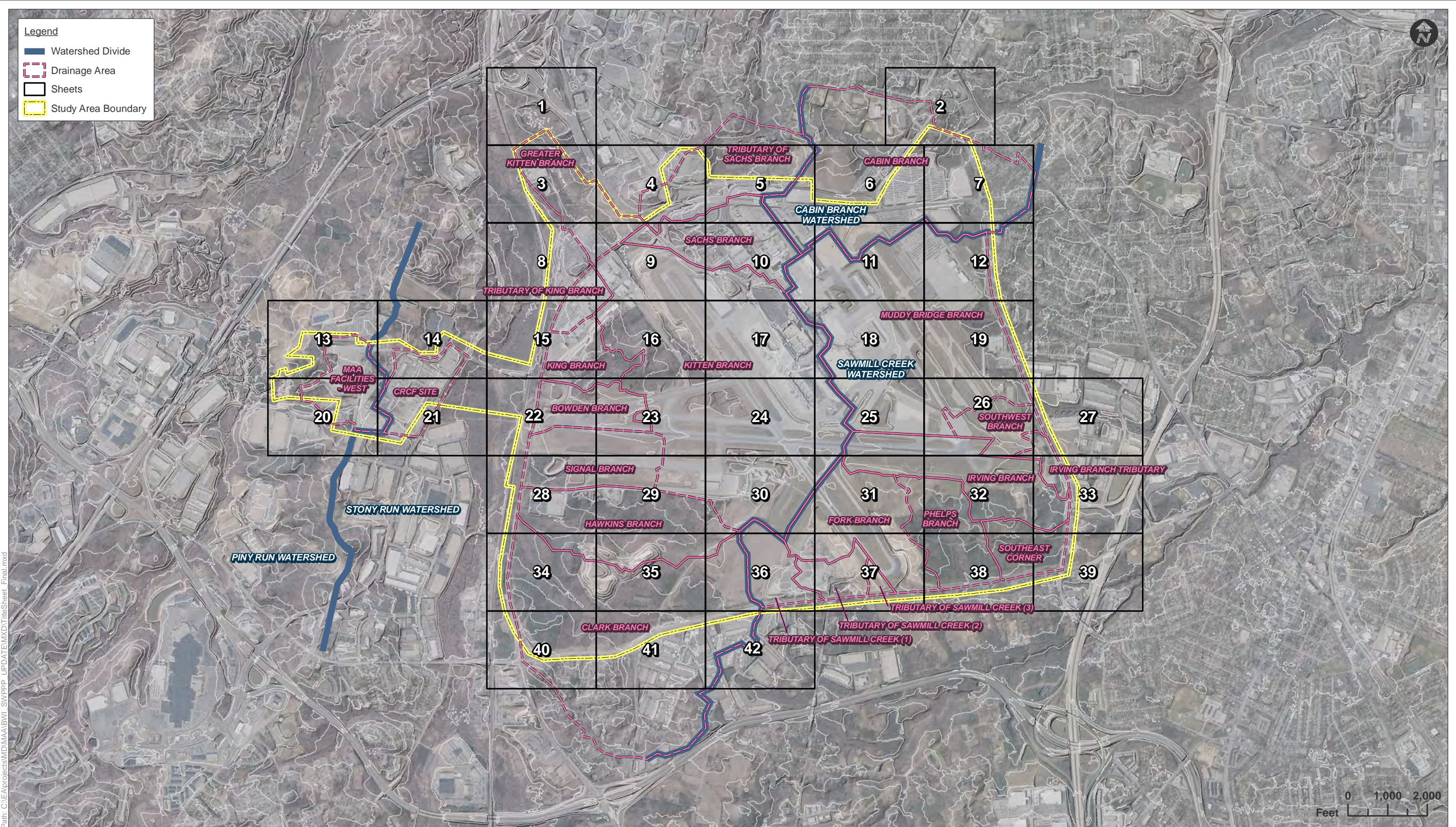


Jay G. Sakat, Director
Water Management Administration



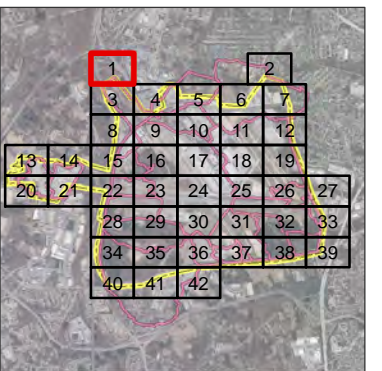
**BWI AIRPORT
OUTFALL LOCATION
MAP**

B. BWI SITE MAPS



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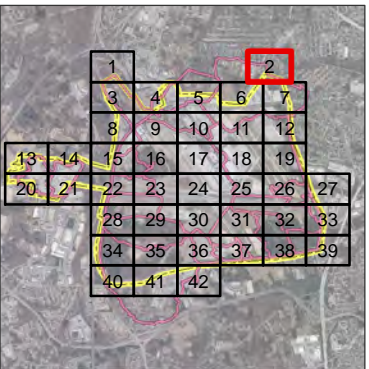
- Inlet
- Outlet
- Culvert
- Drainage Channel
- Elevation Contour (ft)
- Rail Line
- Stream Channel
- Drainage Area Boundary
- DRAINAGE AREA**
- 155 Building
- Stream Restoration Area
- Study Area Boundary
- Wetland

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Feet (1" = 200')

Baltimore/Washington International
Thurgood Marshall Airport
Stormwater Pollution Prevention Plan
2016 Update

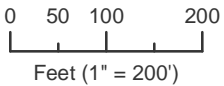


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Legend

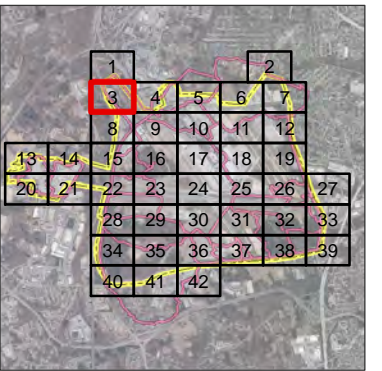
- Drainage Area Outlet
- Inlet
- Outlet
- Culvert
- Drainage Channel
- Elevation Contour (ft)
- Rail Line
- Stream Channel
- Drainage Area Boundary
- DRAINAGE AREA**
- 155 Building
- Open Water
- Study Area Boundary
- Wetland



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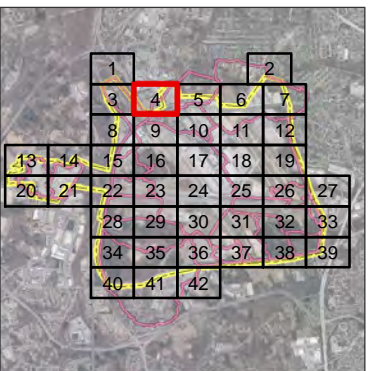
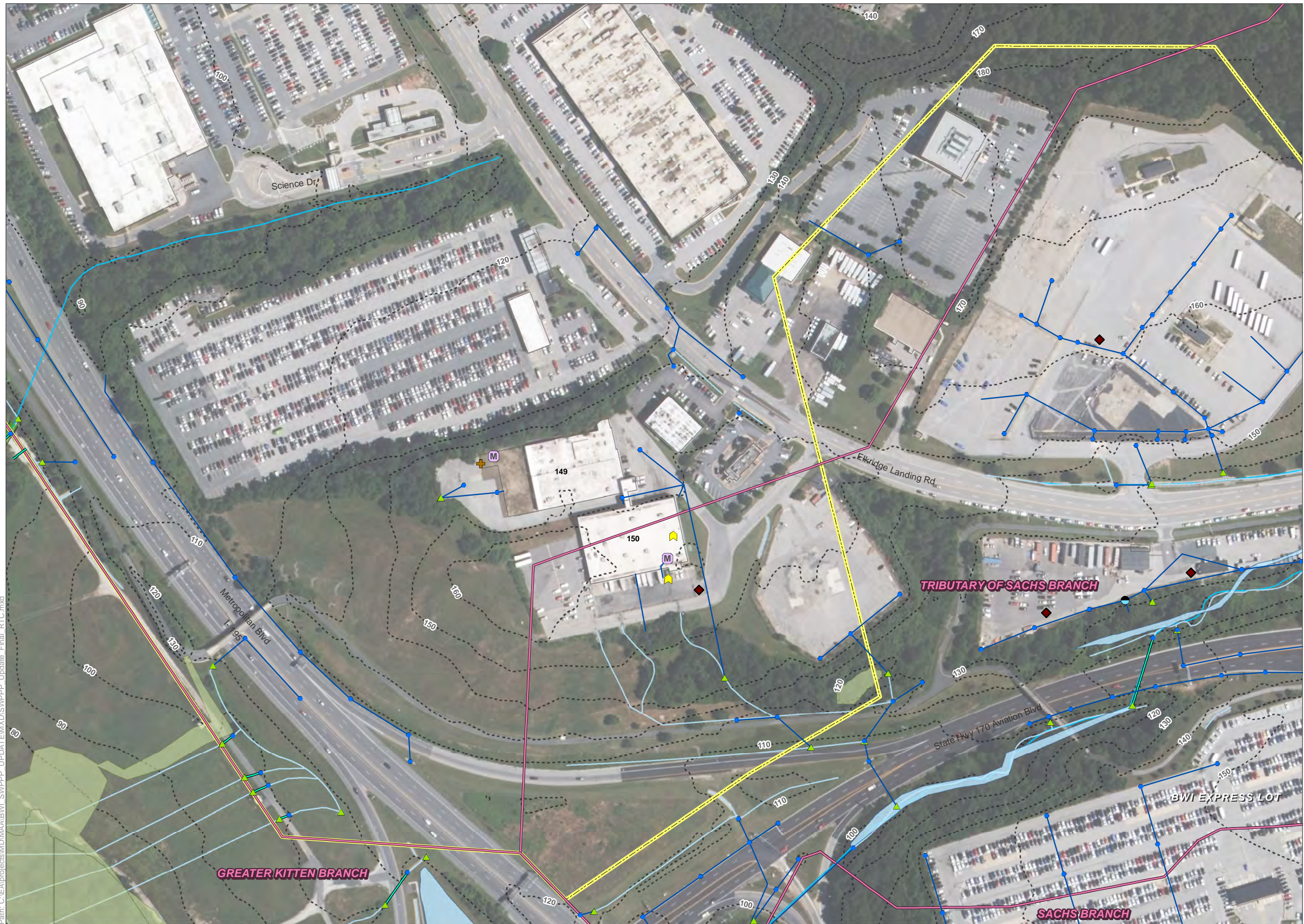
- Legend
- AST (MAA)
 - Inlet
 - Outlet
 - Storage Area
 - Culvert
 - Drainage Channel
 - Elevation Contour (ft)
 - Rail Line
 - Storm Drain
 - Stream Channel
 - Drainage Area Boundary
 - DRAINAGE AREA**
 - 155 Building
 - Open Water
 - Stream Restoration Area
 - Study Area Boundary
 - Wetland

0 50 100 200
Feet (1" = 200')

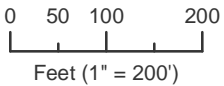
Baltimore/Washington International
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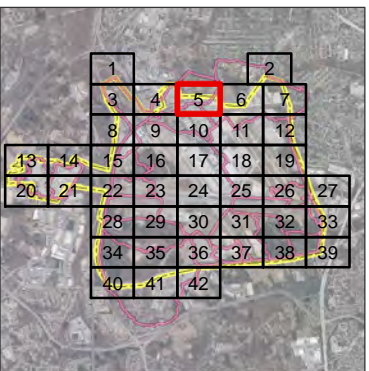
- Legend
- AST (Tenant)
 - Inlet
 - Oil/Water Separator
 - Outlet
 - Storage Area
 - Vehicle/Equipment Maintenance
 - Waste Management Area
 - Culvert
 - Drainage Channel
 - Elevation Contour (ft)
 - Storm Drain
 - Stream Channel
 - Drainage Area Boundary
 - DRAINAGE AREA**
 - 155 Building
 - Open Water
 - Stream Restoration Area
 - Study Area Boundary
 - Wetland



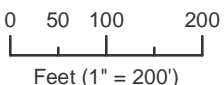
Baltimore/Washington International
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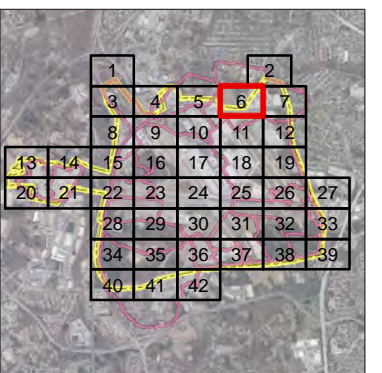
- Legend**
- AST (Tenant)
 - Fueling Station
 - Glycol Storage Tank (Virgin)
 - Glycol Storage Tank (Waste)
 - Inlet
 - Monitoring Point
 - Oil/Water Separator
 - Outlet
 - Storage Area
 - UST (Tenant)
 - Vehicle/Equipment Maintenance
 - Vehicle/Equipment Washing
 - Waste Management Area
 - Culvert
 - Glycol Recovery Line
 - Drainage Channel
 - Elevation Contour (ft)
 - Rail Line
 - Storm Drain
 - Stream Channel
 - Trench Drain
 - Watershed Divide
 - WATERSHED**
 - Drainage Area Boundary
 - DRAINAGE AREA**
 - 155 Building
 - Open Water
 - Study Area Boundary
 - SWM Pond
 - Wetland



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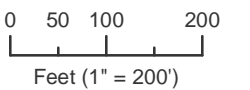


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Legend

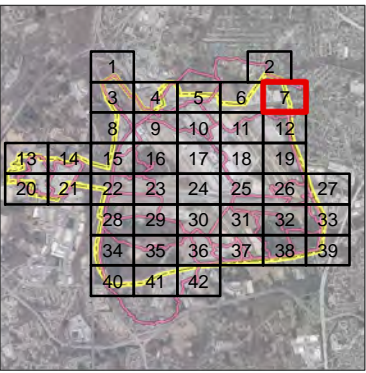
- Infiltration Trench
- Inlet
- Oil/Water Separator
- ▲ Outlet
- Culvert
- Drainage Channel
- Elevation Contour (ft)
- Rail Line
- Storm Drain
- Stream Channel
- Watershed Divide
- WATERSHED**
- Drainage Area Boundary
- DRAINAGE AREA**
- 155 Building
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- Study Area Boundary
- SWM Pond



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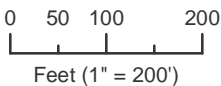


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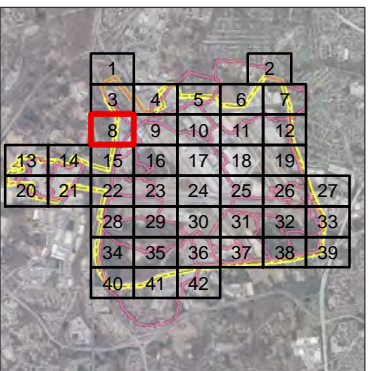
- Infiltration Trench
- Inlet
- Oil/Water Separator
- ▲ Outlet
- Culvert
- Drainage Channel
- - - Elevation Contour (ft)
- Rail Line
- Storm Drain
- Stream Channel
- Watershed Divide
- WATERSHED**
- Drainage Area Boundary
- DRAINAGE AREA**
- 155 Building
- Open Water
- Study Area Boundary
- SWM Pond



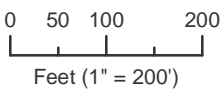
Baltimore/Washington International
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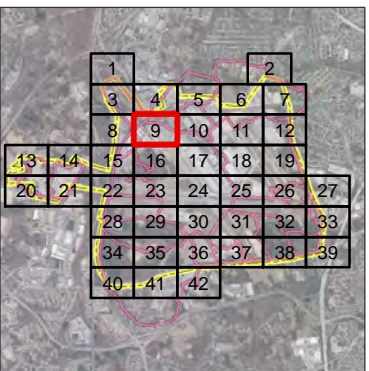
- Legend
- Inlet
 - Outlet
 - Culvert
 - Drainage Channel
 - Elevation Contour (ft)
 - Rail Line
 - Storm Drain
 - Stream Channel
 - Drainage Area Boundary
 - DRAINAGE AREA**
 - 155 Building
 - Open Water
 - Stream Restoration Area
 - Study Area Boundary
 - Wetland



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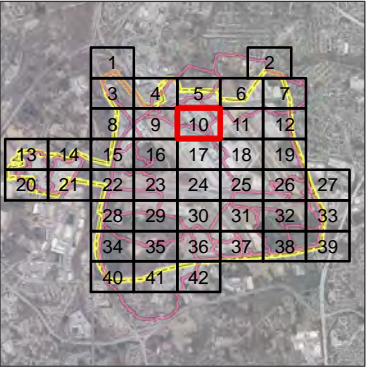
Legend

- Drainage Area Outlet
- Glycol Diversion Vault
- Infiltration Trench
- Inlet
- Outfall (Permitted)
- Outlet
- Culvert
- Glycol Recovery Line
- Drainage Channel
- Elevation Contour (ft)
- Storm Drain
- Stream Channel
- Trench Drain
- Deicing Area
- Drainage Area Boundary
- DRAINAGE AREA**
- 155 Building
- Open Water
- Stream Restoration Area
- Study Area Boundary
- SWM Pond
- Wetland

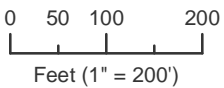
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Feet (1" = 200')

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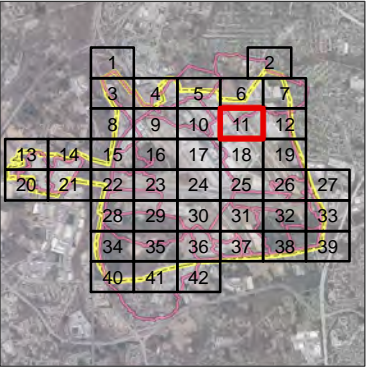


- Legend**
- AST (MAA)
 - AST (Tenant)
 - Fueling Station
 - Glycol Diversion Vault
 - Infiltration Trench
 - Inlet
 - Monitoring Point
 - Oil/Water Separator
 - Outlet
 - Storage
 - UST (MAA)
 - Vehicle/Equipment Maintenance
 - Vehicle/Equipment Washing
 - Waste Management
 - Culvert
 - Glycol Recovery Line
 - Drainage Channel
 - Elevation Contour (ft)
 - Rail Line
 - Storm Drain
 - Stream Channel
 - Trench Drain
 - Watershed Divide
 - WATERSHED**
 - Deicing
 - Drainage Area
 - DRAINAGE AREA**
 - 155 Building
 - Open Water
 - Study Area
 - SWM Pond



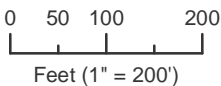
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Legend

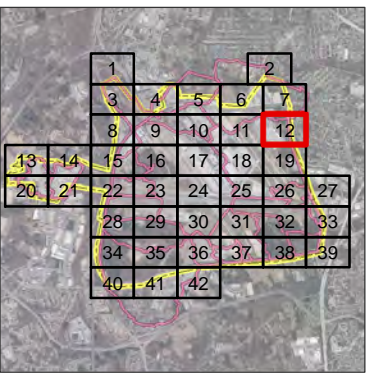
- AST (MAA)
- AST (Tenant)
- Glycol Diversion Vault
- Infiltration Trench
- Inlet
- Oil/Water Separator
- Outlet
- Storage Area
- Vehicle/Equipment Maintenance
- Waste Management Area
- Culvert
- Glycol Recovery Line
- Drainage Channel
- Elevation Contour (ft)
- Storm Drain
- Stream Channel
- Trench Drain
- Watershed Divide
- WATERSHED**
- Drainage Area Boundary
- DRAINAGE AREA**
- Building
- Study Area Boundary



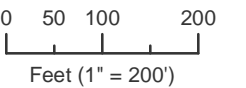
Baltimore/Washington International
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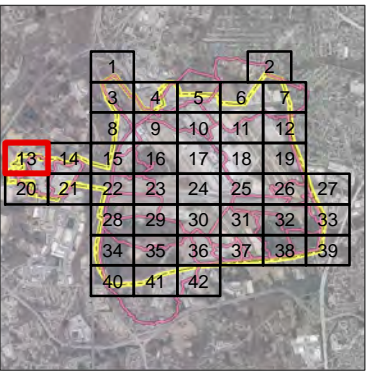
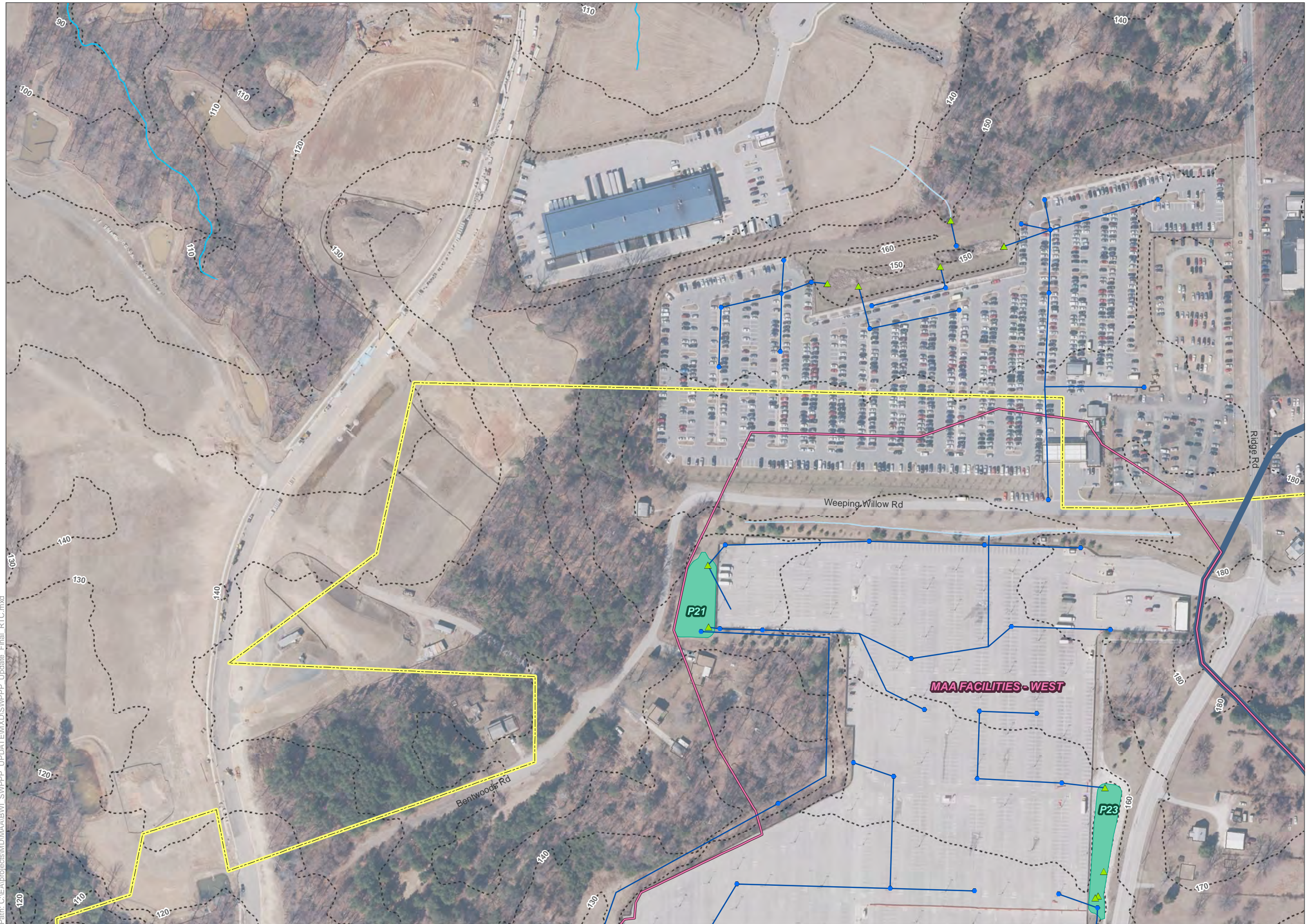
- Legend
- Fueling Station
 - Glycol Diversion Vault
 - Glycol Storage Tank (Virgin)
 - Glycol Storage Tank (Waste)
 - Inlet
 - Lift Station
 - Monitoring Point
 - Oil/Water Separator
 - Outfall (Permitted)
 - Outlet
 - Storage Area
 - UST (Tenant)
 - Vehicle/Equipment Maintenance
 - Waste Management Area
 - Culvert
 - Glycol Recovery Line
 - Drainage Channel
 - Elevation Contour (ft)
 - Storm Drain
 - Stream Channel
 - Trench Drain
 - Watershed Divide
 - WATERSHED**
 - Drainage Area Boundary
 - DRAINAGE AREA**
 - 155 Building
 - Study Area Boundary
 - SWM Pond



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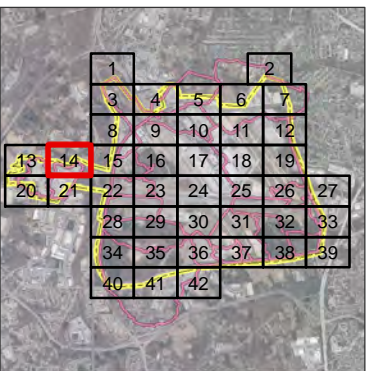
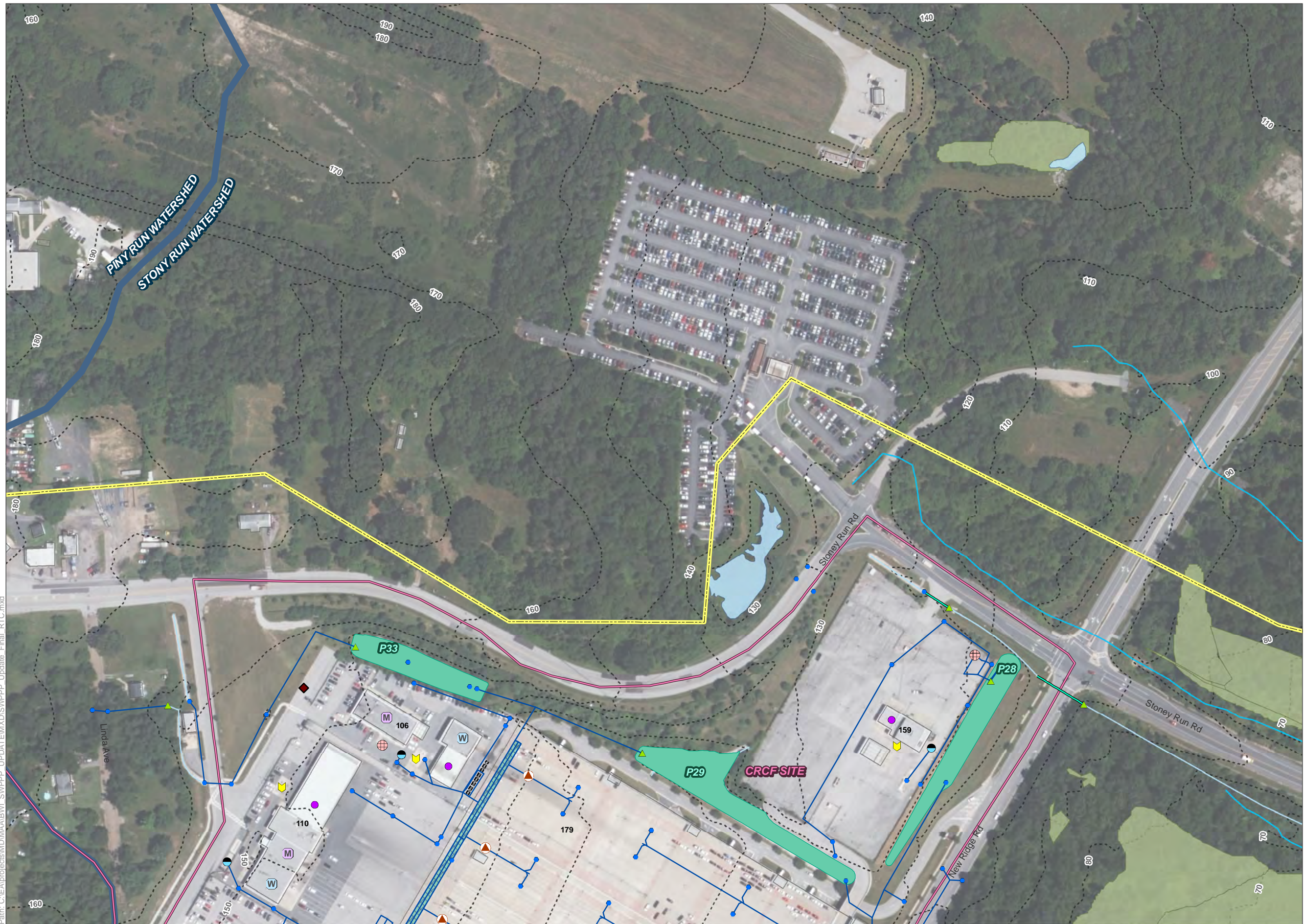
- Legend**
- Inlet
 - Outlet
 - Drainage Channel
 - Elevation Contour (ft)
 - Storm Drain
 - Stream Channel
 - Watershed Divide
 - WATERSHED**
 - Drainage Area Boundary
 - DRAINAGE AREA**
 - 155 Building
 - Study Area Boundary
 - SWM Pond

0 50 100 200
Feet (1" = 200')

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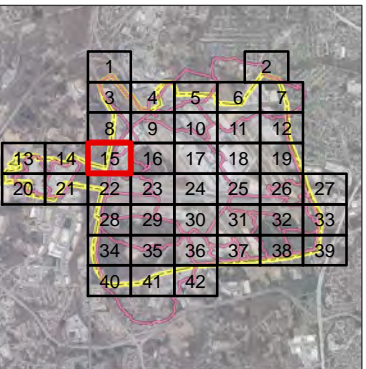


- Legend**
- Fueling Station
 - Inlet
 - Oil/Water Separator
 - Outlet
 - Stormceptor
 - StormFilter
 - UST (Tenant)
 - Vehicle/Equipment Maintenance
 - Vehicle/Equipment Washing
 - Waste Management Area
 - Culvert
 - Drainage Channel
 - Elevation Contour (ft)
 - Storm Drain
 - Stream Channel
 - Trench Drain
 - Watershed Divide
 - WATERSHED**
 - Drainage Area Boundary
 - DRAINAGE AREA**
 - 155 Building
 - Open Water
 - Study Area Boundary
 - SWM Pond
 - Underground Stormwater Storage
 - Wetland

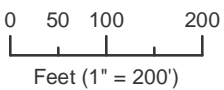
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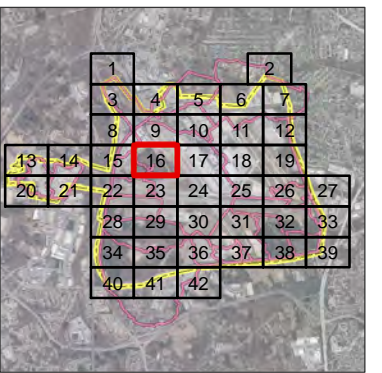
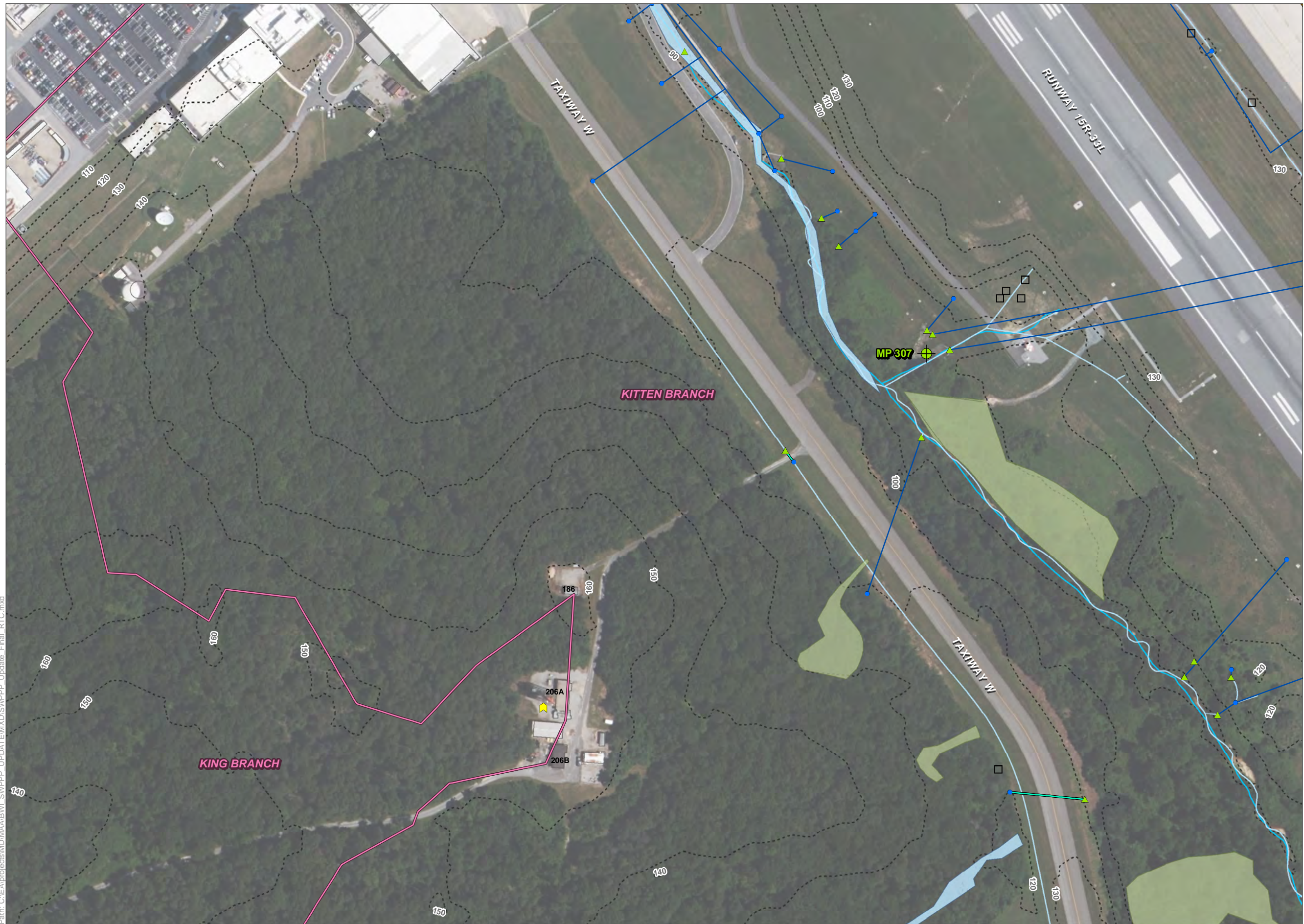
- Legend
- Drainage Area Outlet
 - Inlet
 - Outlet
 - Culvert
 - Drainage Channel
 - Elevation Contour (ft)
 - Rail Line
 - Storm Drain
 - Stream Channel
 - Drainage Area Boundary
 - DRAINAGE AREA**
 - 155 Building
 - Open Water
 - Study Area Boundary
 - Wetland



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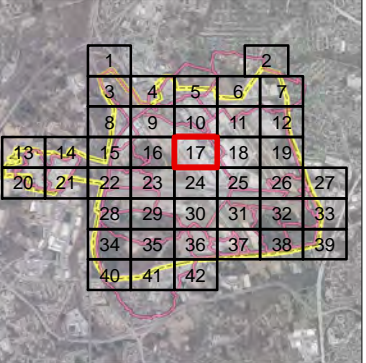
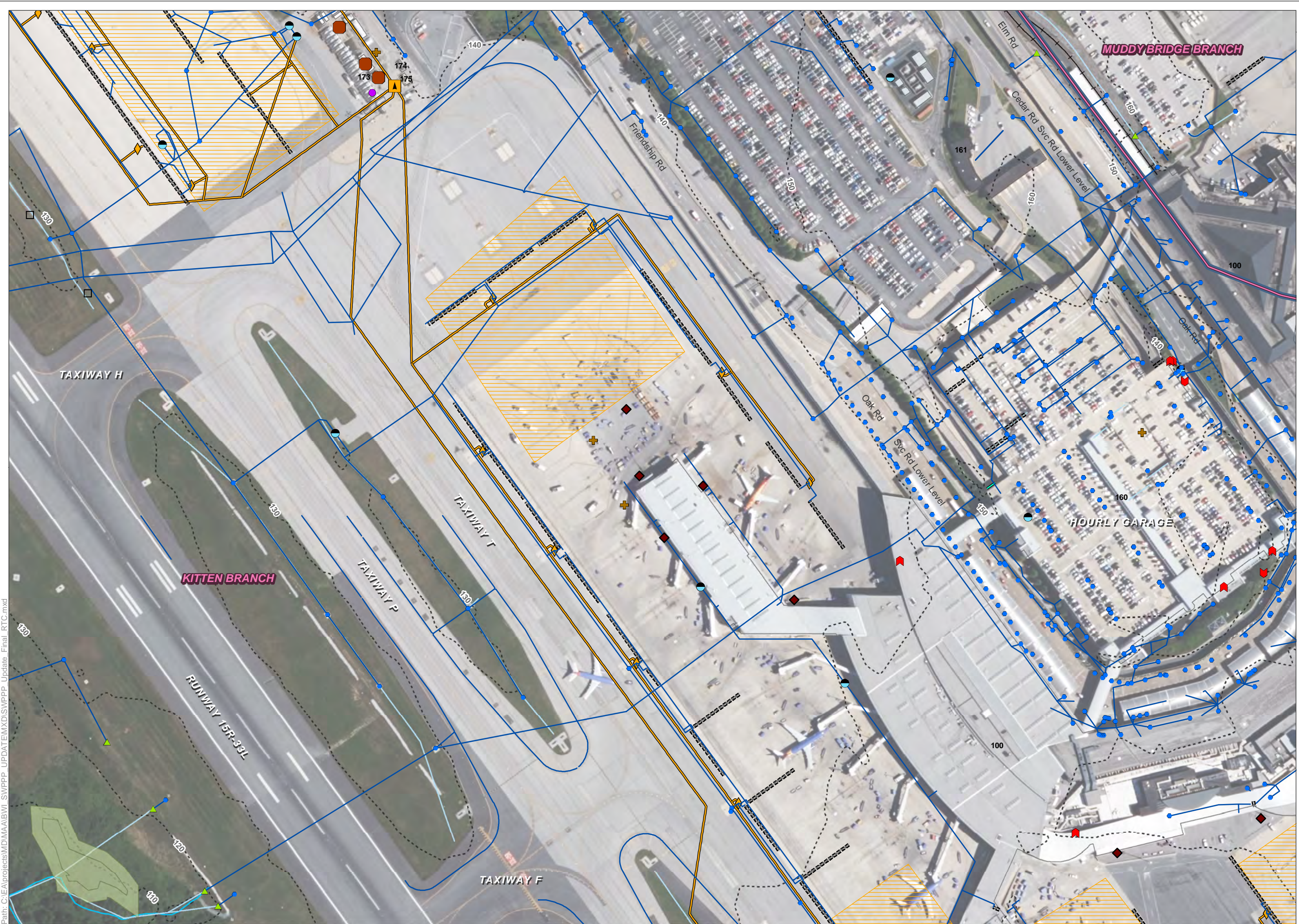
- AST (Tenant)
- Infiltration Trench
- Inlet
- Monitoring Point
- Outlet
- Culvert
- Glycol Recovery Line
- Drainage Channel
- Elevation Contour (ft)
- Storm Drain
- Stream Channel
- Drainage Area Boundary
- DRAINAGE AREA**
- 155 Building
- Open Water
- Study Area Boundary
- Wetland

0 50 100 200
Feet (1" = 200')

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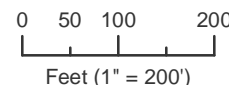


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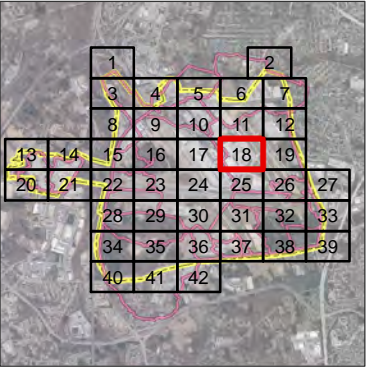
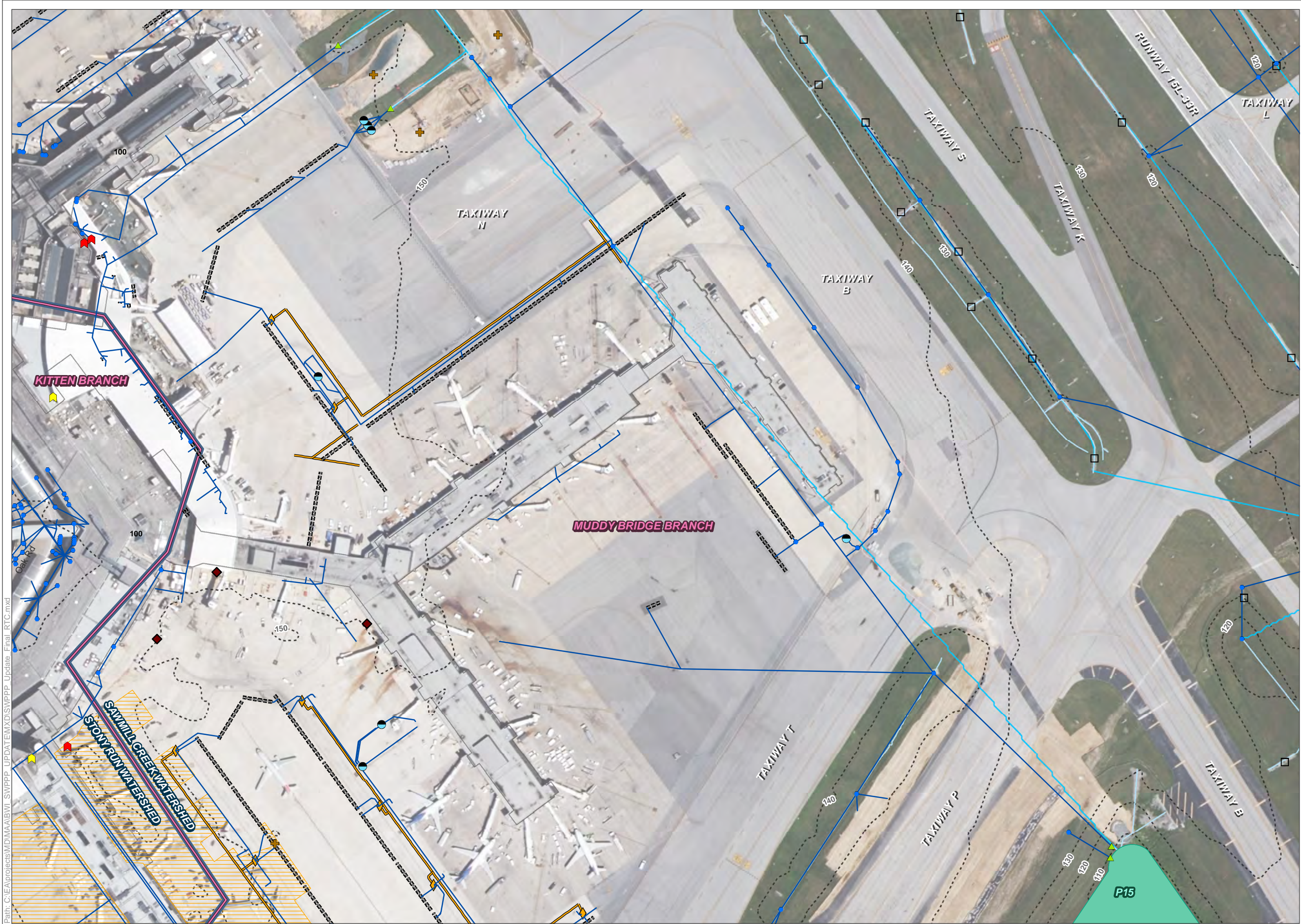
Legend

- AST (MAA)
- Fueling Station
- Glycol Diversion Vault
- Glycol Storage Tank (Virgin)
- Infiltration Trench
- Inlet
- Lift Station
- Oil/Water Separator
- Outlet
- Storage Area
- UST (MAA)
- Waste Management Area
- Culvert
- Glycol Recovery Line
- Drainage Channel
- Elevation Contour (ft)
- Rail Line
- Storm Drain
- Stream Channel
- Trench Drain
- Watershed Divide
- WATERSHED**
- Deicing Area
- Drainage Area Boundary
- DRAINAGE AREA**
- 155 Building
- Study Area Boundary
- Wetland

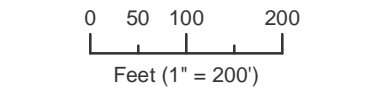


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- Legend**
- AST (MAA)
 - AST (Tenant)
 - Glycol Diversion Vault
 - Infiltration Trench
 - Inlet
 - Oil/Water Separator
 - Outlet
 - Storage Area
 - Waste Management Area
 - Glycol Recovery Line
 - Drainage Channel
 - Elevation Contour (ft)
 - Storm Drain
 - Stream Channel
 - Trench Drain
 - Watershed Divide
 - WATERSHED**
 - Deicing Area
 - Drainage Area Boundary
 - DRAINAGE AREA**
 - Building
 - Study Area Boundary
 - SWM Pond

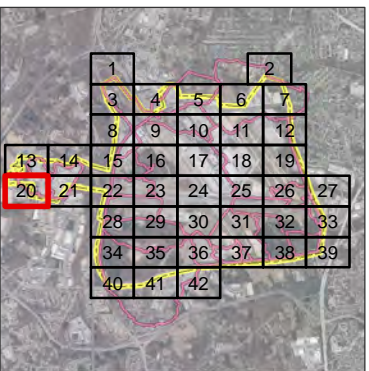


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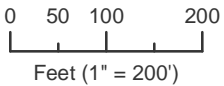




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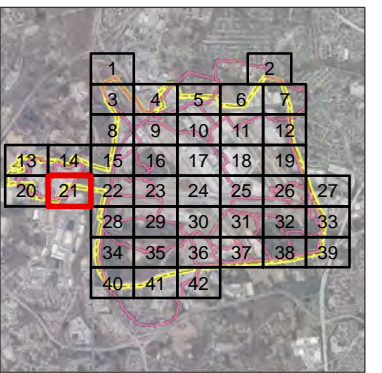
- Legend**
- AST (Tenant)
 - Inlet
 - Oil/Water Separator
 - Outlet
 - StormFilter
 - Vehicle/Equipment Maintenance
 - Vehicle/Equipment Washing
 - Culvert
 - Drainage Channel
 - Elevation Contour (ft)
 - Storm Drain
 - Stream Channel
 - Watershed Divide
 - WATERSHED**
 - Drainage Area Boundary
 - DRAINAGE AREA**
 - 155 Building
 - Open Water
 - Study Area Boundary
 - SWM Pond
 - Wetland



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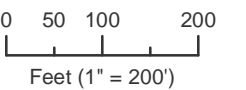


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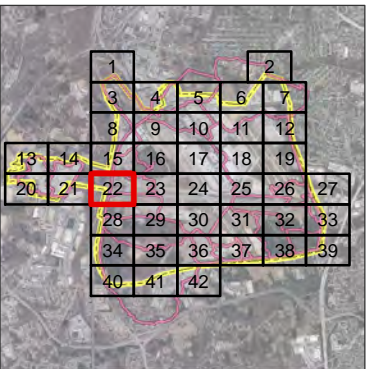
- AST (Tenant)
- Fueling Station
- Inlet
- Oil/Water Separator
- Outlet
- Storage
- Stormceptor
- StormFilter
- UST (Tenant)
- Vehicle/Equipment Maintenance
- Vehicle/Equipment Washing
- Waste Management
- Drainage Channel
- Elevation Contour (ft)
- Rail Line
- Storm Drain
- Stream Channel
- Watershed Divide
- WATERSHED**
- Drainage Area
- DRAINAGE AREA**
- Building
- Study Area
- SWM Pond
- Underground Stormwater Storage
- Wetland



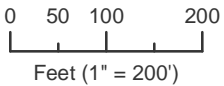
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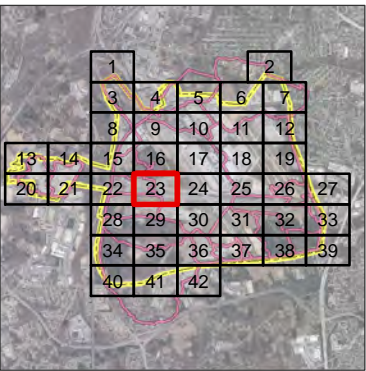
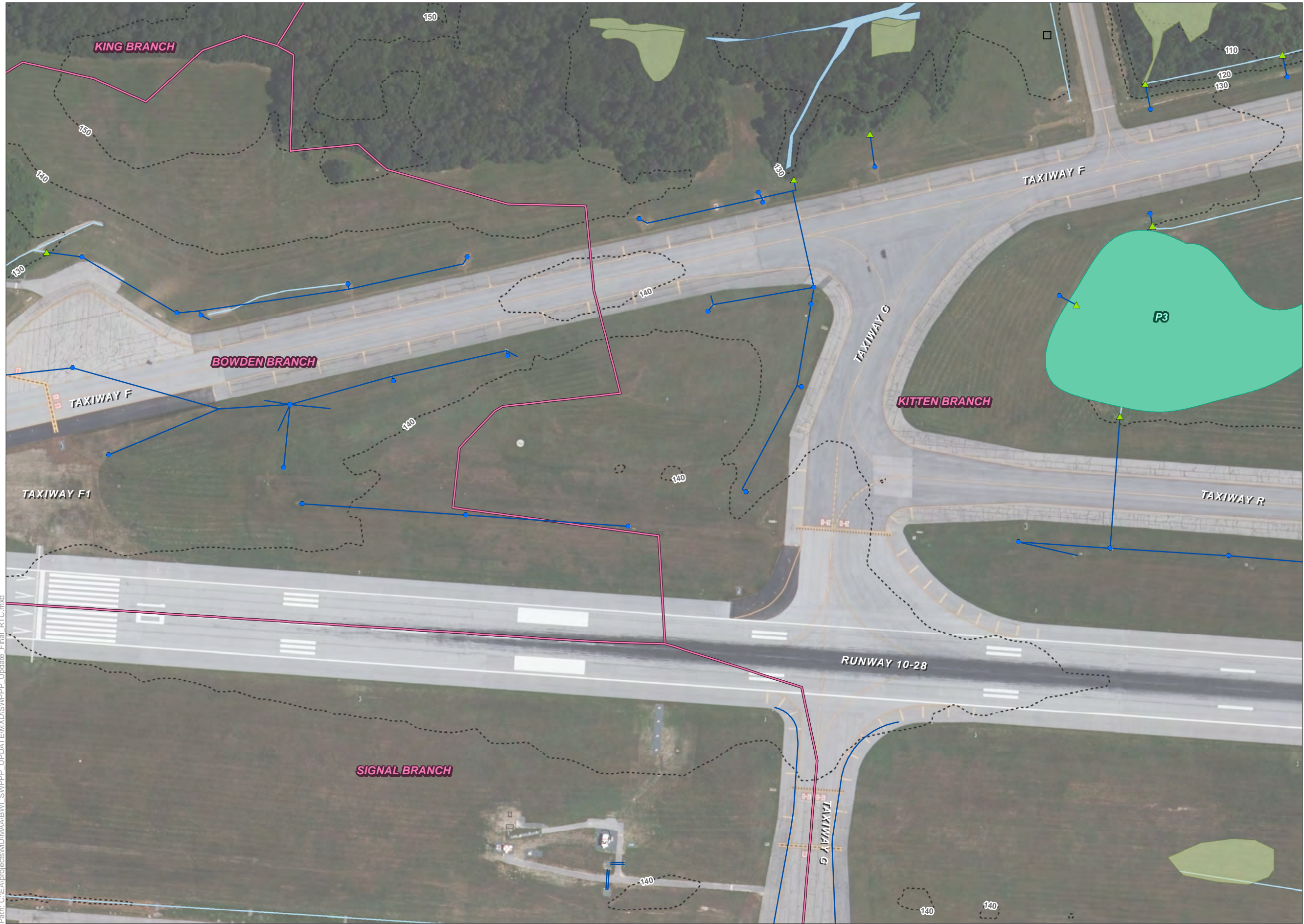
- Legend
- AST (Tenant)
 - Drainage Area Outlet
 - Infiltration Trench
 - Inlet
 - Outlet
 - Culvert
 - Drainage Channel
 - Elevation Contour (ft)
 - Rail Line
 - Storm Drain
 - Stream Channel
 - Drainage Area Boundary
 - DRAINAGE AREA**
 - 155 Building
 - Open Water
 - Study Area Boundary
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 - Wetland



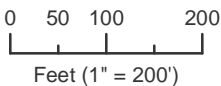
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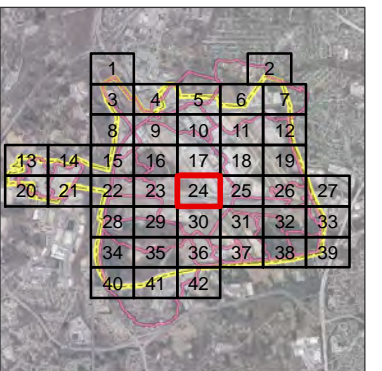
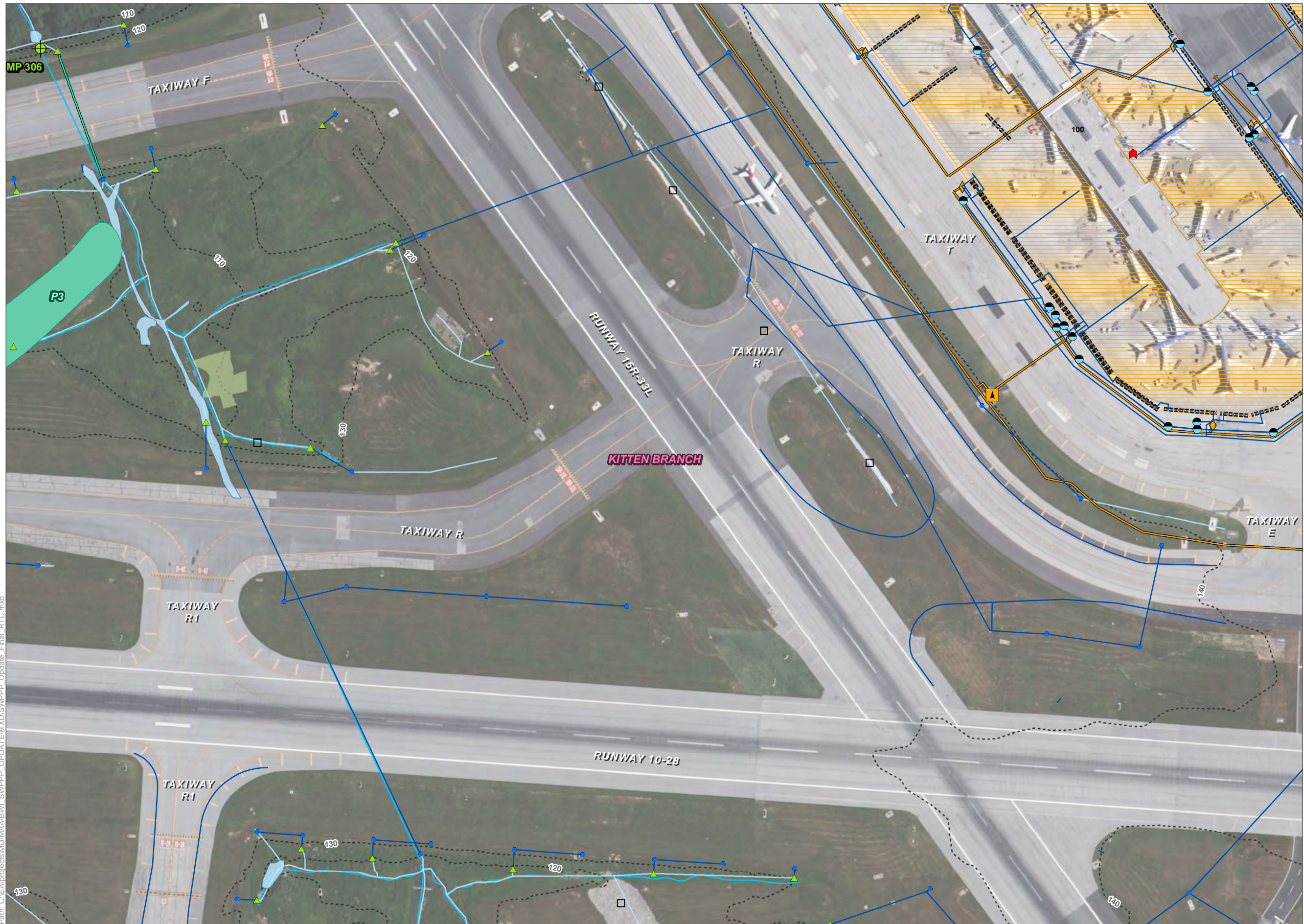
- Legend
- Infiltration Trench
 - Inlet
 - Outlet
 - Drainage Channel
 - Elevation Contour (ft)
 - Storm Drain
 - Drainage Area Boundary
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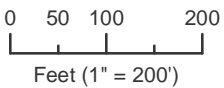
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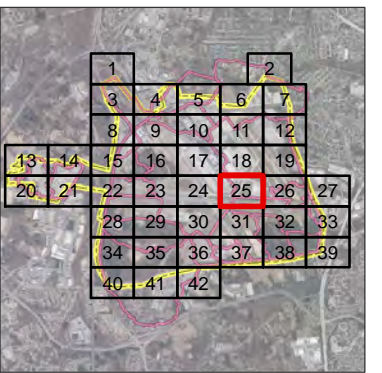
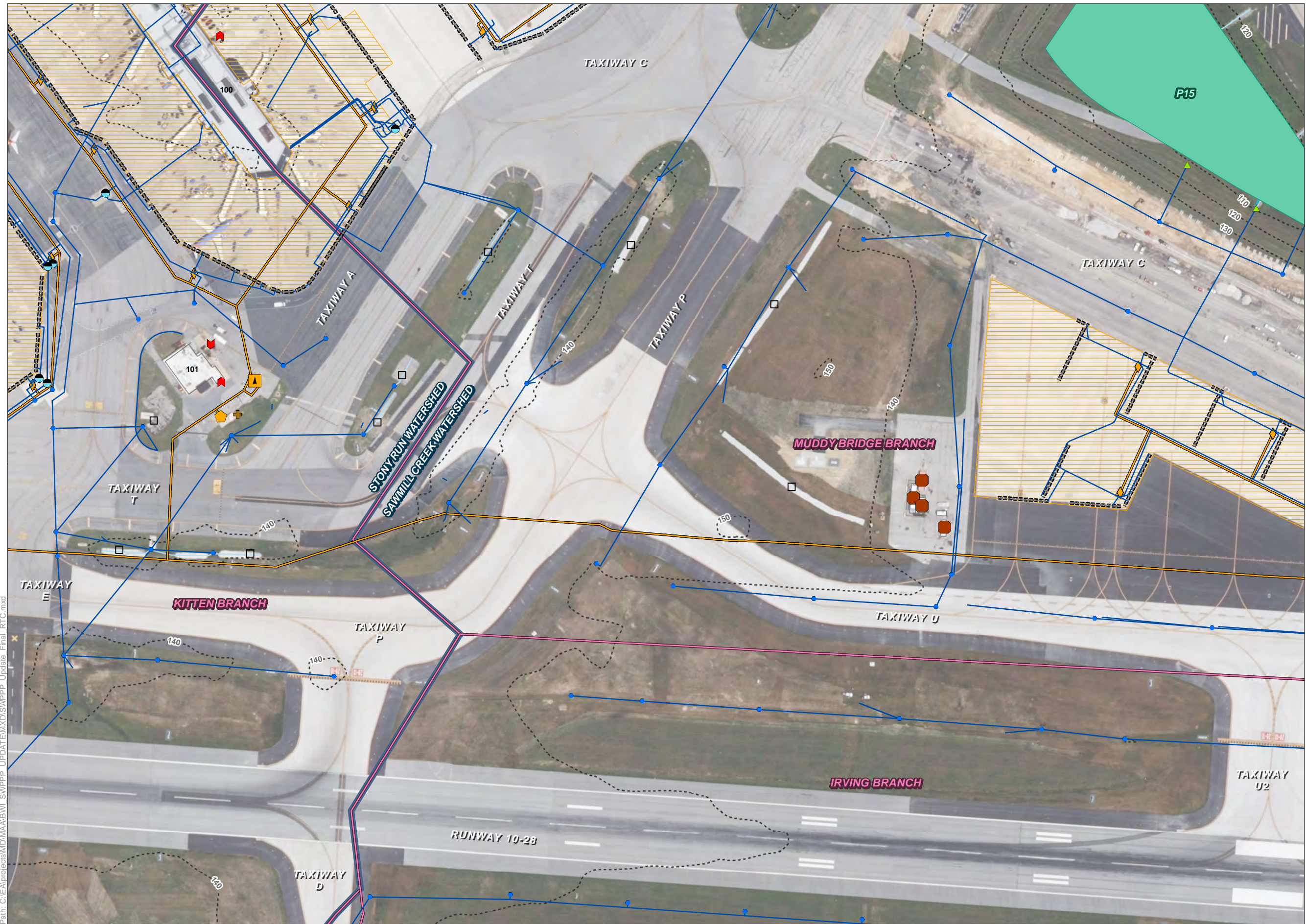
- Legend
- AST (MAA)
 - Glycol Diversion Vault
 - Infiltration Trench
 - Inlet
 - Lift Station
 - Monitoring Point
 - Oil/Water Separator
 - Outlet
 - Culvert
 - Glycol Recovery Line
 - Drainage Channel
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 - Trench Drain
 - Deicing Area
 - Drainage Area Boundary
 - DRAINAGE AREA**
 - 155 Building
 - Open Water
 - Study Area Boundary
 - SWM Pond
 - Wetland



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Stormwater Pollution Prevention Plan
2016 Update



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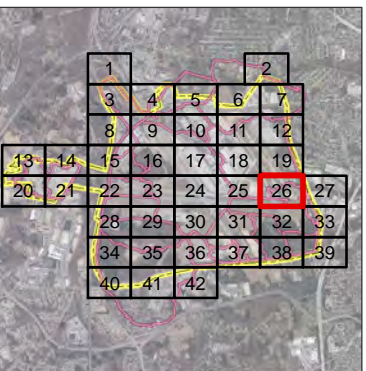
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- SWM Pond

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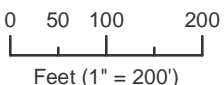
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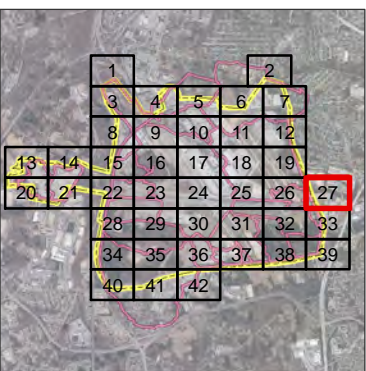
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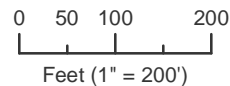


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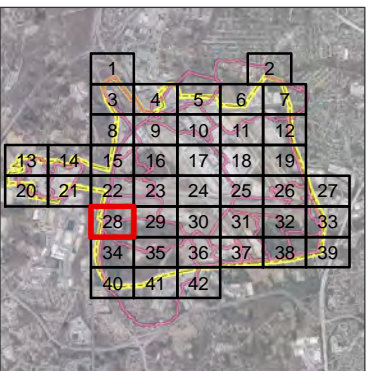
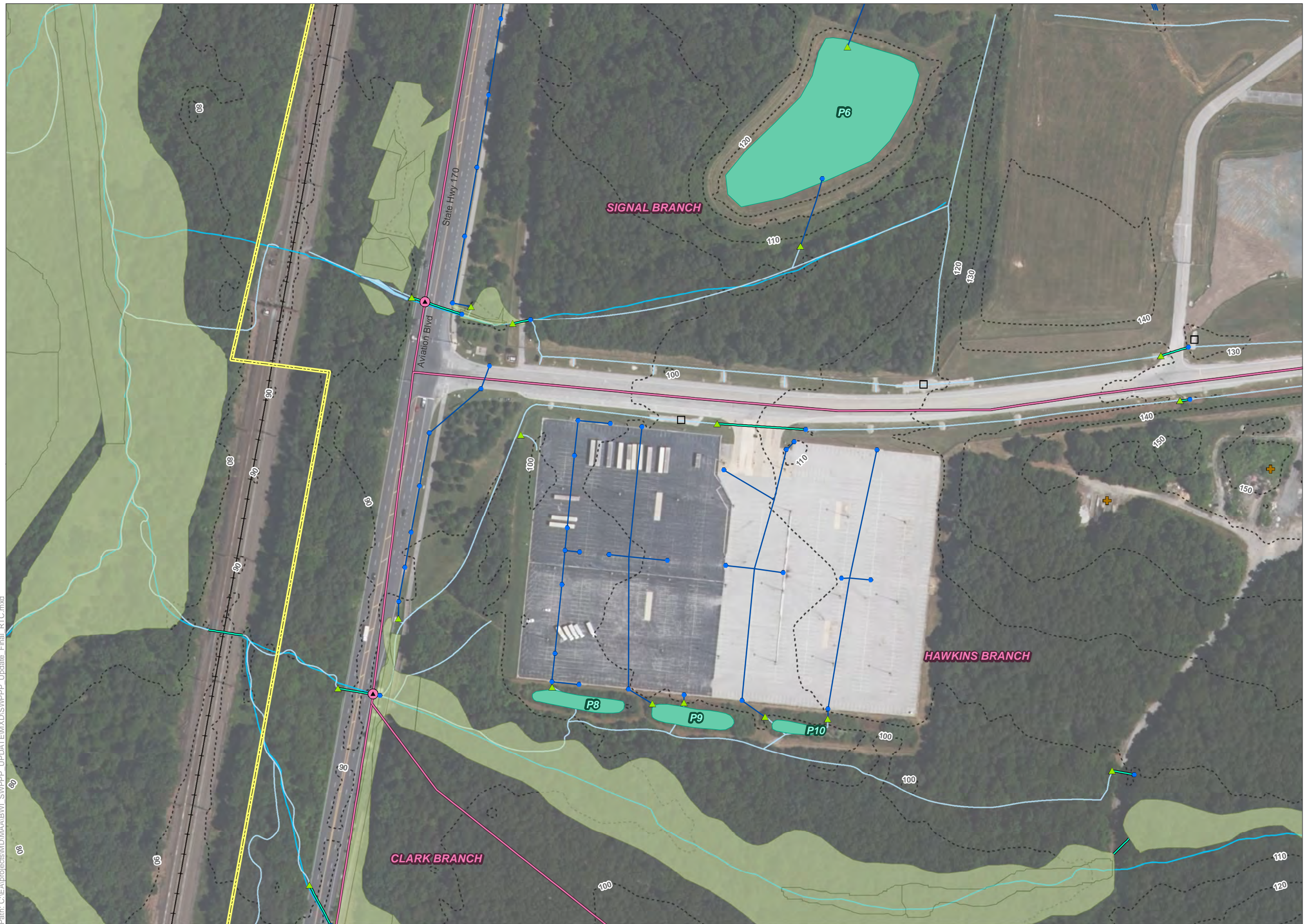
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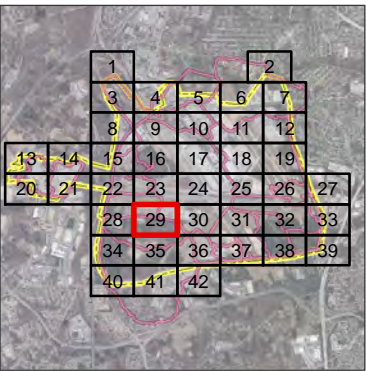
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Feet (1" = 200')

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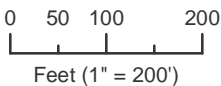


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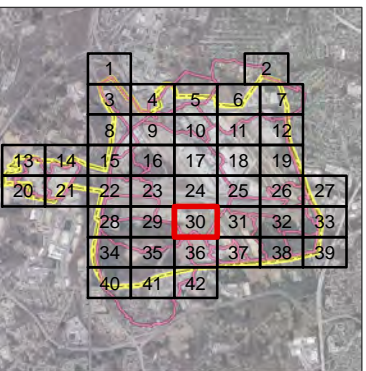
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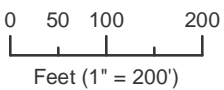
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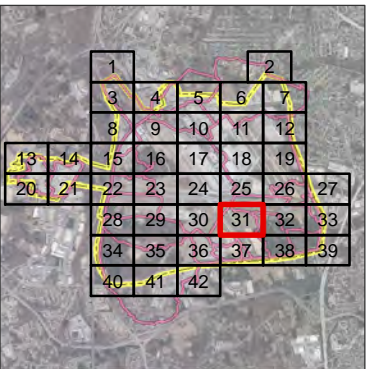
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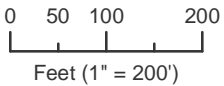
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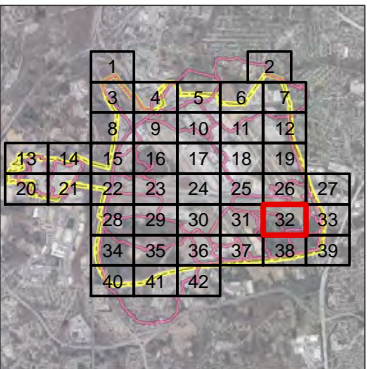
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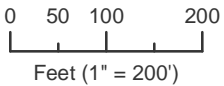
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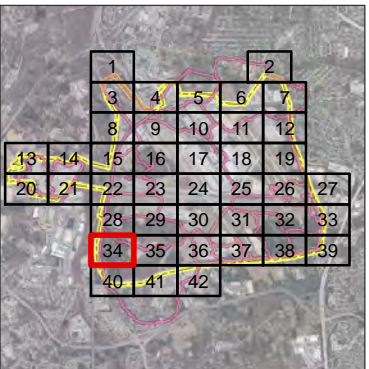
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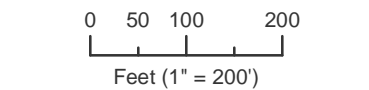


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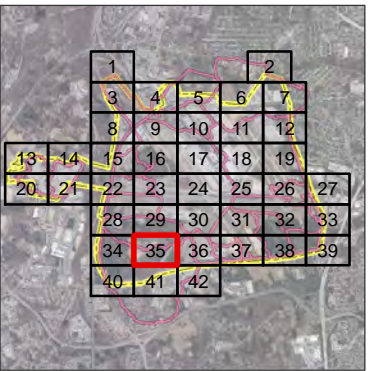
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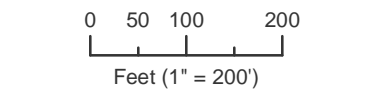


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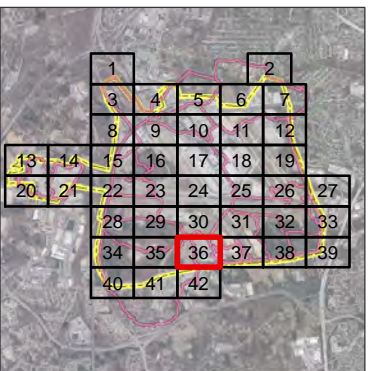
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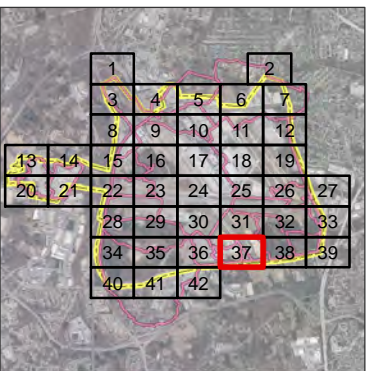
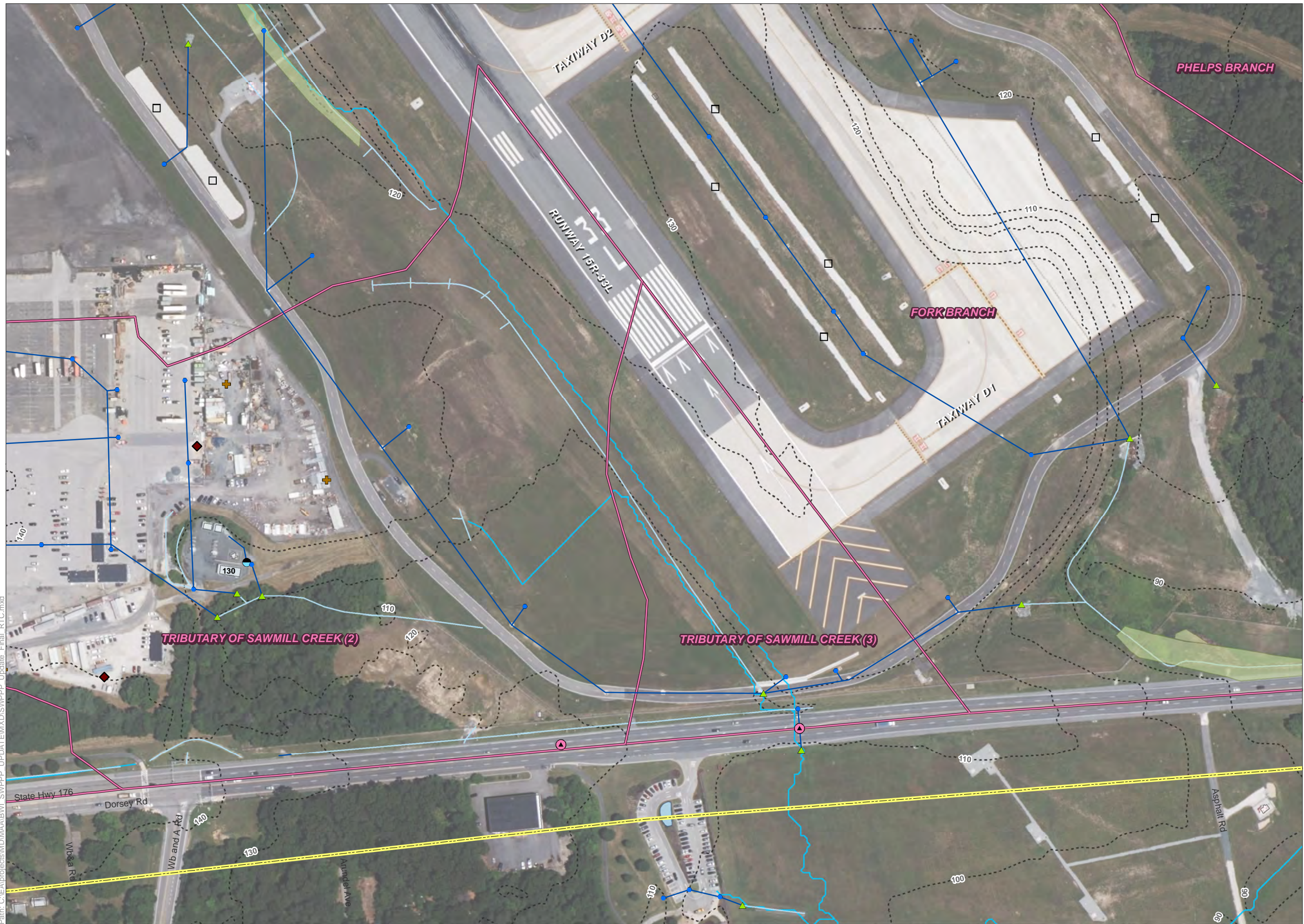
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- WATERSHED**
- Drainage Area Boundary
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- 155 Building
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0 50 100 200
Feet (1" = 200')

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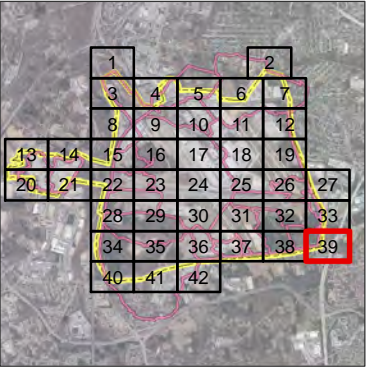
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- Storm Drain
- Stream Channel
- Drainage Area Boundary
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- Wetland

Note:
Topography not updated in areas of recent construction.

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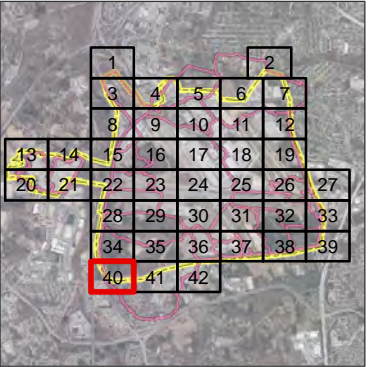


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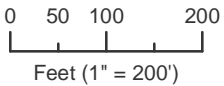


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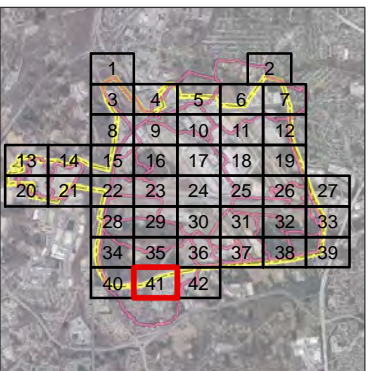
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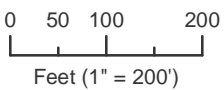


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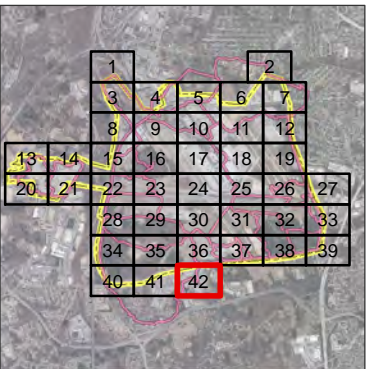
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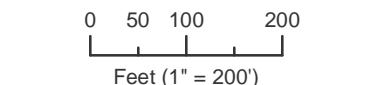


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**C. STORMWATER MANAGEMENT PLAN FOR NON-INDUSTRIAL
STORMWATER DISCHARGES AT BWI THURGOOD MARSHALL AIRPORT**

Stormwater Management Program Plan for Non-Industrial Stormwater Discharges at BWI Airport

The Maryland Aviation Administration (MAA) has prepared this Stormwater Management Program Plan for Non-Industrial Stormwater Discharges at Baltimore Washington International (BWI) Airport in response to NPDES Permit MD0063371 requirements.

The permit states:

The permittee shall have and implement a storm water management plan. The plan shall be prepared in accordance with sound engineering practices. The plan shall *identify potential sources of pollution* which may reasonably be expected to affect the quality of stormwater discharges associated with non-industrial activity from the facility.

The plan shall include the following:

- a. The best *management practices* (BMPs) to be implemented and the *measurable goals* to be used for each of the minimum control measures
- b. A *schedule* for BMPs and stormwater management program implementation;
- c. A *description of the entities* that will implement the BMPs and the stormwater management program components to satisfy each of the minimum control measures; and
- d. A *fiscal analysis* of the anticipated expenditures to implement the minimum control measures

Potential Sources of Pollution

A wide variety of both industrial and non-industrial activities occur at BWI Airport. The MAA has already developed many programs to address pollutants that may be associated with industrial activities as a requirement of the NPDES industrial stormwater permit requirements. These existing programs are addressed in BWI Airport's Stormwater Pollution Prevention Plan (SWPPP) and many either directly or indirectly address non-industrial stormwater across the airport.

Industrial activities specifically covered in the SWPPP include deicing, vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), and equipment cleaning operations. Additional information on where these activities occur and how stormwater discharges are impacted by these activities are also included in the SWPPP.

In addition to these activities, several additional activities occur on airport grounds that are considered non-industrial in nature. Potential sources of pollution that are specifically associated with non-industrial activity include construction and post-construction activities, restaurant waste and trash and litter disposal, and fleet yard and building maintenance activities. Additionally, spills, illicit discharges or storm drain system connections may potentially affect the quality of stormwater discharges associated with non-industrial activities at the airport.

Minimum Control Measures

To address BWI Airport's NPDES stormwater permit requirements, MAA will implement the best management practices (BMPs) listed below and has identified the associated measurable goals to evaluate the effectiveness of individual control measures and the stormwater management program as a whole.

Public Education and Outreach

Permit language: The permittee shall implement and maintain a personnel education and outreach program to help reduce the discharge of pollutants caused by stormwater runoff. Personnel education and outreach can be coordinated with other portions of the permittee's stormwater management program, developed independent of other pollution control efforts, or implemented by an entity other than the permittee. At a minimum, the personnel education program shall contain information about the impacts of stormwater discharges on receiving waters, why controlling these discharges is important, and what the personnel can do to reduce pollutants in stormwater runoff.

Year to Develop/Implement	BMP	Implementation Details	Measurable Goal	Responsible Airport Division
Years 2-5	Develop a stormwater educational campaign for employees and tenants	Develop a posters and brochures that can be easily disseminated to employees, tenants, and visitors at the airport. Information included in these materials will include an overview of stormwater pollution, activities at the airport that can impact stormwater, and BMPs that can be implemented to protect stormwater quality.	Make materials available at MAA training center. Distribute materials to existing employees and tenants. Distribute brochures to 100% of new employees and tenants.	MAA - Environmental Compliance Division
Years 2-5	Provide internet access to stormwater related resources	Use the MAA website to disseminate information to citizens, employees, and tenants related to the airports stormwater program and provide links to sites with extensive stormwater pollution information such as US EPA and MDE.	Update webpage with new documents as they are developed.	MAA - Environmental Compliance Division, IT
Annually or as needed	Conduct Environmental Awareness Training	Conduct Environmental Awareness Training annually that includes information on stormwater and activities that can be implemented at the airport that help prevent stormwater pollution.	Provide Environmental Awareness training to applicable employees annually or as needed.	MAA- Environmental Compliance Division

Public Involvement and Participation

Permit language: The permittee shall implement and maintain a public involvement and participation program. The permittee shall, at a minimum, comply with all State and federal public notice requirements in actions or decisions made having to do with stormwater management.

Year to Develop/Implement	BMP	Implementation Details	Measurable Goal	Responsible Airport Division
Years 1-5	Provide public notification and meetings/hearings on actions or decisions made having to do with stormwater management.	Continue standard notice procedures for public meetings and continue to provide opportunity for public comment during public meetings to comply with all state and federal public notice requirements.	Publicly notice all applicable documents and hold public meetings as necessary.	MAA - Environmental Compliance Division
Years 1-5	Conduct community group meetings	Continue existing community group meetings addressing any stormwater quality issues as necessary.	Meet with the existing community group at least once annually.	MAA - Environmental Compliance Division
Years 1-5	Develop an email link for reporting, comments, or questions through website	On website, provide email link to allow the public, MAA staff, and tenants to easily contact MAA with environmental comments or concerns.	Respond to all questions and inquiries from the public, tenants, or MAA staff.	MAA - Environmental Compliance Division, IT

Illicit Discharge Detection and Elimination

Permit language: The permittee shall develop, implement, and maintain a program to identify and eliminate illicit storm drain system connections and non-stormwater discharges to the maximum extent practicable. The program developed to satisfy this minimum control measure shall contain elements to field screen storm drain system outfalls, inspect the storm drain system for the purpose of identifying the source of any illicit discharges, and eliminate any illegal connection or illicit discharge to the storm drain system. The illicit discharge program shall also contain components to address illegal dumping and spills.

This minimum control measure may be implemented and maintained by the permittee or by another responsible entity. If the responsibilities for complying with this minimum control measure are to be shared between the permittee and another responsible entity, the relationship and specific duties of all participating entities shall be outlined in the stormwater management plan.

At a minimum, a program developed to implement illicit discharge detection and elimination to satisfy this control measure shall contain the following:

1. A map showing the extent of the storm drain system;
2. The legal means to provide for entering onto private property to investigate and eliminate illicit storm drain system discharges;
3. Procedures to field screen storm drain outfalls on a consistent basis;
4. Inspection procedures for identifying the source of any suspected illicit discharges to the storm drain system;
5. Enforcement and penalty procedures;
6. Procedures to address spills and illegal dumping;
7. Means to inform public employees, businesses, and the general public of illegal discharges and improper waste disposal; and

8. Any other components deemed necessary to ensure that non-stormwater discharges to the municipal separate storm sewer system are either permitted by MDE under NPDES or eliminated.

The permittee shall cooperate regarding discharges entering or leaving its jurisdictional boundaries or waters of the state. The intent of this program is to control non-stormwater discharges to and from municipal separate storm sewer systems.

Year to Develop/Implement	BMP	Implementation Details	Measurable Goal	Responsible Airport Division
Years 1-5 as needed	Maintain storm drain system map	MAA staff updates the current map based on inspections and when modifications are made on airport property.	Periodically update map as needed.	MAA - Environmental Compliance Division
Years 1-5 as needed	Assure legal means to provide for entering onto private property to investigate illicit storm drain discharges	Tenant leases will be updated as needed to assure language regarding right of entry and the right to require tenants to complete/correct stormwater related issues are included.	Update current tenant agreements as needed.	MAA - Environmental Compliance Division, Legal Department, Commercial Management
Years 1-5	Develop and implement procedures to field screen storm drain outfalls on a consistent basis	Outfall Reconnaissance Inventory (ORI) procedures will be developed. ORI will be conducted on an annual basis to detect illicit discharges or connections. A subset of the airports outfalls will be identified as representative.	Develop ORI procedures in year 1. Conduct ORI at 100% of representative outfalls once annually in years 2-5.	MAA, - Environmental Compliance Division
Years 1-5	Develop and implement inspection procedures for identifying the source of any suspected illicit discharges to the storm drain system	Illicit Connection Investigation (ICI) procedures will be developed. ICI will be conducted at any storm drain outfall where the ORI has indicated a potential illicit discharge or connection.	Develop ICI procedures in year 1. Conduct ICI for illicit connections as detected in years 2-5.	MAA, Environmental Compliance Division
Years 1-5	Ensure enforcement and penalty procedures are in place	MDE will be relied upon for technical assistance and enforcement. MAA tenant lease and contract agreements will be referenced as needed for enforcement purposes.	Refer 100% of enforcement actions to MDE for those entities that have not responded to MAA requests to halt illicit discharges or connections.	MDE; MAA - Environmental Compliance Division
Years 1-5	Implement procedures to address spills and illegal dumping	MAA will enlist the assistance of MDE and contractor and tenant staff in response to small spills while the airport fire department will be used to respond to large spills (Tenant Directive #502.1).	Respond to, clean up, and report 100% of spills that reach the storm drain system.	MAA, - Environmental Compliance Division, Airport Fire Department, Operations
Years 1-5	Develop a means to inform tenants of illegal discharges and improper waste disposal	As tenant leases are renewed, MAA will assure that tenant directives referencing spills are	Assure 100% of tenant leases include reference to tenant directives for spills.	MAA - Environmental Compliance Division, Legal

		referenced therein.		Department, Commercial Management
Years 2-5	Develop information for applicable public employees and the general public regarding how to identify possible illicit connections and discharges and report them appropriately	Educational materials will be developed for public employees and the general public. The MAA website will be updated to include a mechanism to report spills and will provide reporting phone numbers and applicable forms for employees.	Develop educational materials in association with the Public Education and Outreach Minimum Measure. Update website with educational materials, spill information, and a reporting mechanism. Include new information as it is developed.	MAA - Environmental Compliance Division, IT

Construction Site Stormwater Runoff Control

Permit language: The permittee shall comply with all state and federal laws, regulations, ordinances, and procedures relating to erosion and sediment control. The permittee shall clearly state how this minimum control measure will be implemented in the stormwater management plan.

Year to Develop/ Implement	BMP	Implementation Details	Measurable Goal	Responsible Airport Division
Years 1-5	Have MDE to enforce soil erosion and sediment control requirements on airport property		Submit plans for all projects disturbing 5,000 square feet or more or 100 cubic yards to MDE for erosion and sediment control approval.	MDE
Years 1-5	Require all applicable construction projects (those triggered by the regulatory size limits) to contain soil erosion and sediment control BMPs sufficient to meet state regulatory requirements.	Sediment and Erosion Control plans will be prepared and implemented for applicable construction projects. The plans will identify the specific control measures that will be in place during construction to minimize erosion and sedimentation. MAA staff will review and comment on plans.	Review 100% of all construction project design plans.	MAA - Environmental Compliance Division, Environmental Planning, Environmental Engineering
Years 1-5	Require all construction projects to obtain applicable federal, state, and/or local permits prior to the start of construction.	MAA staff and hired representatives will verify each project is covered under an appropriate permit if applicable.	Require 100% of applicable airport construction projects to maintain coverage under a stormwater construction permit.	MAA - Environmental Compliance Division, Environmental Planning
Years 1-5	Require construction oversight on MAA airport construction projects.	Employees or hired representatives of MAA will provide construction site oversight. Responsible personnel conducting oversight will possess MDE SESC training and certification.	Assure that all applicable projects have appropriate oversight.	MAA - Environmental Compliance Division, Environmental Planning

Post Construction Stormwater Management

Permit language: The permittee shall comply with all state and federal laws, regulations, ordinances, and procedures relating to stormwater management. Additionally, the permittee must implement and comply with the principles, methods, and practices found in the "2000 Maryland Stormwater Design Manual, Volumes I & II."

Year to Develop/ Implement	BMP	Implementation Details	Measurable Goal	Responsible Airport Division
Years 1-5	Have MDE enforce stormwater management requirements		Submit plans for all projects disturbing 5,000 square feet or 100 cubic yards or more to MDE for stormwater management approval.	MDE
Years 1-5	Follow stormwater directives set out in "Existing and Future Stormwater Management Needs at BWI Airport"	"Existing and Future Stormwater Management Needs at BWI Airport" will be a guide used for stormwater management at BWI Airport including when and where to add additional BMPs. The document will be updated as needed.	Add additional stormwater management facilities as needed on airport property.	MAA - Environmental Compliance Division, Environmental Planning
Years 1-5	Continue to review the need to retrofit existing stormwater management facilities.	Stormwater management facilities will be retrofitted as needed or as construction occurs in their drainage area. The stormwater management facilities will comply with the 2000 Maryland Stormwater Design Manual	Existing stormwater stormwater management facilities will be retrofitted as needed on airport property.	MAA, - Environmental Compliance Division, Environmental Planning
Years 1-5	Maintain operation and maintenance (O&M) manuals on structural stormwater management facilities at BWI.	O&M records for all tasks completed on structural stormwater management facilities will be maintained for three years.	O&M manuals will be updated as necessary. New manuals will be added with each additional structural stormwater management facilities are constructed.	MAA - Environmental Compliance Division, Environmental Planning

Pollution Prevention and Good Housekeeping

Permit language: The permittee shall implement and maintain pollution prevention and good housekeeping techniques and procedures to reduce pollutants from all facility operations.

Components of this minimum control measure shall include employee training materials to prevent and reduce pollutant discharges to the storm drain system, runoff controls geared toward fleet yard and building maintenance activities, and ensuring all facility activities are properly permitted under NPDES or any other appropriate state or federal water pollution control program. Permittee shall develop pollution prevention or good housekeeping procedures themselves or rely on another responsible entity to comply with this minimum control measure.

Year to Develop/Implement	BMP	Implementation Details	Measurable Goal	Responsible Airport Division
Years 1-5	Continue implementation of SWPPP best management practices for Good Housekeeping (See SWPPP, Section 5.1.2)	BMP Fact Sheets have been included in the SWPPP that include good housekeeping measures for aircraft, ground vehicle and equipment maintenance, building and grounds maintenance, cleaning and storage; material storage areas; and fueling	Include SWPPP on website to assure easy access by tenants and MAA staff.	See SWPPP for airport division responsible for applicable practice
Years 1-5	Continue implementation of SWPPP best management practices for Preventative Maintenance (See SWPPP, Section 5.1.1)	Maintenance manuals have been developed by the MAA to address infiltration trenches, retention ponds, detention ponds, underground storage facilities, combined detention/filtration systems, oil/water separators, and storm filter systems	Conduct maintenance on stormwater facilities as needed.	MAA - Environmental Compliance Division, Maintenance
Years 1-5	Continue stormwater facility inspections (See SWPPP, Section 5.1.6)	Needed repairs and maintenance are reported based on the inspections.	Inspect/screen 100% of stormwater facilities at least once every three years.	MAA - Environmental Compliance Division
Years 1-5	Continue stormwater facility maintenance		Conduct maintenance on stormwater facilities once every 3 years or as inspections warrant.	MAA -- Maintenance???
Years 1-5	Continue oil/water separator inspections (See SWPPP, Section 5.1.6)	Cleaning or maintenance needs for the separators are identified and carried out as determined by inspections.	Inspect 100% of oil/water separators at least once annually.	MAA - Environmental Compliance Division
Years 1-5	Conduct cleaning and maintenance of oil/water separators		Conduct cleaning and maintenance once annually or as inspections warrant.	MAA -- Maintenance???
Years 1-5	Continue visual inspections of designated equipment and facility areas (See SWPPP, Section 5.1.6)	Material handling areas are inspected for evidence of, or the potential for, pollutants entering the drainage system in 10 areas of the airport.	Inspect 100% of designated equipment and facility areas annually.	MAA - Environmental Compliance Division

Years 1-5	Continue spill prevention and response activities (See SWPPP, Section 5.1.3)	Notification, response, and reporting procedures are included in the BWI Integrated Contingency Plan. MAA staff, tenants, and contractors respond to small spills while the Airport Fire Department responds to larger spills.	Assure all spills are recorded and reported appropriately.	MAA - Environmental Compliance Division, Airport Operations Center, Fire and Rescue Department; tenants and airlines
Years 1-5	Continue employee pollution prevention training program (See SWPPP, Section SWPPP 5.1.7)	Continue to train employees on topics including, but not limited to, spill response, good housekeeping practices, and material management practices.	Train applicable employees annually or as needed.	MAA - Environmental Compliance Division
Years 1-5	Complete GIS mapping project for all areas of BWI property to show all outfalls and water resources		Complete current project to update GIS mapping of BWI. Update in years 2-5 as needed.	MAA - Environmental Compliance Division
Years 1-5	Maintain and update SWPPP which includes BMP Fact Sheets		Update SWPPP as necessary and assure that it, including the BMP Fact Sheets, is distributed to appropriate personnel and posted on the website.	MAA - Environmental Compliance Division
Years 1-5	Conduct street sweeping of paved areas that receive winter sanding		Sweep 100% of roads and around gate areas receiving winter sanding at least on a monthly basis.	MAA - Maintenance
Years 1-5	Employ the use of scrubbers to clean oil stains off pavement and vacuum debris on airport property and around aircraft gate areas		Conduct scrubbing and vacuuming at least monthly or as needed.	MAA - Maintenance
Years 1-5	Continue recycling program		Recycle cardboard and waste oil at BWI. Consider expanding program as needed.	MAA - Maintenance
Years 1-5	Ensure all facility activities are properly permitted under NPDES or any other appropriate state or federal water pollution control program		Work with associated permitting authorities to assure that permits, such as the Baltimore County Wastewater Discharge Permit, are kept up-to-date. Also see the Construction Site Stormwater Runoff Control Minimum Measure above.	MAA - Environmental Compliance Division

Fiscal Analysis

Permit language: Develop a fiscal analysis of the anticipated expenditures to implement the minimum control measures.

The table below provides a range of costs for annual capital and operating expenditures over five years to implement each of the six minimum measures. It is important to recognize that a more specific number is difficult to estimate as costs may vary widely from year to year. For instance, the number of construction projects requiring erosion and sediment control measures may increase or decrease significantly based on available budget and current needs at the airport.

Fiscal Analysis of Anticipated Expenditures Annually (for five years)

	Expenditures
Public Education and Outreach	\$45,000 – 65,000
Public Involvement and Participation	\$1,200 – 2,500
Illicit Discharge Detection and Elimination	\$175,000 – 200,000
Construction Site Runoff Control	\$590,000 – 628,000
Post Construction Stormwater Management	\$190,000 – 250,000
Pollution Prevention and Good Housekeeping	\$1,290,000 – 1,533,700
Total Annually	\$2,291,200 – 2,620,700

- * Note that some of the BMPs that are described above for each of the six minimum measures have been developed and implemented under other related programs at the airport. The costs of these programs; however, are included above.
- * Various programs may be performed under multiple Minimum Measures; however, costs will only be included in associated with one Minimum Measure in the Fiscal Analysis.
- * Ranges for expenditures for each of the Minimum Measures is necessary due to the difficulty in estimating the extent of activities in each of the categories above (i.e., the number of construction projects, the number of spills requiring clean up, etc.)

D. TENANT CONTACT LIST

1. Tenant Contact Information as reported by 2016 Tenant Survey respondents
2. Tenant Address Listing provided by MAA in July 2016

Tenant Contact List

Company Name	Surveyed in 2005	Surveyed in 2011	Surveyed in 2016	2016 New Tenant	2016 Survey Information					
					LocationBuilding	POCName	Title	Email	Phone	Fax
AA WORKFORCE DEVELOPMENT CORP.	FALSE	TRUE	TRUE		Baggage Claim area near door 8	Jeff Trice	Director, Business Solutions	jtrice@aawdc.org	410-793-5635	
ABX Air (Formerly DHL/AIRBORNE EXPRESS)	TRUE	FALSE	TRUE		128 Cargo Drive	Phil Spencer	Lead Line Maint Rep	phil.spencer@abxair.com	410-850-4602	410-850-4603
AERONAUTICAL RADIO, INC.	TRUE	TRUE	TRUE		Lower Level, North Terminal, Room NT107, 26 s/f	Stephanie Smith	Lease Administrator	sxsmith@arinc.com	410-266-4066	410-266-4010
AEROVIAS DE MEXICO, S.A. DeC.V	FALSE	FALSE	TRUE	TRUE	International	James Lay	Station Manager - IAD	jlay@aeromexico.com	202-498-4008	703-572-9176
AFCO CARGO BWI LIMITED PARTNERSHIP	TRUE	TRUE	TRUE		Bldgs B, C, F & G	John Northcott	VP, Facilities	jnorthcott@afcoinc.com	703-902-1184	703-902-2901
AIR CANADA JAZZ	TRUE	TRUE	TRUE		Concourse D	Chris Messina	Mgr., Airports North-East USA	chris.messina@aircanada.ca	617-569-1418	
AIR MOBILITY COMMAND	TRUE	TRUE	FALSE							
AIRPORT LOGISTICS d/b/a/ NBS/Interline	TRUE	TRUE	FALSE							
AIRPORT SHUTTLE	TRUE	TRUE	FALSE							
AIRPORT TERMINAL SERVICES	TRUE	TRUE	FALSE							
AIRTRAN AIRWAYS	TRUE	FALSE	FALSE							
ALL STAR LEASING d/b/a NEXTCAR	FALSE	FALSE	TRUE	TRUE	QTA Building 189	Joey Sypolt	Airport Manager	joey@nextcar.com	240-417-4698	
ALLIANCE, INC.	TRUE	FALSE	FALSE							
AMERICAN AIRLINES, INC.	TRUE	FALSE	TRUE		Terminal C	Jay Jay Lavine	General Manager	jayjay.lavine@aa.com	703-615-4240	
ANNE ARUNDEL ECONOMIC DEVELOPMENT CORP.	FALSE	TRUE	FALSE							
ANNE ARUNDEL HISTORICAL SOCIETY	FALSE	FALSE	FALSE							
ARGOS FOOD SERVICE, INC.	TRUE	TRUE	FALSE							
ASIG	TRUE	TRUE	FALSE							
ATLAS AIR, INC.	FALSE	FALSE	TRUE	TRUE	Suite E 3805 Concourse E	Rob Scala	na	Robert.Scala@AtlasAir.com	302-344-1081	
AVDYNE AEROSERVICES LLC	TRUE	FALSE	TRUE		1 Aaronson Dr	Jerome Hodge	President	hodgej@avdyne.com	410-859-3917	410-859-0704
AVIATION PORT SERVICES, INC.	FALSE	FALSE	TRUE	TRUE	Building B, bay door 21	Jeff Cross	Staton Manager	Jcross@avportsvcs.com	443-362-2062	410-981-9902
AVIATION SAFEGUARDS	TRUE	TRUE	FALSE							
AVIS BUDGET GROUP INC. (AVIS/BUDGET)	FALSE	FALSE	FALSE							
BAA MARYLAND (AIRMALL Maryland)	TRUE	TRUE	FALSE							
BALTIMORE DISTRIBUTION LLC (formerly LUGGAGE SERVICES AND LOGISTICS)	FALSE	FALSE	TRUE	TRUE	n/a	Billy Arden	COO	barden@makeraveleasier.com	407-849-0670	
BAX GLOBAL	TRUE	FALSE	FALSE							
BRIAN'S TRANSPORTATION, INC.	TRUE	TRUE	FALSE							
BRITISH AIRWAYS, PLC	TRUE	FALSE	FALSE							
BWI BUSINESS PARTNERSHIP, INC.	FALSE	FALSE	TRUE	TRUE	1302 Concourse Drive, Linthicum heights, MD	Greg Pecoraro	Executive Director	gpecoraro@bwipartner.org	410-859-1000	
BWI RAC, LLC	FALSE	TRUE	FALSE							
BWI TAXI MANAGEMENT	TRUE	TRUE	FALSE							
CHIMES, INC.	FALSE	FALSE	FALSE							
CLEAN ENERGY CORPORATION	FALSE	FALSE	TRUE	TRUE	n/a	James Wright	Corporate Safety Manager	james.wright@cleanenergyfuels.com	949-437-1207	949-438-2267
COLONIAL PIPELINE COMPANY	TRUE	TRUE	FALSE							
CONTINENTAL AIRLINES	TRUE	FALSE	FALSE							
DAL GLOBAL SERVICES	TRUE	FALSE	FALSE							

Tenant Contact List

Company Name	Surveyed in 2005	Surveyed in 2011	Surveyed in 2016	2016 New Tenant	2016 Survey Information					
					LocationBuilding	POCName	Title	Email	Phone	Fax
DELTA AIR LINES, INC.	TRUE	TRUE	TRUE		123-4	Llwellyn Antel	GMT	llwellyn.antel@delta.com	410-859-1222	410-859-1338
DELTA AIR LINES, INC.	TRUE	TRUE	TRUE		Terminal D	Mark Astifan	Station Manager	mark.astifan@delta.com	410-855-7300	410-855-7301
DTG OPERATIONS, INC. (DOLLAR & THRIFTY)	FALSE	TRUE	FALSE							
DUTY FREE AMERICAS (BALTIMORE-WASHINGTON), INC.	FALSE	FALSE	TRUE	TRUE	Pier E	Donna Arnold	Terminal Manager	Darnold@dutyfreeamericas.com	410-859-1236	410-859-1305
ENTERPRISE LEASING COMPANY OF BALTIMORE	FALSE	FALSE	TRUE		7434 New Ridge	Sabrina Sauer		sabrina.m.sauer@ehi.com	410-412-4695	
FEDERAL AVIATION ADMINISTRATION (FAA)	TRUE	FALSE	FALSE							
FEDERAL AVIATION ADMINISTRATION (FAA,FSDO)	TRUE	TRUE	FALSE							
FEDERAL EXPRESS CORPORATION	TRUE	TRUE	TRUE		North Cargo D, E, F	Louis Guido	Sr Mgr, Ramp Ops	laguido@fedex.com	410-850-0461	
FIRST TRANSIT, INC.	TRUE	TRUE	TRUE		55312	Floyd Walters	Maintenance Manager	floyd.walters@firstgroup.com	410-361-0575	
FLIGHT SERVICES & SYSTEMS	FALSE	FALSE	FALSE							
FLIK MANAGEMENT	FALSE	FALSE	FALSE							
FOUR POINTS BY SHERATON BWI AIRPORT	TRUE	TRUE	FALSE							
Fursyth Petroleum Foundation Inc.	FALSE	FALSE	TRUE	TRUE	1001 Aviation Blvd, Baltimore, MD	Jeff Bucaro	Director of Assets	jbucaro@petromg.com	703-494-5839	703-494-5839
GENCO I, INC.	FALSE	FALSE	TRUE	TRUE	107 Fuel Farm Rd	Brett Trotta	TMS Supervisor	brett.trotta@genco.com	410-859-4773	410-859-4777
GENERAL AMERICAN RENTALS, INC. d/b/a PAYLESS CAR RENTAL	FALSE	FALSE	TRUE	TRUE	7440 B New Ridge Rd. QTA Bldg 189, Hanover, MD 21076	David J. Lynch		dlynch@garinc.net	814-255-2136 ext.222	814-255-2448
Harris Corporation	FALSE	FALSE	TRUE	TRUE	ATCT	Jennifer Banasik	Implementation Project Manager	Jbanasik@harris.com	703-245-4341	
HERTZ CORPORATION	FALSE	FALSE	TRUE		7416 New Ridge Road	John Flynn	GM Operations	jflynn@hertz.com	410-684-7964	866-333-8290
HUDSON GENERAL	FALSE	FALSE	FALSE							
Impark/Fleetpro	FALSE	FALSE	TRUE	TRUE	None entered on faxed sheet	Matt Farcosky	Vice President	mtf@fleetpro.com	4102471310	410-247-2729
INTERNATIONAL ASSOCIATION OF MACHINISTS AND AEROSPACE WORKER	TRUE	TRUE	FALSE							
JETBLUE AIRWAYS	FALSE	TRUE	TRUE		3 JetBLue	Nelson	Supervisor	nelson.menacho@jetblue.com	347-924-4707	
JUST PLANE CLEAN	TRUE	TRUE	FALSE							
LAING INTERNATIONAL, INC.	TRUE	TRUE	FALSE							
LASSEY'S TRAVEL SOLUTIONS	FALSE	FALSE	FALSE							
LSG/SKY CHEFS, INC.	TRUE	FALSE	TRUE		776 Elkridge Landing Road	Brad Ferriell	General Manager	bradley.ferriell@lsgskychefs.com	410-412-3530	410-412-3533
MARYLAND DEPARTMENT OF HEALTH AND MENTAL HYGIENE	FALSE	FALSE	TRUE	TRUE						
MARYLAND ENVIRONMENTAL SERVICE	FALSE	FALSE	FALSE							
MARYLAND PARKING LIMITED PARTNERSHIP	TRUE	FALSE	FALSE							
MID-ATLANTIC TRADE SERVICES, INC.	TRUE	FALSE	FALSE							
NATIONAL RAILROAD PASSENGER CORP. (AMTRAK)	FALSE	FALSE	FALSE							

Tenant Contact List

Company Name	Surveyed in 2005	Surveyed in 2011	Surveyed in 2016	2016 New Tenant	2016 Survey Information					
					LocationBuilding	POCName	Title	Email	Phone	Fax
NORTHROP GRUMMAN CORPORATION	TRUE	TRUE	TRUE		7323 Aviation Blvd., Linthicum MD 21090	Shelly Leibowtz	Environmental Scientist	shelly.leibowitz@ngc.com	410-765-5205	
NORTHWEST AIRLINES, INC.	TRUE	FALSE	FALSE							
OMNI AIR INTERNATIONAL	TRUE	FALSE	TRUE		32	Josh Starr	Station Manager	jstarr@oai.aero	918-804-4053	410-691-1549
PEPCO ENERGY SERVICES (also PEPCO GOVERNMENT SERVICES)	FALSE	TRUE	FALSE							
PET AIRWAYS, INC.	FALSE	TRUE	FALSE							
PMIG 1025, LLC (Shell Gas Station)	FALSE	FALSE	TRUE		1001 Aviation Blvd	Airport Shell		bhamzat@yahoo.com	410-850-8997	
PPE CASINO RESORTS MARYLAND LLC	FALSE	FALSE	TRUE	TRUE	Ridge Road	Howard Weinstein	General Counsel	howard.weinstein@marylandlivecasino.com	443-445-2406	
PRIME FLIGHT AVIATION SERVICES	FALSE	TRUE	FALSE							
PROSPECT INTERNATIONAL AIRPORT SERVICES, INC	FALSE	FALSE	TRUE	TRUE	Outside of Door 1 Upper Level	Matt Keller	General Manager	matt.keller@prospectair.com	410-859-8010	
QUAKER CITY MOTOR PARTS COMPANY (NAPA)	TRUE	TRUE	FALSE							
QUANTEM AVIATION	FALSE	FALSE	TRUE		Bldg B Gate 29	Andrew Garton	General Manager	agarton@qasllc.aero	804-640-0061	
RIDGELY/BWI PARTNERSHIP	TRUE	TRUE	FALSE							
SCIS AIR SECURITY CORPORATION	FALSE	FALSE	TRUE	TRUE	LSG Sky Chefs	Jack Thrun	Mgr, OPS Support	jthrun@scisairsecurity.com	817-792-4522	817-792-4511
SIGNATURE FLIGHT SUPPORT	TRUE	FALSE	TRUE		184	Johnathan Washington	Duty Manager	johnathan.washington@signatureflight.com	410-859-8393	
SIGNATURE FLIGHT SUPPORT	TRUE	FALSE	TRUE		145	David Buberl	AFQC	David.Buberl@signatureflight.com	410-218-5151	
SMARTE CARTE, INC.	FALSE	FALSE	TRUE	TRUE	Terminal	Mike Multer	Sr. Director	multerm@smartecarte.com	651-308-0049	
SOUTHWEST AIRLINES CO.	TRUE	TRUE	TRUE		Terminals A,B,C. Cargo Buildings B,C.	Pratik Patel	Station Manager	pratik.patel@wnco.com	410-981-1236	
SPIRIT AIRLINES, INC.	FALSE	FALSE	TRUE	TRUE	Main Terminal, D Pier	Jason Seiple	General Manager	jason.seiple@spirit.com	404-312-3433	
STARKEY AVIATION CORPORATION	FALSE	FALSE	TRUE	TRUE	D Space 17-20	Samantha Coleman	Admin	samantha@starkyaviation.com	888-436-3424	888-436-5558
TRANSPORTATION SECURITY ADMINISTRATION	TRUE	FALSE	FALSE							
U.S. AIR FORCE	FALSE	TRUE	FALSE							
U.S. CUSTOMS AND BORDER PROTECTION	TRUE	TRUE	FALSE							
U.S. FISH AND WILDLIFE SERVICE	TRUE	TRUE	FALSE							
U.S. IMMIGRATIONS & CUSTOMS ENFORCEMENT	TRUE	FALSE	FALSE							
Unicorn Transportation	FALSE	FALSE	TRUE	TRUE	Suite C- Cargo Bld G	Brooks Cotgreave	President	bcotgreave@unicornbwi.com	410-766-1716	410-766-2358
UNITED AIRLINES	FALSE	FALSE	TRUE		D Pier Gate 13-16	Steve Pantin	Supervisor	peter.pantin@united.com	1-410-865-7962	410-865-7927
UNITED PARCEL SERVICE	TRUE	TRUE	TRUE		Ridgely Cargo Terminal	Afolabi Ozah	Manager	aozah@ups.com	410-684-2056	
UPS CARTAGE SERVICES, INC. (UPS SUPPLY CHAIN SOLUTIONS)	FALSE	TRUE	TRUE		Bldg F Suite 1300	John Hammett	Manager	jwhammett@ups.com	410-859-4226	410-684-2641
US AIRWAYS, INC.	TRUE	FALSE	FALSE							
USO	TRUE	TRUE	FALSE							
VANDERLANDE INDUSTRIES/USO	FALSE	TRUE	FALSE							

Tenant Contact List

Company Name	Surveyed in 2005	Surveyed in 2011	Surveyed in 2016	2016 New Tenant	2016 Survey Information					
					LocationBuilding	POCName	Title	Email	Phone	Fax
VANGUARD CAR RENTAL USA INC. (ALAMO & NATIONAL)	FALSE	FALSE	FALSE							
VMW Express LLC	FALSE	TRUE	FALSE							
WORLD AIRWAYS, INC.	TRUE	TRUE	FALSE							
WORLDWIDE FLIGHT SERVICES	TRUE	FALSE	TRUE		North Cargo Complex Bldg D	Jeff Armstrong	Manager	jarmstrong@wfs.aero	410-859-5008	

**Office of Commercial Management
TENANT ADDRESS LISTING
June 1, 2016**

ABX AIR, INC.

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Ms. Stephanie Smith
Operations/Leasing Specialist
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(410) 266-4066
(410) 266-4010 (FAX)
Email: sxsmith@arinc.com

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Mr. Mike Hinojosa
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(410) 863-7293
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Email: mhinojos@arinc.com
Email: bwimm@arinc.com

Mr. Bryan Hall
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Real Estate Department/MS5-1B35
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(305) 869-4445 (FAX)
Email: ilizaso@aeromexico.com

Mr. James Lay
Airport Manager
P.O. Box 16332
Washington DC 20041
(703) 572-9172
Email: jlay@aeromexico.com

AFCO CARGO BWI LIMITED PARTNERSHIP (Cargo Bldgs B, C, F, G)

Mr. Chuck Stipancic
President & Chief Operating Officer
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(703) 902-2901 (FAX)
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Mr. John Northcott
Director of Facilities
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(703) 902-2901 (FAX)
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(514) 422-5032
(514) 422-7798 (FAX)
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Mr. Kevin Hogan
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AIR GEORGIAN LIMITED

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AIR MOBILITY COMMAND

Ms. Shavette A. Bradley
Realty Specialist
U.S. Army Corp of Engineers
Baltimore District
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Baltimore MD 21201
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(410) 962-0866 (FAX)
Email: shavette.a.bradley@usace.army.mil

MSgt. Robert Thurman
305 APS/DET 1
P.O. Box 8613
BWI Airport MD 21240
(410) 918-6904
(410) 918-6903 (FAX)
Email: robert.thurman@us.af.mil

AIR TRANSPORT INTERNATIONAL LIMITED LIABILITY COMPANY

Mr. Richard 'Pat' Nelson
Manager, Government Contracts
& Services
145 Hunter Drive
Wilmington OH 45177
(937) 366-5034
(FAX)
Email: richard.nelson@airtransport.cc

AIR WISCONSIN AIRLINES CORPORATION

Mr. Tim Thatcher, Manager
Properties & Facilities
5211 Eastview Street
Cheyenne WY 82001
(307) 632-8333
(307) 632-2829 (FAX)
Email: timothy.thatcher@airwis.com

AIRMALL, INC.

Mr. Brett C. Kelly
Vice President
P.O. Box 377
Linthicum MD 21090
(410) 859-9201, Ext. 13
(410) 859-9204 (FAX)
Email: b_kelly@airmallusa.com

AIRNET SYSTEMS, INC.

Mr. Jennifer Penney
Airline Operation Manager
7250 Star Check Drive
Columbus OH 43217
(877) 293-8463
(800) 825-6058 (FAX)
Email: jennifer.penney@airnet.com

AIRPORT TERMINAL SERVICES, INC.

Ms. Jody Giordano
Contract Manager
111 Westport Plaza Drive, Suite 400
St. Louis MO 63146
(314) 739-1900, ext. 375
(314) 392-5958 (FAX)
Email: jgiordano@atsstl.com

Ms. Chicvoda Layne
General Manager
c/o Delta Air Lines, Inc.
P.O. Box 8609
Baltimore MD 21240
(410) 850-4103
(410) 691-7393 (FAX)
Email: clayne@atsstl.com

AIRWAY CLEANERS, INC.

Mr. Don Matera
Vice President-General Manager
15 Clinton Avenue
Rockville Centre NY 11570
(516) 594-4944
(516) 594-4902 (FAX)
Email: donmatera@airwayllc.com

Mr. Seelan Sivakkolunthu
Station Manager
(443) 515-0022
Email: seelans@airwayllc.com

ALAMO Rental US, Inc. (a/k/a VANGUARD CAR RENTAL USA, INC.)

Mr. Bert Sheppard
Vice President, Airport Relations
700 Corporate Park Drive
St. Louis MO 63105
(954) 377-6848
(918) 401-8536
Email: sheppardb@vanguardcar.com

Mr. Ted Tesfaye
City Manager
P.O. Box 347
Hanover MD 21076
(410) 859-8860, ext. 226
(410) 859-5637 (FAX)
Email: tesfayet@vanguardcar.com

ALASKA AIRLINES, INC.

Mr. Mark Berg
Manager, Airport Affairs
Corporate Real Estate
19300 International Boulevard
SEAPZ Seattle WA 98188
(206) 310-9482
(206) 392-5031 (FAX)
Email: mark.berg@alaskaair.com

Mr. Jim Walliin
General Manager
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E. POLLUTION SOURCE INVENTORY

Pollution Sources by Watershed and Tenant Activity¹

Company Name	Location	Activity								
		Fueling	Vehicle Equipment/ Washing	Vehicle/ Equipment Maintenance	Material Loading/ Unloading Areas	Industrial Waste Management	Outside Storage Area for Raw Materials	Outside Manufacturing Areas	Materials Inventory	Non-Stormwater Discharge
CABIN BRANCH WATERSHED										
Cabin Branch										
AVIATION PORT SERVICES, INC.	Building B, bay door 21			*						
Fursyth Petroleum Foundation Inc.	1001 Aviation Blvd, Baltimore, MD	*	*		*					
PMIG 1025, LLC (Shell Gas Station)	1001 Aviation Blvd	*	*							
SAWMILL CREEK WATERSHED										
Muddy Bridge Branch										
ABX Air (Formerly DHL/AIRBORNE EXPRESS)	128 Cargo Drive	*		*		*			*	
AEROVIAS DE MEXICO, S.A. DeC.V	International	*								
AFCO CARGO BWI LIMITED PARTNERSHIP	Bldgs B, C, F & G									
AIR CANADA JAZZ	Concourse D	*								*
AMERICAN AIRLINES, INC. ²	Terminal C									
ATLAS AIR, INC.	Suite E 3805 Concourse E									
AVDYNE AEROSERVICES LLC	1 Aaronson Dr			*						
DELTA AIR LINES, INC.	123-4		*	*						
DELTA AIR LINES, INC.	Terminal D	*	*	*		*				
DUTY FREE AMERICAS (BALTIMORE-WASHINGTON), INC.	Pier E									
FEDERAL EXPRESS CORPORATION	North Cargo D, E, F	*	*	*						
JETBLUE AIRWAYS	JetBLue									
MARYLAND DEPARTMENT OF HEALTH AND MENTAL HYGIENE	Cargo Building G									
OMNI AIR INTERNATIONAL	32	*		*		*	*	*	*	*
SIGNATURE FLIGHT SUPPORT	145	*			*				*	
SIGNATURE FLIGHT SUPPORT	184	*			*		*	*	*	*
SPIRIT AIRLINES, INC.	Main Terminal, D Pier	*								
STARKEY AVIATION CORPORATION	D Space 17-20									
Unicorn Transportation	Suite C- Cargo Bld G									
UNITED AIRLINES	D Pier Gate 13-16	*			*	*			*	*
UNITED PARCEL SERVICE	Ridgely Cargo Terminal			*	*	*				

Pollution Sources by Watershed and Tenant Activity¹

Company Name	Location	Activity								
		Fueling	Vehicle Equipment/ Washing	Vehicle/ Equipment Maintenance	Material Loading/ Unloading Areas	Industrial Waste Management	Outside Storage Area for Raw Materials	Outside Manufactur ing Areas	Materials Inventory	Non-Stormwater Discharge
UPS CARTAGE SERVICES, INC. (UPS SUPPLY CHAIN SOLUTIONS)	Bldg F Suite 1300			*	*				*	
WORLDWIDE FLIGHT SERVICES	North Cargo Complex Bldg D									
STONY RUN WATERSHED										
Kitten Branch										
AA WORKFORCE DEVELOPMENT CORP.	Baggage Claim area near door 8									
AERONAUTICAL RADIO, INC.	Lower Level, North Terminal, Room NT107, 26 s/f									
FIRST TRANSIT, INC.	55312		*	*					*	
Harris Corporation	ATCT									
PROSPECT INTERNATIONAL AIRPORT SERVICES, INC	Outside of Door 1 Upper Level									
QUANTEM AVIATION	Bldg B Gate 29			*					*	
SMARTE CARTE, INC.	Terminal									
SOUTHWEST AIRLINES CO.	Terminals A,B,C. Cargo Buildings B.C.			*	*	*			*	*
Sachs Branch/Tributary of Sachs Branch										
GENCO I, INC.	107 Fuel Farm Rd									
SCIS AIR SECURITY CORPORATION	LSG Sky Chefs									
LSG/SKY CHEFS, INC.	776 Elkridge Landing Road			*		*				
King Branch/Tributary of King Branch										
NORTHROP GRUMMAN CORPORATION	7323 Aviation Blvd., Linthicum MD 21090	*	*	*	*	*	*	*	*	
CRCF Site										
ALL STAR LEASING d/b/a NEXTCAR	QTA Building 189	*	*							
ENTERPRISE LEASING COMPANY OF BALTIMORE	7434 New Ridge	*	*	*					*	
GENERAL AMERICAN RENTALS, INC. d/b/a PAYLESS CAR RENTAL	7440 B New Ridge Rd. QTA Bldg 189, Hanover, MD 21076	*	*		*				*	
HERTZ CORPORATION	7416 New Ridge Road	*	*	*						
OFFSITE OR UNKNOWN										
BALTIMORE DISTRIBUTION LLC (formerly LUGGAGE SERVICES AND LOGISTICS)	n/a									
BWI BUSINESS PARTNERSHIP, INC.	1302 Concourse Drive, Linthicum heights, MD									
CLEAN ENERGY CORPORATION	n/a	*				*			*	
Impark/Fleetpro	None entered on faxed sheet		*	*	*					
PPE CASINO RESORTS MARYLAND LLC	Ridge Road									

1. Results are self-reported by 2016 Tenant Survey Respondents

2. Terminal C is located in both Kitten Branch and Muddy Bridge Branch

F. BEST MANAGEMENT PRACTICES (BMP) FACT SHEETS

BMP

Sheet #	Title
BL1	Elimination of Non-Stormwater Discharges to Storm Drains
BL2	Emergency Spill Cleanup Plans
BL3	Stormwater Pollution Prevention Education
AS1	Aircraft, Vehicle, and Equipment Maintenance
AS2	Aircraft, Vehicle and Equipment Fueling
AS3	Aircraft, Vehicle, and Equipment Washing, Cleaning and Degreasing
AS4	Aircraft Deicing/Anti-icing
AS5	Outdoor Waste and Material Handling
AS6	Outdoor Storage of Waste and Materials
AS7	Building and Grounds Maintenance
AS8	Lavatory Service Operations
AS9	Outdoor Washdown/Sweeping
AS10	Fire Fighting Foam Discharge
AS11	Potable Water System Flushing
AS12	Runway Rubber Removal
SS1	Oil Water Separators

BL=Baseline; AS = Activity Specific; SS = Structural Specific

MARYLAND AVIATION ADMINISTRATION	
BL BMP 1	ELIMINATION OF NON-STORM WATER DISCHARGES TO STORM DRAIN
<p>PURPOSE:</p> <p>Existing discharges: Eliminate non-storm water discharges to the storm water collection system. Non-storm water discharges can be classified as follows: 1) <i>Activity-based</i> (subtle), and 2) <i>Overt</i> (hard pipe connection). Activity-based non-storm water discharges may include: wash water, and spillage. Overt non-storm water discharges may include: process wastewater, treated cooling water, and sanitary wastewater.</p> <p>Prevention of illicit connections: Prevent improper physical connections to the storm drain system from sanitary sewers, floor drains, industrial process discharge lines, and wash racks through education, developing project approval conditions, and performing both construction phase and post-construction inspections.</p> <p>Implement and follow Maryland Environmental Service's proposed "Standard Operating Procedures for Illicit Discharge Detection and Elimination at Baltimore/Washington International Thurgood Marshall and Martin State Airports"</p> <p>GENERAL APPROACH:</p> <p>Maryland Environmental Service's proposed "Standard Operating Procedures for Illicit Discharge Detection and Elimination at Baltimore/Washington International Thurgood Marshall and Martin State Airports" describes, in detail, the methods and procedures planned for performing illicit discharge inspections. The general procedure involves a staged inspection approach at particular outfalls during periods of dry weather.</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES:</p> <p>Design of New Facilities and Existing Facility Upgrades</p> <ul style="list-style-type: none"> • Perform inspections during the design review and project construction phases to ensure drainage, wastewater, and water supply connections are correct (no cross connections or illicit hookups). • Develop a set of as-built prints for all projects. Keep a set of the prints at the facility. • Design projects to include adequate waste repositories at locations near waste origin points. • Provide adequate and appropriately designed facilities for functions such as steam cleaning, degreasing, painting, mechanical maintenance, chemical/fuel storage and delivery, material handling, waste handling and storage, lavatory service, and food preparation. 	<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> ■ All activities with potential to impact storm water <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> ■ Oil and Grease ■ Antifreeze ■ Fuel ■ Solvent/Cleaning Solutions ■ Battery Acid ■ Pesticides/Herbicides/Fertilizers ■ Paint ■ Aircraft Fire Fighting Foam (AFFF) ■ Scrap Metal and Parts ■ Garbage and Hazardous Waste ■ Sediment ■ Landscape Waste ■ Floatables ■ Lavatory Chemicals and Waste ■ Potable Water System ■ Cleaning Chemicals ■ Rubber Particles <p>KEY APPROACHES</p> <ul style="list-style-type: none"> ■ Perform inspections and enforcement ■ Provide training for employees ■ Promote education of vendors/public

MARYLAND AVIATION ADMINISTRATION	
BL BMP 1	ELIMINATION OF NON-STORM WATER DISCHARGES TO STORM DRAIN
<p>APPROACH TO EXISTING FACILITY ACTIVITIES:</p> <p style="text-align: center;"><i>Operational Considerations</i></p> <ul style="list-style-type: none"> • Use "dry" cleaning and surface preparation techniques where feasible. • Limit the availability of outdoor water supplies (hose bibs). • Post signs at outdoor water sources stating the appropriate uses and discouraging uses that would introduce pollutants to the storm drain system/receiving waters. <p style="text-align: center;"><i>Contingency Response</i></p> <ul style="list-style-type: none"> • Develop and implement a Spill Prevention Control and Countermeasure (SPCC) Plan, if required under guidelines set forth in 40 CFR, Section 112.3(a), (b). • Maintain adequate supplies of spill response equipment and materials in accessible locations near areas where spills may be likely to occur. <p style="text-align: center;"><i>Inspection and Training</i></p> <ul style="list-style-type: none"> • Inspect waste containers frequently for leaks and proper closure seal. • Develop employee training programs which emphasize the proper disposal procedures for operations-derived wastes. • Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education, right-to-know awareness training, and hazardous materials management. <p>REQUIREMENTS:</p> <ul style="list-style-type: none"> • Capital and O&M may be required to eliminate non-storm water discharges. <p>LIMITATIONS:</p> <ul style="list-style-type: none"> • Storm drain documentation for many facilities is not up-to-date. • Activity-based (subtle) non-storm water discharges from a particular facility are typically sporadic, transient, and often require frequent inspections to detect. 	

MARYLAND AVIATION ADMINISTRATION	
BL BMP 2	EMERGENCY SPILL CLEANUP PLANS
<p>PURPOSE: Prevent or reduce the discharge of pollutants to storm water resulting from petroleum products or other materials.</p> <p>GENERAL APPROACH: Owners and operators of facilities that store, process, or refine oil or oil products may be required by federal law (40 CFR 112) to develop and implement a Spill Prevention Control and Countermeasure (SPCC) Plan. Emergency spill cleanup plans should include the following information:</p> <ul style="list-style-type: none"> • A description of the facility including the owner's name and address, the nature of the facility activity, and at the general types and quantities of chemicals stored at the facility. • A site plan showing the location of storage areas for chemicals, the location patterns, fire water source locations, and the location and description of any devices used to contain spills such as positive shut-off control valves. • Notification procedures to be implemented in the event of a spill, such as key company personnel and local, state, and federal agencies. • Instructions regarding cleanup procedures. • Designated personnel with overall spill response cleanup responsibility. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: Operational Considerations</p> <ul style="list-style-type: none"> • Post a summary of the plan at appropriate site locations, identifying the spill cleanup coordinators, location of cleanup equipment, and phone numbers of regulatory agencies to be contacted in the event of a spill. • Maintain an inventory of appropriate cleanup materials on-site and strategically deploy cleanup materials based on the type and quantities of chemicals present. • Make absorbent readily available in fueling areas. <p>Contingency Response</p> <ul style="list-style-type: none"> • Perform the following notifications in the event of a spill: <ul style="list-style-type: none"> - Fire Department - Local Health Department - State Office of Emergency Services - National Response Center - if spill exceeds reportable quantity (RQ) • Containment and cleanup of spills shall begin immediately. 	
<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> ■ Aircraft/ Vehicle/ Equipment Deicing ■ Aircraft/Vehicle/ Equipment Fueling ■ Aircraft Lavatory Service ■ Aircraft/Vehicle/ Equipment Washing ■ Cargo Handling ■ Fuel/Chemical Storage ■ Pesticide/Herbicide Use ■ Runway Deicing <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> ■ Lavatory Chemicals and Waste ■ Fuel ■ Oil and Grease ■ Solvents/Cleaning Solutions ■ Pesticides/Herbicides/ Fertilizers ■ Battery Acid ■ Antifreeze ■ Deicing Fluid <p>KEY APPROACHES</p> <ul style="list-style-type: none"> ■ Implement SPCC (if required) ■ SPCC implementation training ■ Immediate containment/cleanup of spills ■ Availability of spill response equipment/ materials ■ Required agency notification 	

MARYLAND AVIATION ADMINISTRATION	
BL BMP 2	EMERGENCY SPILL CLEANUP PLANS
<p style="text-align: center;"><i>Inspection and Training</i></p> <ul style="list-style-type: none"> • Provide formal training in plan execution to key personnel, with additional training for first responder level personnel (29 CFR 1910.120). All employees should have basic knowledge of spill control procedures. <p>REQUIREMENTS:</p> <ul style="list-style-type: none"> • Capital and O&M costs should be small to moderate depending on the types and quantities of chemicals stored on-site. • Maintenance costs include periodic training and equipment replacement. <p>LIMITATIONS:</p> <ul style="list-style-type: none"> • Spills occurring after work hours in confined areas may go undetected until impacting off-site areas. 	

MARYLAND AVIATION ADMINISTRATION		
BL BMP 3	STORM WATER POLLUTION PREVENTION EDUCATION	
<p>PURPOSE: Prevent or reduce the discharge of pollutants to storm water through implementing an education program targeting employees, contractors, vendors, and the public.</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> • Work early on with design and construction engineers, and local storm water authorities to incorporate proactive storm water management features into projects such as decreased impervious areas, infiltration BMPs, biofilters, oil/water separators, etc. • Inform all construction contractors of their responsibility to comply with adopted BMPs and with regulations prohibiting cross connections between sanitary sewers and storm drains. Provide contractors and subcontractors with copies of relevant BMPs during specification and bidding phases. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Contingency Response</i></p> <ul style="list-style-type: none"> • Provide adequate implementation training for facilities with a Spill Prevention Control and Countermeasure (SPCC) Plan, if required developed under guidelines set forth in 40 CFR, Section 112.3(a), (b). • Adequately train employees in the use of spill response equipment and materials. <p>Inspection and Training</p> <ul style="list-style-type: none"> • Perform and document in a log book frequent inspections of work areas, waste storage facilities, maintenance areas, and contractor projects to examine compliance with BMPs. Follow up with additional training or enforcement as required. Incorporate inspection findings into subsequent training efforts. • Design storm water pollution education programs to contain the following elements: <ul style="list-style-type: none"> - Promote the proper storage, use, and disposal of landscape maintenance chemicals and other potentially harmful chemicals. - Promote the use of safer alternative products such as: short-lived pesticides, non-chlorinated solvents, water-based paints, non-aerosol products. - Encourage the use of "dry" washing processes for aircraft, vehicles, and equipment. 		<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> ■ All Activities with Potential to Impact Storm Water <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> ■ Oil and Grease ■ Vehicle Fluids ■ Fuel ■ Solvents/Cleaning Solutions ■ Battery Acid ■ Pesticides/Herbicides/ Fertilizers ■ Paint ■ Metals ■ Dumpster Wastes ■ Sediment ■ Landscape Waste ■ Floatables ■ Lavatory Chemicals and Waste ■ Runway Rubber Waste ■ Other Miscellaneous Chemicals <p>KEY APPROACHES</p> <ul style="list-style-type: none"> ■ Perform inspections and enforcement ■ Provide training for employees ■ Promote education of vendors/public ■ Show Storm Water Training Video to employees

MARYLAND AVIATION ADMINISTRATION	
BL BMP 3	STORM WATER POLLUTION PREVENTION EDUCATION
<p><i>Inspection and Training (cont.)</i></p> <ul style="list-style-type: none"> Design storm water pollution education programs to contain the following elements: <ul style="list-style-type: none"> - Encourage efficient and safe housekeeping practices in industrial activity areas. - Increase awareness of the detrimental environmental impacts that result when fuel, antifreeze, pesticides, lubricants, detergents, paints and other wastes are dumped onto the ground or into storm drains. - Promote source reduction and recycling of waste materials. - Increase awareness of possible penalties and fines associated with discharge of pollutants into storm drains. - Increase awareness of what is and what is not allowed to enter storm drains. Provide a mechanism for violations to be reported. <p>REQUIREMENTS:</p> <ul style="list-style-type: none"> Capital and O&M costs are minimal for educational programs. Educational programs need to be ongoing. Information and training must be disseminated at regular intervals. <p>LIMITATIONS:</p> <ul style="list-style-type: none"> The success of educational programs is difficult to measure. Acceptance and awareness are critical factors. 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 1	AIRCRAFT, VEHICLE, AND EQUIPMENT MAINTENANCE
<p>PURPOSE: Prevent or reduce the discharge of pollutants to storm water from aircraft, vehicles, and equipment maintenance and repair, including ground vehicle and equipment painting/stripping, floor washdowns, and storage areas for equipment awaiting maintenance.</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> • Provide covered maintenance areas when designing new facilities or upgrading existing facilities. Utilize indoor areas, overhangs, or portable covers. • Locate outdoor maintenance areas so minimal quantities of runoff cross the site. • Include appropriate storm water quality structures (oil/water separators, sumps, first flush diversion basins, etc.) in the design of outdoor maintenance and storage areas. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations</i> Implement the following to the maximum extent practicable.</p> <p><i>Good Housekeeping</i></p> <ul style="list-style-type: none"> • Use drip pans to collect fluid leaks. • Use absorbent materials at potential problem areas. Adequately collect/remove absorbent materials from area after use and dispose of them in an appropriate manner. • Drain and crush oil filters (and oil containers) before recycling or disposal. Store crushed oil filters and empty lubricant containers in a leak-proof container cover if outdoors. • Label storm drain inlets to indicate they are to receive no wastes. Do not hose down work areas to the storm drainage system or use concrete cleaning products unless the storm drain inlet is blocked and wash water is collected and properly disposed of through a permitted sewer connection. As an alternative, use mops, dry sweeping compound, or contract professional cleaning services. Confirm the use of appropriate disposal practices by contract cleaning services. • Drain and properly dispose of all fluids and remove batteries from salvage aircraft, vehicles, and equipment. • Drain parts and equipment of all fluids. Store on secondary containment under cover. • Recycle or properly dispose of the following: grease, oil, antifreeze, brake fluid, cleaning solutions, hydraulic fluid, batteries, transmission fluid, and filters. • Use biodegradable products and substitute materials with less hazardous properties where feasible. 	<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> ■ Aircraft/ Vehicle/ Equipment Maintenance ■ Aircraft/ Vehicle/ Equipment Painting or Stripping ■ Apron/Floor Washdown ■ Potable Water System Cleaning <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> ■ Oil and Grease ■ Vehicle Fluids ■ Solvents/Cleaning Solutions ■ Fuel ■ Battery Acid ■ Paint <p>KEY APPROACHES</p> <ul style="list-style-type: none"> ■ Conduct maintenance indoors, or in covered area. ■ Prevent wash water discharges to the storm drain ■ Clean catch basins regularly ■ Collect and properly dispose of all fluids

MARYLAND AVIATION ADMINISTRATION	
AS BMP 1	AIRCRAFT, VEHICLE, AND EQUIPMENT MAINTENANCE
<p><i>Good Housekeeping, cont.</i></p> <ul style="list-style-type: none"> • Maintain an organized inventory of materials used in maintenance areas. <p><i>Physical Site Usage</i></p> <ul style="list-style-type: none"> • Where feasible, move maintenance activities indoors or provide cover over work area. • Use designated washing, steam cleaning, and degreasing areas to clean equipment. • Store mechanical parts and equipment that may yield even small amounts of contaminants (e.g., oil or grease) under cover and away from drains. • Store aircraft, vehicles, and equipment awaiting maintenance in designated areas only. Storage should be indoors or under cover if practicable. <p><i>Structural Controls</i></p> <ul style="list-style-type: none"> • Equip maintenance and cleaning areas with runoff controls that prevent discharge to storm sewers. • Install and maintain catch basin filter inserts that assist in the removal of oil and grease, sediments and floatables. <p><i>Maintenance</i></p> <ul style="list-style-type: none"> • Maintain clean equipment by eliminating excessive amounts of external oil and grease buildup. Use water-based cleaning agents or non-chlorinated solvents to clean equipment. • Regularly clean any catch basins which receive runoff from a maintenance area, especially after larger storms. • Inspect, clean and maintain sump and oil/water separators, if necessary. <p style="text-align: center;"><i>Contingency Response</i></p> <ul style="list-style-type: none"> • Maintain adequate supplies of spill response equipment and materials in accessible locations near areas where spills may be likely to occur. • Furnish all maintenance vehicles with adequate supplies of spill response materials and appropriate spill response procedures. <p style="text-align: center;"><i>Inspection and Testing</i></p> <ul style="list-style-type: none"> • Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention, right-to-know awareness training, and hazardous materials management. • Provide employee storm water quality awareness training. • Develop regular maintenance and inspection programs for oil/water separators. • Characterize wastes collected from oil/water separators. Provide appropriate employee training. <p>REQUIREMENTS:</p> <ul style="list-style-type: none"> • Capital investment may be required depending on the facility layout. In some cases, diversion basins may be required. • O&M investment is not expected to be significant. <p>LIMITATIONS:</p> <ul style="list-style-type: none"> • Size, space and time limitations may preclude work from being performed indoors. • Identification of engine and equipment leakage points may require the use of solvents or other cleaners to remove external accumulations of oily grime. 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 2	AIRCRAFT, VEHICLE, AND EQUIPMENT FUELING
<p>PURPOSE: Prevent fuel spills and leaks, and reduce their impacts to storm water.</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> Design fueling areas to prevent the run-on of storm water and the runoff of spills by employing the following approaches: <ul style="list-style-type: none"> Cover the fueling area if possible. Use a perimeter drain or slope the fueling area to a dead-end sump or oil/water separator. Pave the fueling area with concrete rather than asphalt. If storm water runoff from fueling areas is not collected, install an appropriately-sized oil/water separator. Install and maintain vapor recovery systems where required and/or appropriate. Existing underground fuel storage tanks should be upgraded with leak detection, spill containment, and overfill. This is relevant to storm water regulations due to the potential for contamination of surface soils or waters that could be transported by storm water runoff. Design facilities to include secondary containment where required and/or appropriate. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations</i> Implement the following to the maximum extent practicable.</p> <p><i>Good Housekeeping</i></p> <ul style="list-style-type: none"> Fuel pumps intended for vehicular use (not aircraft) should be posted with signs stating "No Topping Off" to prevent overflow. Use pigs/mats over catch basins during fueling activity. Place absorptive material beneath aircraft during fueling. Manage the disposal of water that collects in fuel tanks and fueling hydrant sumps according to state and federal regulations. <p><i>Physical Site Usage</i></p> <ul style="list-style-type: none"> Avoid mobile fueling of equipment wherever feasible; fuel equipment at designated fueling areas. <p><i>Structural Controls</i></p> <ul style="list-style-type: none"> Cover the fueling area if possible. Divert storm water runoff away from fueling area to avoid storm water contact with contaminated surfaces through the use of berms or curbing. Install gate valves at catch basins for use during fueling activity. 	
<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> Aircraft/Vehicle/ Equipment Fueling Apron/Floor Washdown <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> Fuel <p>KEY APPROACHES</p> <ul style="list-style-type: none"> Install berms or curbing around fueling areas Use absorbent materials and/or vacuum equipment for spills Install proper equipment for fuel dispensing and tank monitoring to prevent spills, leaks and overflows 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 2	AIRCRAFT, VEHICLE, AND EQUIPMENT FUELING
<p><i>Structural Controls (con't.)</i></p> <ul style="list-style-type: none"> Employ secondary containment or cover when transferring fuel from a tank truck to a fuel tank. <p><i>Equipment</i></p> <ul style="list-style-type: none"> Provide appropriate monitoring for tanks containing fuel, such as: <ul style="list-style-type: none"> - Level indicators and gauges. - Overfill protection with alarms. - Interstitial leak detection for double-walled tanks. - Routine inspection/lockout for drainage valves for tank containment areas. Fuel dispensing equipment should be equipped with "breakaway" hose connections that will provide emergency shut-down of flow should the fueling connection be broken through movement. Automatic shut-off mechanisms should be in place on fuel tankers. These valves should remain in the closed position unless manually opened during fueling. <p><i>Maintenance</i></p> <ul style="list-style-type: none"> Inspect, clean and maintain sumps and oil/water separators at appropriate intervals. <p style="text-align: center;"><i>Contingency Response</i></p> <ul style="list-style-type: none"> Develop and implement a Spill Prevention Control and Countermeasure (SPCC) Plan if required under guidelines set forth in 40 CFR, Sections 112.3(a), (b). Maintain adequate supplies of spill response equipment and materials in accessible locations near areas where spills may be likely to occur. Clean up spills using dry methods (absorptive materials). Prevent spilled fuel from entering storm drains. Use absorbent materials and spot cleaning for small spills; do not hose down the area unless the storm drain is blocked and drainage is collected by vacuum truck and disposed of through a permitted connection to the sanitary sewer. Properly dispose of any fuel spills and leaks. Vacuum equipment/trucks are recommended for collection. Always dispose of materials in an approved manner; use an approved treatment facility through a permitted connection. Never discharge materials to a catch basin or storm drain. Furnish adequate spill response information, equipment and materials on all fueling vehicles. <p style="text-align: center;"><i>Inspection and Training</i></p> <ul style="list-style-type: none"> Inspect fueling areas and storage tanks regularly. Record all maintenance activities and inspections relating to fueling equipment and containers in a log book. Underground fuel storage tanks should be tested as required by federal and state laws. Provide the appropriate level of spill response training to personnel to address all types of potential spills. <p>REQUIREMENTS:</p> <ul style="list-style-type: none"> In rare cases, a fueling area may need to be retrofitted to minimize storm water contamination. Generally, practical design concepts, such as incorporating extruded curb along the upstream side of facilities to prevent run-on of storm water, will be appropriate. <p>LIMITATIONS:</p> <p>Properly sized and installed oil/water separators must be regularly maintained to be effective.</p>	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 3	AIRCRAFT, VEHICLE, AND EQUIPMENT WASHING, CLEANING, AND DEGREASING
<p>PURPOSE: Prevent or reduce the discharge of pollutants to storm water drains from aircraft, vehicle, and equipment washing, and cleaning and degreasing activities.</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> ▪ Use off-site commercial washing where feasible. Using appropriate off -site facilities will decrease the potential for storm water pollution on-site. ▪ Evaluate the need for incorporating a wash water recycling system into the project design. ▪ Outdoor washing operations should have the following design characteristics: <ul style="list-style-type: none"> - Paved with portland cement concrete (PCC). - Bermed and/or covered to prevent contact with storm water. - Sloped to facilitate wash water collection. - Wash water should be collected in a dead-end sump for removal or discharged to the sanitary sewer through a permitted connection. - Discharge piping serving uncovered wash areas should have a positive shut-off control valve that allows switching between the storm drain and the sanitary sewer. - Wash areas should be clearly identified with appropriate signage. - Equipped with an oil/water separator designed to operate under storm water runoff conditions to treat storm water volumes and flow rates. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations</i> Implement the following to the maximum extent practicable.</p> <p><i>Good Housekeeping</i></p> <ul style="list-style-type: none"> ▪ Use "dry" washing and surface preparation techniques when possible. Consider dry washing as an option regardless of aircraft size. Remove all materials (i.e., drippings and residue) using vacuum methods. Dispose of properly. ▪ Provide secondary containment, and cover if possible, for containers of washing and steam cleaning additives. ▪ Use pigs/mats to control the discharge of wash water. ▪ Use biodegradable phosphate-free detergents. ▪ Keep wash area clean and free of waste. ▪ Include proper signage to prohibit the discharge of waste oils into the drains. ▪ Collect and discharge wash water to an approved treatment facility (sanitary sewer system) through a permitted connection. 	
<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> ■ Aircraft/Vehicle/ Equipment Painting or Stripping ■ Aircraft/Vehicle/ Equipment Washing or Cleaning <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> ■ Oil and Grease ■ Solvent ■ Vehicle Fluids ■ Cleaning Solutions <p>KEY APPROACHES</p> <ul style="list-style-type: none"> ■ Use designated area ■ Use dry washing techniques ■ Recycle wash water or discharge appropriately ■ Cover catch basins ■ Provide training 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 3	AIRCRAFT, VEHICLE, AND EQUIPMENT WASHING, CLEANING AND DEGREASING
<p><i>Physical Site Usage</i></p> <ul style="list-style-type: none"> Use off-site commercial washing and steam cleaning where feasible. Using appropriate off-site facilities will decrease the potential for storm water pollution on-site. Clean equipment only in designated wash areas that are covered and/or bermed to prevent contamination of storm water by contact with wastes. Cleaning areas should be clearly demarcated on the ground. <p><i>Structural Controls</i></p> <ul style="list-style-type: none"> Gate valves at catch basins will prevent discharge to the storm drainage system during washing activities by facilitating the collection of wash water. Filter and recycle wash water when possible. <p><i>Maintenance</i></p> <ul style="list-style-type: none"> Patch and repair berms and PCC to maintain containment system. Inspect, clean, and maintain sumps, oil/water separators, and on-site treatment and recycling units. <p><i>Management</i></p> <ul style="list-style-type: none"> Obtain approval prior to commencing wet washing activities in any area outside designated wash rack. <p style="text-align: center;">Contingency Response</p> <ul style="list-style-type: none"> Maintain adequate supplies of spill response equipment and materials in accessible locations near areas where spills of cleaning chemicals may be likely to occur. <p style="text-align: center;">Inspection and Training</p> <ul style="list-style-type: none"> Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education, right-to-know awareness training, and hazardous materials management. Develop regular maintenance and inspection programs. Characterize wastes derived from oil/water separators. Provide appropriate employee training. <p>REQUIREMENTS:</p> <ul style="list-style-type: none"> Capital costs vary depending on measures implemented. <ul style="list-style-type: none"> LOW COST: \$500-1,000 for berm construction. MEDIUM COST: \$5,000-20,000 for plumbing modifications (including re-routing discharge to the sanitary sewer and installing a simple sump). HIGH COST: \$30,000-150,000 for on-site treatment and recycling. O&M costs increase with increasing capital investment. <p>LIMITATIONS:</p> <ul style="list-style-type: none"> Some POTWs may require pretreatment and monitoring of wash water discharges to the sanitary sewer. Steam cleaning and de-greasing operations can generate significant pollutant concentrations that may require permitting, monitoring, pretreatment, and inspections. 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 4	AIRCRAFT DEICING/ANTI-ICING
<p>PURPOSE: Prevent or reduce the discharge of pollutants to storm water from aircraft deicing and anti-icing procedures.</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> When designing or modifying operating areas, evaluate the following characteristics: <ul style="list-style-type: none"> Paved with portland cement concrete (PCC). Sloped to facilitate fluid collection. Fluids could be collected in a dead-end sump for removal or discharged to the sanitary sewer through a permitted connection (check with local wastewater agency). Clearly designated. Evaluate feasibility of incorporating a closed loop recycling system into the design of deicing/ anti-icing stations. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations</i></p> <ul style="list-style-type: none"> Perform anti-icing and deicing operations only in areas designated by the Maryland Aviation Administration as appropriate for such activities. Aircraft deicing procedures shall be performed in accordance with BWI Thurgood Marshall Airport Tenant Directive 215.1. Depending on conditions, apply only enough fluid to surfaces to ensure the safe operation of the aircraft. (Excess fluid dripped to the ground contaminates soil and water if not properly contained.) Clean ramp areas following deicing/ anti-icing operations. Wet-type sweepers are effective in removing deicing fluids from paved areas. Dispose of or recycle the fluids in accordance with local, state, and federal regulations. Implement FAA technical committee recommendations on deicing. Provide for immediate clean-up in areas where deicing is performed. <p>Contingency Response</p> <ul style="list-style-type: none"> Maintain adequate supplies of spill response equipment and materials in accessible locations near areas where spills may be likely to occur. <p>Inspection and Training</p> <ul style="list-style-type: none"> Monitor deicing and anti-icing operations regularly to ensure quantities of fluids used are at a minimum while not jeopardizing aircraft safety. 	
<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> Aircraft/Vehicle/ Equipment Deicing or Anti-icing Floor Washdown <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> Ethylene glycol Propylene glycol <p>KEY APPROACHES</p> <ul style="list-style-type: none"> Perform in designated areas only Apply only required amounts of fluid Clean ramp area when done Implement forthcoming recommendations of FAA 	

MARYLAND AVIATION ADMINISTRATION		
AS BMP 4	AIRCRAFT DEICING/ANTI-ICING	
<ul style="list-style-type: none"> Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education, right-to-know awareness training, and hazardous materials management. 		
REQUIREMENTS: <ul style="list-style-type: none"> Costs associated with the collection and proper disposal of anti-icing fluids can be high. LIMITATIONS: <ul style="list-style-type: none"> POTW may ban conventional anti-icing chemicals, such as ethylene glycol, from the sanitary sewer system or may require extensive pretreatment and monitoring of deicing and anti-icing fluid discharges to the sanitary sewer. 		

MARYLAND AVIATION ADMINISTRATION	
AS BMP 5	OUTDOOR WASTE AND MATERIAL HANDLING
<p>PURPOSE: Prevent or reduce the discharge of pollutants to storm water from handling potential pollutants outside enclosed buildings.</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> Design outdoor waste and material handling areas to prevent storm water run-on through the use of the following practices: <ul style="list-style-type: none"> - Grading or berming - Positioning roof downspout to direct storm water away from outdoor waste and material handling areas Design facilities so that materials which may contribute pollutants to storm water may be stored indoors or under cover. Incorporate oil/water separators into exposed loading dock designs. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations</i></p> <p><i>Good Housekeeping</i></p> <ul style="list-style-type: none"> Use seals or door skirts between vehicles and structures to prevent material exposure to rainfall. Contain and adsorb leaks during transfers and spillage from hose disconnections; dispose of residue properly. Avoid transferring or using materials in close proximity to storm drain inlets. Cover nearby storm drain inlets during material transfer or use. Use drip pans to contain small releases and promptly clean and remove drip pans when not in use. Transfer and use liquids only in paved areas. Portland cement concrete (PCC) should be used if the liquid is asphalt reactive. Provide contractors and haulers with copies of pertinent BMPs. Require contractor/hauler adherence to BMP specifications. Consider contracting maintenance operations for material handling equipment. Designate an appropriate area for contractors to perform maintenance activities. Verify proper waste disposal practices of contractors. <p><i>Physical Site Usage</i></p> <ul style="list-style-type: none"> Protect all loading/unloading activities and material use areas from rainfall, run-on and wind dispersal to the maximum extent practicable. Viable options include conducting activities under existing cover, or moving indoors. Position tank trucks or delivery vehicles so that possible spills or leaks can be contained. 	
<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> ■ Aircraft/Vehicle/ Equipment Deicing ■ Aircraft/Vehicle/ Equipment Fueling ■ Aircraft/Vehicle/ Equipment Maintenance ■ Aircraft Lavatory Service ■ Cargo Handling ■ Fuel/Chemical Storage ■ Pesticide/Herbicide Usage ■ Runway Deicing <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> ■ Fuel ■ Pesticides and Herbicides ■ Oil and Grease ■ Solvent/Cleaning Solutions ■ Battery Acid ■ Lavatory Chemicals and Waste ■ Deicing Chemicals <p>KEY APPROACHES</p> <ul style="list-style-type: none"> ■ Conduct loading/ unloading under cover ■ Transfer materials in paved areas, away from storm drain inlets ■ Contain and absorb releases ■ Maintain readily accessible spill kits ■ Immediately place waste and materials in proper storage/disposal location. 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 5	OUTDOOR WASTE AND MATERIAL HANDLING
<p><i>Physical Site Usage (cont'd.)</i></p> <ul style="list-style-type: none"> • Provide appropriate spill containments, hand pumps, and other devices to minimize releases during material transfer. <p><i>Structural Controls</i></p> <ul style="list-style-type: none"> • Cover loading/unloading areas/docks and material use areas to reduce exposure of materials to rain. Construct roofing structures over material handling areas, or move indoors. • Investigate feasibility of relocating storm drain inlets away from fuel hydrants. <p><i>Maintenance</i></p> <ul style="list-style-type: none"> • Inspect loading/unloading areas and material use areas for repair and patching. • Inspect, clean and maintain oil/water separators. <p>Contingency Response</p> <ul style="list-style-type: none"> • Maintain adequate supplies of spill response equipment in accessible locations near areas where spills may be likely to occur. • Include spill kits on appropriate material handling vehicles and equipment. <p>Inspection and Training</p> <ul style="list-style-type: none"> • Conduct regular inspections and make repairs as necessary. • Check loading/unloading equipment (valves, pumps, flanges, and connections) regularly for leaks. • Develop and implement a written operations plan which describes loading/unloading procedures. • Provide proper training for material handling equipment operators. • Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education, right-to-know awareness training, and hazardous materials management. <p>REQUIREMENTS:</p> <ul style="list-style-type: none"> • Capital and O&M costs should be low except when covering large loading/unloading areas. <p>LIMITATIONS:</p> <ul style="list-style-type: none"> • Space and time limitations may preclude the indoor or covered transfer of cargo and materials. 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 6	OUTDOOR STORAGE OF WASTE AND MATERIALS
<p>PURPOSE: Prevent or reduce the discharge of pollutants to storm water from outdoor storage areas for waste or material (e.g., fuel, chemicals, bagged solids, contaminated soil, bulk storage, etc.)</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> Require the use of appropriate water quality control structures for fuel, waste, and chemical storage areas such as berms, detention/retention basins, and sumps. Develop appropriate minimum performance standards for these water quality control structures and implement a reporting program to monitor the performance and maintenance of these structures. Chemical, fuel, and oil dispensing (non-aircraft) sites, and waste collection areas should be covered, if possible. Chemical, fuel, and oil dispensing sites, and waste collection areas should be sloped to contain releases. Develop standard guidelines for the management of storm water which collects in secondary containment areas. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations</i> <i>Good Housekeeping</i></p> <ul style="list-style-type: none"> Avoid dispensing from drums positioned horizontally in cradles. Dispensing materials from upright drums equipped with hand pumps is preferred. Always use secondary containment and self closing spigots if dispensing from horizontally positioned drums. Store drums and containers on spill containment pallets or other structures to keep the container out of contact with storm water. Use drum lids and drum-top absorbent pads to prevent rainfall from washing materials and drippage from the top of containers to the storm drain system. Discharge collected storm water from secondary containment areas according to guidelines developed by the federal government and applicable state and local regulations. Store all materials in their original containers or containers approved for that use. Ensure that all containers are appropriately sealed. Store empty containers in fully enclosed areas, under cover, or move them off-site. Properly label all containers with information, including their contents, hazards, spill response and first aid procedures, manufacturer's name and address, and storage requirements. Maintain copies of MSDS on file for any materials stored and/or handled by the applicator. Maintain a spill response plan near the material or waste storage area. 	
<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> Aircraft/Vehicle/ Equipment Fueling Aircraft/Vehicle/ Equipment Maintenance Aircraft Lavatory Service Aircraft/Vehicle/ Equipment Washing or Cleaning Fuel/Chemical Storage Equipment Storage <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> Fuel Solvent Cleaning Solutions Liquid Wastes Lavatory Chemicals/ Waste <p>KEY APPROACHES</p> <ul style="list-style-type: none"> Store materials in a covered or fully enclosed area Provide secondary containment Implement an SPCC, if required Perform and document periodic inspections 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 6	OUTDOOR STORAGE OF WASTE AND MATERIALS
<p><i>Physical Site Usage</i></p> <ul style="list-style-type: none"> Protect all significant materials from rainfall, run-on, runoff and wind dispersal to the maximum extent practicable. Viable options are: <ul style="list-style-type: none"> Store material in a fully enclosed area. Cover an outdoor storage area with a roof or awning. Cover the material with a temporary covering made of polyethylene, polypropylene, or hypalon. Minimize storm water run-on by enclosing the area, building a berm around the area, storing indoors, or completely cover the stored material. Reduce the quantities of material and waste stored outside (i.e., chemicals) to the minimum volume required based on variables such as release potential, usage, and shelf life. Make use of existing overhangs as covered storage areas. <p><i>Structural Controls</i></p> <ul style="list-style-type: none"> Provide berms or secondarily contain storage tankers, ASTs, drums and containers. Install and maintain catch basin filter inserts. <p><i>Maintenance</i></p> <ul style="list-style-type: none"> Inspect, clean and maintain sumps, if applicable. Maintain tanks, drums, and other vessels used for liquid storage in good condition to prevent leaks. <p style="text-align: center;"><i>Contingency Response</i></p> <ul style="list-style-type: none"> Develop and implement a Spill Prevention Control and Countermeasure (SPCC) Plan, if required under guidelines set forth in 40 CFR, Section 112.3(a), (b). Maintain adequate supplies of spill response equipment and materials in accessible locations near areas where spills may be likely to occur. Post signs at all chemical storage locations in clearly visible locations noting the materials stored, emergency contacts, and spill cleanup procedures. <p style="text-align: center;"><i>Inspection and Training</i></p> <ul style="list-style-type: none"> Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education, right-to-know awareness training, and hazardous materials management. Perform and document periodic inspections in a log book. Inspection items should include the following: <ul style="list-style-type: none"> Check containers for external corrosion and structural failure. Check for spills and overfills due to operator failure. Check for failure of piping system (pipes, pumps, flanges, couplings, hoses, and valves). Check for leaks or spills during pumping of liquids or gases. Visually inspect new tanks or containers for loose fittings, poor welds, and improper or poorly fitted gaskets. Inspect tank foundations and storage area coatings. <p>REQUIREMENTS: Capital and O&M costs will vary widely depending on the size of the facility and the necessary controls. Costs associated with on-site detention/retention facilities could be high.</p>	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 7	BUILDING AND GROUNDS MAINTENANCE
<p>PURPOSE: Prevent or reduce the discharge of pollutants to storm water from building and grounds maintenance by washing and cleaning up with as little water as possible, preventing and cleaning up spills immediately, keeping debris from entering storm drains, and maintaining the storm water collection system.</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> • Incorporate areas of landscape into project design. Landscape areas are pervious and will result in less runoff discharge from a site. • Incorporate design considerations such as leaving vegetation or planting native vegetation to reduce irrigation, fertilizer, and pesticide needs. • Select landscaping plants that require little maintenance and/or pest control. • Incorporate storm water detention/retention to reduce peak runoff flows and for water quality control. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations</i> <i>Good Housekeeping</i></p> <ul style="list-style-type: none"> • Collect outdoor washdown water and properly dispose of it through a permitted connection to the sanitary sewer. Approval from treatment facility required for discharge. • Clean any catch basins that receive runoff from maintenance areas on a regular basis. Use a vacuum truck to remove accumulated materials. Do not flush wastes into the storm drain system. • Minimize use of pesticides, herbicides, and fertilizers. Use according to directions. Seek less harmful/toxic products to replace ones currently used. • Utilize integrated pest management where appropriate. • Properly dispose of landscape waste, wash water, sweepings, and sediments. • Regularly clean paved surfaces that are exposed to industrial activity. Use "dry" cleaning techniques, such as sweeping, whenever possible. 	
<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> ■ Building Maintenance ■ Grounds Maintenance ■ Pesticide/Herbicide Use ■ Outdoor Washdown <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> ■ Pesticides/Herbicides/ Fertilizers ■ Oil and Grease ■ Sediment ■ Landscape Waste ■ Washdown Waste ■ Building Maintenance Materials (paint, roofing, etc.) <p>KEY APPROACHES</p> <ul style="list-style-type: none"> ■ Keep paved surfaces cleaned and swept ■ Clean catch basins regularly using vacuum trucks ■ Manage use of pesticides/herbicides/ fertilizers 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 7	BUILDING AND GROUNDS MAINTENANCE
<p><i>Structural Controls</i></p> <ul style="list-style-type: none"> • Provide landscaped areas where erosion is becoming a problem. <p><i>Contingency Response</i></p> <ul style="list-style-type: none"> • Maintain adequate supplies of spill response equipment and materials in accessible locations near areas where spills may occur. <p><i>Inspection and Training</i></p> <ul style="list-style-type: none"> • Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education, right-to-know awareness training, and hazardous materials management. <p>REQUIREMENTS:</p> <ul style="list-style-type: none"> • Costs will vary depending on the type and size of the facility. Costs of on-site storm water detention/retention facility could be high. <p>LIMITATIONS:</p> <ul style="list-style-type: none"> • Alternative pest/weed controls may not be available, suitable, or effective in every case. 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 8	LAVATORY SERVICE OPERATION
<p>PURPOSE: Eliminate discharges to the storm drain system associated with ground servicing of aircraft lavatory facilities. The sanitary sewage and associated rinse waters produced during the servicing of aircraft lavatory facilities must be discharged to a wastewater treatment facility under appropriate permitting. Trucks or trailers equipped with bulk storage tanks are typically used to service lavatory facilities. Non-storm water discharges and residuals associated with servicing these facilities can be classified as follows:</p> <ul style="list-style-type: none"> • Discharges and residuals associated with diluting and mixing the surfactants and disinfectants used for servicing lavatory facilities. • Discharges and residuals associated with transferring materials from the aircraft. • Discharges and residuals associated with transporting and disposing materials to the sanitary sewer system. <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> • If possible, design triturator facilities to be covered, with low roll-over type berming. • Include a source of water at the triturator for clean up of lavatory service equipment. • Coordinate permitting of the triturator sanitary sewer connection through the local storm water and sanitary sewer agencies. • Triturator facilities should not be located near storm drains. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations</i></p> <ul style="list-style-type: none"> • Do not discharge lavatory waste to sanitary sewer connections other than triturator facilities. Other industrial-type connections may be equipped with bypass gates which, if improperly maintained or defective, may discharge to the storm water collection system. • Drain the aircraft connecting hose as completely as possible into the storage tank after servicing an aircraft. Properly secure all hoses, valves, and equipment when transporting waste to eliminate leakage and spills. • Use only surfactants and disinfectants approved for discharge to the sanitary sewer system. Do not discharge or rinse other unapproved chemicals or materials into the triturator facility. Any change in the chemicals used in aircraft lavatory service operations must be approved by Maryland Aviation Administration. 	<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> ■ Aircraft Lavatory Service ■ Lavatory Truck Cleanout/Backflushing <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> ■ Lavatory Chemicals ■ Lavatory Waste ■ Lavatory Truck Wash Water <p>KEY APPROACHES</p> <ul style="list-style-type: none"> ■ Do not discharge lavatory waste to sanitary sewer connections other than triturator facilities ■ Utilize buckets or pans to capture drippage from aircraft lavatory access fittings ■ Do not perform lavatory truck cleanout or backflushing at any location other than triturator facilities ■ Carry absorbent and other containment equipment on the lavatory service equipment

MARYLAND AVIATION ADMINISTRATION	
AS BMP 8	LAVATORY SERVICE OPERATIONS
<p><i>Operational Considerations (cont'd)</i></p> <ul style="list-style-type: none"> • If possible, perform surfactant/disinfectant mixing and transfers in the triturator area or under cover. This will allow the rinsing of minor spills and splashes to enter the sanitary sewer system. • Do not perform lavatory truck cleanout/backflushing at any location other than triturator facilities. • Utilize buckets or pans to capture drippage from aircraft lavatory access fittings. Immediately dump the drippage into the bulk storage tank on the service cart or truck. • Carefully handle chemicals and chemical concentrates. Immediately collect dry chemicals or absorb liquid chemicals for proper disposal. Do not hose down spills unless the discharge enters the sanitary sewer system through a permitted connection (triturator facility). • Practice good housekeeping techniques at the triturator facility. Immediately clean spills of wastes and chemicals. <p><i>Contingency Response</i></p> <ul style="list-style-type: none"> • Carry absorbent and other containment equipment on the lavatory service equipment. • Maintain adequate supplies of spill response equipment and materials in accessible locations near areas where spills may be likely to occur. <p><i>Inspection and Training</i></p> <ul style="list-style-type: none"> • Perform regular inspections of the hose and fittings used for transferring lavatory waste. Keep the equipment in good working order. Replace worn equipment before leaks develop. Notify appropriate ground service personnel if it is noticed that the aircraft lavatory fittings require maintenance. • Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education, right-to-know awareness training, and hazardous materials management. <p>REQUIREMENTS:</p> <ul style="list-style-type: none"> • Management practices are based on careful material handling, good housekeeping, and awareness of maintenance requirements. <p>LIMITATIONS:</p> <ul style="list-style-type: none"> • Facilities may have a limited number of permitted sanitary sewer access points (triturator facilities) for a large quantity of lavatory service equipment. 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 9	OUTDOOR WASHDOWN/SWEEPING
<p>PURPOSE: Prevent or reduce the discharge of pollutants to storm water from indoor and outdoor washdown and sweeping operations on aprons and ramps.</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> Consider contracting apron washing/sweeping services. Using appropriate contractors will decrease waste handling responsibilities. Inform contractors of their responsibilities regarding proper disposal of sweeper and scrubber waste. Supply contractors with pertinent BMPs and operating specifications. Follow up with contractor inspections frequently. Incorporate appropriate waste receiving facilities for sweepers and washing equipment. Coordinate sanitary sewer connection permitting through the local sanitary sewerage agency. Incorporate oil/water separators or other water quality devices into project designs. Consider incorporating gate valves in areas where apron washing will occur. The gate valves will direct wash water to the sanitary sewer in dry weather and will direct storm water to the storm drain system during wet weather. Mechanical devices should be incorporated to ensure that valves are not left open (to sanitary sewer) during wet weather. Coordinate permitting and connections through the local sanitary sewerage agency. Employ berms to minimize run-on to other areas. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations</i></p> <ul style="list-style-type: none"> Collect and discharge wash water to the sanitary sewer system through a permitted connection. Use designated and approved discharge facilities to dispose of waste derived from apron/ramp cleaning. Use "dry" sweeping techniques where feasible. Dispose of sweepings in an appropriate manner. Conduct berm repair and patching. Inspect, clean, and maintain sumps and oil/water separators. 	<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> ■ Apron Washing ■ Ramp Scrubbing ■ Outdoor/Power Washing ■ Floor Washdown <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> ■ Oil and Grease ■ Solvents/Cleaning Solutions ■ Fuel ■ Aircraft Fire Fighting Foam (AFFF) ■ Deicing/Anti-Icing Fluids ■ Sediment ■ Floatables <p>KEY APPROACHES</p> <ul style="list-style-type: none"> ■ Collect and discharge wash water to the sewer ■ Use "dry" sweeping techniques ■ Dispose of sweepings

MARYLAND AVIATION ADMINISTRATION	
AS BMP 9	OUTDOOR WASHDOWN/SWEEPING
<p style="text-align: center;"><i>Contingency Response</i></p> <ul style="list-style-type: none"> Maintain adequate supplies of spill response equipment and materials in accessible locations near areas where spills may be likely to occur. <p><i>Inspection and Training</i></p> <ul style="list-style-type: none"> Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education, right-to-know awareness training, and hazardous materials management. Develop regular maintenance and inspection programs for oil/water separators. Document inspections and maintenance in a log book. Characterize wastes derived from oil/water separators. Dispose of these wastes properly and provide appropriate employee training. <p>REQUIREMENTS:</p> <ul style="list-style-type: none"> Capital costs vary depending on measures implemented. <ul style="list-style-type: none"> - LOW COST: \$500-\$1,000 for berm construction. - MEDIUM COST: \$5,000-\$20,000 for plumbing modifications (including re-routing discharge to the sanitary sewer and installing a simple sump). O&M costs increase with increasing capital investment. <p>LIMITATIONS:</p> <ul style="list-style-type: none"> Some wastewater agencies may require pretreatment and monitoring of wash water discharges derived from apron washing to the sanitary sewer. 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 10	FIRE FIGHTING FOAM DISCHARGE
<p>PURPOSE: Eliminate discharges to the storm drain system associated with flushing or testing of aircraft fire fighting foam (AFFF) systems.</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> Design testing facility with the following characteristics: <ul style="list-style-type: none"> - Located away from storm drain inlets, drainage facilities or water bodies. - Paved with concrete or asphalt, or stabilized with an aggregate base. - Bermed to contain foam and to prevent run-on. - Configure discharge area with a sump to allow collection and disposal of foam. Discharge foam waste to a sanitary sewer or collect for disposal (industrial wastewater permitting may be required). Foam waste shall not be discharged to storm drains or water bodies. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations</i></p> <ul style="list-style-type: none"> Perform fire fighting foam testing operations only in the existing fire pit. Collect and dispose of foam waste, fuel and/or water from the fire pit after training. Conduct berm repair and patching. Regularly inspect, clean, and maintain AFFF collection sumps. <p><i>Contingency Response</i></p> <ul style="list-style-type: none"> Maintain adequate supplies of spill response equipment and materials in accessible locations near area of activity. <p><i>Inspection and Training</i></p> <ul style="list-style-type: none"> Regularly inspect testing facility. Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education, right-to-know awareness training, and hazardous materials management. 	
<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> Fire Fighting Equipment Testing and Flushing <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> Aircraft Fire Fighting Foam (AFFF) <p>KEY APPROACHES</p> <ul style="list-style-type: none"> Perform testing operations in designated areas Properly dispose of, or recycle, foam discharge Service sump regularly 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 10	FIRE FIGHTING FOAM DISCHARGE
REQUIREMENTS: <ul style="list-style-type: none"> Capital costs vary depending on measures implemented. <ul style="list-style-type: none"> - LOW COST: \$500-\$1,000 for berm construction. - MEDIUM COST: \$5,000-\$20,000 for plumbing modifications (including re-routing discharge to the sanitary sewer and installing a simple sump). O&M costs increase with increasing capital investment. LIMITATIONS: <ul style="list-style-type: none"> Some wastewater agencies may require permitting, pretreatment, and/or monitoring of this type of discharge to the sanitary sewer. 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 11	POTABLE WATER SYSTEM FLUSHING
<p>PURPOSE: Eliminate discharges to the storm drain system associated with flushing of aircraft potable water systems.</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> Design water truck flushing area with the following characteristics: <ul style="list-style-type: none"> - Located away from storm drain inlets or drainage facilities. - Paved with concrete or asphalt, or stabilized with an aggregate base. - Bermed to contain wastewater and to prevent run-on. - Configure discharge area with a sump to allow collection and disposal of water. Discharge water to a permitted sanitary sewer connection. Waste water shall not be discharged to storm drains. <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations</i></p> <ul style="list-style-type: none"> Perform water truck flushing operations only in designated areas, designed with berms to prevent run-on and runoff. Do not perform flushing near storm drains. Collect all discharge from aircraft potable water flushing or water truck flushing containing Purine, chlorine bleach or other chemicals and properly discharge to a permitted sanitary sewer connection, or recycle the water. Conduct berm repair and patching. Inspect, clean, and maintain sumps and on-site treatment and recycling units. <p><i>Contingency Response</i></p> <ul style="list-style-type: none"> Maintain adequate supplies of spill response equipment and materials in accessible locations near area of activity. <p><i>Inspection and Training</i></p> <ul style="list-style-type: none"> Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education, right-to-know awareness training, and hazardous materials management. Monitor flushing operations regularly to ensure that proper collection and disposal of discharge is being performed. 	
<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> ■ Aircraft potable water system cleaning and flushing ■ Water truck cleaning and flushing <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> ■ Purine ■ Chlorine Bleach <p>KEY APPROACHES</p> <ul style="list-style-type: none"> ■ Perform water truck flushing in designated areas only ■ Collect all discharge from aircraft potable water flushing or water truck flushing and discharge to a permitted sanitary sewer connection ■ Do not discharge water to the ground or storm sewer connection 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 11	POTABLE WATER SYSTEM FLUSHING
<p>REQUIREMENTS:</p> <ul style="list-style-type: none"> • Capital costs are low for implementation of collection system for aircraft potable water flushing. • For new facility, capital costs vary depending on measures implemented. <ul style="list-style-type: none"> - LOW COST: \$500-\$1,000 for berm construction. - MEDIUM COST: \$5,000-\$20,000 for plumbing modifications (including re-routing discharge to the sanitary sewer and installing a simple sump). - HIGH COST: \$30,000-\$150,000 for on-site treatment and recycling. <p>LIMITATIONS:</p> <ul style="list-style-type: none"> • Some wastewater agencies may require pretreatment and monitoring of this type of discharge to the sanitary sewer. 	

MARYLAND AVIATION ADMINISTRATION	
AS BMP 12	RUNWAY RUBBER REMOVAL
<p>PURPOSE: Eliminate discharges to the storm drain of particulate rubber generated by runway rubber removal activities.</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades</i></p> <ul style="list-style-type: none"> Periodically research and implement new cost-effective and environmentally sensitive runway rubber removal technology (including process water/particulate collection technologies). <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations</i></p> <ul style="list-style-type: none"> Use manual or mechanical cleaning methods (ordinary mechanical street sweepers) to remove rubber particulates from the runway and adjacent paved areas after runway rubber removal activities. <p><i>Inspection and Training</i></p> <ul style="list-style-type: none"> Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education, right-to-know awareness, and hazardous materials management. Inspect runway surface after rubber removal activities. <p>REQUIREMENTS:</p> <ul style="list-style-type: none"> Capital and O&M costs should be low. <p>LIMITATIONS:</p> <ul style="list-style-type: none"> Runway drainage patterns may not be suitable for the collection of rubber particulates. 	<p>TARGETED ACTIVITIES ■ Runway Rubber Removal</p> <p>TARGETED POLLUTANTS ■ Rubber particles ■ Dirt particles</p> <p>KEY APPROACHES ■ Use manual or mechanical cleaning methods (e.g., street sweepers) to remove particulates following normal removal process</p>

MARYLAND AVIATION ADMINISTRATION	
SS BMP 1	OIL/WATER SEPARATORS
<p>PURPOSE: Oil/water separators are baffled chambers designed to remove petroleum compounds and greases from storm water. Oil/water separators also remove floatable debris and settled solids (sediment).</p> <p>APPROACH TO FUTURE FACILITIES AND UPGRADES: <i>Design of New Facilities and Existing Facility Upgrades:</i> Oil/water separators are typically used in areas where the concentrations of petroleum hydrocarbons, floatables, or sediment may be abnormally high and source control techniques are not very effective. There are two types of oil/water separators: the American Petroleum Institute (API) separator and the coalescing plate separator (CPS). Design, sizing, and placement of oil/water separators is dependent on several factors including: contributory area, type of activity, pollutant type and concentration, and water temperature.</p> <p>APPROACH TO EXISTING FACILITY ACTIVITIES: <i>Operational Considerations:</i></p> <ul style="list-style-type: none"> • Separators must be inspected and cleaned frequently of accumulated oil, grease, floating debris and sediments to be effective storm water quality controls. • Oil absorbent pads are to be replaced as needed but will always be replaced prior to the wet season. • The effluent shutoff valve will be closed during cleaning operations. • Any standing water removed during the cleaning operation must be disposed of in accordance with federal, state, and local requirements. • Any standing water removed during the cleaning operation must be replaced with clean water to prevent oil carry-over through the outlet. <p><i>Contingency Response</i></p> <ul style="list-style-type: none"> • Maintain adequate supplies of spill response equipment and materials in accessible locations near areas where spills may be likely to occur. 	
<p>TARGETED ACTIVITIES</p> <ul style="list-style-type: none"> ■ Aircraft/Vehicle/ Equipment Fueling ■ Aircraft/Vehicle/ Equipment Washing ■ Fuel/Chemical Storage ■ Installing, Cleaning, and Maintaining Oil/ Water Separators <p>TARGETED POLLUTANTS</p> <ul style="list-style-type: none"> ■ Oil and Grease ■ Fuel ■ Floatables ■ Sediment <p>KEY APPROACHES</p> <ul style="list-style-type: none"> ■ Frequently inspect and clean separators ■ Replace absorbent pads as needed 	

MARYLAND AVIATION ADMINISTRATION	
SS BMP 1	OIL/WATER SEPARATORS
<p style="text-align: center;"><i>Inspection and Training</i></p> <ul style="list-style-type: none"> • Provide the appropriate level of employee training in the following areas: spill response and prevention, storm water pollution prevention education, right-to-know awareness training, and hazardous materials management. • Perform and document in a log book all inspections and maintenance operations. • Develop a written operating, sampling, and reporting procedure under local storm water authority guidelines. Train appropriate employees to implement these procedures. <p>REQUIREMENTS:</p> <ul style="list-style-type: none"> • Capital and O&M Costs increase as the contributory area increases. <p>LIMITATIONS:</p> <ul style="list-style-type: none"> • Oil/water separator installations should be designed and installed by experienced individuals. Little data on the characteristics of petroleum hydrocarbons in storm water leads to considerable uncertainty about separator performance. 	

G. LIST OF SPILLS FOR 2013-2016

Spill History Log
Operations Spill Log and FRS Incident Logs Combined

Date	Time	Incident Location	Incident Description	Gallons Spilled	Incident Information (OPS Log)	FRD Report Number or OPS Log
CABIN BRANCH WATERSHED						
Cabin Branch						
1/17/2013	21:00	F9	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A/Freight ramp spot F-9 [GALLONS SPILLED]: Approximately 10 to 15 gallons [COMMENT]: FEDEX A300(N674FE) vented fuel from left wing while refueling acft. ASIG(Jay)reported spill to OPS.	15	FRD and OPS responded. Spill contained and cleaned up. No drains effected. Incident report filed.	Ops Log and 13-0000141
5/1/2013	8:58	Cargo F	Dispatched and responded COLD to fuel spill in parking lot near Cargo building F. Arrived to find White Ford Mustang leaking gasoline at a slow but steady rate. Police and a tow truck were called for. After police had arrived, owner came back to vehicle. Owner asked if he could take vehicle and get repaired rather than towed and police allowed owner to do so. Spill was covered with quick dry and units returned to service.	1		13-0001012
3/28/2014	19:50		[FUEL/OIL/LAV SPILLS]: Oil [FUEL TYPE/LOCATION]: Transformer oil [GALLONS SPILLED]: 3 [COMMENT]: Oil has leaked from the transformer into the parking lot. No drains affected.	3	Mark Williams paged. Clean Venture responding.	Ops Log
9/28/2015	15:38	F18	[FUEL/OIL/LAV SPILLS]: FUEL SPILL [FUEL TYPE/LOCATION]: JET-A/F-18A [GALLONS SPILLED]: 20 [COMMENT]: Reported Fuel spill of approx 20-30 gallons vented from right wing vent of Atlas 747 on Freight Ramp Spot F-18A for unknown reason. Currently no drains affected and BWI ARFF/OPS responding. Updated info. Fuel spill estimated to be a maximum of 20 gallons now fully contained with clean up underway. No drains or soil affected. Aircraft was on Freight Ramp undergoing preliminary service and maintenance inspection for overnight/overseas AMC flight departing early AM. Aircraft was not being fueled and no fueling personnel or equipment were present at time of spill. Reason for spill is still unknown. ARFF and OPS remain on scene until cleanup is complete. No affect on operations.	20	Page sent.	Ops Log
5/19/2016	22:10		[FUEL/OIL/LAV SPILLS]: Fuel Spill [FUEL TYPE/LOCATION]: Jet A/Gate F-9 [GALLONS SPILLED]: 25-30 [COMMENT]: Overflow venting	30	OPS/FRD responded. Spill is contained. ASIG cleaning spill	Ops Log
5/31/2016	21:54		[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet-A, Spot F-9 [GALLONS SPILLED]: 10 [COMMENT]: Fuel Spill: Fed Ex reports an approximate 10 gallon fuel spill from an Airbus 300 (N681FE) during fueling. Fire Department and Operations Responding. Spill is contained on the right side of the aircraft.	10	Page sent. This is the second instance of a fuel vent for this tail number. Maintenance checked the aircraft and deemed a fueller mistake. Aircraft will depart.	Ops Log

Spill History Log
Operations Spill Log and FRS Incident Logs Combined

Date	Time	Incident Location	Incident Description	Gallons Spilled	Incident Information (OPS Log)	FRD Report Number or OPS Log
7/27/2016	7:07	RP	[FUEL/OIL/LAV SPILLS]: Fuel		FRD/OPS responded. SWA cleaning spill	16-0004187
			[FUEL TYPE/LOCATION]: Jet-A/Cargo Ramp F-09			
			[GALLONS SPILLED]:			
			[COMMENT]: BWI UNITS WERE DSIPATCHED FOR THE LARGE FUEL SPILL. UNITS ARRIVED WITH A SMALL SPILL THAT WAS BEING CLEANED UP BY THE FUEL COMPANY. NO FIRE SERVICES WERE NEEDED ON SCW/ENE AND UNITS WENT AVAILABLE.			
SAWMILL CREEK WATERSHED						
Muddy Bridge Branch						
8/22/2013	7:35	D46	Units initially alerted via crash phone for possible vehicle fire (units smoking, no fire visible) at the ramp area D-46. On initial arrival of units found over heated radiator, no fire present. Puddle of coolant and oil on the ground under vehicle, not moving. Command placed units available with the exception of E-43. E-43 crew placed adsorbent on the spill and awaited the arrival of US Air maintenance for remove materials. E-43 cleared with out incident.	1		13-0002486
10/4/2013	5:45	28 Holdblock	[FUEL/OIL/LAV SPILLS]: OIL	6	Port 33 responds with Port 11; Hydraulic reservoir leak.	
			[FUEL TYPE/LOCATION]: HYDRAULIC			
			[GALLONS SPILLED]: 6			
			[COMMENT]: RWY 28 Hold Block Delta B757, N665D, FLT 8777. Aircraft returned to Gate 29.			
11/2/2013	15:25	C5	[FUEL/OIL/LAV SPILLS]: FUEL SPILL [FUEL TYPE/LOCATION]: JET-A/C-5 [GALLONS SPILLED]: Approx. 15 gals. [COMMENT]: AAL reported fuel spill while refueling Flight 140/DFW/MD-88/N591AA both right and left side. ASIG conducting clean up of area, no drains affected. No negative impact on operation.	15	HipLink page sent. IR Filed.	
11/9/2013	8:50	28 Holdblock	[FUEL/OIL/LAV SPILLS]:Fuel [FUEL TYPE/LOCATION]:Jet A [GALLONS SPILLED]:1 to 2 gallons [COMMENT]:Air Tran,B737,N326AT,spilled fuel out of the number one engine at the Rwy 28 hold block. The aircraft also layed a trail of fuel from the gate at B10 along the taxi route to the hold block.	2	FRD,OPS repoded. Swa notified to send crews for the holdblock and taxiway adjacent the gate for clean-up. FMX(Cully) notified to scrub taxi route. Page sent.	
12/25/2013	8:45		[FUEL/OIL/LAV SPILLS]:Fuel [FUEL TYPE/LOCATION]:D-12 [GALLONS SPILLED]:10 gallons [COMMENT]:UAL A/C N11184	10	FRD responded, Spill contained and cleaned up by UAL.	Ops Log
1/30/2014	19:21	C5	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A/ C5 [GALLONS SPILLED]: 10/20 [COMMENT]: Drew with AAL called to inform OPS of a fuel spill at C5. AC-N491AA, MD-88, ASIG containing spill with speedy dry. Wing Overflow.	20	CDC called, Port 32 and FRD responded.	Ops Log and 14-0000377

Spill History Log
Operations Spill Log and FRS Incident Logs Combined

Date	Time	Incident Location	Incident Description	Gallons Spilled	Incident Information (OPS Log)	FRD Report Number or OPS Log
5/13/2014	17:00		[FUEL/OIL/LAV SPILLS]: FUEL SPILL [FUEL TYPE/LOCATION]: JET-A/SIGNATURE GA [GALLONS SPILLED]: 5-10 Gallons [COMMENT]: Signature Flight support reported fuel spill on GA Ramp at Beech King Air N802UP. Reason for spill is unknown. A/C was last fueled at IAD. No drains affected. BWI ARFF and OPS on scene. Spill is contained and clean up is underway.	12	HipLink Page sent.	Ops Log and 14-0001598
6/3/2014	11:24		[FUEL/OIL/LAV SPILLS]: Fuel spill Gate E4 [FUEL TYPE/LOCATION]: Jet A [GALLONS SPILLED]: Approximately 5-7 [COMMENT]: ASIG covered and cleaned the spill. No drains or soft ground were affected.	10	OPS and FRS responded.	Ops Log and 14-0001824
11/19/2014	18:48	D23	[FUEL/OIL/LAV SPILLS]: FUEL [FUEL TYPE/LOCATION]: Jet A/ D23 [GALLONS SPILLED]: 8 [COMMENT]: DAL MD 83(N904DE). No drains affected. Situation contained.	8	Hiplink Page sent. IR filed.	Ops Log
2/3/2015	14:32	D21	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A [GALLONS SPILLED]: 10 [COMMENT]: DAL, FLT 3440 to MSP, N934XJ, while being fueled at D21, vented 10 gallons of Jet A onto ramp due to faulty fuel valve. No drains affected. FRD on scene clean up in progress	10	Page sent	Ops Log
2/23/2015	10:30	D10	[FUEL/OIL/LAV SPILLS]: Oil [FUEL TYPE/LOCATION]: D10 Jetway [GALLONS SPILLED]: 1 Gallon [COMMENT]: U.S. Airways GPU oil line broke and spilled onto D10 Jetway	1	U.S. Airways alerted of spill and sent employees to clean up oil with absorbent.	Ops Log
3/2/2015	16:02	GA	[FUEL/OIL/LAV SPILLS]: Fuel Spill Update [FUEL TYPE/LOCATION]: Jet-A [GALLONS SPILLED]: 25 to 30 [COMMENT]: Approximately 25 gallons spilled from a Hawker 800 (N517LR) as it was transferring fuel from one wing to another and a valve was left open. Some fuel reached a drain (maybe up to 20 gallons). Clean up in progress.	30	MAA Environmental notified.	Ops Log
5/9/2015	8:05	D14	[FUEL/OIL/LAV SPILLS]: Fuel Spill [FUEL TYPE/LOCATION]: Jet A / Ramp D-14 [GALLONS SPILLED]: Less than 10 Gallons [COMMENT]: BWI dispatch contacted Airport Operations about fuel spill at gate D-14. UAL B-737 (N37434) fuel vented from F/O side of aircraft. 10 Gallons spilled, contained and being cleaned up by ASIG. No drains affected. FRD on the scene.	10	HipLink page sent. FRD secured the scene 0845L. IR completed (PN).	Ops Log
6/29/2015	5:04		[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A [GALLONS SPILLED]: 5 [COMMENT]: While fueling AC N993AN the ac vented and dropped approx 5 gallons onto the ground. ASIG in process of cleaning. No fuel entered drains	5	BWI FRD on location along with Port 32.	Ops Log
7/8/2015	19:31	D2	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Between VSR and gate D2 [GALLONS SPILLED]: 1 gallon	1	Fuel spill between VSR and gate D2. Port 11 and FRD responded. Less than 1 gallon mixed with water.	Ops Log

Spill History Log
Operations Spill Log and FRS Incident Logs Combined

Date	Time	Incident Location	Incident Description	Gallons Spilled	Incident Information (OPS Log)	FRD Report Number or OPS Log
8/6/2015	18:58	E1	[FUEL/OIL/LAV SPILLS]: Fuel update [FUEL TYPE/LOCATION]: Jet Fuel/E1 [GALLONS SPILLED]: 900 most accurate assessment [COMMENT]: ATCT notified OPS (and other stations) via crash phone of spill at gate E-3. WOW airlines parked at gate. Port 13 on site. Fuel was being on loaded to acft from fuel truck and operational switches were on automatic. The left wing was full and began to vent overboard with out any personnel seeing it. Issue remains with storm drains. MES on site and determined the storm drain the fuel went into has an oil separator. MES meeting with MDE for course of action with drain clean- up/mitigation.	900	FRD and Port 13 responding. Call made to MES emergency response number. Everbridge page sent. MDE has approved flushing the drain with water into the separator and ASIG will reclaim fuel/water mix into empty truck under the supervision of MDE. Av Dyne working to resolve issue with WOW A/C	Ops Log
8/21/2015	14:40	D26	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet-A [GALLONS SPILLED]: 4 to 5 [COMMENT]: ASIG advises of a fuel spill at Gate D- 26. Approximately 4 to 5 gallons vented from the left wing of a Delta MD-88 (N931DL). Spill is contained and being cleaned up. No drains affected.	5	Pages sent. Port 12 responding. Fire Department was dispatched at 1447L.	Ops Log
8/29/2015	14:23	D29	[FUEL/OIL/LAV SPILLS]: FUEL SPILL [FUEL TYPE/LOCATION]: JET-A D-29 [GALLONS SPILLED]: APPROX 5-6 GALLONS [COMMENT]: DAL reported small Jet-A spill of approx 5-6 gallons while fueling MD-88(N920DE) at D-29. ASIG Fueller Workneh Mirkena (1006307) was loading fuel (Truck 10420)(Decal#0990) when the A/C started venting fuel out of the right wing. Spill was contained, clean up underway, no drains affected. There was no affect to the flight.	6	Port 13 and ARFF responded. Page sent. DAL MX said no issues with A/C found.	Ops Log
9/25/2015	14:55	C1	[FUEL/OIL/LAV SPILLS]: Lav Spill [FUEL TYPE/LOCATION]: C1 Blue water [GALLONS SPILLED]: 2-3 [COMMENT]: American Airlines cleaned up spill.	3		Ops Log
11/16/2015	22:04	E3	[FUEL/OIL/LAV SPILLS]: HYDRAULIC FLUID SPILL [FUEL TYPE/LOCATION]: HYD FLUID/E3 [GALLONS SPILLED]: 15 GALLONS [COMMENT]: APS K Loader ruptured hydraulic fluid line while loading Atlas 767 at E3. Spill contained with no drains affected. K loader being towed off gate. Clean up underway. No other affect to operation. Scene is secured.	15	JMB	Ops Log
1/10/2016	8:55		[FUEL/OIL/LAV SPILLS]: FUEL SPILL UPDATE [FUEL TYPE/LOCATION]: Jet-A/D-13 [GALLONS SPILLED]: 10 gallons [COMMENT]: Clean up complete. No drains effected. Scene secure.	10	Page sent.	Ops Log
2/9/2016	12:30		[FUEL/OIL/LAV SPILLS]: LAV SPILL [GALLONS SPILLED]: Less than 4 [COMMENT]: Aviation Port Svcs while working Norwegian Air spilled approx 4 gallons lav fluid. Clean up was immediate and no drains were affected. MES inspected. Area returned to service.	4	Page sent.	Ops Log

Spill History Log
Operations Spill Log and FRS Incident Logs Combined

Date	Time	Incident Location	Incident Description	Gallons Spilled	Incident Information (OPS Log)	FRD Report Number or OPS Log
4/27/2016	17:53		[FUEL/OIL/LAV SPILLS]: Fuel Jet A	3	FRD and Port 11 on scene.	Ops Log
			[FUEL TYPE/LOCATION]: Jet A/Gate D16/N842UA			
			[GALLONS SPILLED]: >3			
			[COMMENT]: Spill contained and cleanup underway. No drains affected.			
4/27/2016	16:39	JW	[FUEL/OIL/LAV SPILLS]: Fuel	10	FRD responded.	16-0002232
			[FUEL TYPE/LOCATION]: Gate D-16			
			[GALLONS SPILLED]: Less than 10 gallons			
			[COMMENT]: Dispatched and responded for fuel spill at D16. Arrived to find Airbus 319 with spill under aircraft at wing tip and under still running fueling vehicle. 436 took up position to protect and aircraft and crews working around spill as Engine 43 crew pulled and extinguisher and placed member onboard aircraft in case of evacuation. Fueling vehicle was moved from spill area and cleanup was undertaken. United aircraft maintenance was called by company and after 30 minutes cleared aircraft. Pilot then pushed back from gate and started engines in the alley at DX pier. Spill was less than 10 gallons.			
6/15/2016	14:22	L2	[FUEL/OIL/LAV SPILLS]: Fuel		FRD/OPS responded. ASIG staff cleaned and mitigated the hazard.	16-0003285
			[FUEL TYPE/LOCATION]: Jet-A/Cargo Ramp F-20			
			[GALLONS SPILLED]:			
			[COMMENT]: Alerted for Aircraft with large fuel leak at Cargo Building Foxtrot... A Atlas B-747 at parking space F-20 off of Cargo E ramp side was found to be leaking fuel. DC1 Frazer established command and the ASIG staff cleaned and mitigated the hazard. R431 stood-by in the event of emergency. NFi DAB			
6/20/2016	8:30		[FUEL/OIL/LAV SPILLS]: Oil spill.	0.5	Clean up in progress.	GS
			[FUEL TYPE/LOCATION]: E-3			
			[GALLONS SPILLED]: 1/2 gallon.			
			[COMMENT]: FMX contacted.			
6/26/2016	13:53		[FUEL/OIL/LAV SPILLS]: Oil	1	Port 11 responded. FSS cleaned spill with absorbent.	JF
			[FUEL TYPE/LOCATION]: Hydraulic C/D alley near C7			
			[GALLONS SPILLED]: 1 gallon spilled from FSS push back tug			
7/10/2016	8:26	RP	[FUEL/OIL/LAV SPILLS]: Fuel	8	Port 12, BWI Fire Rescue responded. ASIG and SWA cleaned up fuel. Scene secure.	JF 16-0003798
			[FUEL TYPE/LOCATION]: Jet-A/Gate C-13			
			[GALLONS SPILLED]: 8			
			[COMMENT]: T 43 and R 435 arrive to find ramp crew covering jet fuel spill of aprox 5-8 gallons of fuel. T 43 made contact with ground crew Supv and Mechanic of Aircraft to verify what caused spill. Both advised over fill no Aircraft issues confirmed by SWA Maint.			
7/12/2016	17:20		[FUEL/OIL/LAV SPILLS]: Hydraulic fluid	2	Port 12 responded. No drains effected. APS cleaning spill with speed dry. Ground unit taken out of service.	PN
			[FUEL TYPE/LOCATION]: Gate E-3			
			[GALLONS SPILLED]: Approximately 2 gallons			
			[COMMENT]: APS(Cross)reported a hydraulic spill from ground equipment unit.			

Spill History Log
Operations Spill Log and FRS Incident Logs Combined

Date	Time	Incident Location	Incident Description	Gallons Spilled	Incident Information (OPS Log)	FRD Report Number or OPS Log
7/18/2016	13:24		[FUEL/OIL/LAV SPILLS]: FUEL SPILL	12	Page sent. IR Filed.	JMB
			[FUEL TYPE/LOCATION]: Jet-A/D-22			
			[GALLONS SPILLED]: 10-12 Gallons			
			[COMMENT]: Allegiant MD-80 A/C N417NV vented fuel out left wing overflow during fueling. ASIG conducting clean up. No drains affected. No other effect to operation.			
STONY RUN WATERSHED						
Kitten Branch						
4/26/2013	15:04	A10	[FUEL/OIL/LAV SPILLS]: Large oil spill on Taxilane A1 near Gate A-10. Southwest contacted twice since 2:30pm and has not shown up to clean. MAA Field Maintenance is applying absorbent and sweeping the area.	10	Page sent. Stain is now dry but still visibly dark and large.	Ops Log
5/1/2013	6:44	C6	[FUEL/OIL/LAV SPILLS]: Fuel spill. [FUEL TYPE/LOCATION]: Jet-A [GALLONS SPILLED]: Approximately 20 gallons. [COMMENT]: AAL (Tom) reported fuel spill at C-6, MD80 (N7547A) port wing.	20	FRD, Ops responding. Hiplink page sent. FMX will scrub area after all speedy dry has been picked up. Hiplink Page sent, IR on file.	Ops Log
5/1/2013	10:12	B14	[FUEL/OIL/LAV SPILLS]: Fuel spill. [FUEL TYPE/LOCATION]: Jet A/ B14 [GALLONS SPILLED]: Approx 15 gallons. [COMMENT]: No drains affected. Seal on fuel cart failed.	15	Fuel cart taken OTS for repairs. Hiplink page sent. Port 11 responding.	Ops Log
5/19/2013	14:11	B3	Alerted for odor of gas inside the terminal at B3 boarding area. Prior to arrival dispatch advised a spill at same location from broken hose on fuel cart. E43 invest the odor inside determined it was from outside and units cleared. No services needed.	1		13-0001205
6/6/2013	12:41	B10-B14	[FUEL/OIL/LAV SPILLS]: Oil [FUEL TYPE/LOCATION]: Twy A btn B-14 and B-10 [GALLONS SPILLED]: 3/4 gallons [COMMENT]: Twy A closed btn B14 and B10	0.75	SWA contacted to clean up spill. MAA sweeper called to assist. HipLink page sent.	Ops Log
6/6/2013	13:56	B12	[FUEL/OIL/LAV SPILLS]: Oil spill update [FUEL TYPE/LOCATION]: Near Gate B12 [GALLONS SPILLED]: 3-4 [COMMENT]: Spill cleaned and Twy A section open. SWA A/C N611SW lost fluid on TWY A and was towed to the gate B-2 from B12 and then towed back to C-12.	4	HipLink page sent.	Ops Log
6/21/2013	11:40	A4	[FUEL/OIL/LAV SPILLS]: Fuel spill [FUEL TYPE/LOCATION]: Jet-A at Gate A4 [GALLONS SPILLED]: Approximately 10 [COMMENT]: No drains affected. Clean up conducted by ASIG/SWA.	10	OPS, MES, and FRS responding. HipLink page sent. IR filed.	Ops Log
7/4/2013	6:44	A8	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet-A, Gate A-8. [GALLONS SPILLED]: Less than 5 gallons. [COMMENT]: Spill came from a faulty seal on #2 engine on SWA B737 (N7732A). FRD on scene. Spill contained and no drains affected.		PORT 13 responded and FRD Division Chief(Kertpatrick) secured scene. SWA (Pete) advised OPS at 0720L that the fuel seal has been repaired and A/C has RTS. IR completed.	Ops Log
7/13/2013	18:44	A8	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A/Gate A8 [GALLONS SPILLED]: 10-15 [COMMENT]: SWA N 219WN. Spill contained and cleaned up. No drains affected.		Hiplink sent. IR on file.	Ops Log and 13-0001958

Spill History Log
Operations Spill Log and FRS Incident Logs Combined

Date	Time	Incident Location	Incident Description	Gallons Spilled	Incident Information (OPS Log)	FRD Report Number or OPS Log
8/15/2013	7:31	A5	[FUEL/OIL/LAV SPILLS]: Southwest Airlines advises of a large fuel spill at gate A-5. Fuel has run downhill under the aircraft. Coincidentally, water was pumped out of the fuel pit prior and was mixed with the fuel. Fire Department estimates 10 to 15 gallons spilled. Cleanup is in progress. [FUEL TYPE/LOCATION]: Jet-A, Gate A-5 [GALLONS SPILLED]: 10-15	15	Page sent, Port 12 responding.	Ops Log and 13-0002416
8/24/2013	10:40	A11	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A @ Gate A11, Twy A abeam A11, Rwy 28 Holdblock [GALLONS SPILLED]: 25 total with 10 at each the Gate and Twy A areas and 5 at the 28 Holdblock. [COMMENT]: Ops, FRD and SWA responded.	25	Spill occurred and reported at 1000L and cleanup completed at all areas by 1035L. HipLink page sent.	Ops Log and 13-0002516
9/7/2013	6:32	B10	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet-A/TWY A abeam gate B-10 [GALLONS SPILLED]: Approximately 5 [COMMENT]: Air Tran 737 (N168AT) spilled fuel on Taxiway A abeam gate B-10. Aircraft was pulled back into the gate.	5	Page sent, Fire Department and Airport Operations responded, cleanup in progress. TWR asked to avoid the area for a few minutes.	Ops Log and 13-0002663
9/19/2013	10:08	A1	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet-A/TWY A Adjacent Gate A- 1. [GALLONS SPILLED]: 2 to 3 gal [COMMENT]: Spill cleaned/No drains affected.	3	FRD has secured scene. TWY A inspected. IR completed.	
9/24/2013	10:18	A9	[FUEL/OIL/LAV SPILLS]: FUEL [FUEL TYPE/LOCATION]: Jet A; TWY A at A-9 [GALLONS SPILLED]: 3 [COMMENT]: Port 11 found spill during routine ramp check. Port 11 communicating aircraft movements with TWR.	3	SWA(Jeff)notfied, TWR(FX)AREA CLSD 1015L	
10/26/2013	8:25	B13	[FUEL/OIL/LAV SPILLS]: Fuel Spill. [FUEL TYPE/LOCATION]: Jet A [GALLONS SPILLED]: 1 [COMMENT]: SWA reporting fuel spill at gate B-13. SWA B-737 (N226WN) vented fuel from number 2 engine. ASIG and SWA on site cleaning spill. No drains affected.	1	FRD/Airport Operations responded. FRD secured the scene 0855L. HipLink page sent. IR filed.	
11/19/2013	8:20	A1	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A @ A1 and H [GALLONS SPILLED]: 1 gallon [COMMENT]: SWA-737, N288WN- During left engine start up aircraft dropped fuel on ramp	1	Spill cleaned by Southwest.	
1/25/2014	9:13	15R Pad	[FUEL/OIL/LAV SPILLS]: FUEL SPILL [FUEL TYPE/LOCATION]: JET-A, 15R DEICE PAD [GALLONS SPILLED]: 2-4 GALLONS [COMMENT]: AirTran reported A/C (B737-700/N338AT) in Lane 1 of 15R Deice pad venting fuel. ARFF and Port 11 responding.Approx 2-4 gallons Jet-A spilled. No drains affected. Scene secured.	4	HipLink page sent.	Ops Log and 14-0000312
1/31/2014	11:50	B/C	[FUEL/OIL/LAV SPILLS]: Fuel from AAL baggage Tug. [FUEL TYPE/LOCATION]: Gasoline/ Ramp area B/C Connector. [GALLONS SPILLED]: Approximately 6 Gallons [COMMENT]: FRD is responding.	6	Port 13 is on Site.	Ops Log and 14-0000390

Spill History Log
Operations Spill Log and FRS Incident Logs Combined

Date	Time	Incident Location	Incident Description	Gallons Spilled	Incident Information (OPS Log)	FRD Report Number or OPS Log
3/28/2014	6:59		[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A [GALLONS SPILLED]: 4 to 5 gallons initial estimate. Vented from the wing. [COMMENT]: AAL, MD80, N9677W, Flt.1373 to DFW parked at gate C8. Spill contained and clean-up in progress. No drains effected.	5	FRD,OPS responding. Page sent.	Ops Log and 14-0001041
4/17/2014	15:46		[FUEL/OIL/LAV SPILLS]: Fuel Spill [FUEL TYPE/LOCATION]: Jet A, Gate B-9 [GALLONS SPILLED]: 5 to 8 [COMMENT]: Aircraft was overfilled and fuel vented from the wing. Spill contained and cleaned by ASIG/Southwest.	8	Port 26 responded. Page sent, Incident Report filed.	Ops Log and 14-0001322
6/1/2014	19:22		[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A [GALLONS SPILLED]: 15 [COMMENT]: SWA called about 1915 with fuel spill. Speedy dry placed over fuel spill and fuel has not entered drains. FLT SWA3067 to DEN, N274WN	15	FRD notified. Incident report completed.	Ops Log and 14-0001806
7/17/2014	9:47		[FUEL/OIL/LAV SPILLS]: Jet-A Fuel Spill [FUEL TYPE/LOCATION]: Gate C-14 [GALLONS SPILLED]: Estimated 13 gallons spilled covering a 30 X 40 area. [COMMENT]: No drains affected. Pilot of AirTran B-	13	BWI FRD and OPS responding to a reported fuel spill at Gate C-14. SWA MX on scene. HipLink page sent.	Ops Log
7/18/2014	20:40		[FUEL/OIL/LAV SPILLS]: Fuel Spill [FUEL TYPE/LOCATION]: Jet A/Gate B-7 [GALLONS SPILLED]: 8 gallons [COMMENT]: AirTran B737-700 (N240AT). Fuel spill was caused by a faulty float switch on the acft	8	FRS/OPS responded. IR filed	Ops Log
10/11/2014	16:50	A7	[FUEL/OIL/LAV SPILLS]: Lav Spill [FUEL TYPE/LOCATION]: A-7 ramp [GALLONS SPILLED]: 3 gallons [COMMENT]: SWA, Richard Mudd, notified OPS of spill. Ph: 410-209-9018	3	Spill contained and cleaned up by SWA.	Ops Log
10/17/2014	9:30	C14	[FUEL/OIL/LAV SPILLS]: FUEL SPILL [FUEL TYPE/LOCATION]: JET-A [GALLONS SPILLED]: 15 Gallons [COMMENT]: ASIG fueling AirTran/SWA 737-700 N295AT at C-14 shut off did not work. Fueler released emergency line which stopped flow. Ops/FRD responded. Small spill contained, no drains effected.	15	HipLink page sent.	Ops Log
11/2/2014	7:48	BC Alley	[FUEL/OIL/LAV SPILLS]: Fuel Spill [FUEL TYPE/LOCATION]: Jet A, BC Alley [GALLONS SPILLED]: 2-3 [COMMENT]: SWA Reported a Line of fuel between B/C piers on centerline of ally. Line of fuel is about 100ft long 6 inches wide. No puddles of fuel.	3	SWA directed to clean up spill. Crew was on a pullback basis while Port 12 monitored Ground frequency.	Ops Log
11/14/2014	8:20	A7	[FUEL/OIL/LAV SPILLS]: FUEL SPILL [FUEL TYPE/LOCATION]: JET-A [GALLONS SPILLED]: Approx. 20 gallons [COMMENT]: SWA1804 at Gate A-7 experienced fuel spill during fueling process. Fueling hose disconnected from inground connection. Spill did not come from A/C. No drains affected. OPS/FRD on scene. ASIG conducting clean up.	20	HipLink page sent. IR filed.	Ops Log and 14-0003881

Spill History Log
Operations Spill Log and FRS Incident Logs Combined

Date	Time	Incident Location	Incident Description	Gallons Spilled	Incident Information (OPS Log)	FRD Report Number or OPS Log
11/19/2014	9:26	GA -	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet-A [GALLONS SPILLED]: 10 [COMMENT]: Fuel Spill reported in Northrop Grumman hangar on the General Aviation Ramp. Northrop Grumman ATR 42 (N470JF) in hangar was being worked on. Fuel began flowing out. Plane was removed from hangar to ramp and fuel, now just dripping, is being contained in buckets. Approximately 10 gallons spilled in hangar.	10	Page sent, Port 12 responding.	Ops Log
1/29/2015	7:01	C14	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Behind gate C14 [GALLONS SPILLED]: Approximately 2 [COMMENT]: Advised by SWA Ops aircraft experienced fuel leak after pushback. A/C N917WN approximately 2 gallons from right engine.	2	Port 13 responded. Cleanup in progress. Page sent.	Ops Log
3/2/2015	18:38	B11	[FUEL/OIL/LAV SPILLS]: B-11 Jet-A fuel spill update: [COMMENT]: An ASIG fueller improperly connected the fuel hose at the B-11 fuel pit. Updated spill amount is 7 gallons. 2 of the 7 gallons remains in the pit. Cleanup is underway.	7	HipLink page sent.	Ops Log
4/24/2015	20:18	C4	[FUEL/OIL/LAV SPILLS]: Fuel Spill [FUEL TYPE/LOCATION]: Jet A/Gate C4 [GALLONS SPILLED]: approximately 5 gallons [COMMENT]: American Airlines called to report a Fuel spill by an MD80(AC Tail#N964TW)spill is contained and being cleaned up from pavement.	5	Fire Department responded.	Ops Log
6/15/2015	20:35	B6	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A/B6 ramp [GALLONS SPILLED]: approx 3 [COMMENT]: ASIG cleaning spill. Aircraft N7737E	3	HipLink page sent	Ops Log
6/28/2015	21:05	B10	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A/Gate B10 [GALLONS SPILLED]: 5 [COMMENT]: Fuel vented from right wing of SWA aircraft N7817J. Fuel did not enter any drains or soft ground. Cleaned up by ASIG.	5	Port 12 responded.	Ops Log
6/28/2015	8:49	B8	[FUEL/OIL/LAV SPILLS]: FUEL [FUEL TYPE/LOCATION]: JET-A behind B8 [GALLONS SPILLED]: 5-10 gallons [COMMENT]: SWA during startup dropped approx. 5-10 gallons of fuel from aircraft at B8. Tail Number N7727A	10	FRD/Port 13 responded. Page Sent MES paged	Ops Log
7/12/2015	18:35	B12	[FUEL/OIL/LAV SPILLS]: FUEL SPILL [FUEL TYPE/LOCATION]: JET-A GATE B-12 [GALLONS SPILLED]: EST. UP TO 20 GALLONS [COMMENT]: ASIG reported fuel spill at Gate B-12, BWI ARFF/OPS responding. ASIG in process of clean up. ASIG reports fuel was vented from left wing during fueling process. Apparent valve closure issue. ASIG is cleaning area under the watch of BWI ARFF and OPS. No drains were affected. SWA and BWI ARFF report to OPS that the issue with SWA flight 137 to SLC (N476WN) was a bad crossover valve on the right side which caused the fuel to vent out of the left wing vent. The flight is undergoing repairs at this time and is expected to leave for SLC as soon as possible. SWA is handling their passengers needs. Scene is secure.	20	HipLink page sent.	Ops Log

Spill History Log
Operations Spill Log and FRS Incident Logs Combined

Date	Time	Incident Location	Incident Description	Gallons Spilled	Incident Information (OPS Log)	FRD Report Number or OPS Log
7/18/2015	21:40	B13	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A/ B13 Jetway [GALLONS SPILLED]: 20G [COMMENT]: Fuel vented from SWA AC N777QC Right wing	20	ARFF and port 13 responded. ASIG/SWA ground contained and cleaned up spill. Incident report completed.	Ops Log
						Ops Log
7/26/2015	9:53	A4	[FUEL/OIL/LAV SPILLS]: FUEL SPILL [FUEL TYPE/LOCATION]: JET-A/GATE A-4 [GALLONS SPILLED]: LESS THAN 2 GALLONS [COMMENT]: SWA reported small fuel spill at Gate A-4. OPS responded to find a spill of less than 2 gallons and clean up had already begun. No drains affected with SWA/ASIG cleaning area. Scene is secure with no safety threat.	2	HipLink page sent.	Ops Log
						Ops Log
7/28/2015	7:01	A15	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A/ A15 [GALLONS SPILLED]: SWA mx estimates 50 gallon [COMMENT]: SWA MX transferring fuel created fuel spill - A-15 Fuel Spill update: The contractor has cleaned up all the fuel and is replacing the drain grates. MAA Environmental, please call Airport Operations before we relieve them.	50	Page sent out under airport status. Mark Williams reporting they are enroute (0709L).	Ops Log
						Ops Log
8/14/2015	7:24	A9	[FUEL/OIL/LAV SPILLS]: Fuel Spill [FUEL TYPE/LOCATION]: Jet-A, Taxiway T abeam gate A-9 [GALLONS SPILLED]: 7 [COMMENT]: Southwest at gate A-9 was pushed back and upon engine start, began purging fuel. Engines are shut down and the aircraft is stationary on Taxiway T. Southwest flight 779 to Chicago (N7701B) has pulled back into the gate. Approximately 5 gallons of fuel is on the taxiway and another 2 at the gate. Taxiway T is closed between F and T1 for cleanup. Southwest has completed the fuel cleanup and the section of Taxiway T has been inspected and reopened.	7	Page sent, Port 12 and Fire Department responding.	Ops Log
9/16/2015	9:14	C14	[FUEL/OIL/LAV SPILLS]: Fuel Spill [FUEL TYPE/LOCATION]: Jet-A Gate C-14/TWYs [GALLONS SPILLED]: Less than 5 [COMMENT]: TWR reported SWA 899 vented fuel from left engine after landing. Small trail of fuel from RWY 33L and TWY R, TWY P,E and T to Gate C14. Less than 2 gallons spilled on ramp. SWA conducting clean up. No drains affected.	5	Page sent.	Ops Log
1/6/2016	17:30		[FUEL/OIL/LAV SPILLS]: Simplicity reported lav spill from lav truck.	5	JI Simplicity will be responsible for clean-up.	Ops Log
			[LOCATION]: C-2 Ramp			
			[GALLONS SPILLED]: 3-5 gal.			
1/10/2016	8:17	C-2	[FUEL/OIL/LAV SPILLS]: FUEL SPILL	10	Page sent.	Ops Log 16-0000117
			[FUEL TYPE/LOCATION]: Jet-A/D-13			
			[GALLONS SPILLED]: Approx 10 gallons			
			[COMMENT]: UAL reported spill of approx 10 gallons from overflow of A-320/N474UA. Airport Ops and BWI ARFF on scene.			

Spill History Log
Operations Spill Log and FRS Incident Logs Combined

Date	Time	Incident Location	Incident Description	Gallons Spilled	Incident Information (OPS Log)	FRD Report Number or OPS Log
2/8/2016	8:56	L3	[FUEL/OIL/LAV SPILLS]: GASOLINE SPILL [GALLONS SPILLED]: [COMMENT]: Alerted for small gas leak. Arrived to find gas leaking from a vehicle in the parking garage. Covered spill and waited for vehicle to be towed away. Parking contractor cleaned up absorbant. Scene turned over to MTAP and Parking contractor		Gasoline or other combustible liquid spill.	16-0000592
2/19/2016	19:29	RP	[FUEL/OIL/LAV SPILLS]: Fuel Spill. [FUEL TYPE/LOCATION]: Jet A/Ramp at B12. WN1100. [GALLONS SPILLED]: Less than 5 contained on land. [COMMENT]: Reported by Margaret at ASIG	5	ASIG notified dispatch. Port 12, MDTAP and ARFF responded. Hydrant cart (9819) failure.	Ops Log 16-0000783
3/8/2016	8:02		[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: SPOT 2 between B/C Alleyway [GALLONS SPILLED]: 2 1/2 gallons [COMMENT]: ATCT (RX) reported fuel spill. SWA responding to cleanup a small 2 1/2 gallon fuel spill created during an engine startup at spot #2 between the B/C alleyway. No drains affected.	2.5	Page sent. Southwest did not respond with the spill kit until 0846. Six aircraft taxied through the spot in that timeframe.	Ops Log
4/20/2016	18:55		[FUEL/OIL/LAV SPILLS]: Oil Spill [FUEL TYPE/LOCATION]: B4 [GALLONS SPILLED]: <2 gallons [COMMENT]: SWA belt loader engine failed spilling fluid. ARFF and Airport Operations Responded. Spill contained on land and cleaned up by SWA.	2	JF	Ops Log
4/24/2016	18:31		[FUEL/OIL/LAV SPILLS]: FUEL SPILL [FUEL TYPE/LOCATION]: JET-A GATE B-15/13 [GALLONS SPILLED]: EST 30 GALLONS [COMMENT]: SWA 737 N741SA at Gate B-15/13 vented approx 30 gallons from left wing overflow during fueling process. Fueller reports stuck valve on A/C. Ops and BWI ARFF on scene. SWA conducting clean up. No drains affected.	30	Page sent. IR filed.	Ops Log 16-0002146
5/27/2016	7:50		[FUEL/OIL/LAV SPILLS]: Fuel Spill [FUEL TYPE/LOCATION]: Jet A/Gate B-9 [GALLONS SPILLED]: 20 gallons [COMMENT]: N741SW left wing vent. A/C VTO failure.	20	FRD & OPS responded. ASIG/SWA cleaning spill.	Ops Log 16-0002899
5/27/2016	9:10		[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A/Gate B-9 [GALLONS SPILLED]: 20-25 [COMMENT]: N741SW left wing vent while SWA aircraft maintenance was transferring fuel	25	FRD/OPS responded. SWA cleaning spill	Ops Log 16-0002902
6/18/2016	9:14		[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet A/ A-5 [GALLONS SPILLED]: <3 gal. contained on land. [COMMENT]: SWA 737/300 N358SW a/c auto shut off failed.	3	Port 13 responded. ARFF/MDTAP was not called. Spill was cleaned up and removed.	JF

Spill History Log
Operations Spill Log and FRS Incident Logs Combined

Date	Time	Incident Location	Incident Description	Gallons Spilled	Incident Information (OPS Log)	FRD Report Number or OPS Log
6/19/2016	9:12		[FUEL/OIL/LAV SPILLS]: Oil spill. [FUEL TYPE/LOCATION]: C-2 [GALLONS SPILLED]: 1-gallon [COMMENT]: 2-Areas, FMX notified and responded, appears to be from ground equipment, Alaska notified.	1	Clean-up in progress.	GS
7/5/2016	19:12	L2	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet-A/A Pier Ramp [GALLONS SPILLED]: 1 [COMMENT]: SWA aircraft N446WN vented fuel from wing at gate A-2 during refueling process. 1 gallon spill cleaned up by ASIG.	1	No drains affected. FRD has secured the incident. FRD/OPS responded.	GK 16-0003699
Sachs Branch						
10/15/2014	15:10	Pink Lot	[FUEL/OIL/LAV SPILLS]: OIL [FUEL TYPE/LOCATION]: Pink Lot [GALLONS SPILLED]: 25 [COMMENT]: Jesse Dobson (MES) reported Oil Spill from MAA's equipment.	25	Spill is being contained and affected vegetation and sod is being removed. Hiplink page sent.	Ops Log
12/16/2015	13:43	L1 Daily Parking Garage A	[FUEL/OIL/LAV SPILLS]: OIL OR OTHER FLUID SPILL [FUEL TYPE/LOCATION]: JET-A/L1 [GALLONS SPILLED]: [COMMENT]: Responded for a odor of gas in Building #166 . R-4 and R-2 arrived on location with a small fuel spill (in the water outside the building. Command Notify MDE. Command had E-43 check the building for odors. E-43 crews check the area and found know issues. Command placed the remaining units in and he waited for MDE		Oil or other combustible liquid spill.	15-0005467
3/15/2016	10:01		[FUEL/OIL/LAV SPILLS]: Fuel Spill [FUEL TYPE/LOCATION]: Jet-A, Fuel Farm [GALLONS SPILLED]: Approximately 15 [COMMENT]: Fuel Spill: ASIG had a fuel spill in the Fuel Farm approximately 30 minutes ago. Maintenance was testing a portable fuel cart and pumping into a fuel truck with an inaccurate fill sheet. The overfill vented out of the top. Approximately 15 gallons was spilled and cleaned up by ASIG.	15	Port 12 responded, Page sent. ASIG was educated on notification procedures.	Ops Log
4/19/2016	8:40		[FUEL/OIL/LAV SPILLS]: LAV/SEWAGE [GALLONS SPILLED]: EST 20 GAL [COMMENT]: AAL Lav Truck spilled raw sewage at the Fuel Farm Triturator. OPS/MES on scene. See 09:37 Log entry for more info.	20	Page sent.	Ops Log
6/1/2016	14:56	L2	[FUEL/OIL/LAV SPILLS]: Fuel [FUEL TYPE/LOCATION]: Jet-A [GALLONS SPILLED]: [COMMENT]: Units alerted for odor of gas inside the offices of the daily garage. Units arrived with an odor of jet fuel. Units found a sheen of product on the water in the pond. MES and MDE requested for response. MES to handle further actions. Units cleared after MES on site and took over.		PORT 11 responding. APS on site. Page sent.	JPC 16-0002976

**H. ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDDE)
DOCUMENTS**

Maryland Environmental Service

**Standard Operating Procedures for
Illicit Discharge Detection and Elimination**

**At Baltimore/Washington International
Thurgood Marshall and Martin State Airports**

Standard Operating Procedures for Illicit Discharge Detection and Elimination

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Attachments

- Attachment 1 – Outfalls to be Screened
- Attachment 2 – Inspection Sheets
- Attachment 3 – YSI 650 MDS Multi-Parameter Meter Instructions
- Attachment 4 – Manufacturers Instructions for the CHEMetrics Single-Analyte Meter
- Attachment 5 – Manufacturers Instructions for the CHEMets Kit for Ammonia
- Attachment 6 – Manufacturers Instructions for the HACH Pocket Colorimeter II for Fluoride
- Attachment 7 – Physical and Chemical Parameter Information to Characterize Flows
- Attachment 8 – 40 CFR 122.34(b)(3)(iii) and Martin State Airport Small MS4 Permit, Part VI.C
- Attachment 9 – Chain of Custody Form

Introduction

The NPDES Phase II municipal stormwater program requires the development and implementation of a management program that includes six minimum measures, including illicit discharge detection and elimination (IDDE). The Maryland Aviation Administration (MAA) is required to implement such an IDDE program at both Baltimore/Washington International Thurgood Marshall (BWI) and Martin State Airports to meet the conditions of its NPDES municipal separate storm sewer (MS4) permits.

Federal regulations define an illicit discharge as “...any discharge to an MS4 that is not composed entirely of stormwater...” with some exceptions such as water line flushing, landscape irrigation, air conditioning condensation, or fire fighting activities. Sources of illicit discharges can include: sanitary wastewater, carwash washwater, improper oil disposal, spills from roadway or aircraft accidents, and improper disposal of automotive and household toxics.

To meet this minimum control measure, the Maryland Environmental Service (MES) performs dry weather field screening of selected outfalls (identified in Attachment 1) once annually to identify any illicit discharges at BWI and Martin State Airports. Dry weather is defined as a time when there has been no precipitation greater than a total of 0.10 inches in the previous 72 hours.

This standard operating procedure (SOP) for IDDE at BWI and Martin State Airports has been organized into five sections:

- **Field Screening Preparation** - identifies various tools and equipment needed to complete the necessary dry weather field screening.
- **Field Screening** – discusses the process of dry weather field screening.
- **Record Keeping** – identifies proper record keeping procedures.
- **Notifications** – documents the notification procedure should an illicit discharge be detected.
- **Reporting** - identifies proper reporting procedures.

Field Screening Preparation

Preparation for dry weather field screening is essential for the safety of field staff and successful program results. All personnel conducting field screening must wear steel-toed safety boots and appropriate work clothing. All necessary safety equipment and tools will be brought to the job site and used as required. The basic items needed to complete field screening are as follows:

- First aid kit
- Traffic safety cones
- Flashlights
- Paper towels
- Disposable latex or nitrile gloves

- Inspection sheets
- Pens
- Permanent markers
- Cooler/ice (as needed)
- Labeling tape/preprinted labels
- Several one-liter polyethylene plastic sample bottles
- A “dipper,” – a measuring cup at the end of a long pole to collect samples from outfalls that are hard to reach
- Map showing all outfalls and drains
- Container to collect waste chemicals from field kit for proper disposal
- Safety goggles
- Safety vests
- YSI conductivity/pH/temperature probe
- CHEMetrics Single-Analyte meter for surfactants
- CHEMets Kit for Ammonia
- HACH Pocket Colorimeter for Fluoride

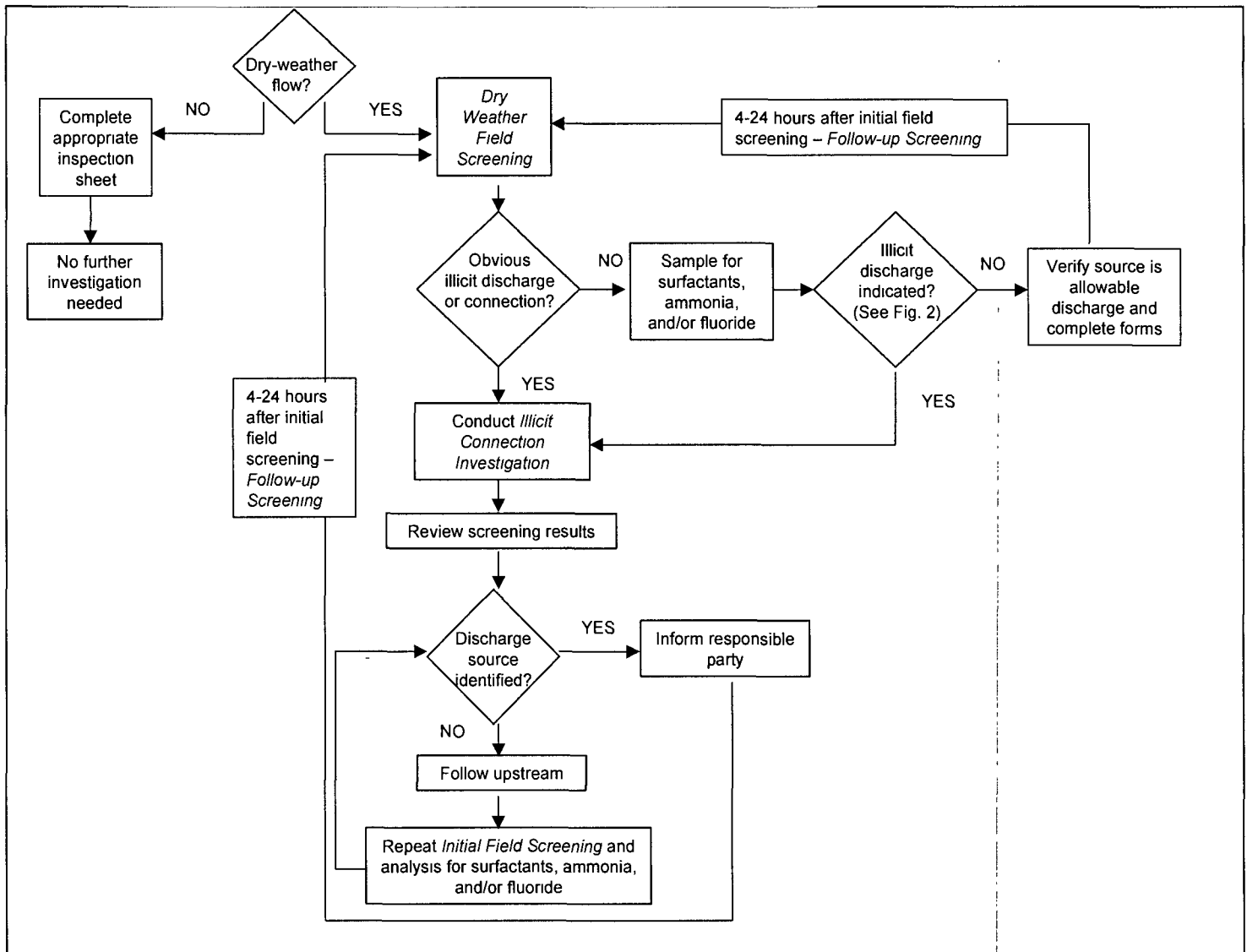
Field crews need to assure that these basic items and any other equipment and supplies that may be needed are readily available. Additionally, each of the field meters will be calibrated according to the manufacturer’s guidance prior to the start of any field screening.

Field Screening

Dry weather screening will be completed once annually at all selected outfalls at BWI Airport both inside and outside the perimeter fence and on the state controlled side of Martin State Airport (Attachment 1). Prior to field screening, MES will monitor weather conditions as reported through the National Weather Service or Accuweather Premium to determine if the 0.10 inch of rain threshold has been reached.

The dry weather field screening approach is described below and is shown in flowchart form in Figure 1.

Figure 1. Dry weather field screening flow chart



Dry Weather Field Screening When No Flow is Detected

If no dry-weather flow is detected at an outfall, this lack of flow will be recorded onto the no-flow inspection sheet. Additionally, visual or olfactory observations that may serve as an indicator of a past illicit discharge will be recorded (i.e., deposits or stains, sediment). When no-flow is detected (including a standing pool of water with no flow), no additional follow-up field screening is necessary and the outfall is considered to have met the screening requirements for the permit year.

Initial Dry Weather Field Screening When Flow is Detected

If dry-weather flow is detected at an outfall, MES staff will conduct an initial field observation screening. The visual and olfactory observations to be recorded on the inspection sheet (Attachment 2) includes the presence of:

- Flow, including a visual estimate of flow rate
- Oily sheen
- Color
- Odor
- Deposits or stains in the channel or at the outfall
- Visual turbidity
- Floating solids

If these visual/olfactory observations clearly identify an illicit discharge or connection, MES staff may conduct the *Illicit Connection Investigation* detailed below without collecting an additional water sample for field analysis.

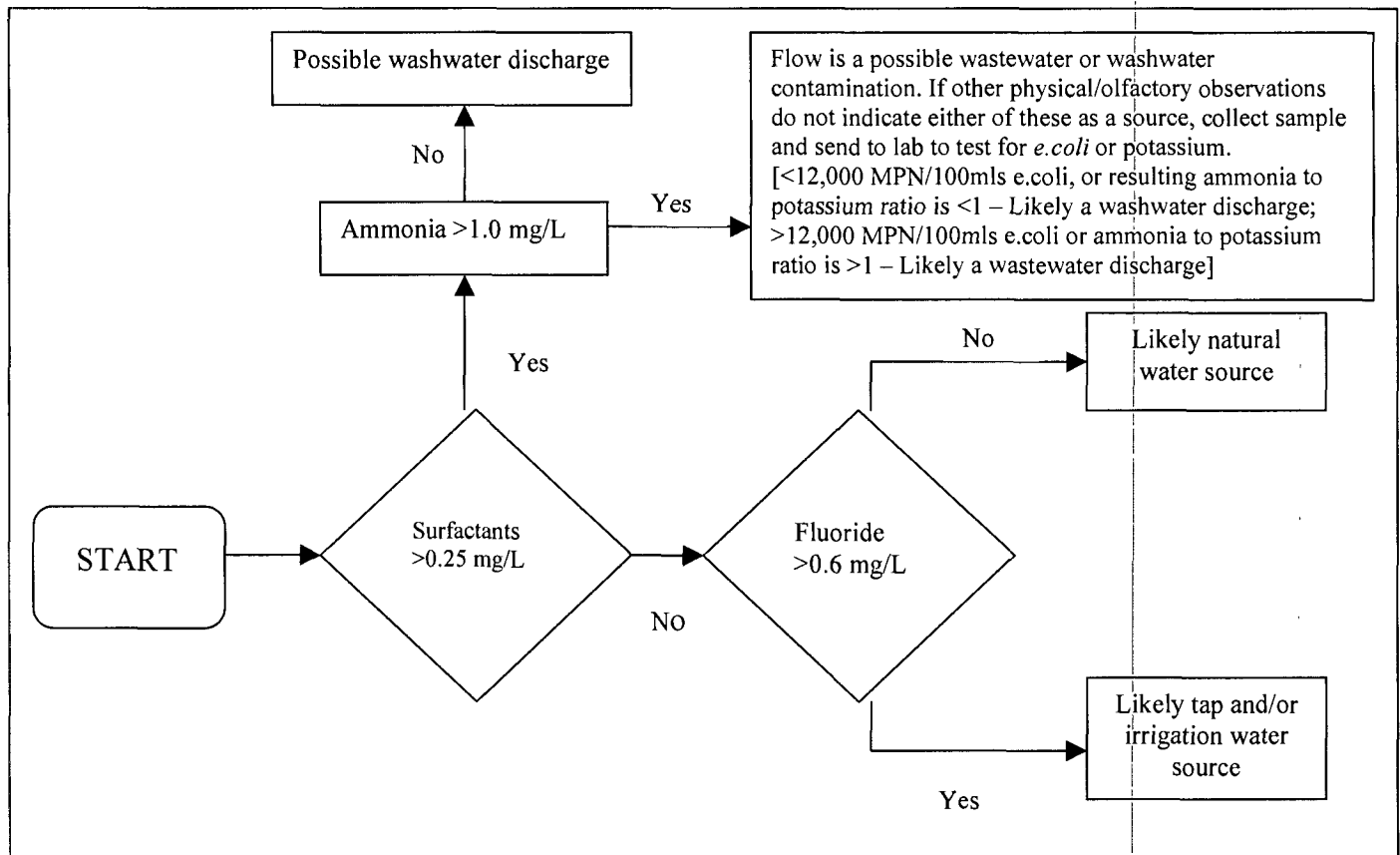
If visual/olfactory clues (Table 1) are inconclusive (i.e., there is no obvious sheen, odor, etc.) or if the source is not immediately obvious, MES staff will collect a water sample for field analysis. The sample will be collected in a clean container (either plastic or glass), which has been triple rinsed with sample water. MES staff will take care to not disturb any sediment or plant material in the drainage channel at the sample collection point or upstream of this point. The temperature, pH, and conductivity of the sample will be measured using a pre-calibrated YSI 650 MDS multi-parameter meter according to the manufacturers instructions (Attachment 3).

Table 1. Visual and olfactory clues and action levels representing possible discharge sources

Elevated Parameter	Action Level	Possible Discharge Sources
Deposits and Stains	Any	Color, texture may indicate pollutant source
Odor	Any unusual	Source may be indicated by odor
Color	Abnormal	Source may be indicated by color
Oil sheen	Any	Maintenance shop areas, oil leaks or spills, improperly functioning oil/water separators
Visual turbidity	Abnormal	Washwater, sanitary sewer, construction sediment
Floating solids	Floating materials particularly in association with odor or color	Sanitary sewer

Each water sample will be analyzed for surfactants, ammonia, and/or fluoride as determined by the flow chart method, identified in Figure 2.

Figure 2. Flow chart for field screening analysis



(CWP, 2004; modified)

Surfactants, ammonia, and fluoride will be tested as needed with the following equipment:

- Surfactants – A CHEMetrics Single-Analyte meter will be used to measure surfactants. MES staff will follow the manufacturer’s methodology for use with this meter (Attachment 4).
- Ammonia – A CHEMets Kit with Self-Filling Ampoules for Colorimetric Analysis will be used to measure ammonia. MES staff will follow the manufacturer’s methodology for use with this kit (Attachment 5).
- Fluoride – A HACH Pocket Colorimeter II will be used to measure fluoride. MES staff will follow the manufacturer’s methodology for use with this meter (Attachment 6).

If the results of these analyses indicate there may be an illicit discharge or connection, MES staff will conduct an *Illicit Connection Investigation*, as described below, followed by *Follow-up Dry Weather Screening*. If the results of the analysis indicate that the dry weather flow is likely a natural water source or from tap and/or irrigation water, MES

staff will investigate and verify the source is from an allowable stormwater discharge (see Attachment 8 for allowable non-stormwater discharges).

Table 2. Parameters and action levels representing possible discharge sources

Elevated Parameter	Action Level	Possible Discharge Sources
Ammonia	>1.0 mg/L	Sanitary sewer, washwater, industrial liquid wastes
Color	Abnormal	Source may be indicated by color
Conductivity	>500 mmho/cm	General indication of contamination from various sources
Fluoride	>0.6 mg/L	Tap water, washwater industrial liquid wastes, sanitary sewer
pH	<6.5 or >8.5	Washwater (high pH)
Potassium	>2.0 mg/L*	Industrial liquid wastes, sanitary sewer
Surfactants	0.25 mg/L	Sanitary wastewater or washwater (vehicle, equipment, or aircraft washing; cleaning or janitorial activities)
Temperature	Abnormal compared to ambient	Industrial operations that use water as a heating or cooling medium – e.g., heating plants, chilled water cooling systems

* The ammonia to potassium ratio may be used to differentiate washwater and wastewater discharges as detailed in Figure 2.

Follow-up Dry Weather Screening When Flow is Detected

When an illicit discharge or connection has been identified, follow-up screening can help determine if the connection has been successfully mitigated. If it appears that there has been an illicit discharge but no source can be identified, follow-up screening can help determine if it the discharge was one-time occurrence or a on-going event that warrants further investigation. Follow-up screening when the initial investigation did not indicate an illicit discharge allows additional verification that nothing was missed during the initial investigation.

A follow-up field screening will be performed at each outfall that has dry weather flow (regardless of initial field screening results) between four and 24 hours after the initial field screening, and prior to a measurable precipitation event (totaling greater than 0.10 inch of rain). The same set of visual/olfactory observations and tests, as identified in Figure 2, will be performed during the follow-up field screening. MES field staff will record the follow-up observations and results on the inspection sheet.

Illicit Connection Investigation

If either the initial or follow-up field screening identifies a chemical, visual, or olfactory parameter that falls within an action level range (see Tables 1 or 2) or identifies a likely source of contamination, MES will initiate field verification of the source of the potential illicit discharge. Tables 1 and 2 reference possible discharge sources that may be associated with these parameters. Additionally, Attachment 7 includes three additional tables that contain information on physical and chemical parameters that may aide in characterizing outfall flows.

If the source of the potential illicit discharge or connection is not obvious, MES may have to follow the stormwater conveyance, pipe, or ditch upstream to the next cross connection point (manhole, channel, etc.) to determine if there are any obvious discharges or connections (spills, dumping, irrigation, hydrant flushing, etc.). At this point, the same observations and water quality tests will be conducted, as described under *Initial Dry Weather Field Screening When Flow is Detected*. This “backtracking” will continue as needed until all efforts have been exhausted to identify the source of the discharge. If the source of the illicit discharge or connection is identified, MES staff will provide the responsible party with information on the legal ramifications of the illicit discharge and conduct reporting and/or follow-up as necessary.

Additional Water Quality Laboratory Testing

In some cases a parameter may indicate the presence of more than one source of illicit discharge or connection (i.e., ammonia indicating sanitary sewer or washwater). If other visual or olfactory clues do not help differentiate the source or content of the discharge, additional laboratory testing may be required. In general, parameters for additional testing will be determined based on the circumstances of the discharge. For example, as shown in Figure 2, if ammonia levels exceed the action level, a sanitary sewer system or washwater discharge may be to blame and laboratory analysis for *e. coli* or potassium can help provide conformation of the source.

If additional water quality tests are required, a separate water sample will be collected for laboratory analysis and preserved as required of the particular analysis. Sample bottles will be sealed immediately, labeled, documented on a Chain of Custody form (Attachment 9), and delivered within the appropriate hold time to:

Atlantic Coast Laboratories
630 Churchmans Rd.
Newark, DE 19702
Phone: 302-266-9121
Fax: 302-454-8720

Hazardous Materials Handling

It is important to note that proper use and handling of all reagents as recommended by the manufacturer is necessary for the health and safety of field technicians. Field analytical tests for both fluoride and surfactants produce small amounts of hazardous waste that

must be properly disposed of through a licensed disposal facility. To dispose of this waste, MES maintains a contract with:

Bay Associates Environmental Inc.
PO Box 21009
Baltimore, MD 21228-0509
Phone: 410-418-4880
Fax: 410-418-4919

As part of the Scope of Work, Bay Associates is responsible for packaging and shipping the waste, which is done upon picking the waste up on site at MES offices.

Additional Documentation

Whenever possible, the outfall will be photographed with a digital camera, particularly when flow is observed and an illicit discharge is suspected.

Additional Assessments

In addition to annual dry weather field screening, MES staff will also be alert for potential illicit discharges or connections that may be encountered while conducting other inspections or maintenance activities at the airports. If a potential illicit discharge or connection is encountered, then further investigation will be conducted as described in *Initial Dry Weather Screening and Illicit Connection Investigation*.

Record Keeping

Record keeping is a required component of an NPDES stormwater program and important for tracking purposes. After dry weather field screening has been completed, information from the inspection sheets, for outfalls where there was dry weather flows as well as where no dry weather flows were found, will be transferred into the OPS32 database. MES will back up this information regularly on the BWI tape drive. MES will file hard copies of all inspection sheets in a binder until the next set of dry weather field screening is completed. All records and information or analyses performed and calibration records for each field screening event will be kept for at least three years [40 CFR 122.41(j)(2)].

Notifications

All drainage areas covered under MAA's NPDES stormwater permits are maintained by MAA. In the event a suspected illicit discharge or connection is found during dry weather field screening activities, MES field staff will notify one of the following MES supervisors:

Shawn Schmelzer, Environmental Specialist
(410) 850-5816 or (443) 250-1031

Kris Carter, Administrator

(410) 850-5816 or (443) 250-1027

Rex Lloyd, Division Chief
(410) 850-5816 or (443) 250-1025

The MES supervisor will forward information about the illicit discharge or connection to MAA, along with recommendations for further action or investigation. The MAA points of contact are:

Joanne Brooks, Manager, Environmental Compliance Division
(410) 859-7806

Mark Williams, Assistant Environmental Manager
(410) 859-7448

If the outfall shows evidence of a spill or release of oil or a hazardous material (e.g., heavy oil sheen, strong odor or discoloration), then immediate actions will be taken to contain the discharge, identify and stop the source of the spill, and conduct appropriate cleanup operations. Further details on oil spill response, including required regulatory notifications, are provided in each airport's Spill Prevention, Control, and Countermeasures (SPCC) Plan.

Further investigations of abnormal discharges may require coordination with the following offices or individuals:

BWI Operations
(410) 859-7018

Tom Thompson, Martin State Airport Operations
(410) 682-8801

Mike Gunn, BWI Operations
(410) 859-7194

Reporting

MES will provide two separate reports (one for each airport) to the MAA Environmental Compliance Division once dry weather field screening has been completed at all selected outfalls. The reports will be submitted within 30 days of completing dry weather field screening, but no later than July 1st of each year for BWI Airport and September 1st of each year for Martin State Airport. The deadline is needed to assure dry weather field screening information is included each airport's NPDES stormwater annual report submitted to the Maryland Department of the Environment. The MES reports will include:

- A summary of the outfalls screened including:
 - Outfalls where dry-weather flow was observed,

- Outfalls where no dry weather flow was observed,
 - Visual and olfactory observations at each outfall, and
 - Water quality screening results;
- The identification of any outfalls which did not receive dry-weather field screening during the year and an explanation of why field screening was not performed;
- A description of any illicit connection investigations, the results and conclusions of the investigation, including any actions taken;
- Any outstanding actions or investigations that require future follow-up, and a proposed schedule for accomplishing the needed actions.

References:

Center for Watershed Protection. 2004. Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments.

I. DEICING FLUID DISCHARGE MONITORING DOCUMENTS

1. BWI Thurgood Marshall Airport Deicing Management Program Plan (including tenant directive 215.1, Aircraft Deicing Procedures)
2. Deicing Fluid Discharge Monitoring Plan
3. MAA BWI Thurgood Marshall Airport Biomonitoring Study Plan

Deicing Management Program Plan

Prepared for:

**BALTIMORE/ WASHINGTON
INTERNATIONAL THURGOOD
MARSHALL AIRPORT**

November 2009



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1. INTRODUCTION

Pursuant to Part I.G of National Pollutant Discharge Elimination System (NPDES) Permit number MD0063371 (issued June 21, 2005), this plan has been prepared to describe the continuing efforts and actions that are conducted to control the impacts of aircraft and pavement deicing on stormwater discharges from the Baltimore/Washington International Thurgood Marshall (BWI Marshall) Airport to adjacent receiving waters. This Annual Deicing Management Plan describes BWI's plans for implementing best management practices, controlling deicing runoff at the airport; best management practices to be implemented and the expected performance benefits resulting from those practices; procedures for recycling/treating captured aircraft deicing runoff; and investigations to be conducted to supplement existing best management practices, if necessary.

1.1 BACKGROUND

The Maryland Aviation Administration operates the BWI Marshall Airport stormwater system under an NPDES permit received from the Maryland Department of the Environment (MDE). The permit covers discharges of stormwater runoff to Stoney Run (outfall 003), Sawmill Creek (outfall 007), and to Cabin Branch (outfall 006).

Compliance with the NPDES permit is based on implementation of a best management practices (BMPs) approach, coupled with monitoring and reporting requirements. The BMP approach is specifically targeted at satisfying the permit requirement for reducing deicing fluids discharged from the facility to 30% or less of the total volume of fluids applied. An annual cycle of reviewing progress and implementing program refinements ensures that objectives are met in a reasonable timeframe.

This Deicing Management Plan continues and expands the efforts initiated during previous deicing seasons, with a focus on reducing acute toxicity in stormwater discharges. Reductions are accomplished through a combination of encouragement of modified deicing practices and deicing runoff controls. In addition, a number of new techniques and practices that have the potential to contribute to future reductions in deicing chemical loads will continue to be evaluated.

1.2 PURPOSE

The purpose of this document is to describe all aspects of BWI Marshall's program to control the environmental impacts of deicing activities.

1.3 OVERVIEW OF THE DEICING MANAGEMENT PROGRAM

Deicing fluid collection activities began at BWI Marshall airport during the 1994/95 deicing season with the development of the 15R deice pad and storage and disposal facility. Subsequent BMP development included:

- Glycol Recovery Vehicle Pilot Study (1995/96)

- Central Storage Facility (0.6 MG capacity) (1995/96)
- 15L/33R Commuter Deicing Pad (1996/97)
- C-Pier gate Collection Facility (1997/98)
- 28 Deicing Pad (1998/99)
- GRV demo ?
- Glycol Recovery Vehicle (GRV) Offload Facility demonstration project (1998/1999)
- GRV Offload Facility (1999/2000)
- Central Storage Facility expansion (to 1.2 MG capacity) (1999/2000)
- B-Pier gate Collection Facility (2000/01)
- Midfield Cargo Complex Collection Facility (2001/02)
- Alternate A Deicing Pad (2003/04)
- A Pier gate Collection Facility (2005/06)
- B/C Alleyway reconstruction completing gate recovery systems on B and C piers (2006/07)
- Central Storage Facility expansion (to 1.8 MG capacity) (2006/07)
- Central Storage Facility expansion (to 2.4 MG capacity) October 2009

The BWI Deicing Management Program consists of a team representing the airport, contractors, and tenants who are responsible for supervising and operating a system of controls and practices. The organizational structure of this team and the system of controls are described in the following subsections.

1.3.1 Organization

The roles and responsibilities of each organizational element within the Deicing Management Program are presented in Figure 1-1.

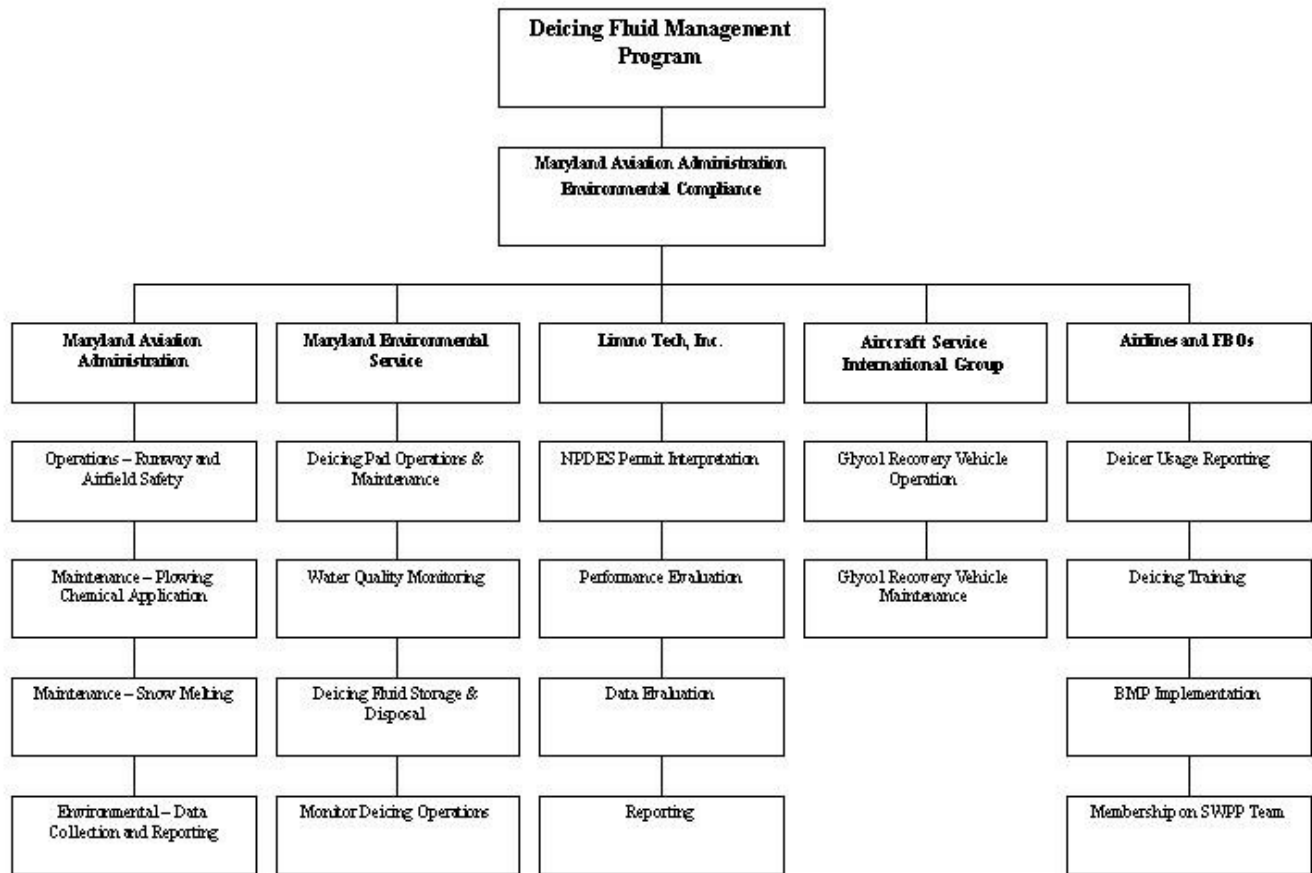


Figure 1-1. Organizational responsibilities of the BWI Deicing Management Program team members.

1.3.2 Control Program Components

The core of the BWI Marshall Deicing Management Program is a suite of BMPs that significantly reduces the environmental impacts from both aircraft and pavement deicing activities.

The elements of the BWI Marshall Deicing Management Plan fall into several categories that benefit stormwater quality as summarized in Table 1-1, and described in the following sections of this Plan.

**Table 1-1.
Major Elements and Expected Benefits of the Deicing Management Program.**

BMP Category	Management Practice/Activity	Expected Benefit(s)
Structural	<ul style="list-style-type: none"> • Deicing Pads • Gate Drainage Controls • Collected Deicing Runoff Management 	Reduced stormwater BOD loading
Operational	<ul style="list-style-type: none"> • GRV Operations • Gate Deicing Restrictions • Deicing Facility Inspections 	Reduced stormwater BOD loading
General	<ul style="list-style-type: none"> • Deicing materials storage • Deicing materials spill management education • Education and training of employees, contractors, and tenants 	Reduced stormwater BOD loading from spills
Landside Pavement Deicing	<ul style="list-style-type: none"> • Mineral salt based deicer 	Reduced stormwater BOD and ammonia loading
Airfield Pavement Deicing	<ul style="list-style-type: none"> • Urea ban • Availability of sodium acetate from BWI Maintenance • Proactive anti-icing • Pavement deicing materials selection • Pavement deicing application • Pavement deicing application area • Materials management • Materials use tracking 	Reduced stormwater BOD and ammonia loading
Aircraft Deicing	<ul style="list-style-type: none"> • Aircraft deicing mixtures • Aircraft deicing equipment • Heating aircraft deicing mixtures • Application technique for aircraft deicing mixtures • Proactive aircraft anti-icing • Two-step aircraft application method • Materials management 	Reduced stormwater BOD loading
Deicing Runoff Storage and Disposal	<ul style="list-style-type: none"> • Tankage and transfer • Off-site disposal • Investigation of alternative disposal options 	Reduced stormwater BOD loading
Training and Awareness	<ul style="list-style-type: none"> • Training programs • Awareness building • Tenant Inspections 	Reduced stormwater pollutant loading
Monitoring	<ul style="list-style-type: none"> • Performance of controls • Stormwater discharges to receiving waters 	Evaluation of BMP performance
New Technology	<ul style="list-style-type: none"> • Information exchange with other airports • Tracking new technology • Annual review of new controls 	Ensure that MAA staff and tenants are aware of new opportunities for reducing stormwater BOD loading
Annual Program Evaluation and Refinement	<ul style="list-style-type: none"> • Performance measures • Annual Report 	Evaluation of overall Program performance and identification of improvements if necessary

2. STRUCTURAL BEST MANAGEMENT PRACTICES

Structural BMPs are characterized by the use of dedicated, specialized infrastructure (e.g. pavement, sewers, valves, etc.) for the collection and management of deicing runoff. Figure 2-1 presents a schematic of the structural components of the BWI Marshall Deicing Control System, along with operational BMPs that are discussed in Section 3.

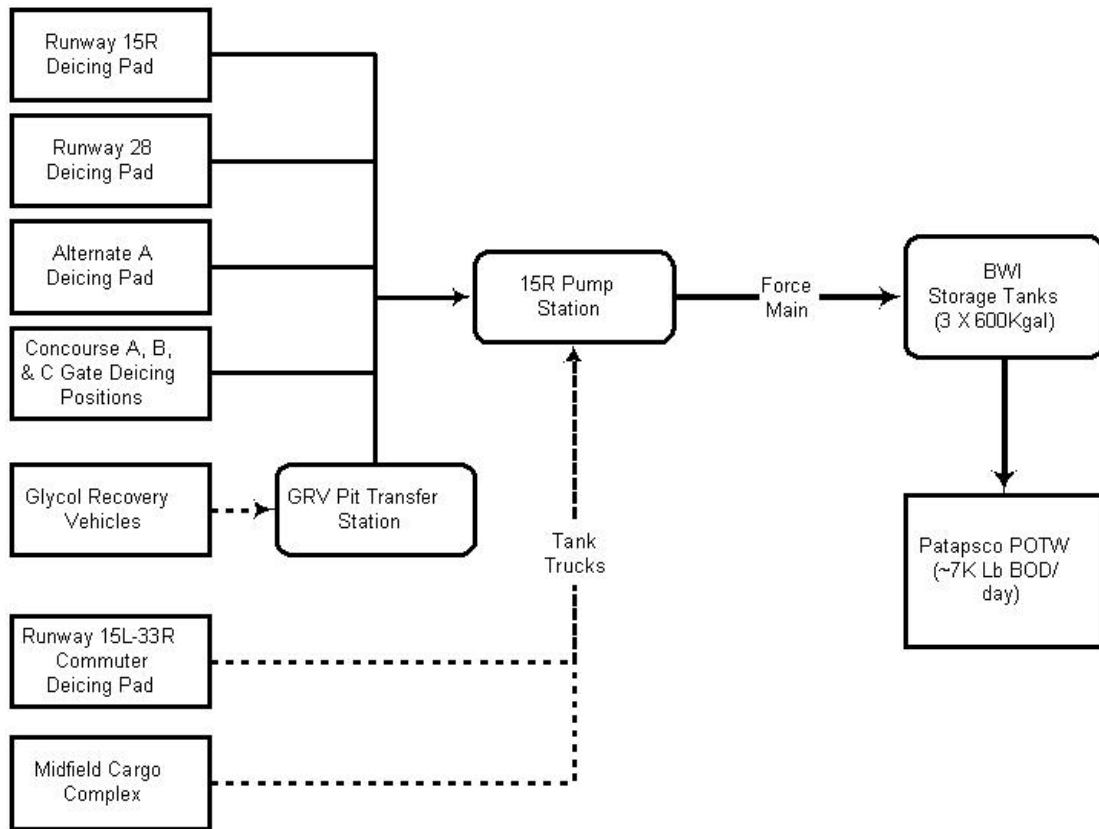


Figure 2-1. BWI Marshall Deicing Control System Components Schematic.

Structural BMPs currently in use at BWI Marshall include 4 deicing pads, 4 drainage control systems, and 2 collected fluid management systems, as described below.

2.1 DEICING PADS

Deicing pads are specially constructed pavement areas dedicated for use during deicing operations. The drainage systems inside the pads allow for the isolation and containment of spent deicing fluids. The collected runoff is then metered to the sanitary sewer system for ultimate disposal. Figure 2-2 shows the locations of the deicing pads at BWI Marshall.



Figure 2-2. BWI Marshall Deicing Pad and Gate Collection Locations.

The four BWI deicing pad facilities range in size from 3 to 7 positions. Table 2-1 contains a summary of the BWI Deicing Pad facilities.

Table 2-1. BWI Marshall Deicing Pad Facilities Summary.

Deicing Pad	Capacity	Description
Runway 15R	5 Positions	Capacity for four B757-200 and one B747-sized aircraft
Runway 15L/33R	3 Positions	Capacity for three F-27 commuter sized aircraft
Runway 28	7 Positions	Capacity for B747-sized aircraft (reducing deicing pad capacity to 6 positions); capacity for seven B757 sized aircraft
Alternate A	3 Positions	Capacity for three 737-900-sized aircraft

2.1.1 Runway 15R Deicing Pad

The Runway 15R deicing facility is a five-position deicing pad. This facility can handle four B757-200 aircraft and one B747-sized aircraft for simultaneous mobile truck deicing. This facility was originally used when airport operations were conducted in East Mode, where aircraft depart from Runway 15R. This facility is now being used during both East and West mode of operations.

2.1.2 Runway 15L/33R Deicing Pad

The Runway 15L/33R commuter deicing facility is a three-position deicing pad. This facility was designed for three F-27 sized aircraft for simultaneous mobile truck deicing. This facility is located at the midpoint of the Runway on the commuter ramp, and can be used during both East and West flight operations. Collected fluids are stored in two 20,000 gallon above ground storage tanks. The collected fluid is hauled by tank truck to the 15R deicing facility pump station.

2.1.3 Runway 28 Deicing Pad

The Runway 28 deicing pad is a seven-position deicing pad and is used during both East and West modes of operation. This facility is designed for seven B757 sized aircraft for simultaneous mobile truck deicing. Runway 28 also has the capability of deicing a B747 sized aircraft. Deicing a Group 5 aircraft, however, requires the use of lanes 2a and 3; so one lane of capacity is lost during such activity.

2.1.4 Alternate A Deicing Pad

The area located at the end of pier A near the runway 15R Deice Pad is a 3 lane deicing pad. The Alternate A deicing pad is currently configured as a 3-position facility but will be able to handle up to five aircraft for deicing purposes.

2.2 GATE DRAINAGE CONTROLS

Runoff from gate areas where deicing activities are allowed at BWI Marshall is contained through the use of drainage control systems. In general terms, collected stormwater flows to a diversion structure equipped with electronically controlled valves that direct runoff either to the stormwater system or to the deicing fluid collection system, depending on whether deicing fluids are in the runoff. The airport's building automation system (Metasys™) is used to open and close valves, and to monitor the facilities and pumping stations. When the diversion valves are configured to collect spent deicing fluid, collected runoff flows to a pumping station located at each of the control facilities. The individual pumping stations transfer the collected runoff to the 15R pump station, which pumps the fluid to a storage facility located at the airport fuel farm. Table 2-2 contains a summary of the BWI Gate Drainage Control systems.

Table 2-2. BWI Marshall Gate Drainage Control Systems Summary.

System	Description
A Pier Ramp	Series of trench drains and diversion valves
B Pier Ramp	Series of trench drains and diversion valves
C Pier Ramp	Series of trench drains and diversion valves
Midfield Cargo Complex	Series of trench drains and diversion valves

2.2.1 A Pier Ramp Drainage Control

The A Pier collection facility is a series of trench drains and diversion valves surrounding the gates on A Pier. Flow collected at A Pier is gravity fed to the 15R pumping station.

2.2.2 B Pier Ramp Drainage Control

The B Pier collection facility is a series of trench drains and diversion valves surrounding the gates on B Pier. The entire pier is served by the collection system.

2.2.3 C Pier Ramp Drainage Control

The C Pier collection facility is a series of trench drains and diversion valves surrounding the gates on C Pier. The system currently serves all 15 gates on the pier.

2.2.4 Midfield Cargo Complex

The midfield cargo complex was constructed with a drainage control system. To date no deicing has taken place at this facility. The tenants operating from this facility are currently deiced by Aircraft Services International Group (ASIG) at the Runway 28 Deicing Pad. During future deicing events, spent deicing fluid will be collected in above ground tank(s) then hauled by tanker truck to the 15R pump station.

2.3 COLLECTED DEICING RUNOFF MANAGEMENT

Two techniques are used for the management of runoff collected at the deicing pads: gate drainage control systems and glycol recovery vehicles (GRVs are described in Section 3).

2.3.1 GRV Offload Station

A centralized GRV offload station is located near the end of Pier C behind the midfield lighting vault. This station speeds the offloading process by allowing collected runoff to be deposited directly into a holding tank, resulting in the GRVs ability to spend more time conducting collection operations. There is also a pavement area at the offload station that is used for the management of snow and slush collected by the GRVs. The pavement is sloped and has a network of grooves to facilitate drainage to the holding tanks. The holding tank contains a series of heaters to prevent clogging with snow and slush. Collected runoff from the GRVs is gravity fed from the holding tank via pipeline to the Pier C deicing facility pump station.

2.3.2 Glycol Storage and Disposal Facility

Collected deicing runoff is pumped from the 15R-lift station via a force main to four 600,000-gallon aboveground tanks located in the BWI Marshall fuel farm for storage prior to disposal. Contracts are in place to rent 21,000-gallon tanks for additional temporary storage of deicing fluids, if needed.

2.3.3 Disposal of Collected Runoff

Collected runoff is discharged to the Patapsco Wastewater Treatment Plant under an industrial discharge permit from Baltimore County. The storage tank facility has a direct connection to the sanitary sewer system with a totalizing flow meter. The primary constraint on the daily volume discharged to the sanitary sewer is a limit of 7,000 lbs of BOD₅ per day. Every batch of fluid released to the sanitary sewer is analyzed for glycol concentration, COD, BOD, and other parameters as required by

the permit. In the event that the storage facility approaches capacity, collected runoff is hauled offsite for treatment and disposal or stored in temporary tanks. If off-site hauling is required, each load is documented under bills of lading and handled in compliance with all applicable laws and regulations regarding non-hazardous materials.

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3. OPERATIONAL BEST MANAGEMENT PRACTICES

The operational procedures described in this section are utilized at BWI Marshall during the deicing season to facilitate the collection of deicing fluids and to maintain deicing facilities.

3.1 GRV OPERATIONS

The MAA purchased three Vactor GRVs to collect spent deicing fluid from gate locations where there are no gate drainage control systems. The GRVs are large vacuum sweeper trucks that collect spent deicing fluid from pavement surfaces using an eight-foot collection head and vacuum assembly. The machines cycle approximately 20,000 cubic feet of air per minute through the collection head. Each truck has a capacity of 1,600 gallons. Collected runoff is deposited at the GRV offload station described in section 2.3.1. The GRVs are operated during both storm events and the more prevalent dry weather defrosting periods.

3.2 GATE DEICING RESTRICTIONS - PRIMARY DEICING

Gate restrictions have been implemented to maximize the collection of deicing fluid by directing aircraft to deicing pads or to gates where collection drains exist, and to increase the efficiency of GRVs by restricting deicing at gates near uncontrolled stormwater drains. BWI Marshall gate restrictions are detailed in Tenant Directive 215.1 (included in Appendix A). This Tenant Directive is updated annually. For the current version of the document contact the Division of Environmental Compliance at 410-859-7448. Gate areas where storm drains are located below or immediately adjacent to the aircraft have been restricted from deicing activities. An airline may request a temporary waiver of this restriction if excessive amounts of snow or ice on the aircraft preclude the safe movement of the aircraft. These circumstances constitute an operational necessity, and under these conditions, MAA will allow deicing activities at the gate with GRV coverage, pursuant to the procedures detailed in the Tenant Directive.

3.3 DEICING FACILITY INSPECTIONS

The operation and maintenance of the deicing fluid collection facilities at BWI has been contracted to the Maryland Environmental Service (MES) since 1994. MES has developed a comprehensive monthly inspection form that is completed for each collection facility and maintains an inventory of common replacement parts to ensure that the facilities are kept operational throughout the deicing season.

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4. GENERAL BEST MANAGEMENT PRACTICES

General BMPs are the first tier management approaches that will continue to be implemented to minimize or prevent the exposure of stormwater runoff to deicing materials. General BMPs include good housekeeping, deicing materials storage, deicing materials spill management education, and education and training of employees, contractors and tenants. Each general BMP is described below.

4.1 GOOD HOUSEKEEPING

Good housekeeping practices are employed to keep facilities neat and orderly with the goal of preventing or minimizing the exposure of materials to stormwater.

4.2 DEICING MATERIALS STORAGE

Deicing materials are stored in accordance with all applicable regulatory requirements, including BWI Marshall's Storm Water Pollution Prevention Plan.

4.3 DEICING MATERIALS SPILL MANAGEMENT EDUCATION

A continuing program of employee, contractor, and tenant orientation and education are maintained to ensure awareness of the necessity of good facility control and quick and proper action in the event of a spill, accident, or equipment failure.

4.4 EDUCATION AND TRAINING OF EMPLOYEES, CONTRACTORS AND TENANTS

Because the control of deicing impacts on stormwater is dependent on the conscientious efforts of airlines, fixed base operators (FBOs), BWI Marshall Operations, and others, specific efforts are undertaken to ensure that all individuals who are involved in the aircraft and pavement deicing processes are aware of both the environmental issues surrounding these activities, as well as the Airport's program for controlling their impacts.

The following subsections refer to education and awareness raising activities that are conducted at BWI Marshall.

4.4.1 Airlines and FBOs

A major component of the Deicing Management Program is the active participation of airlines and FBO representatives in the development of deicing runoff control strategies and procedures. The airlines and FBOs operating at BWI Marshall conduct annual training programs that include the following topics:

- Aircraft deicing and anti-icing procedures
- Aircraft deicing and anti-icing locations
- Materials handling and management

These annual training programs are conducted by each carrier and FBO to ensure awareness of how tenant deicing operations relate to the overall BWI Marshall Deicing Management Program. Training sessions are generally conducted during

October and November of each year at the ramp safety meeting and tenant managers meetings. Additional training sessions are conducted throughout the season on an as-needed basis.

4.4.2 BWI Marshall Employees

BWI Marshall and its tenants conduct an employee, contractor, and tenant education and training program to inform and train personnel who are directly involved in deicing operations or deicing materials collection, treatment, and discharge. This program focuses on the environmental effects of deicing materials and material handling techniques that minimize the amount of deicing materials entering the stormwater system.

As part of the Deicing Management Program, BWI Marshall Field Maintenance staff receives annual training in the use of pavement anti-icing products. Training sessions are generally conducted during October and November of each year. Additional training sessions are conducted throughout the season on an as-needed basis and/or when new equipment or materials are received.

5. PAVEMENT DEICING BEST MANAGEMENT PRACTICES

Pavement deicing activities are separated into airside and landside practices. In both instances, control efforts rely principally on the use of the most environmentally friendly deicing materials that meet Federal Aviation Administration (FAA) and safety requirements. These practices are described in the following subsections.

5.1 AIRSIDE PAVEMENT DEICING

Airside pavement deicing practices at BWI Marshall employ deicing chemicals selected to minimize environmental impact, and application techniques designed to maximize safety and effectiveness while minimizing over-application and waste. These practices are described in the following subsections.

5.1.1 Pavement Deicing Materials Selection

BWI Marshall discontinued the use of urea for airfield pavement deicing because of concerns over elevated ammonia concentrations in runoff from pavement areas treated with urea.

Potassium acetate and sodium acetate are used as the primary airfield pavement deicing products. Potassium acetate, which is a liquid product, has a lower BOD content than ethylene glycol, which had been historically used in conjunction with urea. Sodium acetate is a granular product that has replaced urea because it contributes no ammonia to stormwater runoff.

5.1.2 Airside Pavement Deicing Application

Strategies for improving the efficiency of pavement deicer application while maintaining safe operation conditions in aircraft operating areas focus principally on proactive anti-icing and plowing prior to chemical application.

Proactive Anti-icing. Proactive anti-icing involves application of deicers prior to the onset of a snow or ice event to act as a “bond breaker” at the pavement surface so that mechanical means (plows and brooms) can be used for removal of snow and ice once the event has begun. Proactive anti-icing is important because it has been estimated that it may take 5 to 10 times as much deicing chemical to break the ice-pavement bond than to prevent it. There are also operational benefits to proactive anti-icing. Proactive chemical applications can usually be timed so as to minimize closures and their inherent operational impacts. Additionally, the duration of closures may be minimized because it takes less time to apply less chemical, and there is little or no time wasted waiting for friction readings to recover.

Plowing Prior to Chemical Application. To the maximum extent practical, plowing and brooming are conducted prior to chemical application to minimize wastage and avoid the contamination of plowed snow.

5.1.3 Airfield Deicing Application Area

To the maximum extent practical, BWI Marshall will minimize the application area for airside pavement deicing to reduce the volume of materials necessary. It is anticipated that the application of deicing chemicals on the ramp are minimized and that sand will primarily be used in these areas to provide traction.

5.2 LANDSIDE PAVEMENT DEICING

The use of a mineral salt product that has no BOD has effectively eliminated BOD loading from landside pavement deicing activities. Awareness training will continue to be conducted for all personnel involved in pavement deicing activities at BWI Marshall to ensure that this material is not applied on the aircraft operating area (AOA) or in areas where it might be tracked onto the AOA.

5.3 TENANT PAVEMENT DEICING MATERIALS

The BWI Marshall Maintenance Department provides sodium acetate at cost to the tenants at the airport. The purpose of this program is to ensure that the tenants have a source for an appropriate environmentally friendly airside pavement deicing chemical for use at their facilities.

5.4 MATERIALS HANDLING AND MANAGEMENT

To prevent the contamination of stormwater, BWI Marshall will utilize appropriate spill response techniques, per the Airport's Spill Prevention Control and Countermeasures (SPCC) and Stormwater Pollution Prevention Plans (SWPPP) for spills or leaks of any deicing/anti-icing materials. Any spilled material is contained, cleaned up, and disposed of properly. GRVs are on call to respond to aircraft deicing fluid leaks or spills.

5.5 RECORD-KEEPING AND REPORTING

Record keeping and reporting of airfield conditions and applications is performed by the Airport Operations Center. BWI Marshall Maintenance will track deicing event airside and landside pavement deicer usage. V-box spreaders and liquid sprayers have been equipped with monitoring equipment that is used to calibrate application rates and track product usage. The equipment is used to monitor the following information:

- Start and end times of treatment
- Type(s) of material applied
- Application rate(s)
- Amount(s) of material applied

This information will provide estimates of total amounts of deicers used on the airfield, as well as a basis for documenting relationships between amounts of deicers used and the conditions under which they were applied.

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6. AIRCRAFT DEICING BEST MANAGEMENT PRACTICES

Aircraft deicing/anti-icing is first and foremost an issue of flight safety. The FAA strictly regulates deicing/anti-icing procedures and materials. Pertinent FAA regulations provide:

“...no person may takeoff an aircraft when frost, ice or snow is adhering to the wings, control surfaces, propellers, engine inlets or other critical surfaces of the aircraft.”

“...no person may dispatch, release or takeoff an aircraft anytime conditions are such that frost, ice or snow may reasonably be expected to adhere to the aircraft, unless the certificate holder has an approved ground De/Anti-icing program in its operations specifications and unless the dispatch, release, and takeoff complies with that program.”

(FAR 121.629)

Each of the airlines at BWI Marshall has an FAA approved deicing/anti-icing program. Each airline is required to comply with their approved deicing/anti-icing program. BWI Marshall will continue to promote conservation practices to the air carriers.

Controls on the impacts of aircraft deicing activities are focused on protecting flight safety while minimizing use of deicing/anti-icing fluids through maximizing application efficiency, and on containment of runoff at the locations where aircraft are deiced. The airlines also continue to evaluate procedures to reduce the volume and BOD concentrations of deicing runoff discharges.

6.1 AIRCRAFT DEICING PRACTICES

Air carriers and operators are responsible for all aircraft deicing operations at BWI Marshall. BWI Marshall staff and contractors are responsible for the collection, handling, and disposal of deicing runoff. The responsibilities associated with aircraft deicing BMPs are consistent with these distinctions. The following subsections provide details on the aircraft deicing controls and discharge reduction efforts that are implemented at BWI Marshall Airport.

6.1.1 Aircraft Deicing Equipment

To the maximum extent practical, and consistent with FAA regulations, standards, and requirements, BWI Marshall encourages each carrier to use, and have available for use, deicing fluids and associated equipment that facilitate the use of efficient deicing mixtures, or otherwise reduce the total amount of glycol required to deice aircraft.

6.1.2 Heating Aircraft Deicing Mixtures

To the maximum extent practical, each carrier heats deicing mixtures to a minimum temperature of 140°F prior to application to ensure maximum fluid effectiveness.

6.1.3 Application Technique for Aircraft Deicing Mixtures

To the maximum extent practical, and consistent with their FAA-approved deicing plans, each carrier applies deicing mixtures to aircraft surfaces in a manner and with equipment that maximizes the effectiveness of the deicing mixture while using only the amount of mixture necessary to ensure safe aircraft operations.

6.1.4 Aircraft Anti-icing

Because only glycol-based aircraft deicing fluids (ADFs) and aircraft anti-icing fluids (AAFs) are approved for use on aircraft, source reduction strategies necessarily focus on improving the efficiency of application techniques. Developments in AAF technology provide the potential for significant reductions in stormwater contamination through reduced usage of deicing fluids. Specifically, Type IV AAFs provide for much longer protection from ice and snow accumulation after application (i.e., hold-over times) than Type I fluids. As a result, aircraft can be treated with a Type IV AAF upon arrival, when the aircraft is assumed to be clean, and in many cases remain effectively protected from snow and ice accumulation until takeoff. Thus, the need for conventional deicing prior to departure may be avoided, or at least significantly reduced. In addition, because Type IV fluids are thicker and cling to the aircraft, they tend to be applied more efficiently, with reduced losses due to overspray and drippage.

To the maximum extent practical, each carrier at BWI Marshall Airport will apply Type IV aircraft anti-icing fluid to aircraft in order to reduce BOD loading and in a manner consistent with FAA approved deicing plans when the use of anti-icing fluids will retard or prevent the formation of ice or frost on aircraft. Application of Type IV anti-icing fluids is promoted for remaining overnight (RON) aircraft when snowfall is predicted during the overnight period.

6.1.5 Two-Step Aircraft Application Method

To the maximum extent practical, and consistent with FAA regulations, standards, and requirements, each carrier will utilize a “two-step” method of deicing and anti-icing whereby Type IV anti-icing solution will be applied to an aircraft after deicing is complete for the purpose of reducing the total volume of deicing and anti-icing materials required.

6.1.6 Aircraft Deicing Mixtures

To the maximum extent practical, BWI Marshall will continue to encourage each carrier to apply an efficient deicing mixture that complies with FAA regulations and requirements, and the particular airline’s FAA-approved deicing plan. “Efficient” in this context means the ratio of deicing fluid to water (the ratio is determined by freeze-point depression tables for the fluid, allowing for the FAA required temperature buffer) that will provide effective deicing performance in the current and reasonably anticipated weather and operation conditions while minimizing BOD loading.

Airlines at BWI Marshall typically use a 50/50 mixture of glycol/water for deicing purposes. The FAA requirements for “clean aircraft” are based on the difference in temperature between the outside air temperature and the freeze point temperature of the deicing mixture. For instance, a typical 50/50 mixture of a standard Type I deicing fluid has a freeze point of -18 °F and therefore can be used when the outside air temperature is as low as 0 °F.

Under typical BWI Marshall winter conditions, more moderate temperatures accompany conditions that require deicing/anti-icing. Under these moderate temperatures, a mixture formula with as little as 20% glycol is effective and may be used. Blending to temperature is a potentially money saving item for airlines, but due to operational issues, such as assuring flexibility in having the appropriate mix of fluid available if the temperature drops, its use is not widely adopted at BWI Marshall.

6.1.7 Voluntary Use of Propylene Glycol Based Products

Prior to the 2003-2004 season, all carriers and FBOs voluntarily switched to propylene glycol based products to facilitate recycling and it is expected that the voluntary use of propylene glycol based products will continue.

6.2 MATERIALS HANDLING AND MANAGEMENT

To minimize the contamination of stormwater, airlines and FBOs utilize appropriate spill response techniques, per their company spill response plan, for spills or leaks of any deicing/anti-icing materials. Any spilled material is contained, cleaned up, and disposed of pursuant to such plans.

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7. MONITORING PROGRAM

To build upon the data and insights gained during the previous deicing seasons regarding linkages of different processes and control requirements to meet environmental objectives, a variety of monitoring efforts are conducted. The following subsections describe the major elements of the monitoring program.

7.1 WEATHER

Daily meteorological data, including temperature and precipitation, is obtained from the National Weather Service to support analyses of deicing activities and associated storm water discharges.

7.2 DEICER USAGE

Aircraft and pavement deicer usage is reported by all entities that conduct deicing at BWI Marshall to support mass balance calculations related to BMP performance and stormwater discharge water quality.

7.2.1 Pavement Deicer Usage

The amounts of each type of pavement deicer applied is prepared and submitted by the BWI Marshall Maintenance Department for each deicing event.

7.2.2 Aircraft Deicer Usage

Each airline and FBO is responsible for accurately tracking and reporting the types and volumes of ADF used. Usage is reported by each user by gate, ramp, or location on a daily basis.

The following data elements are requested from the air carriers for each aircraft deicing:

- Gallons applied
- Location of application (i.e., gate number or apron area)
- Glycol base (i.e., ethylene or propylene glycol)
- SAE Type (i.e., Type I, or IV)
- Mixture strength applied (ratio of glycol/water)

These reports are submitted to BWI Marshall by the airlines and FBOs on a monthly basis, and compiled in a project database. A copy of the form used for recording aircraft deicing activities is provided in Appendix B.

7.2.3 Annual Deicing/Anti-Icing Materials Reconciliation

An annual reconciliation is conducted as a check on the accuracy of monthly aircraft deicer usage reporting. A reconciliation form is distributed to the carriers and FBOs at BWI Marshall requesting the following information:

- Amounts of Type I and Type IV fluid on hand at the beginning of the season
- Amounts of Type I and Type IV fluid on hand at the end of the season

- Amounts of Type I and Type IV fluid received during the course of the season
- Type of equipment used for deicing operations
- Estimated percent of fluid usage applied by each piece of equipment

The reconciliation forms are submitted to the BWI Facilities Department by June 30th of each year. A copy of the annual reconciliation form is provided in Appendix B.

7.3 STORMWATER MONITORING

Two types of stormwater monitoring are performed at BWI Marshall during the deicing season: daily and continuous composite sampling. Daily flow-weighted stormwater samples are collected by MES at Outfalls 003 and 007 to provide continuous discharge information throughout the deicing season. This monitoring begins on the first day of glycol usage associated with a deicing event (snow, sleet and/or freezing rain) and ends on March 31 or two weeks after the last day of glycol usage associated with a precipitation-based deicing event (whichever is latest). The continuous discharge monitoring will consist of daily flow proportioned composite (24-hour) samples. Monitored parameters include the following: propylene, ethylene, and total glycols; chemical oxygen demand; and flow. Monitoring includes observations of odors and persistent foam. In addition, permit required peak level monitoring will also be performed monthly or annually during the deicing season. This sampling will consist of collecting samples from monitoring points 306 and 307, which discharge to outfall 003 during deicing events.

Details of the BWI Marshall stormwater monitoring program can be found in the BWI Marshall Deicing Fluid Discharge Monitoring Plan.

7.4 BMP PERFORMANCE

Monitoring of the performance of implemented BMPs is accomplished in several different ways, depending on the nature of the practice being evaluated. BMPs that involve source reduction are difficult for the airport to monitor. The individual airlines implementing these practices evaluate these BMPs internally. The performance of runoff collection efforts is monitored by measuring the glycol concentrations in all collected runoff and comparing the mass of captured glycol to that reported by carriers as being applied to aircraft during the collection period. The mass balance calculations are also used to determine the annual percent of glycol discharged in accordance with the NPDES permit requirement for reducing the volume of deicing fluids discharged from the facility to 30% or less of the total volume used.

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8. BMP INVESTIGATIONS

The science and technology for controlling the environmental impacts of airport deicing activities is relatively new, and is constantly evolving. As with any new field, information on the performance of implemented controls at other facilities and the development of new techniques is essential to ensuring that BWI Marshall's deicing control strategies are reflective of the current state-of-the-science. To that end, BWI Marshall's program includes specific activities to track new technological developments.

An annual review of new and emerging technologies is conducted according to permit requirements to identify developments that may have potential for application at BWI Marshall. This review includes specific recommendations for implementation at the demonstration scale of any such technologies that have been adequately developed and appear to have particular applicability and benefits at BWI Marshall.

8.1 INVESTIGATIONS INTO ALTERNATIVE AIRCRAFT DEICING BMPS

Deicing and anti-icing fluid application and collection technologies are being used to varying degrees at other airports in North America. These technologies may be of use at BWI Marshall in the future.

8.1.1 Forced Air Hybrid Deicing Technology

Several airlines employ hybrid deicing units at other airports, including the General Mitchell International Airport in Milwaukee, Wisconsin, Anchorage International Airport in Anchorage, Alaska, Detroit Metropolitan Wayne County Airport in Detroit, Michigan, and the Gerald R. Ford International Airport in Grand Rapids, Michigan. Southwest Airlines (SWA) has used hybrid deicing units at BWI Marshall in the past. Information from other airports on effectiveness, the impact on glycol discharges and cost and operational impacts will continue to be documented, reviewed, and shared with the carriers at BWI Marshall. Ultimately, it is the carriers who make the decisions regarding the selection of specific aircraft deicing techniques and equipment.

8.1.2 Other Emerging Technologies

The technology of aircraft and pavement deicing is constantly evolving in response to demands for greater safety and improved environmental compliance. BWI Marshall actively tracks the emergence of new technologies that may have applicability to the airport, and evaluates specific technologies that appear to be especially promising.

During the 2008/2009 deicing season Delta Airlines used a deicing product that replaced half of the propylene glycol with glycerol to lower the BOD and toxicity of the fluid they applied. This deicing product was approved by MDE prior to use.

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9. ANNUAL PROGRAM EVALUATION AND REFINEMENT

At the conclusion of each deicing season, BWI Marshall evaluates the data and observations collected during the season and prepare an analysis that addresses the following topics:

- Meteorological conditions and deicing activities during the season
- Quantitative performance of the implemented BMPs
- Environmental benefits achieved by the BMPs
- Results from BMP investigations
- Performance in meeting environmental objectives
- Economic feasibility
- Recommendations for improvements to the Deicing Management Program

An Annual Deicing Management Report is prepared and submitted to MDE for review and approval.

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**APPENDIX A.
TENANT DIRECTIVE 215.1**

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TENANT DIRECTIVE

BWI: 215.1
DATE: December 21, 2004
DISTRIBUTION: D

TITLE: AIRCRAFT DEICING PROCEDURES AT BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT

I. References

- A. Code of Federal Regulations 14 CFR 121
- B. Code of Federal Regulations 14 CFR 135
- C. Federal Aviation Administration Advisory Circular 20-117, Hazards Following Ground Deicing and Ground Operations Conducive to Aircraft Deicing
- D. Federal Aviation Administration Advisory Circular 120-60, Ground Deicing and Anti-Icing Program
- E. Federal Aviation Administration Advisory Circular 135-16, Ground Deicing and Anti-Icing Training and Checking
- F. Federal Aviation Administration Advisory Circular 150/5300-14, Design of Aircraft Deicing Facilities
- G. Baltimore/Washington International Airport National Pollutant Discharge Elimination System Permit 93-DP-2546
- H. This Directive supersedes Tenant Directive 215.1, dated March 15, 2004

II. Directive Statement

- A. This Directive establishes procedures and restrictions for the defrosting/deicing of aircraft at Baltimore/Washington International Airport (BWI).

Tenant Directive 215.1

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- B. This Directive specifies where aircraft deicing can be accomplished at BWI in order to maximize the recovery of deicing fluids
- C. This Directive is applicable to all air carriers and ground support operators responsible for the deicing of aircraft at BWI.
- D. This Directive establishes procedures for reporting the use of aircraft deicing fluid at BWI in order to comply with condition I.H.2 of the Airport's National Pollutant Discharge Elimination System (NPDES) Permit.

III. DEFINITIONS

- A. **Air Carriers** - An air carrier, for the purpose of this Directive, is a cargo, commercial, corporate, commuter, or general aviation aircraft.
- B. **Aircraft Defrosting** - The removal of the accumulation of clear ice/frost on the critical components of the aircraft including, but not limited to, the windshield, control surfaces, and inlet ducts, such that FAA regulations require defrosting of those components before the aircraft may takeoff.
- C. **Anti-icing** - The precautionary procedure of applying Type IV glycol that provides protection against the formation of frost or ice and accumulation of snow on treated surfaces of the aircraft for a limited period of time.
- D. **Declared Aircraft Deicing Event** - The determination that weather conditions warrant the implementation of the air carriers' Ground Deicing/Anti-icing Programs and the subsequent action by the FAA to ensure that air traffic flow controls are put in place.
- E. **Deicing Event** - The application of deicing chemicals onto aircraft (excluding aircraft defrosting) consistent with the air carriers' Ground Deicing/Anti-Icing Program during precipitation-related events.
- F. **Ground Deicing/Anti-Icing Program** - An FAA approved Aircraft Ground Deicing and Anti-icing Program that FAR Part 121 and FAR 135 certificate holders (air carriers) must comply with when conditions at an airport are such that frost, ice, or snow may reasonably be expected to adhere to aircraft.
- G. **Holdover Time** - The estimated time deicing/anti-icing fluid will prevent the formation of frost or ice and the accumulation of snow on the critical surfaces of an aircraft. Holdover time begins when the final application of deicing/anti-icing fluid is applied to the aircraft and expires when the deicing/anti-icing fluid loses its effectiveness.

- H. **Primary Deicing** - The removal of frost, ice, or snow accumulation from aircraft wings, control surfaces, propellers, engine inlets, and other critical surfaces of the aircraft when the air carrier determines that removal is necessary and Aircraft Ground Deicing/Anti-icing Program procedures must be put into effect.
- I. **Secondary Deicing** - The removal of additional frost, snow, ice, or snow that has accumulated on critical aircraft operational or control surfaces while taxiing for departure after having been Primary Deiced, or if Primary Deicing holdover times have been exceeded, as determined by the aircraft pilot in command.

IV. PROCEDURES

A. GENERAL

1. The following aircraft deicing procedures will be used at BWI. These procedures have been coordinated with the FAA Air Traffic Control Tower, the air carriers, and Fixed Base Operators (FBOs).
2. Air carriers and FBOs must call the BWI Airport Operations Center before commencing any Primary or Secondary Deicing, anti-icing, or defrosting operations during non-declared aircraft deicing events. The Airport Operations Center shall be advised the type of deicing operations to be performed, where they will take place, when they are to begin and are expected to end. It is preferred that notification be provided at least one hour before deicing operations are to be initiated. The Airport Operations Center shall notify Maryland Environmental Service and advise them of the information from the air carriers and FBOs.
3. ASIG is responsible for notifying the FAA ATCT and MAA Airport Operations Center that a Deicing Event has been declared. ASIG will make this notification after being contacted by one or more Air Carriers that aircraft deicing is required. ASIG will also be responsible for notifying FAA ATC and MAA Airport Operations Center that the Aircraft Deicing Event has been terminated.
4. The Airport Operations Center shall notify air carriers and FBOs by means of the Airport Weather and Information System (AWIS) and/or GREEN phone network that a Declared Deicing Event has been initiated. ASIG will have responsibility for maintaining radio communications with the FAA Air Traffic Control Tower for deicing operations at the Runway 28 Deicing Pad, and Southwest Airlines (SWA) will have responsibility for maintaining radio communications for deicing operations at the Runway 15R Deicing Pad and

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Concourse-A Alternate Deicing Area. The call sign for ASIG is **FROSTY ONE**. The call sign for Southwest Airlines is **ICEMAN**. Both ASIG and SWA will send a representative to the FAA Tower to coordinate deicing operations for the respective deicing pads/areas. Once a Declared Aircraft Deicing Event is initiated, "Gate Hold" procedures will be implemented by the FAA Air Traffic Control Tower to control the flow of aircraft to the deicing pads on a first-come, first-serve basis for those aircraft that must be deiced at a deicing pad. It is incumbent upon air carriers who utilize deicing pads to ensure deicing crews and equipment are in place at the pad and ready to begin deicing operations before any aircraft enter the deicing pad. Aircraft will not be permitted to sit/wait on a deicing pad waiting for crews/equipment to arrive. Any aircraft located on a gate where primary aircraft deicing is permitted which elects not to deice at the gate, will receive second priority at the deicing pads to all aircraft that must deice at the pad.

5. Flight crews shall advise the FAA Air Traffic Control Tower on Ground Control frequency and their respective air carrier/flight support operations staff as soon as possible when it is learned that secondary deicing/inspection is required for their aircraft. Aircraft requiring secondary deicing/inspection shall not enter a deicing pad until their deicing agent is present at the pad and equipped to accommodate the secondary deicing/inspection. This is to ensure that aircraft do not occupy deicing lanes for extended periods of time waiting for deicing crews to respond and prevent other aircraft from utilizing the deicing pad.
6. All air carriers and ground handlers that need to Primary Deice or Secondary Deice any aircraft in other than their designated locations shall obtain approval from the Airport Operations Center prior to beginning these operations. Only the Airport Operations Center may approve an acceptable alternate location.
7. Aircraft waiting for deicing at one of the Deicing Pads will hold at the gate or other approved ramp location to ensure all taxiways remain clear. As stated in section IV.A.4, priority to use a pad will be given to those air carriers who operate at gates without a deicing fluid collection system.
8. All personnel and equipment operating at Deicing Pads will remain clear of adjacent taxiways at all times.

B DEICING PAD LOCATIONS – Runway 28 Pad, Runway 15R Pad, Runway 15L-33R Pad, and Concourse-A Alternate Deicing Area

1. RUNWAY 28 DEICING PAD

There are seven deicing positions available at the Runway 28 Deicing Pad. Aircraft will queue into this area via Taxiway Charlie and shall not block the taxiway. There are six deicing lanes, numbered 1, 2, 2a, 3, 4, and 5 from west to east. Lanes 1 and 2 can accommodate two aircraft nose to tail, MD-11 size aircraft or smaller. Lane 2a will be used for B747-400 size aircraft only, and when in use, Lanes 2 and 3 are not available. Lanes 3, 4, and 5 can accommodate B757 size aircraft and smaller. The Runway 28 pad is available on a first-come, first-serve basis for those air carriers who do not have primary deicing capability at their gate. ASIG has responsibility for maintaining radio communications with the Air Traffic Control Tower for this pad and serves as coordinator of activities for the Runway 28 Pad. Vehicle access to the Runway 28 Deicing Pad can only be achieved by entering the FAA Controlled Movement Area. Air carriers/FBOs are responsible for providing radio-equipped vehicles and trained personnel to access the Runway 28 Deicing Pad.

For the 2004/2005 Winter Season, aircraft departing from Concourse D, E, and Air Cargo will utilize this facility. The only exceptions are United Airlines and Continental Airlines who will utilize the RWY 15R Deicing Pad.

2. RUNWAY 15R DEICING PAD

There are five deicing positions available on the Runway 15R Deicing Pad. Aircraft queue into this area via Taxiway A and/or Taxiway P. There are five deicing lanes numbered 1, 2, 3, 4, and 5 from North to South. Lane 5 can accommodate B747-400 size aircraft and smaller. Lane 4 can accommodate B767 size aircraft and smaller. The remaining three lanes can accommodate B757 size aircraft and smaller. Southwest Airlines has responsibility for maintaining radio communications with the Air Traffic Control Tower for this pad and serves as coordinator of activities for the Runway 15R Deicing Pad. Air carriers and/or Ground Handlers that want to use the Runway 15R Deicing Pad must receive prior approval from the Airport Operations Center for each deicing event. The Runway 15R Deicing Pad is available on a first-come, first-serve basis for those air carriers who do not have primary deicing capability at the gate.

For the 2004/2005 Winter Season, United Airlines and Continental Airlines will utilize the Runway 15R Deicing Pad for all primary aircraft deicing. Southwest Airlines will utilize this pad for a portion of their primary aircraft deicing operations.

3. RUNWAY 15L-33R DEICING PAD

Commuter Aircraft and General Aviation aircraft will be deiced on the Runway 15L-33R aircraft deicing pad located adjacent to the General Aviation apron and between Taxiways “K” and “L” (see Attachment). There are three aircraft deicing positions numbered 1, 2 and 3 from north to south. All three deicing lanes can accommodate Dash-8 size aircraft and smaller. These positions will be utilized on a first-come, first-serve basis. Commuter aircraft not utilizing the primary deicing pad must comply with the gate restrictions in Section IV.C.

4. CONCOURSE-A ALTERNATE DEICING AREA

There are three aircraft deicing positions located at the Concourse-A Alternate Deicing Area, which is located off the North end of future Concourse-A. Aircraft queue into this area via Taxiway A. The Concourse-A Alternate Deicing Area is restricted to B737-700 size aircraft and smaller. Air carriers and/or Ground Handlers that want to use this area must receive prior approval from the Airport Operations Center.

For the 2004/2005 Winter Season, Southwest Airlines will utilize the Concourse-A Alternate Deicing Area for a portion of their primary aircraft deicing operations. When in use, Southwest will maintain radio communications with the FAA Control Tower and serve as coordinator for deicing activities in this area.

C GATE RESTRICTIONS - PRIMARY AIRCRAFT DEICING

All aircraft that receive deicing at the gate shall be completely deiced at the gate prior to pushing back into the ramp or apron. This applies to all aircraft gate positions with the **exception** of the following:

1. **Concourse A Restrictions** – N/A
2. **Concourse B Restrictions** – Aircraft operating at gates on Concourse-B shall be deiced at the gate with the exception of gates B-1, 2, 3, and 4 where a fluid collection system is not available. Aircraft utilizing these gates must receive primary deicing at one of the deicing pads.

3. **Concourse C Restrictions** - Aircraft operating at gates on Concourse-C shall be deiced at the gate with the exception of gates C-2, 4, and 6 where a fluid collection system is not available. Aircraft utilizing these gates must receive primary deicing at one of the deicing pads.
4. **Concourse D Restrictions** - Aircraft operating at gates on Concourse-D are restricted from performing primary deicing at the gate, and therefore, must utilize one of the deicing pads for all deicing events.
5. **Concourse E Restrictions** - Aircraft operating at gates on Concourse-E are restricted from performing primary deicing at the gate, and therefore, must utilize one of the deicing pads for all deicing events.
6. **Air Cargo Restrictions** –
 - a. Cargo carriers that are deiced by ASIG will perform all aircraft deicing at the Runway 28 Deicing Pad.
 - b. Cargo carriers performing their own aircraft deicing operations **shall not deice** directly over the existing drains located behind gates F5 and F6.
 - c. All aircraft deicing activity is **prohibited** at spots F18, F19, and F20.
 - d. Aircraft deicing is restricted to **defrosting only** at spots F21, F22, F23, and F24.

E. EXEMPTIONS

1. When pre-taxi inspection reveals heavy accumulations of snow/ice on aircraft surfaces that preclude the safe repositioning of the aircraft to an approved deicing location, deicing may be performed at the parking gate. **This operation is limited to removing accumulations of snow and ice that preclude the safe repositioning of the aircraft only and must be coordinated with Airport Operations.**
2. Early morning “Aircraft Defrosting” activities described in Section III.B above may be performed at the aircraft parking gate and are exempt from the restrictions listed in Section IV.C of the Directive.
3. Anti-icing of aircraft using Type IV anti-icing fluids is exempt from restrictions and may be accomplished at any aircraft parking gate.

E. SECONDARY DEICING

Secondary Aircraft Deicing, if required, will be performed at the Deicing Pad on a first-come, first-serve basis. As stated in section IV.A.4, it is incumbent upon air carriers who utilize deicing pads to ensure deicing crews and equipment are in place at the pad and ready to begin deicing operations before the aircraft enters the deicing pad. Aircraft will not be permitted to sit/wait on a deicing pad waiting for crews/equipment to arrive.

V. RESPONSIBILITIES

- A. BWI Airport utilizes Glycol Recovery Vehicles (GRV) that are used to remove glycol fluids from around aircraft terminal gates and air cargo parking spots. They may also remove glycol fluids from the Deicing Pads. This operation will not interfere with any aircraft deicing and/or snow removal activity.
- B. The Airport Operations Center **may** take the following action(s) when a Deicing Event is anticipated:
 - 1. Close Runway 04-22 for Take-Off and Landing.
 - 2. Notify the Airport Noise Office that aircraft with operating noise levels greater than 90 db will be allowed to take off/land on Runway 15L-33R if necessary to meet holdover times.
 - 3. Close portions of taxiways and ramps to accommodate deicing fluid recovery operations.

VI. COMPLIANCE

- A. Any deviations to this deicing directive must be approved by the Airport Operations Center prior to any deicing.
- B. All air carriers and ground handlers shall comply with the provisions of this Directive. The Airport's National Pollutant Discharge Elimination System (NPDES) Permit states that, "**Deicing activities which are not authorized in the permittee's Best Management Practices Plan shall be reported in writing to the Maryland Department of Environment within five working days.**" BWI intends to fully comply with this requirement and will report all observed violations of this Directive to the regulatory authority.

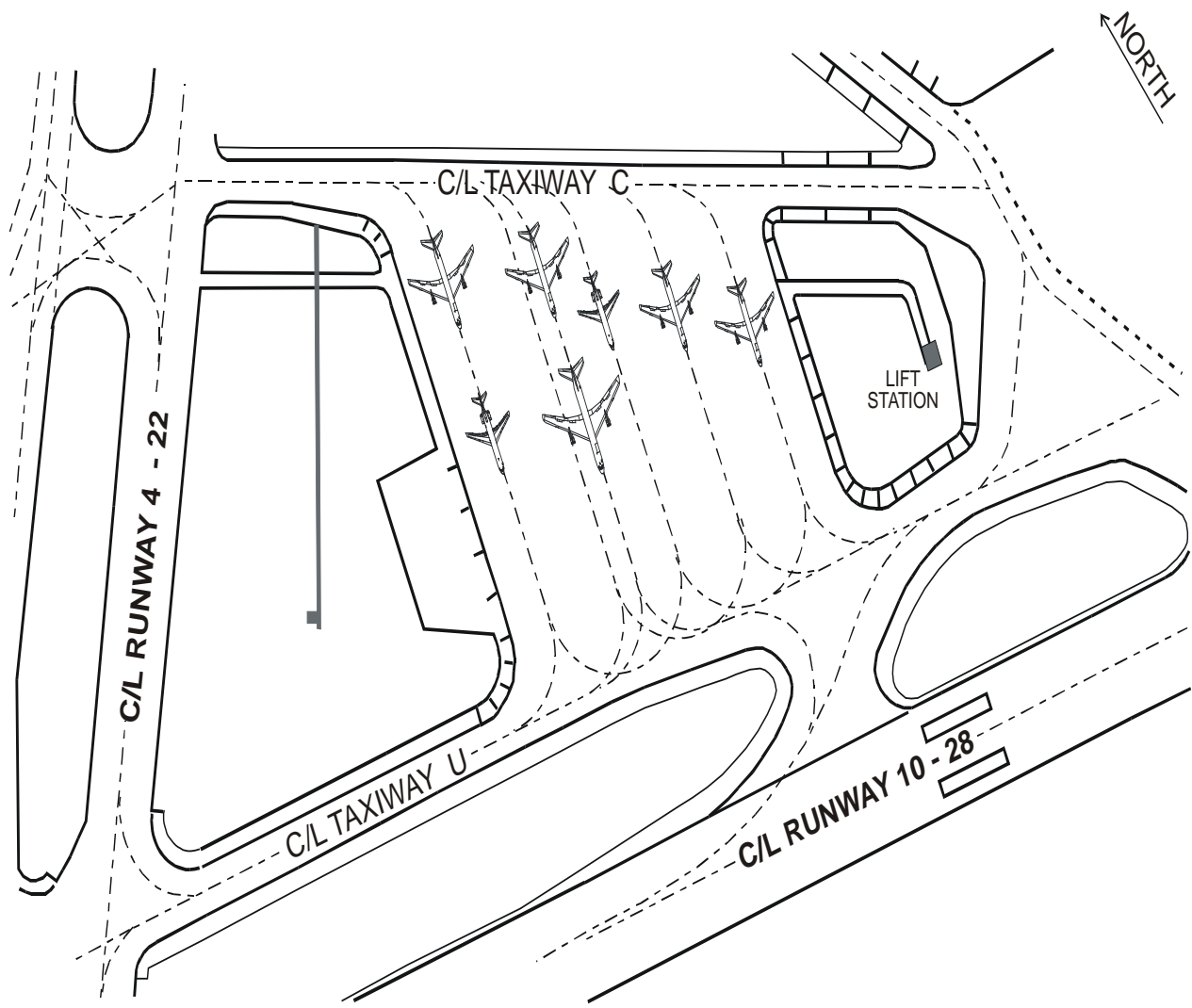
- C. The MAA and its agents will monitor tenant activity for compliance with this directive and report all observed violations to appropriate authorities. Tenant concerns and observed violations should be directed to the Airport Operations Center.
- D. Violations of these deicing procedures could result in additional restrictions being placed on the areas where aircraft Primary and Secondary Deicing operations can be conducted at BWI. Other administrative sanctions may be taken and the air carriers/ground handlers could be placed in default of their contract with the MAA for failure to comply with these procedures.
- E. The reporting of deicing fluid usage is required for the MAA to determine compliance with the NPDES permit conditions. Air carriers and FBOs must complete the deicing log for every aircraft that is deiced. The information that is required includes date, time, gate location, type of fluid used, concentration of glycol, volume applied, weather condition, aircraft or flight number, and type of aircraft. The supervisor responsible for overseeing deicing operations must sign each deicing log sheet. Unsigned logs will be returned for signature. Reports must be provided weekly on MAA supplied or approved forms. The completed forms may be faxed to 410-859-7082 (See Attachment 4).

Stephen D. Sheehan
Deputy Executive Director
Operations and Security

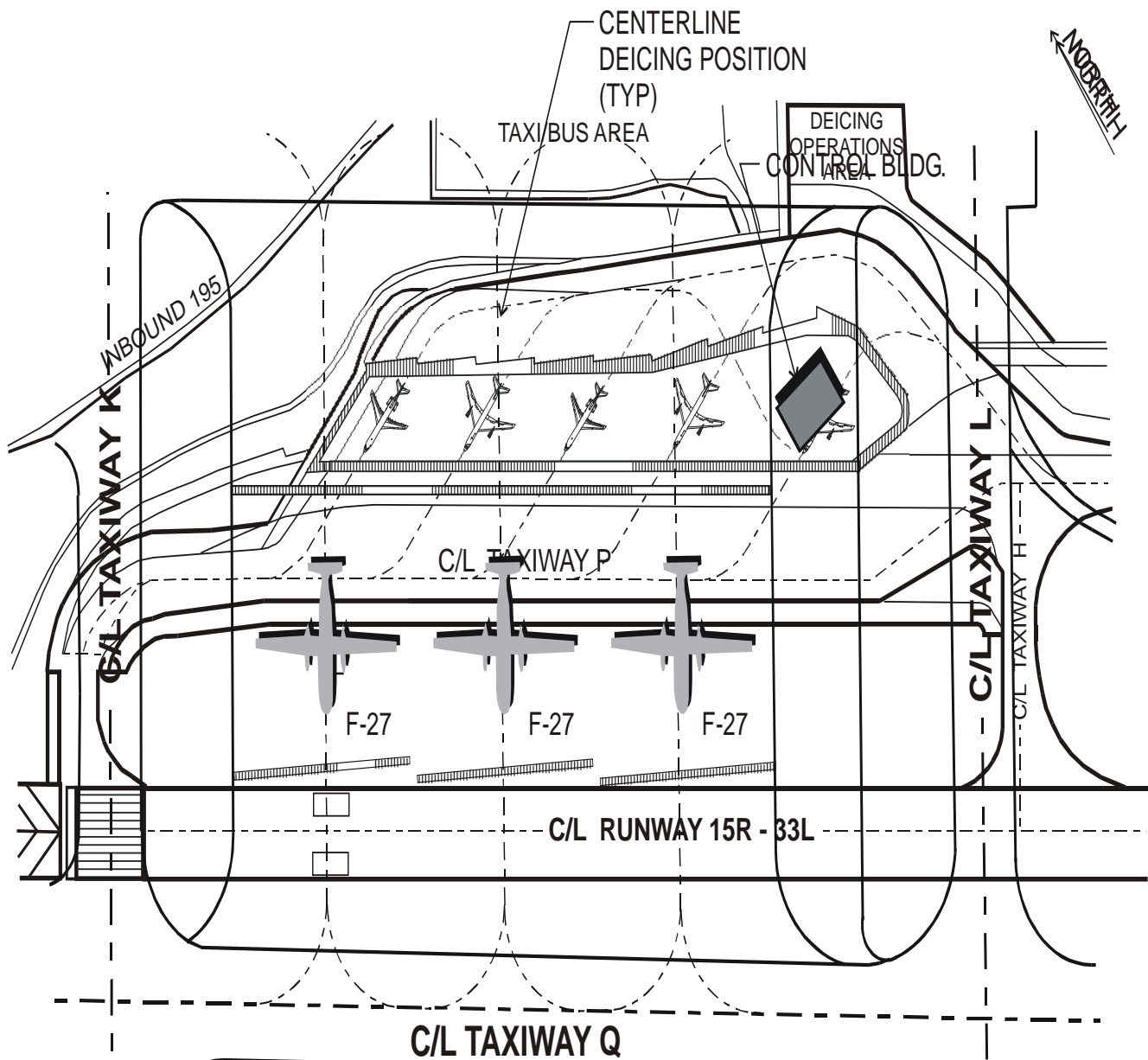
Attachments:

Deicing Pad Locations – Attachment 1, 2, 3
Aircraft Deicing/Anti-Icing Log (MAA-045) – Attachment 4

===== Denotes Changes



TITLE: RUNWAY 28 DEICING AREA
REF:
ATTACHMENT: 3



TITLE: DEICING AREA AT 15R HOLDBLOCK
REF:
ATTACHMENT: 2



TITLE: GENERAL AVIATION DEICING PAD
REF:
ATTACHMENT 1

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**APPENDIX B.
ADF USAGE AND ANNUAL RECONCILIATION RECORDING
FORMS**

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**MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
AIRCRAFT DEICING / ANTI-ICING LOG**

DEICING COMPANY: _____

PAGE _____ OF _____.

[illegible]

SUBMIT FORM TO: MARK WILLIAMS
ENVIRONMENTAL COMPLIANCE OFFICE
FAX NUMBER 410-859-7082
EMAIL: mwilliams1@bwiairport.com

SIGNATURE : _____.

MAA-045
R 11/03

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**MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
ANNUAL DEICING FLUID RECONCILIATION LOG**

COMPANY: _____

DUE DATE : _____ **MAY 15** _____

A: Amounts On-Hand At Beginning of the Season (October 15):

Type I _____ gallons (undiluted glycol)

Type IV _____ gallons (undiluted glycol)

B: Amounts Received During The Season:

Type I _____ gallons (undiluted glycol)

Type IV _____ gallons (undiluted glycol)

C: Amounts On-Hand At The End Of The Season (April 30):

Type I _____ gallons (undiluted glycol)

Type IV _____ gallons (undiluted glycol)

Signature: _____ Date: _____

Submit to: Mark Williams
Environmental Compliance Office
Phone: (410) 859-7448
Fax: (410) 859-7082
Email: mwilliams1@bwiairport.com

Maryland Aviation Administration
Baltimore/Washington Thurgood Marshall
International Airport

Deicing Fluid Discharge
Monitoring Plan

Prepared by the
Maryland Environmental Service

January, 2016

“Revised”

Deicing Fluid Discharge Monitoring Plan

Outline

I. Summary

- A. General
- B. Continuous Monitoring
- C. Deicing Event Based Monitoring
- D. Reporting

II. Site Selection

- A. Outfall and Monitoring Point Description
- B. Location Map

III. Monitoring Stations

- A. Equipment
- B. Equipment and Outfall/Monitoring Point Maintenance

IV. Sample Collection and Laboratory Analysis

- A. Sampling and Analysis Methods
- B. Composite Sampling
- C. Quality Control Sampling
- D. Field Testing
- E. Flow Monitoring
- F. Severe Weather Conditions
- G. Laboratory Analysis

V. Deicing Season Monitoring Summary

VI. Project Coordination

- A. Project Coordinators
- B. Project Coordination

I. Summary

A. General:

The Maryland Environmental Service (MES) performs all NPDES required outfall monitoring and reporting on behalf of the Maryland Aviation Administration (MAA) at the BWI Marshall Airport. To accomplish this monitoring, MES has constructed automated monitoring stations at four locations. Each of these stations is equipped with Teledyne ISCO (ISCO) manufactured sampler(s) and a flow measuring device. The stations located at Outfalls 003 and 007 are equipped with a solar panel powered battery-charging system. All samples collected will be submitted to MES contract laboratories for analyses.

Sections I.A2 and I.A4 of NPDES Permit #MD0063371 reference the routine monthly sampling conducted at monitoring points 301, 302, 303, 304, and 601. Since deicing fluid is not discharged through these points we have not included them in this Deicing Monitoring Plan.

B. Continuous Monitoring:

Continuous monitoring will be conducted at Outfalls 003 and 007, beginning the first day of glycol usage associated with a precipitation based deicing event (snow, sleet, rain and/or freezing rain) and ending March 31st or two weeks after the last day of glycol usage during a precipitation based deicing event (whichever is latest). Monitoring will consist of daily, flow proportioned, 24-hour composite samples. The daily parameters to be monitored are: ethylene glycol, propylene glycol, total glycol, chemical oxygen demand and flow. Monitoring will also include observations of odors, sheen and persistent foam.

C. Deicing Event Based Monitoring:

As required by the NPDES permit, “monitoring shall be conducted during deicing fluid discharges”. This will be accomplished during precipitation based deicing events. Monitoring at Outfall 003, Outfall 007 and Monitoring Point 307 will consist of flow proportioned, 24-hour composite samples, starting at the use of deicing fluid during a precipitation based event and ending 24 hours later. Monitoring at monitoring point 306 will consist of uniform time proportioned, 24-hour composite samples, starting at the use of deicing fluid during a precipitation based event and ending 24 hours later.

Monthly composite monitoring will be conducted as required at monitoring point 306. Monitoring point 307 will be sampled once a year as required in the NPDES permit. The following parameters will be analyzed: ethylene glycol, propylene glycol, total glycol, chemical oxygen demand, and flow. Monitoring will also include observations of odors, sheen and persistent foam.

In conjunction with the deicing event based monitoring, aquatic toxicity (24-hour acute) monitoring will be performed during two deicing events at Outfall 007 and monitoring point 306. Aquatic toxicity sampling will be conducted on 24-hour composite samples at these locations. Sampling for Oil and Grease will be performed at all Outfall 003, Outfall 007 and Monitoring Points (MP) 301, MP 302, MP 303, MP 304, MP 306, MP 307 and MP 601 on quarterly basis.

D. Reporting:

All monitoring results will be summarized on the Discharge Monitoring Report (DMR) submittals as required by the NPDES permit. All non-detectable analytical results will be reported as zero on the DMR and as values in glycol mass balance calculations. In lieu of generating paper copies of the Discharge Monitoring Reports, all data will be submitted electronically to MDE via NetDMR. DMR

All observations of odors or persistent foam will be reported to the MDE Inspection and Compliance Program by telephone within 24 hours of becoming aware of an occurrence. A written report shall be submitted within five calendar days of the occurrence.

II. Site Selection:

A. Outfall and Monitoring Point Description:

Four sites require flow monitoring and sample collection. A site map is attached and a brief description of the monitoring stations is provided below:

Outfall 003:

Outfall 003 is located on Kitten Branch approximately 1,050 feet upstream of Maryland Route 170.

Monitoring Point 306:

Monitoring point 306 is located in the drainage culvert under Taxiway Foxtrot, as close as possible (due to access constraints) to the exit from a 108"x72" reinforced concrete culvert outfall which discharges runoff from the main terminal to Kitten Branch.

Monitoring Point 307:

Monitoring point 307 is the exit from a 54" pipe to Kitten Branch discharging runway and parking lot drainage.

Outfall 007:

Outfall 007 is located at the discharge from the final stormwater management ponds prior to entering the headwaters of Muddy Bridge Branch.

B. Location Map (Attached)

III. Monitoring Stations:

A. Equipment

All the monitoring stations are each equipped with the following dedicated, fully automated monitoring equipment:

- ISCO Automated Sampler (Composite)
- ISCO Solar Panel Battery Chargers

The monitoring stations located at Outfalls 003 and 007 and Monitoring Point 307 are also equipped with the following dedicated, fully automated equipment:

- ISCO Flow Module

The monitoring stations located at Outfalls 003 and 007 and Monitoring Point 307 have either a concrete pad or wooden deck to support the monitoring equipment. The automatic sampler equipment located at Monitoring Point 306 is contained within a Rubbermaid storage shed.

The ISCO flow modules work in tandem with the composite samplers. The flow sensor will be mounted in the center of each pipe or stream.

B. Equipment and Outfall/Monitoring Point Maintenance

Routine equipment and outfall/monitoring point maintenance will be performed at least once per month. Additional maintenance will be performed during the deicing season, as necessary. Typical maintenance activities can include the following:

- Automatic sampler pump and sample tubing inspection and replacement
- Automatic sampler desiccant replacement
- Solar panel cleaning and alignment
- Battery inspection and replacement
- Flow sensor cleaning and calibration
- Downloading of flow data using a Rapid Transfer Device (RTD)
- Debris removal from the discharge channel
- Overall visual inspection.

IV. Sample Collection and Laboratory Analysis:

A. Sampling and Analysis Methods:

The analytical and sampling methods shall conform to procedures for the analysis of pollutant as identified in Title 40 CFR Part 136 – “Guidelines Establishing Test Procedures for the Analysis of Pollutants”.

B. Composite Sampling:

The ISCO samplers will be used to collect a flow proportioned, 24-hour composite samples. The composite ISCO samplers will be programmed to collect 150-ml samples at flow proportioned intervals during the 24-hour period.

C. Quality Control:

To demonstrate acceptable MES sampling procedures and analytical method precision by the contract laboratories, quality control samples will be submitted to the contract labs in conjunction with the monitoring samples submitted during the deicing season. Additionally, each month detailed quality control reports will be requested from the contract labs and reviewed by MES staff.

1. Duplicate Samples – Intra-Lab Precision Test:

Laboratory methods and quality control measures require analytical duplicates (replicates) be run at certain intervals to monitor precision. Laboratory replicates will be tested weekly, alternating between outfalls 003 and 007 samples during the deicing season. Deicing event duplicates will be collected during each event.

2. Field Blank Samples – Environmental Contamination Test:

A field blank is a sample prepared in the field at the same location and the same time that the routine samples are collected. One set of sample bottles is filled with reagent grade water and sent to the laboratory (sometimes as a blind sample). Field blanks are intended to help identify contaminants that may have been introduced in the field as a result of sample collection processes and/or as a result of possible environmental contamination. Field blanks will be submitted once a month during the deicing season.

3. Split Samples – Inter-Lab Precision Test:

Split samples are the same as field duplicate samples but these samples are sent to a different contract laboratory. MES personnel will carefully split a grab

sample from one of the monitoring points and send it to both laboratories once per month during the deicing season.

4. Glycol Spike Samples – Matrix Effects Test:

Spiking a sample adds a known amount of a known compound to a sample. A spiked sample provides information about the effect of each sample matrix on the sample preparation procedures and the measurement methodology. Once each month, MES will submit a glycol sample for a spike and spike duplicate to be analyzed and reported.

5. Laboratory Quality Control Reports – Laboratory Methods Test:

Each month the contract laboratories will prepare a quality control report detailing results of blanks, standards, spikes and duplicates with control limits of a particular batch of data as requested by MES.

D. Field Testing:

Field-testing is not required by the NPDES permit but may be performed if needed.

E. Flow Monitoring:

Flow will be measured during the deicing season as required by the NPDES permit. ISCO flow modules will be used to monitor flows on a daily basis at Outfalls 003 and 007, and once per year at Monitoring Point 307. Due to an accumulation of sediment on the weir located at Outfall 003, a modification was made to allow accurate flow measurement. Flow at Outfall 003 will be measured using a metal rectangular weir installed on November 25, 2015. The Teledyne ISCO flow sensor has been mounted on a metal bracket so that it is level with the bottom of the opening of the weir. The flow meters at these three monitoring stations will be calibrated annually prior to each deicing season. Flow at Monitoring Point 306 will be measured during the deicing season via a V-notch weir located inside the culvert box at the monitoring point.

The flow data is downloaded onto an ISCO Rapid Transfer Device (RTD) so that it can be transferred onto an MES office computer. This data is uploaded into ISCO's FlowLink software package for review and reporting.

Flow at Monitoring Point 301 will be measured using an ISCO 4100 series flow logger. Flow at Monitoring Points 302 and 303 will be measured using a calibrated V-notch weir. Flow at Monitoring Point 304 will be estimated by measuring the water depth and velocity. Flow at Monitoring Point 601 will be estimated based on the amount of time required to fill the 1-liter sample bottle.

Severe Weather Conditions

In the event that severe weather occurs and prohibits safe access to the monitoring stations, MES staff will make every attempt to resume sampling activities at the earliest possible time.

In the event that severe weather occurs and reduces the ability of the automated sampling/flow monitoring equipment to perform properly, MES staff will make every attempt to collect representative grab and/or time-proportioned composite samples in lieu of the discrete and/or flow-proportioned composite samples.

Severe weather can include, but it is not limited to:

- Flooding
- Ice storms
- Sub-freezing temperatures
- Heavy snowfall
- Blizzard conditions

F. Laboratory Analysis:

1. Chemical Analysis:

The following is a list of parameters (chemical) to be analyzed according to Title 40 CFR Part 136 by the contract labs at the outfalls and monitoring points:

- Ethylene Glycol
- Propylene Glycol
- Total Glycol
- Chemical Oxygen Demand

2. Aquatic Toxicity Analysis:

Aquatic toxicity is analyzed by the contract lab, according to Title 40 CFR Part 136, on samples collected at Outfall 007 and monitoring point 306. The testing includes 24-hour definitive acute tests using fathead minnow (*Pimephales promelas*) and daphnid (*Daphnia magna*) species. Toxicity samples will be submitted twice per year as stated in the NPDES permit.

V. Deicing Season Monitoring Summary:

Monitoring Station	Flow	Aquatic Toxicity Monitoring	Chemical Analysis
MP-306	Measured once per month during deicing events	24 Hour composite samples during 2 deicing events	24 Hour composite samples collected once per month during deicing events
MP-307	Measured once per year during a deicing event	None	24 Hour composite sample collected once per year during a deicing event
Outfall 003	Measured daily	None	24 Hour composite samples collected daily
Outfall 007	Measured daily	24 Hour composite samples during 2 deicing events	24 Hour composite samples collected daily

VI. Project Coordination:

A. Project Coordinator(s):

Jason Gillespie (MES)	Headquarters Office	410-729-8363
	Cellular Phone	443-250-1025
Rebecca Sprouse (MES)	Headquarters Office	410-729-8391
	Cellular Phone	443-324-4791
Mark Serio (MES)	BWI Field Office	410-859-5816
	Cellular Phone	240-278-3879
Patrick Carling (MES)	BWI Field Office	410-859-5816
	Cellular Phone	443-336-2901
Mark Williams (MAA)	BWI Airport	410-859-7448
	Cellular Phone	443-250-1029
Jesse Dobson (MAA)	BWI Airport	410-859-7806
	Cellular Phone	443-423-9016

B. Project Coordination:

MES personnel will be on 24-hour standby during upcoming winter months. MES personnel will be on-site to start all equipment and monitor the magnitude of the event. It is at the discretion of the Project Coordinators listed above to determine when monitoring will be initiated or discontinued.



Larry Hogan, Governor

James M. Harkins, Director

January 5, 2016

Maryland Department of the Environment
WMA – Compliance Program
1800 Washington Boulevard - STE 425
Baltimore, MD 21230-1708
Attention: Discharge Monitoring Reports

**RE: Baltimore/Washington International Thurgood Marshall Airport (BWI-Marshall),
Deicing Fluid Discharge Monitoring Plan**

Ms. Heather Nelson:

Maryland Aviation Administration, the Maryland Environmental Service is providing you with the Deicing Fluid Discharge Monitoring Plan for BWI-Marshall Airport as required (NPDES Permit # MD0063371). Please be advised that effective March 23, 2015 the quarterly analysis for TKN (Total Kjeldahl Nitrogen) during deicing season is no longer required at outfalls 003 and 007.

If you have any questions or require any additional information, please feel free to contact me at 410-859-5816.

Sincerely,

|

Patrick Carling

Maryland Aviation Administration
Baltimore Washington Thurgood Marshall International
Airport

Biomonitoring Study Plan

Prepared by:
Maryland Environmental Service
259 Najoles Rd.
Millersville, MD 21108

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IV. Quality Control Procedures	3
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IX. Confirmation of Acute Toxicity	10
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This following plan has been developed in accordance with NPDES Stormwater Permit MD0063371 to evaluate toxicity of stormwater from airport activity at monitoring station 306 and Outfall 007 by using Aquatic Toxicity Testing.

I. Discharge and Deicing Material Volume Variability:

An analysis of daily glycol usage and weather data from November 10, 2003 (first day of applied data in 2006/2007 season) through April 7, 2013 (last day of applied data in 2013/2013 season) was conducted to identify suitable criteria for defining a representative event relative to significant deicing activities and biomonitoring objectives. This analysis concluded that the best criterion for a representative deicing event was total daily glycol usage. A frequency analysis of daily glycol usage records is shown in Figure 1.

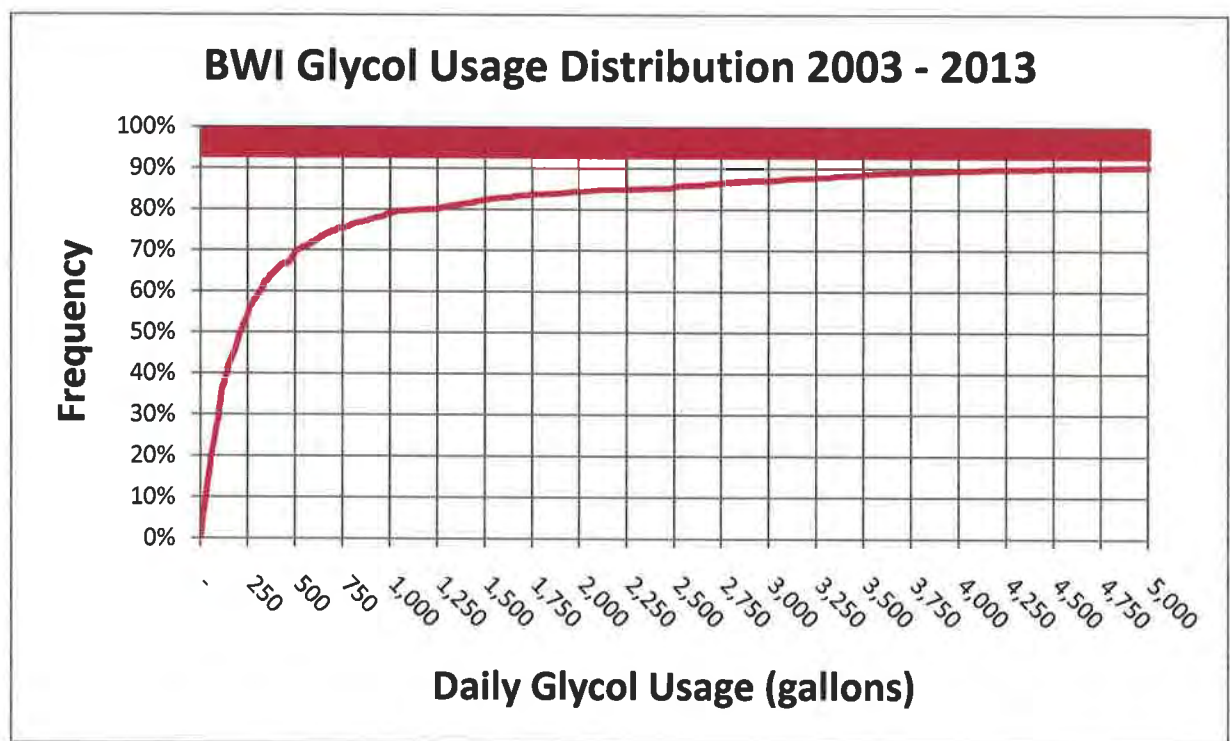


Figure 1. Cumulative frequency distribution of daily glycol usage November 10, 2003 through April 7, 2013

The data shown in Figure 1 indicate that the heaviest 10% of deicing days are characterized by daily usage of approximately 4,000 gallons or more of glycol. This information is only useful retrospectively, because of the difficulty in predicting both weather and glycol usage prior to the actual event.

For practical purposes, operationally-based criteria will be used to decide when biomonitoring will be conducted. Mobilization of biomonitoring field crew will be initiated when Aircraft Service International Group (ASIG), the primary FBO at BWI, declares a deicing event. Sample collection will proceed until such time as either the event is concluded, or it is determined that an event did not actually occur. Determination of the validity of the sampling events will be based on a combination of the actual magnitude of deicing activities that occurred, and the field screening of the samples described below.

II. Sample Collection Procedures for Aquatic Toxicity:

The sampling points for the biomonitoring will be the same points that are utilized for the NPDES discharge permit parameters for monitoring point 306 and outfall 007. The sample points will be clearly posted at each site. All samples will be collected as 24-hour composites taken during representative events to allow capture of the highest glycol discharge during the sampled event. Field screening using a hand-held refractometer, supplemented by screening-level chemical oxygen demand tests will be used to ensure that the sample reflects the deicing event and determine if the peak has been captured. If the event runoff hasn't reached the sampling location before the first 24 hours, and the sampling event is not yet considered representative, sampling will be continued for additional 24-hour periods until the deicing runoff pulse has been captured or the event is judged to be concluded.

III. Sample Handling, Preservation, and Shipping:

The samples will be transported to the laboratory in coolers, iced and maintained between 0° to 6° C. The laboratory will verify temperature and/or icing of the samples upon receipt by noting the temperature of a sample or the ice remaining, on the chain of custody. Aeration of the samples during collection and transfer of the samples will be minimized to reduce the loss of any volatile chemicals. The lapsed time from completion of the sample collection and its first use for initiation of biomonitoring tests will not exceed 36 hours. The samples will be overnight shipped or delivered to the laboratory the same day that they are collected. Samples will be transferred to a refrigerator and between 0 and 6 °C at the laboratory until use. Every effort will be made to initiate the biomonitoring on the day the sample arrives at the laboratory. A chain of custody will be submitted with the sample and will become part of the final report. Sample containers will be new plastic containers. All sample containers will be rinsed with the sample water before being filled with the sample. Sample containers will be completely filled with sample and all effort shall be made to eliminate any air spaces in the sample container before sealing.

Dissolved oxygen will be monitored in the samples for the first 4 to 8 hours after arrival. If a downward trend is observed, gentle aeration will be initiated. If this trend is consistently observed, gentle aeration will be applied throughout the test.

IV. Quality Control Procedures:

All QA/QC protocol referenced in the guidance documents and procedural documents will be followed.

- A. Effluent water sampling and handling: Sample holding times and temperatures will conform to the conditions described above in "Sample Handling, Preservation, and Shipping" and will meet all requirements contained in 40 CFR part 136.

- B. Test Organisms: Test organisms used in the procedures are the fathead minnow *Pimephales promelas* and the water flea *Daphnia magna*. The organisms will be disease-free and will be positively identified to species. The fish and invertebrates should appear healthy, behave normally, feed well, and have a low mortality in cultures and test controls. Test organism cultures are maintained on-site at the contract lab. A narrower range of fish (7-14 days old) and the same cohort shall be used for testing.
- C. Facilities, Equipment etc.: The contract laboratory that will be performing the aquatic toxicity testing is:
- EA Engineering, Science and Technology
231 Schilling Circle
Hunt Valley, MD 21031
Phone 410-771-4950

All of the quality assurance for the facilities, equipment, test chambers, test organisms, laboratory water, sample handling, test conditions, quality of test organisms, food quality, acceptability of results, analytical methods, calibration and standardization of equipment, replication and test sensitivity, variability in toxicity test results, demonstration of acceptable laboratory performance, documentation of laboratory performance, reference toxicants, record keeping, dilution water, test procedures, test data, and data analysis for chronic testing (and acute testing, if required) shall be in accordance with:

Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to the Freshwater and Marine Organisms, 5th ed. October 2002. EPA-821-R-02-012.

A copy of the QA/QC manual from the contract laboratory is available for review at the MES central office.

- D. Analytical Methods: Chemical and physical analyses will include established quality assurance, practices outlined in the Agency methods manuals:

USEPA. 1979A. Handbook for analytical quality control in water and wastewater laboratories. U. S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, EPA 600/4-79-019.

All analyses will be conducted in accordance with methods approved in 40 CFR Part 136.

V. Biomonitoring Testing Protocols:

- A. Invertebrates: The acute testing of the invertebrates will be performed in accordance with all methods and guidelines set forth in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, 5th ed.* October 2002. EPA-S21-R-02-012.
- B. Vertebrates: The acute testing of the invertebrates will be performed in accordance with all methods and guidelines set forth in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, 5th ed.* October 2002. EPA-S21-R-02-012

VI. Biomonitoring Reporting:

The following outline will be used as the general format and content for the biomonitoring reporting.

- A. Chain of Custody Forms will contain the following information:
1. Facility Name
 2. Sample Collection
 - a. Start Date
 - b. End Date

- c. Start Time
 - d. End Time
 - e. Exact Location of sample point
- 3. Total Volume of Sample
- 4. Type of testing to be performed (Grab/composite)
- 5. Samplers signature, date and time
- 6. Description of sample storage during transportation. Chain of custody showing signatures of all persons receiving custody of the sample prior to use in testing, dates and times of receipt.
- 7. Comments as appropriate

B. Effluent Quality Measurements: for each effluent sample the following data shall be reported:

- 1. Summary of conditions
- 2. Estimate of flow volume
- 3. Pertinent laboratory or field data.
- 4. The following tests will be performed on site with dates, times and signatures;
 - a. Temperature in °C
 - b. pH
 - c. Refractometer reading
 - d. Comments as appropriate including visual description
- 5. The following tests will be performed in the laboratory prior to any testing and recording date and time of measurements;
 - a. Temperature in °C
 - b. pH
 - c. Dissolved Oxygen

- d. Total Residual Chlorine¹
- e. Conductivity
- f. Hardness
- g. Alkalinity
- h. Visual Description of sample
- i. Comments as appropriate

C. Toxicity Test Data

- 1. Dilution Water
 - a. Source of the dilution water
 - b. Manipulation steps, if any
- 2. Test Organisms
 - a. Source of test organism
 - b. Any acclimation steps
 - c. Disease treatment, if applicable
 - d. Reference toxicant data²
 - (1) Reference toxicant identity
 - (2) Test date
 - (3) Test results (48-hour LC₅₀ with 95% confidence limits)
 - (4) Rate of control mortality
- 3. Effluent Toxicity Tests. The organisms utilized shall be clearly identified in the reporting of the following information for each effluent toxicity test.
 - (1) Test results for acute testing, the LC₅₀ value, with 95% confidence limits, from the first 48 hours of the test
 - (2) Water Quality measurements

¹ If the TRC exceeds 0.02 mg/l, the samples shall be dechlorinated in the laboratory prior to their use in toxicity tests.

² When in-house organisms are used, monthly test data from the previous 5 months shall be reported. When organisms from an outside source are used, reference toxicant data from the test performed concurrently with the effluent shall be reported.

- (a) Daily measurements (before and after renewal) of temperature, DO³, and pH for all dilutions
 - (b) Daily measurements of conductivity, alkalinity and hardness for 100% and 0% dilutions for each new sample
 - (c) A summary (mean and range) of the data described (a) and (b), above.
- (3) Initial test measurements
 - (a) Number of replicates
 - (b) Number of organisms in each replicate
 - (c) Volume of solution and the size of the test chambers
- (4) Daily mortality data
- (5) Summarized mortality
- (6) Statistical calculations, including tests on assumptions (e.g. normality, homogeneity of variance). The statistical method and data used shall be clearly identified
- (7) Any test method deviations
- (8) Relevant observations on test organisms or conditions

The above reporting format will be utilized to submit reports to Maryland Department of the Environment. The reports and test results shall be submitted to MDE within one month of the receipt of the test from the contract laboratory. Test results shall be submitted in accordance with MDEIWMA "Reporting Requirements for Effluent Biomonitoring Data" (3/21/03) as outlined above.

³ If the DO is below 40% saturation (3.3 mg/l at 25° C), samples are to be aerated gently before toxicity testing.

VII. Schedule for Biomonitoring and Toxic Chemical Testing:

The following schedule will be adhered to once MDE approval of the plan is received. Each of the two testing events will include a 24-hour test using fathead minnow and a 24-hour test using a daphnid species and will be performed during representative events:

- A. First Event: As soon as approval of the study plan is received from MDE, the first sampling event will be scheduled during the first representative deicing event. Samples will be submitted for 24-hour acute testing. The results from this testing will be sent to MDE within thirty days of receipt of the report from the testing laboratory.
- B. Second Event: A second representative event will be sampled and 24-hour acute testing will be performed during the same deicing season or during the following deicing season. MAA will submit the report to MDE within thirty days of receipt of the results from the testing laboratory.

VIII. Test Results Showing Acute Toxicity:

If the test results of any two consecutive valid toxicity tests for a given monitoring station conducted within any deicing season show acute toxicity ($LC_{50} \leq 100\%$), the MAA will provide the following to MDE:

- A. Written notice to MDE of receipt of "failed" test results within ten days of MAA receipt of the second consecutive "failed" test results
- B. Brief description of expected cause of "failure"
- C. Climatic conditions of the event and precedent 72 hours (accounting for snow)
- D. Summary of estimated daily (total) glycol use for the period
- E. Summary of estimated daily (total) land deicing activities and materials for the period
- F. Summary of glycol recovery efforts to include estimates of total volume collected

- O. Description of remedial actions taken in response to the event
- H. Description of remedial actions planned as a result of observed toxicity
- I. Plan and schedule to conduct "confirmatory" toxicity testing provided samples can be collected during the remainder of the deicing season. If "confirmatory" sampling cannot be conducted as a result of the cessation of deicing operations for that season, the first toxicity test results of the next deicing season will constitute "confirmatory" testing.

IX. Confirmation of Acute Toxicity:

If on the basis of the information collected in VIII above, an upset has not occurred and acute toxicity is confirmed MAA will:

- A. Eliminate the source of toxicity through operational changes as soon as possible, or
- B. Conduct a Toxicity Reduction Evaluation (TRE). If the toxicity test is repeated and the repeat test results do not confirm the acute toxicity, MAA will complete any remaining testing required.

X. Conclusion:

MAA will implement the above biomonitoring plan, with any amendment required, as soon as approval is received from MDE. If any major operational changes or additions occur, MDE will be notified in writing of the changes.

**J. NUTRIENT SOURCE IDENTIFICATION FOR STORMWATER RUNOFF
ASSOCIATED WITH INDUSTRIAL ACTIVITIES**



Lawrence J. Hogan, Jr.
Governor

Boyd K. Rutherford
Lt. Governor

Pete K. Rahn
Acting Secretary

Paul J. Wiedefeld, A.A.E.
Executive Director / CEO

March 9, 2015

Mr. Kevin Cookley
Water Management Administration – Compliance Program
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore Maryland 21230-1708

SUBJECT: Nutrient Source Identification for Baltimore/Washington International Thurgood Marshall Airport (BWI-Marshall)

Dear Mr. Cookley:

Please see attached Nutrient Source Identification Plan. This Plan includes an inventory of significant sources of total phosphorus and total nitrogen associated with industrial activities at BWI-Marshall Airport that may end up discharged to waters of the State. Submission of this Plan is required by item "R" under Permit #10-DP-2546; MD006337 which was issued to the Maryland Aviation Administration.

If you have any questions or concerns upon review of this Plan, please do not hesitate to call me at 410- 859-7448.

Sincerely,

Mark Williams, Manager
Division of Environmental Compliance



MARYLAND DEPARTMENT OF THE ENVIRONMENT

RECEIPT

TO:

Devon Cookley

FROM:

Maryland Aviation Administration

DATE RECEIVED:

03/10/15

TIME RECEIVED:

3:14pm

RECEIVED BY:

J. Miller

MDE

MAR 10 2015

3:14pm

Nutrient Source Identification for Stormwater Runoff Associated with Industrial Activities

Permit #10-DP-2546; MD0063371

Baltimore/Washington International Thurgood Marshall Airport



Prepared For:



Maryland Aviation Administration
Environmental Compliance Division
P.O. Box 8766
BWI Airport, MD 21240

Prepared By:



AECOM
8000 Virginia Manor Road
Suite 110
Beltsville, MD 20705

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ACRONYMS

AST	Aboveground Storage Tank
BMP	Best Management Practice
BWI	Baltimore/Washington International
CFR	Code of Federal Regulations
COMAR	Code of Maryland Regulations
CRCF	Consolidated Rental Car Facility
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DNR	Department of Natural Resources
ED	Extended Detention
GIS	Geographic Information System
GRV	Glycol Recovery Vehicle
IP	Infiltration Practice
JETS	Joint Environmental Tracking System
MAA	Maryland Aviation Administration
MDE	Maryland Department of the Environment
MP	Monitoring Point
MS4	Municipal Separate Storm Sewer System
MSDS	Material Safety Data Sheet
NPDES	National Pollutant Discharge Elimination System
SWM	Stormwater Management
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
WP	Wet Pond

UNITS OF MEASURE ABBREVIATIONS

ft	Foot or feet
lbs/d	Pounds per day
lbs/yr	Pounds per year
mg/L	milligrams per liter
%	Percent
ppm	Parts per million

EXECUTIVE SUMMARY

This report presents the identification of nutrient sources in stormwater runoff from industrial activities associated with the operation of Baltimore/Washington International (BWI) Thurgood Marshall Airport in Anne Arundel County, Maryland. This report identifies and quantifies the existing nutrient sources at the airport to satisfy a permit condition in the BWI discharge permit for stormwater associated with industrial activity (10-DP-2546, NPDES #MD0003371). The identification of nutrient sources is limited to those sources associated with industrial activities as defined in 40 CFR 122, and which are specifically regulated under the above referenced permit. Other nutrient sources exist at the facility and result in the discharge of nutrients to the BWI stormwater drainage system; however such sources are not addressed in this report.

Primary sources of nutrient discharge associated with industrial activities are associated with aircraft deicing (84% of TP and 87% of TN) and to a far lesser extent, by runway deicing activities (16% of TP and 13% of TN). Nutrient loads from other industrial activities are negligible because materials have no or little exposure to precipitation and runoff and/or because the nutrient content in such materials is negligible.

Average annual total phosphorus (TP) discharge associated with industrial activities is estimated to be approximately 472 pounds per year (lbs/yr); average annual total nitrogen (TN) discharge loads associated with industrial activities is estimated to be approximately 63 lbs/yr.

The following summarizes other relevant conclusions of this assessment.

1. Type I aircraft deicing agents account for more than 99% of the aircraft deicing TP and TN source loads, respectively.
2. The site-wide estimated nutrient source load reduction prior to discharge was 55% for TP and TN based on glycol recovery as well as treatment via infiltration and stormwater basin BMPs. Other additional non-structural BMPs, including disconnected pavement, pavement sweeping and swales, are not accounted for in this estimate and would further reduce export loads.
3. Approximately 46% of the site-wide export load is discharge via outfall 007 to Muddy Bridge Branch and 46% is discharged via outfall 003 to Kitten Branch. The remaining 8% of the nutrient loads are discharged via several other small drainage areas (Southwest Branch, Signal Branch, Irving Branch and Fork Run).
4. Estimates of source loads are based on available data and numerous assumptions (detailed in Section 5). Actual source and export loads associated with industrial activities may differ from the averages reported herein.
5. Nutrient loads are influenced by a number of external factors including weather conditions and precipitation which vary within and between years. These factors would contribute to intra and inter-annual variability in loads.
6. Despite the stated assumptions and limitations of the nutrient source load quantification, the estimates provided here provide a reasonable planning level estimate of potential nutrient loads associated with BWI's regulated industrial activities.

1.0 INTRODUCTION

This assessment is being conducted for Baltimore-Washington International (BWI) Airport, located in Anne Arundel County, Maryland. BWI is managed by the Maryland Aviation Administration (MAA). MAA maintains an individual discharge permit for stormwater discharges associated with industrial activity at BWI (herein referred to as "the Permit"), which was reissued on September 30, 2013 (Maryland Discharge Permit #10-DP-2546 / NPDES Permit MD0063371). The Permit (Special Condition I.R) requires that BWI develop an inventory of all significant total phosphorus (TP) and total nitrogen (TN) generating activities and chemical formulations used at the facility which contain TN and/or TP that may be discharged to waters of the State.

1.1 PURPOSE

The purpose of this assessment is to satisfy Special Condition I.R of the Permit which requires an identification of nutrient sources associated with industrial activities. That permit condition requires an inventory of all significant TP and TN generating activities and chemical formulations used at the facility which contain TN and/or TP that may be discharged to waters of the State.

1.2 SCOPE OF WORK

The nutrient inventory must include an estimate (to the nearest 100 pounds per year; lbs/yr) of the annual quantity of TN and TP expected from each source/generating activity and shall provide a TN and TP material balance for the facility activities associated with industrial activities. The required submission to the Department must also include a facility-wide summary report which totals the annual load of TN and TP being discharged to the waters of the state by source and by outfall. The report must provide an explanation of all estimation methodologies used. Minor sources (less than 50 lbs/yr for either TN or TP) are not required to be included.

The NPDES permit Special Condition I.R states that potential sources to be evaluated shall include, but not be limited to, sanitary wastewater, scrubber wastewater, demineralizer regenerate. These wastewater streams are not discharges through the storm drainage system, and are properly disposed of via sanitary sewers and/or offsite transport and disposal at an appropriately licensed facility. Therefore, these waste streams are not addressed further in this assessment.

The MAA has upgraded multiple sections of the sewer main and established remote wireless monitoring device to monitor wastewater flow at critical manholes locations. These devices allow MAA to be immediately notified of any backup issues, which might result in sewer overflows. These monitoring devices have been added at approximately 30 manholes.

Special Condition I.R of the Permit also requires that the following possible chemical additive/formulation sources be addressed: boiler operation, cooling tower operation, wastewater treatment, anti-corrosion, anti-scaling, and equipment cleaning. Boiler and cooling tower operations as well as wastewater treatment do not themselves constitute a regulated industrial activity under the NPDES regulations for stormwater discharges associated with industrial activities. Storage and use of equipment and vehicle cleaning compounds are regulated activities at BWI, and are addressed in this assessment.

Clarification was received from Mr. Paul Hlavinka of Maryland Department of the Environment (MDE)¹ regarding the scope of this assessment. Mr. Hlavinka confirmed that only those industrial sources/activities

¹ Personal communication via telephone on 12/11/14 between Mr. Paul Hlavinka (MDE) and Ms. Nancy Palmstrom (AECOM)

which are the basis for the Permit need to be addressed. Therefore, the identification of nutrient sources reported here, is limited to sources associated with regulated industrial activities identified in the Permit.

Industrial activities at BWI regulated by the Permit include the following:

- Aircraft and Runway Deicing Operations
- Aircraft, Ground Vehicle and Equipment Maintenance and Cleaning
- Airport Aircraft and Ground Vehicle Fueling

Therefore, the scope of this analysis is limited to potential nutrient sources associated with the above referenced activities and the materials handled, stored and used for such activities.

The scope of the assessment has been accomplished with the following general tasks.

- Identification of potential industrial sources or activities regulated by the individual stormwater permit.
- Evaluation of potential sources of TN and TP associated with the identified industrial activities.
- Evaluation of the potential exposure industrial activities or sources to precipitation and runoff.
- Estimation of annual TN and TP loads from industrial sources/activities with exposure to precipitation and runoff.

The above work is documented in this report which, per the Permit, is to be submitted to the MDE.

1.3 STUDY AREA DESCRIPTION

BWI is an international public use airport located approximately ten miles southwest of Baltimore City, in Anne Arundel County, Maryland. The majority of the facility sits between I-295 and I-97. The main campus is bound by Airport Loop which is Route 170 (Aviation Boulevard) on the north and west of the airport, Route 176 (Dorsey Road) south of the airport and Route 162 (Aviation Boulevard) east of the airport (**Figure 1**). The airport lies approximately 10 miles west of the Patapsco River, close to where the river discharges into the Chesapeake Bay.

The surrounding areas are predominantly developed suburban residential and commercial areas. BWI discharges to four waterbodies as shown in **Figure 2**. Stony Run flows north and is located west of the airport campus. Kitten Branch, a tributary to Stony Run, runs through the airport site exiting on the north of the airport campus before joining Stony Run. Finally Cabin Branch starts in the northeast corner of the site, and Sawmill Creek lies south of the airport.

The storm drainage system at BWI is complex and includes numerous structural Best Management Practices (BMPs) for the treatment of stormwater runoff as well as the collection of deicing compounds used during deicing events. Regulated industrial activities occur at a number of different locations around the facility, and within each drainage area (**Figure 2**).

The Permit requires monitoring at three outfalls (as well as several internal monitoring points; MPs). The following provides a brief description of each regulated outfall and associated drainage areas:

Outfall 003 – This outfall discharges to Stony Run and receives runoff from portions of the property located in the Kitten Branch and Sachs Branch drainage areas. MPs 301, 302, 303, 304, 306, 307 are associated with this outfall. Runoff discharge via outfall 003 includes areas of the BWI facility associated with industrial activities (Midfield Cargo Fuel Farm, areas from North Air Cargo and Main Fuel Farm Area in Sachs Branch Watershed, and airside facilities including most of Runway 15R-33L,

a substantial portion of Runway 10-28, the portion of Runway 4-22 south of Pier C, and the taxiways that connect these runways), and the Midfield Cargo Complex. Non-industrial activities in this drainage area include MAA facilities including the Airport Rescue Fire Fighting Station. Off-site runoff is received from portions of Northrop Grumman facility via outfall 003.

MPs 301, 302, 303 are located in Sachs Branch watershed receiving runoff from industrial activities including Main Fuel Farm, vehicle washing, maintenance, outside storage, and above and underground storage tank areas. MP 304 is located in Midfield Cargo Complex near stormwater basin B7. Runoff from nearby deicing pad and midfield fuel storage facility drains to MP 304 before entering stormwater basin B7. MP 306 discharges runoff from the main terminal to Kitten Branch. MP 307 is the exit from a 54" pipe to Kitten Branch discharging runway and parking area drainage. Aircraft and runway deicing operations are the major industrial activities associated with MP 306 and 307.

Drainage areas for MPs 301, 302, and 303 are 47.5 acres with 38.8 acres of impervious areas. Drainage areas for MP 304, 306, and 307 are 513.1 acres with 282.5 acres of impervious areas and 230.6 acres of maintained turf or undeveloped areas. Additional direct drainage area to outfall 003 accounts for an additional 161.4 acres, 20.1 of which are impervious. Based on AECOM's delineation the estimated total drainage area for outfall 003 is 722 acres, with an impervious acreage of 341 acres.

Outfall 006 – This outfall discharges to Cabin Branch and is located at the discharge from stormwater basin B11. Runoff from portions of the BWI facility associated with industrial activities (the general aviation fuel terminal), and non-industrial activities (Long Term B parking lots) discharges via outfall 006. MP 601 is located at the discharge from the oil/water separator associated receiving runoff from the portion of the drainage area associated with a regulated industrial activity (fueling). Stormwater discharge from the oil water separator is reportedly infrequent. The drainage area for MP 601 is approximately 0.1 acres and is 100% impervious. Based on AECOM's delineation the total drainage area for outfall 006 is estimated as 17 acres, with an impervious acreage of 13 acres.

Outfall 007 – This outfall discharges to Sawmill Creek and receives stormwater runoff from portions of the property located in the Muddy Bridge Branch drainage area. Runoff discharge via outfall 007 includes areas of the BWI facility associated with industrial activities (aircraft deicing pads, maintenance buildings, fueling station, and airside facilities including most of Runway 15L-33R and 4-22, Taxiways O, S, B, C and U), and non-industrial activities (portions of airport Long Term B parking lots, and additional facilities including General Aviation Complex, hangars, and commercial buildings). Existing SWM facilities include three detention basins (B12, B14, and B15), 30 infiltration trenches, 115 catch basins, and 8 swales. Outfall 007 is located at the discharge from stormwater basin B12 prior to entering the headwaters of Muddy Bridge Branch. Based on AECOM's delineation the total drainage area for this outfall is estimated as 463 acres, with an impervious acreage of 276 acres.

2.0 METHODOLOGY

2.1 SOURCE IDENTIFICATION

Nutrient source identification for this analysis focuses on sources of nutrients that meet the following two criteria:

- The source is associated with industrial activities regulated under the BWI individual NPDES permit for stormwater associated with industrial activities, and
- The source has exposure to precipitation and/or runoff under routine operating conditions.

This identification of potential nutrient sources and development of a nutrient material balance associated with regulated industrial activities at BWI relies entirely on the existing and available data sources.

2.2 DATA SOURCES AND USES

Information including but not limited to documents, monitoring data, and mapping, was compiled from MAA and from other sources (**Table 1**). The collected data were used to identify industrial activities, the potential exposure of such activities to precipitation and runoff, the identification of BMPs that may reduce nutrient discharges from the site, and to quantify nutrient use and discharge for regulated industrial activities at BWI.

2.3 ESTIMATION METHODS

The material balance was developed using the following basic equations:

$$\text{Equation 1 Source Load: } N_S \text{ or } P_S \text{ (in lbs/yr)} = (\text{Prod}) * (N_{\text{PROD}} \text{ or } P_{\text{PROD}}) * (Cx)$$

Where: N_S or P_S = Annual source load of nitrogen or phosphorus in lbs/yr.
 Prod = Annual quantity of nutrient containing product applied in tons or gallons.
 N_{PROD} or P_{PROD} = fraction of TN or TP contained in the product by weight or volume.
 Cx = appropriate unit conversion factors.

$$\text{Equation 2 Export Load: } N_{\text{EXP}} \text{ or } P_{\text{EXP}} = (N_S \text{ or } P_S) * (R_1) * (R_2)$$

Where: N_{EXP} or P_{EXP} = Annual export load of nitrogen or phosphorus in lbs/yr.
 N_S or P_S = Annual source load of nitrogen or phosphorus in lbs/yr.
 R_1 = percentage of source recovery; recovered prior to discharge to drainage system.
 R_2 = percentage removal in structural BMPs.

BMP effectiveness was determined based on the reported nutrient treatment efficiencies for the BMPs as provided in the MDE NPDES Permit Guide (MDE, 2011).

Certain assumptions regarding the location and distribution of chemical applications and recovery rates for applied chemicals were made. Assumptions are described in detail in Section 5.0. Detailed calculations used to estimate loads are provided in Appendix A. The Appendix A tables including annotations regarding assumptions made, where appropriate.

2.4 MONITORING DATA

Nutrient data were collected as part of routine NPDES discharge monitoring at two outfalls (003 and 007) for four quarters between 2013 and 2014. There are three primary limitations to the use of these data to serve as a relative check to the export load estimates derived from Equation 2 and/or to estimate nutrient loads exclusively associated with industrial activities. First, outfalls 003 and 007 receive stormwater runoff from portions of the BWI facility which are not associated with industrial activities. Second, outfall 003 is located downstream of natural wetlands, which may modify the export load, although such modification would not be counted for as treatment by BWI. And finally, the grab samples by their nature represent a snap shot of conditions at the time of sample collection, and therefore are not necessarily representative of long-term discharge conditions.

Nutrient concentration and daily load (pounds per day; lbs/d) as reported in Discharge Monitoring Reports (DMRs) by BWI are discussed in Section 4.2.

Table 1. Primary Data Sources and Uses

Data	Source	Date of Acquisition	Purpose
Aerial Imagery	MAA, MD iMap ^a	2011	Base mapping
Stormwater conveyance system mapping	MAA	Provided in 2011	Base mapping
Wetlands	MAA, DNR ^b	Provided in 2011	Base mapping
BWI SWPPP	MAA, EA (2011)	Downloaded from JETS in 2011	Identification of industrial activities, potential nutrient sources, potential exposure and identification of BMPs
10-DP-2546 / NPDES MA0063371 permit	MAA	Downloaded from JETS in 2011	Permit conditions, identification of industrial activities
Discharge Monitoring Reports	MAA	Downloaded from JETS in 2014	Stormwater discharge sampling data
10-DP-2546 / NPDES MA0063371 Permit Renewal Application	MAA	December 2014	Identification of industrial activities, potential nutrient sources, potential exposure and identification of BMPs
Material Safety Data Sheets for Aircraft and Runway Deicing	MAA (via email)	December 2014	Identification of nutrient content in deicing materials
Deicing Chemical Composition	Chemical Manufacturers	December 2014	Identification of nutrient content in deicing materials
Deicing Chemical Composition	Scientific and gray literature	December 2014	Identification of nutrient content in deicing materials
Deicing Event Based Application Info 2009-2014	MAA	December 2014	Material balance for aircraft and runway deicing activities
Annual Deicing Review reports for 2009-10, 2010-11, 2011-2012, 2012-2013 and 2013-2014 Deicing Seasons	MAA	Downloaded from JETS in 2014	Material balance for aircraft and runway deicing activities

Notes:

a- MD iMap – Map services that can be connected through ArcGIS server located at <http://mairmap.towson.edu/arcgis/services>

b - DNR – MD Department of Natural Resources geospatial data center

3.0 IDENTIFICATION OF NUTRIENT SOURCES

3.1 SIGNIFICANT EXPOSED MATERIALS

According to information contained in the SWPPP, the majority of the significant exposed materials, excluding actual aircraft and runway deicing applications, are located within five of the drainage areas (Table 2). However, not all are associated with industrial activities regulated under the Permit (10-DP-2546).

Table 2. Significant Exposed Material Storage for Regulated Industrial Activities by Drainage Area

Drainage Area	Significant Materials Exposed ¹	Industrial Activities ²	Regulated Outfall
Sachs Branch	<i>Deicing fluid, alkaline cleaner, paints, waste oil, fuel, salt</i>	Deicing, , aircraft, ground vehicle and equipment maintenance, salt storage	Outfall 003; MPs 301, 302, 303 and 304
Muddy Bridge Branch	<i>Deicing fluid, waste deicing fluid, waste fuel</i>	Aircraft deicing, aircraft, ground vehicle and equipment maintenance	Outfall 007
Stony Run Watershed	Drums of used oil filters, detergents, used oil, and waste fuel at the Consolidated Rental Car Facility (CRCF) site	None	NA
Kitten Branch	<i>Diesel fuel, drums of detergents</i>	Aircraft, ground vehicle and equipment maintenance and cleaning	Outfall 003, MPs 306 and 307
Piney Run	Drums of solvents and cleaners at the CRCF bus maintenance facility	Ground vehicle maintenance (bus maintenance)	NA

Notes:

¹ Significant Materials Exposed: those significant materials with potential exposure to precipitation and runoff as identified in the BWI SWPPP (EA, 2011). Materials shown in italics are associated with industrial activities

² Industrial activities: include industrial activities as regulated under Permit #10-DP-2546 which include aircraft and runway deicing operations, aircraft, ground vehicle and equipment maintenance and cleaning and airport aircraft and ground vehicle fueling.

The quantity and location of exposed materials may vary over time; and often materials may be stored temporarily prior to use or disposal. A site visit was completed on December 9, 2014. During this site visit, selected locations associated with industrial activities were reviewed, and revealed no significant outdoor storage of materials that would result in exposure of significant materials to precipitation or runoff. Established BMPs are implemented, as detailed in the SWPPP which largely minimize or eliminate exposure of most materials and waste products.

3.2 INDUSTRIAL ACTIVITIES AND ASSOCIATED SOURCE MATERIALS

The potential to for exposure to precipitation and/or runoff associated with normal facility operations is identified for each, as is the potential to include phosphorus or nitrogen containing compounds. Designated

equipment and facility areas are inspected on a monthly basis for compliance with good housekeeping and other applicable control measures.

Each regulated industrial activity is briefly discussed below with respect to its potential as a nutrient source, exposure to precipitation and runoff, and potential for export nutrients to regulated outfalls. Where known or believed to be a source of nutrients an estimate of nutrient content is provided based on available information. In some cases, exact content is not known, and estimates are provided based on information available for similar materials; estimates are documented in the table notes.

3.3 RUNWAY DEICING OPERATIONS

Runway deicing activities may be a significant source of nutrients (i.e., may contribute more than 50 lbs/yr of TN or TP) in stormwater discharges at BWI.

Activity Description: Application of deicing agents to runways, taxiways ramps, and aprons.

Drainage Areas/Outfalls: Outfalls 003 (internal monitoring points 306 and 307) and 007. Approximately 3% to 10% of the treated runways, taxiways and aprons occur within the following additional drainage areas: Signal Branch, Bowden Branch, Fork Branch, Irving Branch, and Southwest Branch. Less than 1% of the treated areas occur in other drainage areas (including tributaries of Sawmill Creek and Cabin Branch).

Chemicals Used/Waste Generated: Potassium acetate (liquid) and sodium acetate (solid); See **Appendix A, Table A1** for details regarding deicing compounds used.

Potential for Exposure: Deicing chemicals are applied to the runway, taxiway, aprons and ramps and are exposed to precipitation and runoff.

Nutrients: Potentially significant source. Corrosion inhibitors used in deicing compounds often contain both TN and TP. Manufacturer's data on TP and TN content in potassium acetate and sodium acetate products used at BWI were not available. Literature data were reviewed and a TP concentration of 86 part per million (ppm) in potassium acetate deicing agents was reported by Levelton Engineering Ltd. (1998). Other data regarding specific TP or TN content for potassium acetate were not found in the literature. Documentation regarding the TP content in sodium acetate deicing agents was not found in a review of available literature. However, corrosion inhibitors reportedly account for less than 1 percent of the product by weight for the Cryotech NAAC® and Alpine RF-11 (potassium acetate) (see MSDS in **Appendix B**). While not all corrosion inhibitors contain phosphate it is assumed for conservativeness that those used in the Cryotech and Alpine products (sodium acetate and potassium acetate) are phosphate based (either H_3PO_4 or K_3PO_4) and are present at 0.05% by weight or 500 ppm. Depending on the corrosion inhibitor used, this would suggest an approximate phosphate concentration between 70 and 160 ppm, consistent with the literature reported value for potassium acetate of 86 ppm. An average concentration of 90 ppm was assumed for both the potassium acetate and sodium acetate runway deicers. Per the Cryotech Environmental Safety Datasheet for NAAC® (Cryotech, 2015), the product does not contain nitrogen. The TN content in potassium acetate deicing agents was not found in literature. One source anecdotally reported a potassium acetate product as containing no nitrogen. It is assumed that the nitrogen content in runway deicing agents is small (<10 ppm).

BMPs: Stormwater discharges from outfalls 003 and 007 receive treatment by a number of stormwater treatment systems (basins, infiltration, and swales) prior to discharge to the receiving water. Runway deicing is undertaken in accordance with the BWI Deicing Management plan (Limno Tech, 2009) to select deicing compounds which reduce environmental impacts and which serves to reduce the application of runway deicing chemicals.

Potential for Nutrient Discharge: Nutrients associated with deicing chemicals are discharged to the storm drainage system. Such discharges are treated via a series of stormwater treatment systems prior to discharge to the receiving water.

3.4 AIRCRAFT DEICING OPERATIONS

Aircraft deicing activities may be a significant source of nutrients (i.e., may contribute more than 50 lbs/yr of TN or TP) in stormwater discharges at BWI.

Activity Description: Application of deicing agents to aircraft during defrosting and deicing events.

Drainage Areas/Outfalls: Outfalls 003 (MPs 306 and 307) and 007.

Chemicals Used/Waste Generated: Propylene glycol (various manufacturers and formulations); See **Appendix A, Table A1** for details regarding deicing compounds used.

Potential for Exposure: Deicing chemicals are exposed to precipitation and runoff associated with aircraft deicing and defrosting activities. Deicing agents applied to the aircraft remain exposed to precipitation throughout aircraft taxi and take off. Deicing chemicals are stored in bulk storage tanks with appropriate secondary containment.

Nutrients: Potentially significant source. Corrosion inhibitors used in deicing compounds often contain both TN and TP. Phosphorus concentrations vary considerably, ranging from <1 – 10 ppm in Type IV deicing agents and from 240 – 800 ppm in Type I deicing agents (concentrates), based on information available from product manufacturers (See **Appendix A; Table A-1**). Nitrogen content in Type IV deicing agents was typically low (<5 ppm); nitrogen content in Type I deicing agents varied widely from <5 to 140 ppm.

BMPs: Aircraft deicing occurs at designated deicing pads equipped with glycol recovery systems which are activated during declared deicing events in accordance with the BWI Deicing Management Plan (Limno-Tech, 2009). The glycol recovery system is actuated during deicing events. Deicing runoff (stormwater and glycol) are collected and disposed to the Patapsco Wastewater Treatment Plant under an Industrial User permit issued by Baltimore County.. Glycol recovery is achieved using Glycol Recovery Vehicles (GRVs) and the diversion and collection of stormwater runoff during declared deicing events. GRVs are the primary collection mechanism for frost deicing activities. The glycol recovery system is not actuated during defrosting events. The annual average discharge of glycol to streams based on continuous monitoring during each deicing season was 6.5% (over the last 5 years).

In addition, stormwater discharges from outfalls 003 and 007 receive treatment by a number of stormwater treatment systems (basins, infiltration, and swales) prior to discharge. Good housekeeping measures are implemented including source reduction, materials management and use tracking and management of deicing runoff.

Potential for Nutrient Discharge: Nutrients associated with deicing chemicals are discharged to the storm drainage system. Such discharges are treated via a series of stormwater treatment systems prior to discharge to the receiving water.

3.5 AIRCRAFT, GROUND VEHICLE AND EQUIPMENT MAINTENANCE

Aircraft and ground vehicle maintenance activities are not a significant source of nutrients in stormwater discharges at BWI.

Activity Description: Aircraft, ground vehicle and equipment maintenance activities including ground vehicle and equipment, painting/stripping, floor washdowns, and storage areas for equipment awaiting maintenance.

Drainage Areas/Outfalls: Outfalls 003 (MP 301) and 007

Chemicals Used/Waste Generated: Antifreeze, oil, grease, oil filters, cleaning solutions, solvents, batteries, hydraulic and transmission fluids, paints, pavement deicing agents (sand, salt, sodium acetate).

Potential for Exposure: Materials and wastes associated with maintenance activities are stored indoors or in sealed containers with secondary containment, where appropriate. Aircraft, ground vehicle and equipment maintenance activities are undertaken indoors, with the exception of compressor oil changes which occur outdoors. There is a potential for exposure during loading/unloading and storage of materials/wastes in the event of a spill or release. However, there is typically no exposure of materials or wastes during normal maintenance operations. Salt and sand applied for deicing may be exposed to precipitation and runoff.

Nutrients: Oils and greases (raw and waste) will contain negligible TP and may contain small amounts of TN. Ururahy et al (1998) report concentrations of TP in oily sludge at <0.03 mg/L, and TN concentrations of 17.0 mg/L. Compressor oils may contain both phosphorus and nitrogen, though content by weight is typically less than 1% and 4%, respectively. Some automotive antifreeze may contain TP associated with corrosion inhibitors or other additives, although phosphate free coolants are also available. Nitrate-nitrite concentrations in some coolants may be as high as 4200 ppm. Hydraulic and transmission fluids may also contain phosphate (used as a corrosion inhibitor). Sand applied for traction control on some airside paved surfaces may also contain phosphorus. Source specific data regarding nutrient content in sand used at BWI is not available. However, literature sources cite concentrations ranging from 5 to 55 ppm (NYSOAG, 2002; MPCA, 2003). Typical nitrogen content of sand and salt used for deicing was not found in a review of available literature, and is assumed to be negligible (<10 ppm). Pavement deicing agents used by tenants in work areas is comparatively small, and not believed to be a significant source of nutrients.

BMPs: A number of non-structural BMPs are used to minimize risks of drips, leaks and spills. Secondary containment is provided where appropriate/required for storage of maintenance products and wastes. Good housekeeping measures are implemented including performing maintenance activities indoors or in covered areas if practicable, maintaining an organized inventory of material used in the maintenance areas, and draining all parts of fluids and store with secondary containment under cover prior to disposal. Floor wash water is not directed to storm drains. Street sweeping is used to reduce the amount of accumulated sand on paved surfaces from deicing activities.

Potential for Nutrient Discharge: Negligible; the potential for nutrient discharge is negligible during normal vehicle and equipment maintenance with implementation of BMPs which eliminate or substantially reduce any potential exposure.

3.6 AIRCRAFT, GROUND VEHICLE AND EQUIPMENT CLEANING

Aircraft and ground vehicle cleaning activities are not a significant source of nutrients in stormwater discharges at BWI.

Activity Description: Aircraft, ground vehicle and equipment cleaning operations including washing, cleaning and degreasing activities.

Drainage Areas/Outfalls: Outfalls 003 (MP 301).

Chemicals Used/Waste Generated: Oil and grease, solvents, cleaning solutions; pavement deicing agents (salt, sand)

Potential for Exposure: Materials and wastes associated with cleaning activities are stored indoors or in sealed containers with secondary containment, where appropriate. Most aircraft and ground vehicle cleaning activities are undertaken in designated areas. There is a potential for exposure during loading/unloading and storage of cleaning materials/wastes in the event of a spill. Salt and sand applied for deicing may be exposed to precipitation and runoff.

Nutrients: Some cleaning solutions may contain phosphorus.

BMPs: A number of non-structural BMPs are used to minimize risks of drips, leaks and spills, including using designated areas, utilizing dry washing techniques where possible, recycling wash water or discharging appropriately, and keeping catch basins covered during cleaning. Street sweeping is used to reduce the amount of accumulated sand on paved surfaces from deicing activities.

Potential for Nutrient Discharge: Negligible; the potential for discharge is negligible during normal vehicle and equipment cleaning with implementation of BMPs.

3.7 AIRCRAFT AND GROUND VEHICLE FUELING

Aircraft and ground vehicle fueling operations are not a source of nutrients in stormwater discharges at BWI.

Activity Description: Aircraft and ground vehicle fueling operations, including fuel delivery and storage, aircraft/vehicle fueling, and apron/floor washdown.

Drainage Areas/Outfalls: Outfalls 003 (MP 301), outfall 006 (MP 601), and outfall 007.

Chemicals Used/Waste Generated: Diesel and jet fuels. Conventional road salt and/or sand may be applied to paved surfaces associated with aircraft and ground vehicle fueling areas.

Potential for Exposure: There is no exposure of fuels to precipitation and runoff during normal fuel storage; potential exposure exists for drips/leaks and spills associated with fueling operations. Salt and sand applied for deicing may be exposed to precipitation and runoff.

Nutrients: Negligible. Phosphorus content in diesel fuel, including fuel additives, is limited to a maximum of 0.001% to avoid interferences with equipment after combustion. Likewise, nitrogen content in non-combusted fuel is negligible.

BMPs: Fuel is stored in closed tanks with secondary containment. Berms or curbing areas are installed around fueling areas. No direct discharge of stormwater from fuel storage areas occurs; Precipitation is retained within the secondary containment system, and only discharged after being deemed non-contaminated in accordance with established procedures. Runoff from fueling operations is treated via oil/water separators prior to discharge to the storm drainage system. A number of non-structural BMPs are used to minimize risks of drips, leaks and spills during fuel transfers. Absorbent materials and/or vacuum equipment are used for spills. Proper equipment for fuel dispensing and tank monitoring are installed to prevent spills, leaks and overflows. Inspections and trainings are carried out regularly. In addition, stormwater discharges from outfalls 006 and 007 receive treatment through stormwater treatment systems (basins, infiltration, or swales) prior to discharge. Street sweeping is used to reduce the amount accumulated sand on paved surfaces from deicing activities.

Potential for Nutrient Discharge: Negligible; stormwater runoff from fueling areas is treated prior to discharge to treat potential discharges associated with drips, leaks or minor spills. Nutrient content in fuels is negligible.

4.0 NUTRIENT MATERIAL BALANCE

4.1 NUTRIENT LOADS FROM REGULATED INDUSTRIAL ACTIVITIES AT BWI

Of the potential nutrient sources associated with regulated industrial activities reviewed in Section 3, runway and aircraft deicing compounds are the only significant sources of nutrients identified which have significant potential exposure to precipitation and runoff. Other sources including aircraft, ground vehicle and equipment maintenance and cleaning as well as aircraft and ground vehicle fueling operations are undertaken with appropriate structural and non-structural BMPs to avoid/minimize exposure during normal activities, and with appropriate collection and disposal of wastes. As such, such sources are expected to have negligible contribution to nutrient loads at BWI.

The nutrient source loads associated with industrial activities are summarized in **Table 3**; detailed calculations are provided in **Appendix A, Tables A-4.1 and A-4.2**. As noted in the NPDES permit condition, source loads less than <50 lbs/yr are not required to be addressed in this analysis. Nutrient source loads and BMP reductions are provided by source area discharging to various structural BMPs in each drainage area in **Tables 3 and 4**, and are illustrated in the material balance (**Figure 3**). Detailed calculations of source area loads and reductions, and export loads are provided in **Appendix A, Table A-6**. Assumptions associated with these estimates are detailed in **Section 5**, and are also included in table annotations in **Appendix A**.

Nutrient source loads associated with salt and sand applications for deicing in areas of industrial activities are less than 50 lbs/yr (**Table 3**), and as such are not addressed in the detailed estimates of load by drainage area/outfall or illustrated in **Figure 3**. Average source loads for runway and aircraft deicing agents exceed 50 lbs/yr (**Table 3**). Therefore, nutrients associated with aircraft and runway deicing addressed in the detailed estimates of source loads and discharge loads by watershed and regulated outfall (see **Table 4**).

On a site-wide basis, total estimated average TP and TN source loads associated with aircraft and runway deicing were 1,059 and 143 lbs/yr, respectively (**Table 4**). Average annual TP and TN export loads after treatment (including both glycol recovery and treatment in structural BMPs) were 472 and 64 lbs/yr, respectively (**Table 4**). Based on the load estimates developed for this assessment, aircraft deicing represents the single largest source of TP and TN source loads (84% and 87%, respectively) associated with regulated industrial activities at BWI. Aircraft deicing agents account for 74% and 77% of the export loads for TP and TN, respectively. And, Type I deicing agents account for more than 99% of the aircraft deicing TP and TN source loads.

Average nutrient source loads within the Muddy Bridge Branch drainage area (associated with outfall 007) accounted for approximately 55% of the total site-wide loads; loads from the Kitten Branch drainage area (associated with outfall 003) were 41% of the site wide load. The remaining 4% of the nutrient loads were associated with several smaller drainage areas receiving runoff from runways, taxiways or aprons (**Table 4; Figure 3**). Approximately 46% of the TP and TN associated with industrial activities are discharged via outfall 007 and approximately 46% of the TP and TN is discharge via outfall 003. The remaining 8% of the TP and TN loads are discharged from other drainage areas.

As noted in Section 5, the development of the above estimates incorporate a number of assumptions, and as such actual site wide and individual drainage area loads may differ from the estimates provided. Actual

source and export loads are also highly dependent on weather conditions (number of declared deicing events, frequency and duration of events requiring defrosting, duration of deicing season, precipitation (type, event duration, event intensity, event frequency, and time between events). As such, significant intra- and inter-annual variation is to be expected in both source and export loads.

Also of note is the fact that aircraft deicing agent nutrient content varied by as much as one (1) order of magnitude where manufacturer data were available. Nutrient data were not available for numerous aircraft deicing agents; data were available for only two of four Type I products and two of five Type IV deicing agents. For example, the minimum estimated TP source load for aircraft deicing agents is 215 lbs/yr and the maximum 1855 lbs/yr; the average used for the purposes of load estimates is 898 lbs/yr. Therefore, the actual nutrient content of Type I and Type IV deicing products used at BWI may not be accurately represented by the averages content used for this analysis, and estimated loads (source and export) could be 0.25 to 2.0 times the load estimates reported here.

The average estimated TP and TN removal from glycol recovery and structural BMPs (infiltration and stormwater basins) was 55%. This removal efficiency is a conservative estimate of reductions on a site wide basis, because non-structural BMPs including disconnected pavement, swales, pavement sweeping have not been accounted for in this analysis. Therefore, actual total nutrient reductions from source loads are expected to be greater than those used for the purpose of this assessment.

4.2 OUTFALL 003 AND 007 NUTRIENT EXPORT

Table 5 summarizes quarterly nutrient concentration data collected by MAA for outfalls 003 and 007 as required by and in accordance with the Permit. No nutrient monitoring is required at the MP 601 for outfall 006. Copies of the DMRs are provided in **Appendix C** for reference. Grab samples are collected during storm events for nutrient analysis. The TP and TN data collected (concentrations and estimated daily loads) represent a snap shot of conditions at the particular time of sampling.

Total phosphorus and total nitrogen are measured in grab samples collected once per quarter at outfalls 003 and 007. At outfall 003, the average TN concentration was 1.26 mg/L, and the average TP concentration was 0.40 mg/L. Concentrations were somewhat lower at outfall 007, with an average TN concentration of 1.01 mg/L and TP concentration of 0.33 mg/L.

The daily load of TP, as reported in the quarterly DMRs, ranged from 0.8 to 70.5 lbs/day with a mean of 34.4 lbs/d for outfall 003; the reported average daily TP loads at outfall 007 ranged from 1.8 to 24.9 lbs/d with a mean of 9.2 lbs/d (**Table 5; Appendix C**). The average daily load of TN ranged from 4.0 to 256.4 lbs/d with a mean of 123.8 lbs/d for outfall 003; and ranged from 9.0 to 111.8 lbs/d with a mean of 35.3 lbs/d for outfall 007. These load estimates derived from quarterly grab samples would reflect the TP and TN loads from all on-site and off-site contributing drainage areas to each outfall at the time of sample collection. For comparison, the average daily loads for nutrients associated with industrial activities are estimated at approximately 1.3 lbs/d TP via outfalls 003 and 007, and <0.2 lbs/d TN at outfalls 003 and 007. Because only limited monitoring data are available and because grab samples reflect conditions at the time of sampling as well as the conservative assumptions made in estimating nutrient loads from industrial sources, it is difficult to draw specific conclusions about the fraction of nutrients contributed by industrial activities.

Table 3. Estimated Maximum, Minimum and Average Annual Nutrient Source Load Associated with Industrial Activities (by Source)

Deicing Agent	Max TP Source Load (lbs/yr) ¹	Min TP Source Load (lbs/yr) ¹	Avg TP Source Load (lbs/yr) ¹	Max TN Source Load (lbs/yr) ¹	Min TN Source Load (lbs/yr) ¹	Avg TN Source Load (lbs/yr) ¹
Aircraft Deicing						
Type I Aircraft Deicer	1847	215	895	323	4	125
Type IV Aircraft Deicer	8	0	2	4	0	1
Runway Deicing						
Potassium Acetate	287	11	89	18	2	10
Sodium Acetate	206	16	74	13	2	8
Other Deicing						
Sand	8	0	3	1	0	1
Salt	10	0	1	4	0	2

Notes:

See Tables A-4.2 and A-4.3 for detailed load calculations.

Bold text identifies loads in excess of 50 lbs/yr.

(1) Source load estimates do not include any reductions associated with glycol recovery or structural BMPs.

Table 4. Estimated Annual Average Nutrient Source and Export Loads Associated with Industrial Activities (By Regulated Outfall or Drainage Area)

Deicing Agent	Average Total Phosphorus			Average Total Nitrogen		
	Source Load (lbs/yr) ¹	Load After Treatment (lbs/yr) ²	Total Load Reduction (%) ³	Source Load (lbs/yr) ¹	Load After Treatment (lbs/yr) ²	Total Load Reduction (%) ³
Outfall 003	430	216	50%	58	29	50%
Runway Deicing	73	64	12%	8	7	13%
Aircraft Deicing	357	152	57%	50	22	56%
Outfall 007	580	215	63%	80	30	63%
Runway Deicing	41	17	59%	5	2	60%
Aircraft Deicing	539	198	63%	76	28	63%
Other Drainage Areas	49	41	16%	5	5	0%
Runway Deicing	49	41	16%	5	5	0%
Totals	1,059	472	55%	143	64	55%

Notes:

See Tables A-6 for detailed export load calculations by source and drainage area.

Subtotals and totals may not equal sum of individual components due to rounding

(1) Source load estimates do not include any reductions associated with glycol recovery or structural BMPs.

(2) After treatment (export) loads account for reductions associated with glycol recovery (aircraft deicing only) and treatment in structural BMPs.

Table 5. Quarterly Average Nutrient Concentration and Daily Load Data- Outfalls 003 and 007 (From DMRs supplied by MAA)

Quarter	Outfall 003				Outfall 007			
	TP (mg/l)	TP (lbs/d)	TN (mg/l)	TN (lbs/d)	TP (mg/l)	TP (lbs/d)	TN (mg/l)	TN (lbs/d)
4 th Quarter 2013	0.64	5.9	1.17	10.8	0.54	5.0	0.98	9.1
1 st Quarter 2014	0.21	0.8	1.07	4.0	0.19	1.8	0.94	9.0
2 nd Quarter 2014	0.43	60.3	1.60	224.2	0.36	24.9	1.62	111.8
3rd Quarter 2014	0.33	70.5	1.20	256.4	0.22	5.1	0.49	11.4
Average	0.40	34.5	1.26	123.8	0.33	9.2	1.01	35.3

All concentrations and loads are taken from DMRs supplied by MAA to AECOM. Concentrations are based on a single grab sample collected during a storm event within each quarter.

5.0 ASSUMPTIONS AND LIMITATIONS

The identification of nutrient sources and estimation of nutrient loads presented in this document involve a number of important assumptions and have certain limitations which are identified below:

Products and Product Application

1. Runway deicing product application occurs at various locations within multiple drainage areas. For the purpose of this analysis, application rates are assumed equal for all such areas. Actual application rates may vary based on runway usage and/or if application rates vary for runways versus taxiways and aprons. However, more specific details are not deemed necessary for this basic nutrient source identification.
2. Aircraft deicing product application occurs at numerous deicing pads and designated locations at Piers A, B and C within multiple drainage areas. For the purpose of this analysis, total application rates are assumed proportional to the number of lanes (for deicing pads) or lane equivalents (for Piers A, B and C). Actual application rates may vary based on different pad/pier area application. More specific details are not deemed necessary for this basic nutrient source identification.
3. Deicing program summary information does not provide a breakdown of material use by product for aircraft deicing, but rather reports quantities for the two primary classes (Type I and Type IV) of aircraft deicers.
4. BWI reports the percentage and total quantities of Type I and Type IV deicers used. For the purposes of this analysis, it was assumed that Type I and Type IV deicers are used in equal proportion within all deicing pads/pier areas.
5. Nutrient content of products was obtained from manufacturers or manufacturer's literature where possible. However, such information was not available for all products used.
6. Nutrient content of products used at BWI (where manufacturing data was available) varied by two orders of magnitude in some cases. Maximum, minimum and average reported content are provided in **Appendix A**. The number of manufacturers reporting nutrient content data was very

small. Products for which data were not available are assumed to be consistent with those where data were available, and are assumed to be adequately represented by the average content.

7. Glycol recovery is accomplished by a combination of collection pits, trench/drainage collection and the use of Glycol Recovery Vehicles (GRVs). For the purposes of this analysis, glycol recovery (as a percent of total applied) is assumed to be equal for all designated deicing pads and areas. Actual recovery efficiencies may vary.
8. Source specific nutrient content data for salt and sand used at BWI are not available. Literature data were used (See Appendix A, Table A-2).

Source Areas

1. Aircraft deicing occurs at designated deicing pads or locations within the outfall 003 and 007 drainage areas. Glycol recovery is implemented during deicing events. BWI reports the total percentage of aircraft deicers applied within the outfall 003 and 007 drainage areas. Further breakdown by designated deicing pad/area was approximated based on the number of aircraft lanes or equivalent area (for deicing occurring at Piers A, B and C). Actual quantities of product used may not be proportionate to available lanes or equivalent area.
2. Runway deicing as used herein includes deicing of runways, taxiways and aprons. Application of deicing agents was assumed to be proportional to the surface area (in acres) of treated runways, taxiways and aprons occurring within each drainage area and for each area discharging to different stormwater BMPs. Actual application rates for different runway, apron or taxiways may not be uniform. (See Appendix A, Table A-4.1)
3. Areas of industrial activities without exposure of significant source materials were assumed to have a negligible contribution of nutrients (reported as zero).
4. With the exception of glycol recovery associated with aircraft deicing, 100% of applied deicing agents are assumed to be washed off impervious surfaces and into the drainage system.

Stormwater Treatment BMPs

1. BMPs, primarily including infiltration systems and stormwater basins, provide treatment of stormwater runoff from areas with regulated industrial activities as well as from other non-industrial activities and areas.
2. AECOM identified 88 structural BMPs (including stormwater ponds, infiltration practices, and sand filters) that provide water quality benefits related to nutrients for runoff from various portions of the BWI property (including both industrial and non-industrial activity areas).
3. BMP treatment effectiveness for TN and TP were based on the MDE NPDES Permit Guide (MDE, 2011) and the impervious area runoff volume treated. The volume of runoff treated varies depending on when the BMP was constructed; those constructed prior to 2002 were required to provide treatment of the first ½ inch of runoff versus the 1-inch of runoff that is currently required by state regulations.
4. For BMPs in series, the downstream BMPs were assumed to provide the stated level of removal on the remaining load discharged from the upstream BMP.

5. Only treatment associated with infiltration systems and stormwater ponds was accounted for in this analysis. BMPs receiving runoff from industrial activity areas which have no exposure of materials to precipitation and runoff are not included in this analysis.
6. Treatment (i.e., nutrient load reduction) associated overland flow, disconnected pavement and swales were not taken into account, but would provide additional nutrient reductions beyond those identified in this report.
7. Average glycol recovery was assumed to be equivalent for all aircraft deicing areas. Actual recovery rates may vary.

General

1. The estimation of annual nutrient source and export loads incorporate a number of assumptions (as noted above) and were developed to estimate average annual conditions. Therefore, actual loads associated with industrial activities (primarily deicing activities) may differ from the estimates provided herein.
2. Differences in precipitation events (frequency, duration, and timing) and weather conditions influence nutrient source and export loads. Intra- and inter-annual differences in precipitation and weather conditions may result in source and/or export loads which differ considerably from the estimates presented herein.

6.0 CONCLUSIONS

Nutrient (TP and TN) sources associated with regulated industrial activities at BWI were identified and the source and export loads quantified using available information and data. The following summarizes key conclusions from this assessment:

Nutrient Sources

1. Regulated industrial activities other than aircraft and runway deicing contribute negligible quantities of nutrients because of lack of exposure to precipitation and runoff and/or negligible nutrient content in significant materials used.
2. Aircraft and runway deicing products contain both phosphorus and nitrogen. Phosphorus content is often associated with corrosion inhibitors added to the deicing products.

Nutrient Loads

1. Total estimated TP and TN source loads associated with industrial activities were 1,060 and 143 lbs/yr, respectively.
2. Average annual TP and TN export loads after treatment (including both glycol recovery and treatment in structural BMPs) were 472 and 63 lbs/yr, respectively.
3. Aircraft deicing represents the single largest source of TP and TN source loads (84% and 87%, respectively) associated with regulated industrial activities at BWI. Runway deicing accounts for 16% to 13% of the TP and TN source loads.
4. Type I aircraft deicing agents account for 99.7% and 99.2% of the aircraft deicing TP and TN source loads, respectively.
5. Aircraft deicing agents account for 74% and 78% of the export loads for TP and TN, respectively.

6. Site-wide estimated nutrient load reduction was 55% for TP and TN.
7. Approximately 55% of the site-wide nutrient source loads are generated within the Muddy Bridge Branch drainage area; and approximately 46% of the site-wide TP and TN export loads are discharged via outfall 007 to Muddy Bridge Branch.
8. Approximately 41% of the site-wide nutrient source loads are generated within the Kitten Branch drainage area; and approximately 46% of the site-wide export load is discharge via outfall 003 to Kitten Branch.
9. Runway deicing contributes nutrients to several additional drainage areas (Southwest Branch, Signal Branch, Irving Branch and Fork Run). These drainage areas account for approximately 4% of the source loads and 8% of the export loads.

Estimate Uncertainty and Load Variability

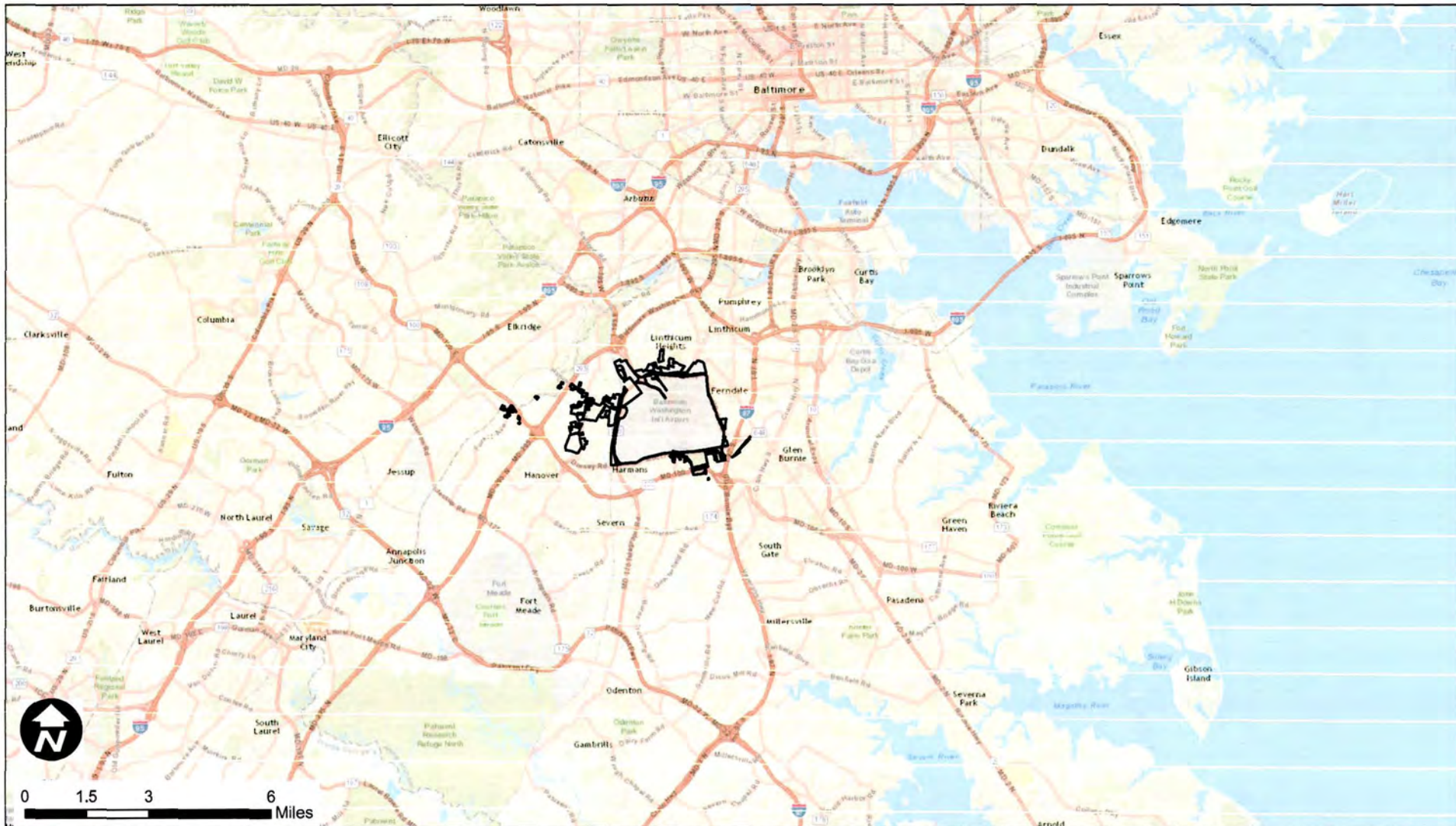
1. Estimates of source loads are based on available data and numerous assumptions (detailed in Section 5). Actual source and export loads associated with industrial activities may differ from the averages reported herein.
2. Based on the minimum and maximum product content data available for aircraft deicing, actual loads could be as little as 0.25 the estimated average load or as much as 2.0 times the estimated average load.
3. Nutrient loads are influenced by a number of external factors including weather conditions and precipitation which vary within and between years. These factors would contribute to intra and inter-annual variability in loads.
4. Despite the stated assumptions and limitations of the nutrient source load quantification, the estimates provided here provide a reasonable planning level estimate of potential nutrient loads associated with BWI's regulated industrial activities.

7.0 REFERENCES

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FIGURES



Legend

— Property Boundary

BALTIMORE/WASHINGTON INTERNATIONAL THURGOOD MARSHALL AIRPORT

IDENTIFICATION OF NUTRIENT SOURCES

Maryland State Discharge Permit # 99-DP-2546 (NPDES Permit # MD0063371)

FIGURE 1: SITE LOCUS

Date: 12/23/2014

Project No: 60336442

AZCOM



Legend

- Permitted Outfall
- Infiltration Practice
- Roadway/Runway
- Stormwater Point Feature
- Watershed Boundary
- SWM Structure
- Fence Line
- Stormwater Line Feature
- Wetland
- Filtration Practice
- Building

Activity Spot Legend

- Fueling Station
- Outside Manufacturing Area
- Vehicle/Equipment Washing
- Vehicle/Equipment Maintenance
- Waste Management Areas
- AST
- Outside Storage Areas for Raw Materials
- Other Activities (Specify)
- Aircraft Deicing Area
- Runway/Taxiway/Apron Deicing Area

BALTIMORE/WASHINGTON INTERNATIONAL
THURGOOD MARSHALL AIRPORT

IDENTIFICATION OF NUTRIENT SOURCES

Maryland State Discharge Permit # 99-DP-2546
(NPDES Permit # MD0063371)

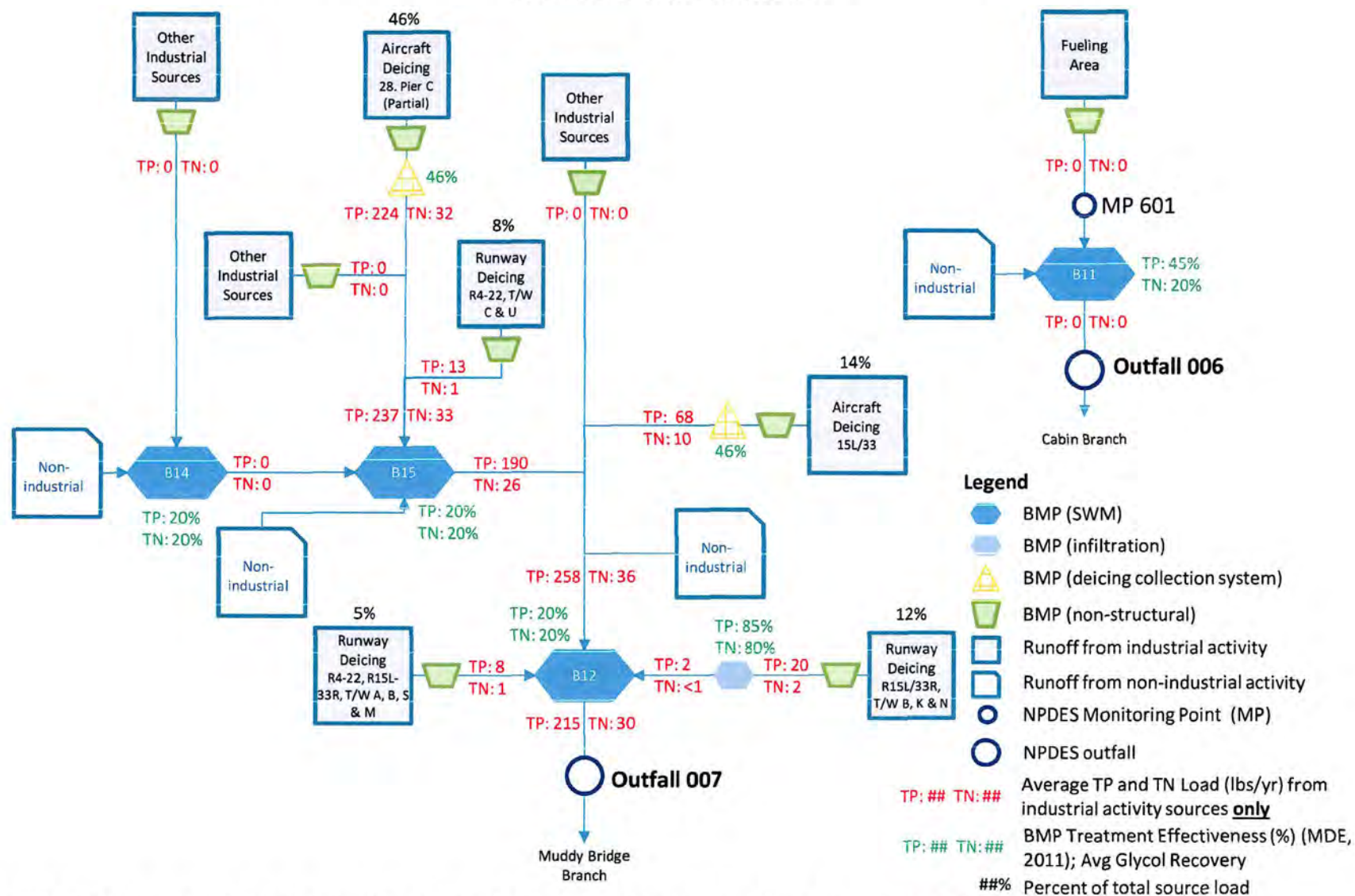
FIGURE 2: DRAINAGE AREA AND SOURCE ACTIVITY MAP

Date: 01/26/2015

Project No: 60339442

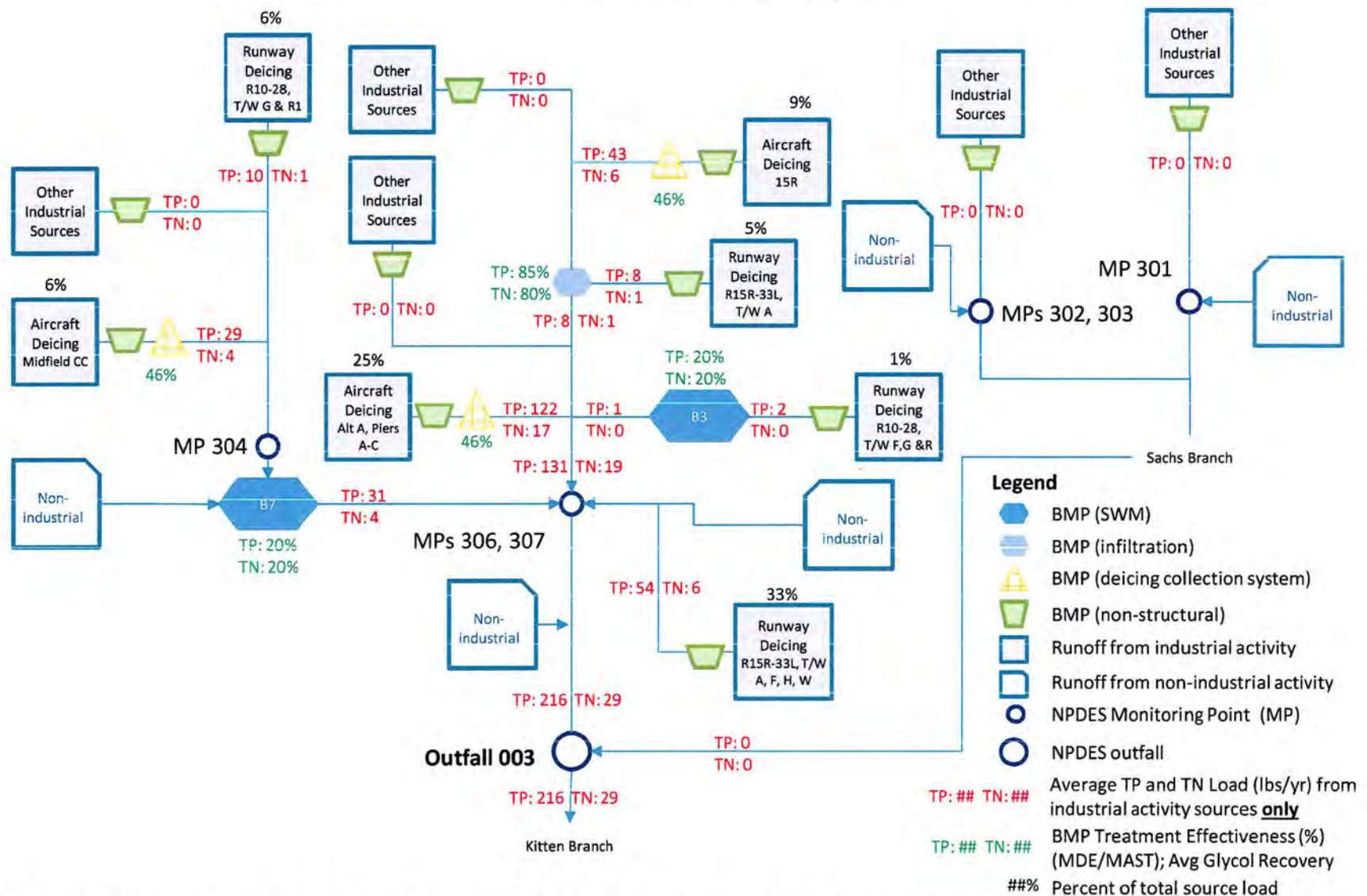
ACCOM

**Figure 3.1 Nutrient Material Balance Associated with Industrial Activities
NPDES Outfalls 006 and 007**

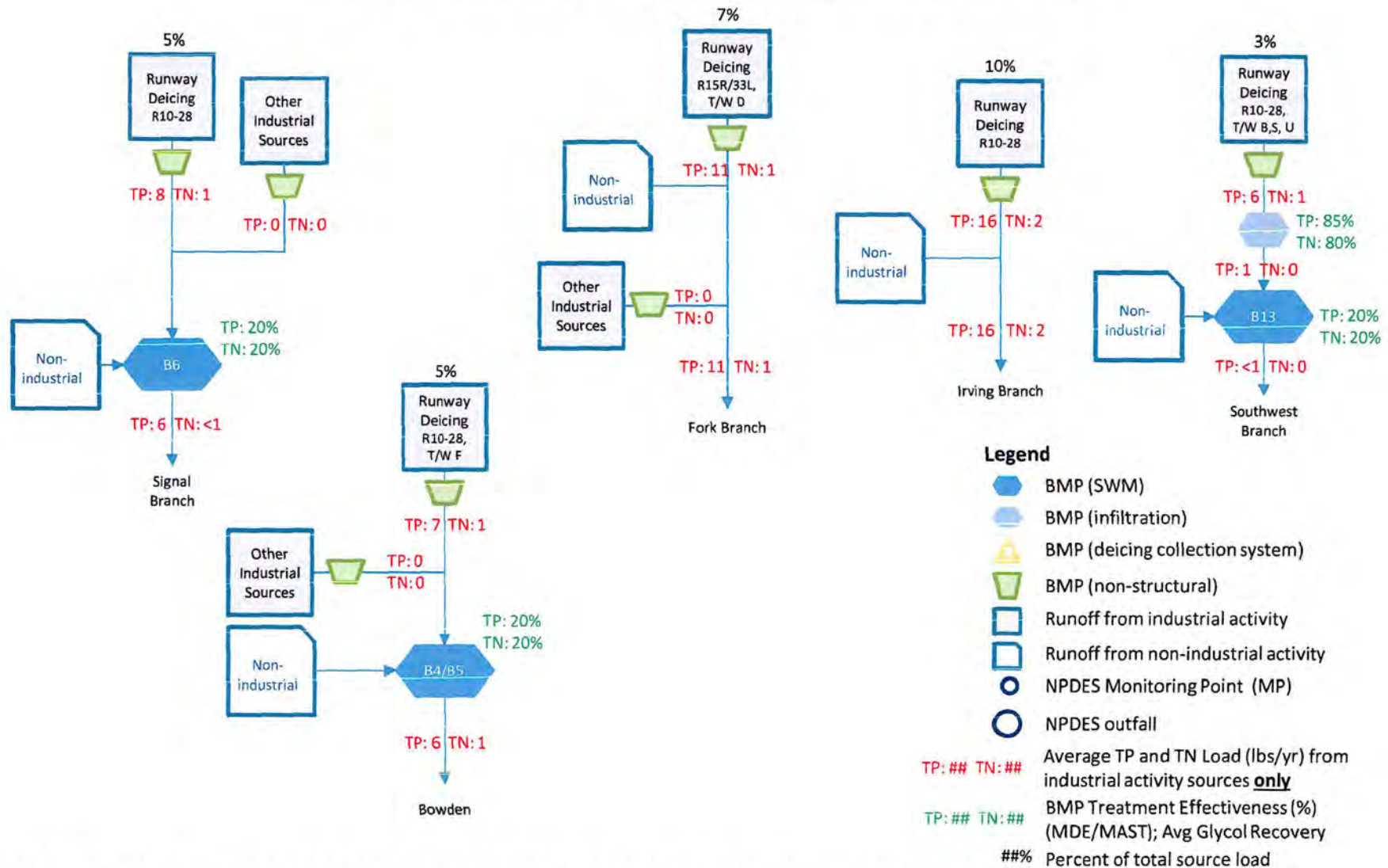


Note: BMPs which only treat runoff from non-industrial activities and/or other industrial sources are not shown or quantified on this figure

**Figure 3.2 Nutrient Material Balance Associated with Industrial Activities
NPDES Outfall 003**



**Figure 3.3 Nutrient Material Balance Associated with Industrial Activities
Other Sawmill Creek and Stone Run Watershed Drainage Areas**



Note: BMPs which only treat runoff from non-industrial activities and/or other industrial sources are not shown or quantified on this figure

APPENDIX A

Supporting Data and Calculations

Table A-1.	Deicing Chemicals Used
Table A-2.	Deicing Nutrient Content - Literature Compilation
Table A-3.	Deicing Chemical Application and Recovery Information - Last 5 Deicing Seasons
Table A-4.1.	Runway and Aircraft Deicing Contributing Areas
Table A-4.2.	Deicing Chemical Total Phosphorus Source Calculations
Table A-4.3.	Deicing Chemical Total Nitrogen Source Calculations
Table A-5.	Structural Stormwater BMPs Treating Industrial Sources of Nutrients
Table A-6.	Industrial Activity Nutrient Loads by Source and Drainage Area

Table A-1
Deicing Chemicals Used
Baltimore/Washington International Thurgood Marshall Airport

Entity	Product Name ⁽¹⁾	Description	Composition	Manufacturer Provided Nutrient Content ⁽²⁾	Manufacturer	Manufacturer Contact
ASIG	UCAR(TM) PG Aircraft Deicing Fluid Concentrate	Type I Aircraft Deicing Fluid	Propylene glycol (88%) Water	Total Phosphorus 800 ppm, Total Nitrogen 140 ppm	Dow	The Dow Chemical Company 2030 Willard H. Dow Center Midland, MI 48674 800-258-2436 SDSQuestion@dow.com
ASIG	UCAR(TM) FlightGuard(TM) AD-49	Type IV Aircraft Deicing Fluid	Propylene glycol (52.85%) Deionized water	Total Phosphorus <10 ppm, Total Nitrogen <5 ppm	Dow	Same as above
FedEx	POLAR GUARD® ADVANCE	Type IV Aircraft Deicing/ Anti-icing Fluid	Propylene glycol (50%) Water and other proprietary ingredients (50%)	Manufacturer indicated they are unable to supply the requested information.	Cryotech	Cryotech Deicing Technology 6103 Orthoway Fort Madison, IA 52627 (800)346-7237 deicers@cryotech.com
FedEx	CRYOTECH POLAR PLUS®-CONCENTRATE	Type I Aircraft Deicing/ Anti-icing Fluid	Propylene glycol (88%) Water (12%) Corrosion inhibitors (<1%)	Manufacturer indicated they are unable to supply the requested information.	Cryotech	Same as above
FedEx	KILFROST ABC -S PLUS (being phased out)	Type IV Aircraft Deicing Fluid	Propylene glycol (50% min.)	Phosphate < 1ppm, Nitrate < 2ppm	Cryotech	NA
Southwest	MAXFLIGHT 04 Type IV	Type IV Aircraft Deicing Fluid	1,2-Propanediol (40-60%)	No response received from manufacturer	Clariant	4000 Monroe Road Charlotte, NC, 28205 Telephone No.: +1 704 331 7000
Southwest	OCTAFLO EF Concentrate	Type I Aircraft Deicing Fluid	1,2-Propanediol (70-90%)	No response received from manufacturer	Clariant	Same as above
Southwest	CRYOTECH NAAC	Solid Runway Deicer; used in work area	Anhydrous sodium acetate (97%) Corrosion inhibitors (<1%) Inert materials (3%)	Manufacturer indicated they are unable to supply the requested information.	Cryotech	Same as Fedex info above
United	Kilfrost DF PLUS (88)	Type I Aircraft Deicing Fluid	Monopropylene glycol (88% min.)	Phosphate 240 ppm, Nitrate < 5 ppm	Kilfrost Ltd/ Clariant	Albion Works HAL TWHISTLE Northumberland NE49 0HJ ENGLAND (01434)1320332 kilfrost.haltwhistle@virgin.net
United	SAFEWING MP IV LAUNCH	Type IV Aircraft Deicing Fluid	1,2-Propanediol (>1%)	No response received from manufacturer	Clariant	See Southwest listing above for Clariant contact

Table A-1
Deicing Chemicals Used
Baltimore/Washington International Thurgood Marshall Airport

Entity	Product Name ⁽¹⁾	Description	Composition	Manufacturer Provided Nutrient Content ⁽²⁾	Manufacturer	Manufacturer Contact
MAA	CRYOTECH NAAC	Runway Deicer - Solid	Anhydrous sodium acetate (97%) Corrosion inhibitors (<1%) Inert materials (3%)	Manufacturer indicated they are unable to supply the requested information.	Cryotech	Same as Fedex info above
MAA	Alpine RF-11	Runway Deicing Fluid	Potassium acetate (50%) Water (50%) Corrosion inhibitors (<1%)	No information available from manufacturer	Nachurs Alpine Solutions	421 Leader Street Marion, OH 43302
MAA	Sand	Traction control	Sand	No source specific nutrient data available	Purchased from York Building Supply	Mason-Dixon Sand & Gravel – Belvedere Plant 1079 Belvidere Rd., Port Deposit, MD 21904 OR Mason-Dixon Sand & Gravel – Cecil Plant 340 Perrylawn Dr., Port Deposit MD 21904
MAA	Salt	Pavement Deicing - solid	Sodium chloride	No source specific nutrient data available	Various	Various

Notes

(1) Product MSDS supplied by BWI (See Appendix B)

(2) Nutrient content data as supplied by manufacturers based on request for data where not otherwise available in MSDS or publically available technical product literature

Table A-2
Deicing Nutrient Content - Literature Compilation
Baltimore/Washington International Thurgood Marshall Airport

Deicing Agent Type	Product/Material	Composition	TP (ppm)	TN (ppm)	Data Source ¹
Other	Liquid KA (50%)	Potassium Acetate (50%)	86.0	NA	Levelton Engineering Ltd., 1998
Salt	Westchester County salt	Sodium Chloride	4.0	NA	NYSOAG, 2002
Salt	Westchester County salt	Sodium Chloride	1.0	NA	NYSOAG, 2002
Salt	Delaware Co. NYSDOT salt	Sodium Chloride	2.0	NA	NYSOAG, 2002
Salt	Leslie Foods, Newark, California	Sodium Chloride	0.2	NA	Goldman and Hoffman, 1975
Salt	Minnesota Road Salt 4.6 (2)	Sodium Chloride	4.6	NA	Biesboer and Jacobson, 1993
Salt	Hennepin County Hwy Dept Salt 1 (6)	Sodium Chloride	1.0	NA	Oberts, 1986
Salt	Utah Salt Co., Salt Lake City, Utah 0.231 (3)	Sodium Chloride	0.2	NA	Goldman and Hoffman, 1975
Salt	Southwest Salt Co., Los Angeles, California 25.696 (3)	Sodium Chloride	25.7	NA	Goldman and Hoffman, 1975
Salt	Morton Salt Co., Burlingame, California 0.872 (3)	Sodium Chloride	0.9	NA	Goldman and Hoffman, 1975
Salt	West Coast Salt & Milling Co., Bakersfield, California	Sodium Chloride	14.3	NA	Goldman and Hoffman, 1975
Sand	Westchester County sand	Sand	53.4	NA	NYSOAG, 2002
Sand	Sand Westchester County sand	Sand	55.0	NA	NYSOAG, 2002
Sand	Hennepin County Hwy Dept Sand	Sand	4.7	NA	Oberts, 1986
Salt:Sand	Delhi (10:90)	Sodium Chloride: Sand	113.5	NA	NYSOAG, 2002
Salt:Sand	Walton Village (10:90)	Sodium Chloride: Sand	55.0	NA	NYSOAG, 2002
Salt:Sand	Bloomville salt/sand (10:90)	Sodium Chloride: Sand	163.5	NA	NYSOAG, 2002
Salt:Sand	Colorado Salt/Sand (18:82)	Sodium Chloride: Sand	1.9	NA	Lewis, 1999
Salt:Sand	Colorado Salt/Sand (5:95)	Sodium Chloride: Sand	3.2	NA	Lewis, 1999
Salt:Sand	Colorado Salt/Sand (5:95)	Sodium Chloride: Sand	2.5	NA	Lewis, 1999

(1) See References Section in Report for Data Source full citations

Table A-3
Deicing Chemical Application and Recovery Information - Last 5 Deicing Seasons
Baltimore/Washington International Thurgood Marshall Airport

Deicing Season	Glycol Applied (gallons)	Percent of fluid used for Defrosting	Percent of fluid used for Deicing	Fluid used for Deicing events	Type I Applied (gallons)	Type IV Applied (gallons)	Percent Type I	Percent Type IV	Percent Applied in Outfall 003 Drainage Area ¹	Percent Applied in Outfall 007 Drainage Area ¹
2009/2010	204,283	13.2%	86.8%	177,298	180,648	23,634	88.4%	11.6%	40.6%	59.4%
2010/2011	252,847	15.0%	85.0%	215,027	230,704	22,143	91.2%	8.8%	32.0%	68.0%
2011/2012	103,195	49.7%	50.3%	51,946	93,730	9,464	90.8%	9.2%	55.5%	44.5%
2012/2013	176,603	16.1%	83.9%	148,245	153,179	23,424	86.7%	13.3%	37.4%	62.6%
2013/2014	286,825	18.5%	81.5%	233,841	241,271	45,555	84.1%	15.9%	40.2%	59.8%
Maximum	286,825	49.7%	86.8%	233,841	241,271	45,555	91.2%	15.9%	55.5%	68.0%
Minimum	103,195	13.2%	50.3%	51,946	93,730	9,464	84.1%	8.8%	32.0%	44.5%
Average	204,750	22.5%	77.5%	165,271	179,906	24,844	88.3%	11.7%	41.1%	58.9%

Notes

Unless otherwise noted, data presented here was supplied by MAA in Event Based Application Info 1999-2014.xls

(1) From annual deicing reports (MAA, 2010; MAA, 2011; MAA, 2012; MAA, 2013; MAA, 2014)

Table A-3
Deicing Chemical Application and Recovery Information - Last 5 Deicing Seasons
Baltimore/Washington International Thurgood Marshall Airport

Deicing Season	Glycol Recovered (gallons)	Glycol Recovered (%)	Glycol Discharge to Outfall 003 (%)	Glycol Discharged to Outfall 007 (%)	Additional Glycol Reduction - Outfall 003 (gallons)2	Additional Glycol Reduction - Outfall 007 (gallons)2	Additional Glycol Reduction - Outfall 003 (%)
2009/2010	114,781	56.2%	16.7%	7.2%	22,487	44,427	25%
2010/2011	148,408	58.7%	6.3%	2.1%	28,323	67,408	27%
2011/2012	17,376	16.8%	3%	1.4%	45,723	37,561	53%
2012/2013	75,209	42.6%	5%	6.5%	34,624	56,262	34%
2013/2014	155,869	54.3%	10%	5.0%	40,994	69,729	31%
Maximum	155,869	58.7%	16.7%	7.2%	45,723	75,007	35%
Minimum	17,376	16.8%	3.3%	1.4%	22,487	37,561	26%
Average	102,329	45.7%	8.3%	4.4%	34,430	54,935	34%

Table A-3
Deicing Chemical Application and Recovery Information - Last 5 Deicing Seasons
Baltimore/Washington International Thurgood Marshall Airport

Deicing Season	Additional Glycol Reduction - Outfall - 007 (%)	Potassium Acetate (gallons)	Urea (tons)	Sodium Acetate (tons)	Sodium Formate (tons)	Sand (tons)	Salt (tons)
2009/2010	50%	146,280	-	634	-	736	1,394
2010/2011	27%	93,086	-	390	-	368	1,766
2011/2012	53%	19,459	-	117	-	120	209
2012/2013	34%	112,206	-	309	-	45	424
2013/2014	31%	213,207	-	610	-	606	1,994
Maximum	53%	213,207	-	634	-	736	1,994
Minimum	27%	19,459	-	117	-	45	209
Average	39%	116,848	-	412	-	375	1,157

Table A-4.1
Runway and Aircraft Deicing Contributing Areas
Baltimore/Washington International Thurgood Marshall Airport

Drainage Area	Regulated Outfall	Runway Deicing Area ¹	% of Total Area
RUNWAY DEICING			
Bowden Branch	NA	15.2	4%
Cabin Branch	NA	0.4	0%
Fork Branch	NA	24.0	7%
Irving Branch	NA	32.8	9%
Kitten Branch 1	007	149.8	43%
To infiltration	007	23.8	7%
To B3	007	12.7	4%
To B7	007	15.5	4%
Direct to 007	007	97.8	28%
Muddy Bridge Branch	003	84.6	24%
To B12 from B15	003	38.2	11%
To B12	003	18.0	5%
To B12 from Infiltration	003	24.4	7%
Direct to 003	003	4.0	1%
Signal Branch	NA	16.7	5%
Southwest Branch	NA	11.7	3%
To B13 from Infiltration	NA	9.2	3%
To B13	NA	0.2	0%
Direct to SW Branch	NA	2.3	1%
Tributary of Sawmill Creek 1	NA	0.4	0%
Tributary of Sawmill Creek 2	NA	1.3	0%
Tributary of Sawmill Creek 3	NA	0.9	0%
All Runway Deicing		351.2	100%
Drainage Area	Regulated Outfall	Approx. % of Treatment Area ²	Est. % of Total Application ³
AIRCRAFT DEICING			
Kitten Branch	003	50%	41%
15 R (To Infiltration)	003	12%	9%
Midfield CC (To B7)	003	8%	6%
Alt A, Piers A-C (direct)	003	31%	25%
Muddy Bridge Branch	007	50%	59%
15L/33 (To B12)	007	12%	14%
Runway 28/Pier C (Partial) (To B15)	007	38%	46%
All Aircraft Deicing		100%	100%

Notes

- (1) From GIS measurements performed by AECOM based on runway/taxiway/apron areas within each BMP subdrainage area
- (2) Approximate percentage of treatment area based on treatment lanes or approximated lane equivalents for Piers A - C
- (3) Average aircraft deicing reported for Outfalls 003 and 007 from Table A-3; percentages to individual BMPs based on total drainage area applications adjusted for approximate % of treatment area within the drainage area.

Table A-4.2
Deicing Chemical Total Phosphorus Source Calculations
Baltimore/Washington International Thurgood Marshall Airport

Deicing Agent	Typical Percent Glycol (%) ⁽¹⁾	Max Applied (gallons) ⁽²⁾	Min Applied (gallons) ⁽²⁾	Avg Applied (gallons) ⁽²⁾	Max Applied (tons) ⁽⁴⁾	Min Applied (tons) ⁽⁴⁾	Avg Applied (tons) ⁽⁴⁾
Aircraft Deicing							
Type I Aircraft Deicer	88%	241,271	93,730	179,906	--	--	--
Type IV Aircraft Deicer	50%	45,555	9,464	24,844	--	--	--
Runway Deicing							
Potassium Acetate	NA	213,207	19,459	116,848	--	--	--
Sodium Acetate (runway)	NA	--	--	--	644	117	412
Other Deicing							
Sand ⁽³⁾	NA	--	--	--	74	5	38
Salt ⁽³⁾	NA	--	--	--	199	21	116

Notes

- (1) Typical percent glycol for deicing and anti-icing agents used in aircraft deicing/defrosting activities (see Table A-1)
- (2) Total pure glycol applied (gallons) as reported in annual deicing reports prepared by MAA and summarized in Deicing Program Summary data supplied by MAA (2009 - 2014)(See Table A-3); potassium acetate is reported as total gallons applied.
- (3) Salt and Sand - calculated as a percentage of the total applied to all pavement and roadways at BWI (as reported in annual deicing report); assumes that only 10% of the salt and sand is applied to areas associated with industrial activities (e.g., aircraft/vehicle maintenance and cleaning, aircraft/vehicle fueling) subject to regulation under the 10-DP-2546 permit. See Table A-2 for TP content information.
- (4) Runway and pavement deicing rates based on annual deicing program summary data supplied by MAA (2009 - 2014) (See Table A-3).
- (5) TP Content based on literature data (used for potassium acetate, sodium acetate, sand and salt)(See Tables A-1 and A-2; see also report Section 3.3)

Table A-4.2
Deicing Chemical Total Phosphorus Source Calculations
Baltimore/Washington International Thurgood Marshall Airport

Deicing Agent	Max	Min Product	Avg Product	Max Annual	Min Annual	
	Product TP Content (ppm) ⁽⁵⁾	TP Content (ppm) ⁽⁵⁾	TP Content (ppm) ⁽⁵⁾	TP Source Load (lbs/yr)	TP Source Load (lbs/yr)	Avg Annual TP Source Load (lbs/yr)
Aircraft Deicing						
Type I Aircraft Deicer	800	240	520	1847	215	895
Type IV Aircraft Deicer	10	1	6	8	0	2
Runway Deicing						
Potassium Acetate	160	70	90	287	11	89
Sodium Acetate (runway)	160	70	90	206	16	74
Other Deicing						
Sand ⁽³⁾	55	4.7	38	8	0	3
Salt ⁽³⁾	25.7	0.2	5	10	0	1

Notes

- (1) Typical percent glycol for deicing and anti-icing agents used in aircraft deicing/defrosting activities (see Table A-1)
- (2) Total pure glycol applied (gallons) as reported in annual deicing reports prepared by MAA and summarized in Deicing Program Summary data supplied by MAA (2009 - 2014)(See Table A-3); potassium acetate is reported as total
- (3) Salt and Sand - calculated as a percentage of the total applied to all pavement and roadways at BWI (as reported in annual deicing report); assumes that only 10% of the salt and sand is applied to areas associated with industrial activities (e.g., aircraft/vehicle maintenance and cleaning, aircraft/vehicle fueling) subject to regulation under the 10-DP-2546 permit. See Table A-2 for TP content information.
- (4) Runway and pavement deicing rates based on annual deicing program summary data supplied by MAA (2009 - 2014) (See Table A-3).
- (5) TP Content based on manufacturers information (where available) and/or literature data (used for potassium acetate, sand and salt)(See Tables A-1 and A-2)

Table A-4.3
Deicing Chemical Total Nitrogen Source Calculations
Baltimore/Washington International Thurgood Marshall Airport

Deicing Agent	Typical Percent Glycol (%) ⁽¹⁾	Max Applied (gallons) ⁽²⁾	Min Applied (gallons) ⁽²⁾	Avg Applied (gallons) ⁽²⁾	Max Applied (tons)	Min Applied (tons)	Avg Applied (tons)
Aircraft Deicing							
Type I Aircraft Deicer	88%	241,271	93,730	179,906	--	--	--
Type IV Aircraft Deicer	50%	45,555	9,464	24,844	--	--	--
Runway Deicing							
Potassium Acetate	NA	213,207	19,459	116,848	--	--	--
Sodium Acetate (runway)	NA	--	--	--	644	117	412
Other Deicing							
Sand ⁽³⁾	NA	--	--	--	74	5	38
Salt ⁽⁴⁾	NA	--	--	--	199	21	116

Notes

- (1) Typical percent glycol for deicing and anti-icing agents used in aircraft deicing/defrosting activities (see Table A-1)
- (2) Total pure glycol applied (gallons) as reported in annual deicing reports prepared by MAA and summarized in Deicing Program Summary data supplied by MAA (2009 - 2014)(See Table A-3); potassium acetate is reported as total gallons applied.
- (3) Salt and Sand - calculated as a percentage of the total applied to all pavement and roadways at BWI (as reported in annual deicing report); assumes that only 10% of the salt and sand is applied to areas associated with industrial activities (e.g., aircraft/vehicle maintenance and cleaning, aircraft/vehicle fueling) subject to regulation under the 10-DP-2546 permit. See Table A-2 for TP content information.
- (4) Runway and pavement deicing rates based on annual deicing program summary data supplied by MAA (2009 - 2014) (See Table A-3).
- (5) TN content data were not available for potassium acetate, sodium acetate, sand or salt. However, such concentrations are assumed to be negligible (<10 ppm) for the purpose of this analysis.

Table A-4.3
Deicing Chemical Total Nitrogen Source Calculations
Baltimore/Washington International Thurgood Marshall Airport

Deicing Agent	Max Product TN Content (ppm) ⁽⁵⁾	Min Product TN Content (ppm) ⁽⁵⁾	Avg Product TN Content (ppm) ⁽⁵⁾	Max Annual TN Source Load (lbs/yr)	Min Annual TN Source Load (lbs/yr)	Avg Annual TN Source Load (lbs/yr)
Aircraft Deicing						
Type I Aircraft Deicer	140	5	72.5	323	4	125
Type IV Aircraft Deicer	5	2	3.5	4	0	1
Runway Deicing						
Potassium Acetate	10	10	10	18	2	10
Sodium Acetate (runway)	10	10	10	13	2	8
Other Deicing						
Sand ⁽³⁾	10	10	10	1	0	1
Salt ⁽⁴⁾	10	10	10	4	0	2

Notes

- (1) Typical percent glycol for deicing and anti-icing agents used in aircraft deicing/defrosting activities (see Table A-1)
- (2) Total pure glycol applied (gallons) as reported in annual deicing reports prepared by MAA and summarized in Deicing Program Summary data supplied by MAA (2009 - 2014)(See Table A-3); potassium acetate is reported as total gallons applied.
- (3) Salt and Sand - calculated as a percentage of the total applied to all pavement and roadways at BWI (as reported in annual deicing report); assumes that only 10% of the salt and sand is applied to areas associated with industrial activities (e.g., aircraft/vehicle maintenance and cleaning, aircraft/vehicle fueling) subject to regulation under the 10-DP-2546 permit. See Table A-2 for TP content information.
- (4) Runway and pavement deicing rates based on annual deicing program summary data supplied by MAA (2009 - 2014) (See Table A-3).
- (5) TN content data were not available for potassium acetate, sodium acetate, sand or salt. However, such concentrations are assumed to be negligible (<10 ppm) for the purpose of this analysis.

Table A-5
Structural Stormwater BMPs Treating Industrial Sources of Nutrients
Baltimore/Washington International Thurgood Marshall Airport

BMP ID	BMP Type ¹	Associated Outfall	Industrial Source Area	Upstream BMP?	Downstream BMP?	TP Removal (%) ²	TN Removal (%) ²
B3	ED	003	Runway deicing	N	N	20	20
B7	ED	003	Runway deicing, aircraft deicing, other industrial sources	N	N	20	20
Multiple IP ³	IP	003	Runway deicing, aircraft deicing, other industrial sources	N	N	85	80
B12	ED	003	Runway deicing, aircraft deicing, other industrial sources	Y	N	20	20
B14	ED	007	Other industrial sources	N	Y	20	20
B15	ED	007	Runway deicing, aircraft deicing, other industrial sources	Y	Y	20	20
Multiple IP ³	IP	007	Runway deicing	N	Y	85	80
B11	WP	006	Other industrial sources	N	N	45	20
B4/B5	ED	NA	Runway deicing, other industrial sources	N	N	20	20
Multiple IP ³	IP	NA	Runway deicing	Y	N	85	80
B13	ED	NA		N	Y	20	20
B6	ED	NA	Runway deicing, other industrial sources	N	N	20	20

Notes

(1) BMP Types: ED = extended detention basin; IP = infiltration practice; WP = wet pond

(2) BMP removal based on MDE NPDES Guidelines (MDE, 2011)

(3) Multiple infiltration practice BMPs were not assumed to operate in series, although they may in some cases be operated in series

Table A-6
Industrial Activity Nutrient Loads by Source and Drainage Area
Baltimore/Washington International Thurgood Marshall Airport

Source Area	Outfall #	Applied Chemicals	Total Avg TP Load (lbs/yr) ¹	Total Avg TN Load (lbs/yr) ²	Source Area Percent of Total Load (%)	Source Area Avg TP Load (lbs/yr)	Source Area Avg TN Load (lbs/yr)
ALL AIRCRAFT DEICING	All	Type I and IV Aircraft Deicers	898	126	100.0%	--	--
<i>Deicing Pads/Areas to Outfall 003</i>	<i>003</i>	<i>Type I and IV Aircraft Deicers</i>	<i>--</i>	<i>--</i>	<i>41%</i>	<i>357</i>	<i>50</i>
Runway 15R	003	Type I and IV Aircraft Deicers	--	--	9%	79	11
Alt A, Piers A, B and C (partial)	003	Type I and IV Aircraft Deicers	--	--	25%	224	32
Midfield Cargo Complex	003	Type I and IV Aircraft Deicers	--	--	6%	54	8
<i>Deicing Pads/Areas to Outfall 007</i>	<i>007</i>	<i>Type I and IV Aircraft Deicers</i>	<i>--</i>	<i>--</i>	<i>59%</i>	<i>539</i>	<i>76</i>
Runway 28 Pad and Pier C (partial)	007	Type I and IV Aircraft Deicers	--	--	46%	413	58
Runway 15L/33	007	Type I and IV Aircraft Deicers	--	--	14%	126	18
ALL RUNWAY/TAXIWAY/APRON DEICING	All	Runway Deicers	163	18	100%	--	--
<i>Runway/Taxiway Deicing to Outfall 003</i>	<i>003</i>	<i>Runway Deicers</i>	<i>--</i>	<i>--</i>	<i>45%</i>	<i>73</i>	<i>8</i>
Portions of Runway 15R-33L (north) and Taxiways A	003	Runway Deicers	--	--	5%	8	1
Portions of Runway 10-28 (north) and Taxiways F, G & R	003	Runway Deicers	--	--	1%	2	0
Portions of Runway 10-28 (south) and Taxiways G and R1	003	Runway Deicers	--	--	6%	10	1
Portions of Runway 15R-33L (south) and Taxiways A, F, H and W	003	Runway Deicers	--	--	33%	54	6
<i>Runway/Taxiway Deicing to Outfall 007</i>	<i>007</i>	<i>Runway Deicers</i>	<i>--</i>	<i>--</i>	<i>25%</i>	<i>41</i>	<i>5</i>
Portions of Runway 4-22 and Taxiways C & U	007	Runway Deicers	--	--	8%	13	1
Portions of Runway 15L/33R and Taxiways B, K & N	007	Runway Deicers	--	--	12%	20	2
Portions of Runways 4-22 & R15L-33R and Taxiways A, B, S & M	007	Runway Deicers	--	--	5%	8	1
<i>Runway/Taxiway Deicing to Other DAs</i>	<i>Other</i>	<i>Runway Deicers</i>	<i>--</i>	<i>--</i>	<i>30%</i>	<i>49</i>	<i>5</i>
Runway 10-28 (south)	Signal Br	Runway Deicers	--	--	5%	8	1
Runway 10-28 (north), Taxiway F (west)	Bowden Br	Runway Deicers	--	--	5%	7	1
15R/33L, Taxiway D	Fork Br	Runway Deicers	--	--	7%	11	1
Runway 10-28 (south) east of Runway 4-22	Irving Br	Runway Deicers	--	--	10%	16	2
Runway 10-28 (north), Taxiways B, S and U	Southwest Br	Runway Deicers	--	--	3%	6	1
Misc Runways, Taxiways and Aprons	Other Minor	Runway Deicers	--	--	1%	1	0
SUMMARY BY REGULATED OUTFALL						0	0
Kitten Branch (Outfall 003)	003	Runway and Aircraft Deicers	--	--	--	430	58
To/from Infiltration	003	Runway and Aircraft Deicers	--	--	--	87	12
To/from B3	003	Runway Deicers	--	--	--	2	0
To/from B7	003	Runway and Aircraft Deicers	--	--	--	64	9
Direct	003	Runway and Aircraft Deicers	--	--	--	278	38
Muddy Bridge Branch (Outfall 007)	007	Runway and Aircraft Deicers	--	--	--	579	80
To B12 (from Inf, B15 and direct)	00	Runway and Aircraft Deicers	--	--	--	579	80

Notes

(1) See Table A-4.2

(2) See Table A-4.3

Table A-6
Industrial Activity Nutrient Loads by Source and Drainage Area
Baltimore/Washington International Thurgood Marshall Airport

Source Area	Avg Glycol Recovery (%)	Avg TP Load After Glycol Recovery (lbs/yr)	Avg TN Load After Glycol Recovery (lbs/yr)	Other Treatment BMPs	Cumulative BMP TP Removal (%)	Cumulative BMP TN Removal (%)	Avg TP Load After BMPs (lbs/yr)	Avg TN Load After BMPs (lbs/yr)
ALL AIRCRAFT DEICING	46%	487	69	SWM Basins, Infiltration	28%	28%	350	50
<i>Deicing Pads/Areas to Outfall 003</i>	46%	194	27	SWM Basins, Infiltration	22%	21%	152	22
Runway 15R	46%	43	6	Infiltration	85%	80%	6	1
Alt A, Piers A, B and C (partial)	46%	122	17	NA	0%	0%	122	17
Midfield Cargo Complex	46%	29	4	SWM Basin B7	20%	20%	23	3
<i>Deicing Pads/Areas to Outfall 007</i>	46%	292	41	SWM Basins	32%	32%	198	28
Runway 28 Pad and Pier C (partial)	46%	224	32	SWM Basins B15 and B12	36%	36%	143	20
Runway 15L/33	46%	68	10	SWM Basin B12	20%	20%	55	8
ALL RUNWAY/TAXIWAY/APRON DEICING	NA	NA		SWM Basins, Infiltration	25%	24%	122	14
<i>Runway/Taxiway Deicing to Outfall 003</i>	--	--	--	SWM Basins, Infiltration	13%	12%	64	7
Portions of Runway 15R-33L (north) and Taxiways A	--	8	1	Infiltration	85%	80%	1	0
Portions of Runway 10-28 (north) and Taxiways F, G & R	--	2	0	SWM B3	20%	20%	1	0
Portions of Runway 10-28 (south) and Taxiways G and R1	--	10	1	SWM B7	20%	20%	8	1
Portions of Runway 15R-33L (south) and Taxiways A, F, H and W	--	54	6	NA	0%	0%	54	6
<i>Runway/Taxiway Deicing to Outfall 007</i>	--	41	5	SWM Basins, Infiltration	58%	56%	17	2
Portions of Runway 4-22 and Taxiways C & U	--	13	1	SWM B15 and B12	36%	36%	8	1
Portions of Runway 15L/33R and Taxiways B, K & N	--	20	2	Infiltration, B12	88%	84%	2	0
Portions of Runways 4-22 & R15L-33R and Taxiways A, B, S & M	--	8	1	SWM B12	20%	20%	7	1
<i>Runway/Taxiway Deicing to Other DAs</i>	--	49	5	SWM Basins, Infiltration	16%	16%	41	5
Runway 10-28 (south)	--	8	1	SWM B6	20%	20%	6	1
Runway 10-28 (north), Taxiway F (west)	--	7	1	SWM B4/B5	20%	20%	6	1
15R/33L, Taxiway D	--	11	1	NA	0%	0%	11	1
Runway 10-28 (south) east of Runway 4-22	--	16	2	NA	0%	0%	16	2
Runway 10-28 (north), Taxiways B, S and U	--	6	1	Infiltration, B13	88%	84%	1	0
Misc Runways, Taxiways and Aprons	--	1	0	NA	0%	0%	1	0
SUMMARY BY REGULATED OUTFALL							0	0
Kitten Branch (Outfall 003)	NA	267	35	SWM Basins, Infiltration	19%	19%	216	29
To/from Infiltration	NA	51	7	Infiltration	85%	85%	8	1
To/from B3	NA	2	0	SWM B3	20%	20%	1	0
To/from B7	NA	39	5	SWM B7	20%	20%	31	4
Direct	NA	176	23	NA	0%	0%	176	23
Muddy Bridge Branch (Outfall 007)	NA	333	46	SWM Basins, Infiltration	35%	35%	215	30
To B12 (from Inf, B15 and direct)	NA	333	46	SWM B12	35%	35%	215	30

Notes

(1) See Table A-4.2

(2) See Table A-4.3

APPENDIX B**Deicing Agent Material Safety Data Sheets**

**Tenant Aircraft Deicing Agent –
Material Safety Data Sheets
(MSDS)**

- ASIG
- FedEx
- Southwest
- United



AS16

Material Safety Data Sheet

The Dow Chemical Company

Product Name: UCAR(TM) PG Aircraft Deicing Fluid Concentrate

Issue Date: 10/19/2009

Print Date: 03 Jan 2011

The Dow Chemical Company encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name

UCAR(TM) PG Aircraft Deicing Fluid Concentrate

COMPANY IDENTIFICATION

The Dow Chemical Company
2030 Willard H. Dow Center
Midland, MI 48674
USA

Customer Information Number:

800-258-2436

SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact:

989-636-4400

Local Emergency Contact:

989-636-4400

2. Hazards Identification

Emergency Overview

Color: Orange

Physical State: Liquid.

Odor: Sweet

Hazards of product:

No significant immediate hazards for emergency response are known.

OSHA Hazard Communication Standard

This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects

Eye Contact: May cause slight temporary eye irritation. Corneal injury is unlikely.

Skin Contact: Prolonged contact is essentially nonirritating to skin. Repeated contact may cause flaking and softening of skin. Material may be handled at elevated temperatures; contact with heated material may cause thermal burns.

Skin Absorption: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

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Inhalation: At room temperature, exposure to vapor is minimal due to low volatility; vapor from heated material or mist may cause respiratory irritation and other effects.

Ingestion: Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.

Effects of Repeated Exposure: In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

3. Composition Information

Component	CAS #	Amount
Propylene glycol	57-55-6	88.0 %
Water	7732-18-5	11.4 %

4. First-aid measures

Eye Contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

Skin Contact: Wash skin with plenty of water.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Ingestion: No emergency medical treatment necessary.

Notes to Physician: If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

Medical Conditions Aggravated by Exposure: Skin contact may aggravate preexisting dermatitis.

Emergency Personnel Protection: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

5. Fire Fighting Measures

Extinguishing Media: To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam.

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam.

Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

Unusual Fire and Explosion Hazards: This material will not burn until the water has evaporated. Residue can burn.

Hazardous Combustion Products: Under fire conditions some components of this product may decompose. The smoke may contain unidentified toxic and/or irritating compounds.

6. Accidental Release Measures

Steps to be Taken if Material is Released or Spilled: Small spills: Absorb with materials such as: Cat litter, Sawdust, Vermiculite, Zorb-all®. Collect in suitable and properly labeled containers. Large spills: Dike area to contain spill. Recover spilled material if possible. Contain spilled material if possible. See Section 13, Disposal Considerations, for additional information.

Personal Precautions: Keep unnecessary and unprotected personnel from entering the area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental Precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

7. Handling and Storage

Handling

General Handling: Product shipped/handled hot can cause thermal burns. Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Storage

Store in accordance with good manufacturing practices.

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Propylene glycol	WEEL	TWA Aerosol.	10 mg/m3

Personal Protection

Eye/Face Protection: Use safety glasses (with side shields). When handling hot material: Use chemical goggles. Wear a face-shield which allows use of chemical goggles, or wear a full-face respirator, to protect face and eyes when there is any likelihood of splashes. Eye wash fountain should be located in immediate work area.

Skin Protection: Wear clean, body-covering clothing. When handling hot material, protect skin from thermal burns. Selection of specific items will depend on the operation. When handling hot material, a safety shower should be located in the immediate work area.

Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Use gloves with insulation for thermal protection, when needed. Examples of preferred glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl chloride ("PVC" or "vinyl"). Avoid gloves made of: Polyvinyl alcohol ("PVA"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Respiratory Protection: Atmospheric levels should be maintained below the exposure guideline. When airborne exposure guidelines and/or comfort levels may be exceeded, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

Ingestion: Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

Engineering Controls

Ventilation: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

9. Physical and Chemical Properties

Physical State	Liquid.
Color	Orange
Odor	Sweet
Flash Point - Closed Cup	ASTM D93 none to 100°C (212 °F)
Flammable Limits In Air	Lower: No test data available Upper: No test data available
Autoignition Temperature	No test data available
Vapor Pressure	8.7 mmHg @ 20 °C
Boiling Point (760 mmHg)	125 °C (257 °F) Literature .
Vapor Density (air = 1)	1.9 Literature
Specific Gravity (H2O = 1)	1.045 Literature
Freezing Point	< -30 °C (< -22 °F) ASTM D1177
Melting Point	Not applicable to liquids
Solubility in water (by weight)	100 % @ 20 °C
pH	7 - 9 ASTM E70
Decomposition Temperature	No test data available
Evaporation Rate (Butyl Acetate = 1)	0.6

10. Stability and Reactivity

Stability/Instability

Thermally stable at recommended temperatures and pressures.

Conditions to Avoid: Some components of this product can decompose at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

Incompatible Materials: Avoid contact with: Strong acids. Strong bases. Strong oxidizers.

Hazardous Polymerization

Will not occur.

Thermal Decomposition

Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Aldehydes. Ethers. Alcohols. Organic acids.

11. Toxicological Information

Acute Toxicity

Ingestion

For component(s) tested. LD50, Rat 20,000 - 34,000 mg/kg

Skin Absorption

For component(s) tested. LD50, Rabbit > 20,000 mg/kg

Inhalation

For component(s) tested. LC50, 8 h, Vapor, Rat > 1,314 ppm

No deaths occurred following exposure to a saturated atmosphere.

Repeated Dose Toxicity

In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

Chronic Toxicity and Carcinogenicity

Contains component(s) which did not cause cancer in laboratory animals.

Developmental Toxicity

Contains component(s) which did not cause birth defects or any other fetal effects in lab animals.

Reproductive Toxicity

Contains component(s) which did not interfere with reproduction in animal studies. Contains

component(s) which did not interfere with fertility in animal studies.

Genetic Toxicology

In vitro genetic toxicity studies were negative for component(s) tested. Genetic toxicity studies in animals were negative for component(s) tested.

12. Ecological Information

ENVIRONMENTAL FATE

Data for Component: Propylene glycol

Movement & Partitioning

Bioconcentration potential is low (BCF less than 100 or log Pow less than 3). Potential for mobility in soil is very high (Koc between 0 and 50). Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Henry's Law Constant (H): 1.2E-08 atm*m3/mole Measured

Partition coefficient, n-octanol/water (log Pow): -0.92 Measured

Partition coefficient, soil organic carbon/water (Koc): < 1 Estimated.

Persistence and Degradability

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

Biodegradation may occur under anaerobic conditions (in the absence of oxygen).

Indirect Photodegradation with OH Radicals

Rate Constant	Atmospheric Half-life	Method
1.28E-11 cm3/s	10 h	Estimated.

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method
81 %	28 d	OECD 301F Test
96 %	84 d	OECD 308 Test

Biological oxygen demand (BOD):

BOD 5	BOD 10	BOD 20	BOD 28
69 %	70 %	86 %	

Chemical Oxygen Demand: 1.53 mg/mg

Theoretical Oxygen Demand: 1.68 mg/mg

ECOTOXICITY

Typical for this family of materials. Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

13. Disposal Considerations

All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Reclaimer, Incinerator or other thermal destruction device.

14. Transport Information

DOT Non-Bulk
NOT REGULATED

DOT Bulk
NOT REGULATED

IMDG
NOT REGULATED

ICAO/IATA
NOT REGULATED

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information

OSHA Hazard Communication Standard

This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	No
Delayed (Chronic) Health Hazard	No
Fire Hazard	No
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:

The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Component	CAS #	Amount
Propylene glycol	57-55-6	88.0%

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

WARNING: This product contains a chemical(s) known to the State of California to cause cancer.

Component	CAS #	Amount
Ethylene oxide	75-21-8	<= 0.02 PPM
Acetaldehyde	75-07-0	<= 6.0 PPB

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Issue Date: 10/19/2009

Formaldehyde	50-00-0	<= 4.0 PPB
1,4-Dioxane	123-91-1	<= 5.0 PPB

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

WARNING: This product contains a chemical(s) known to the State of California to cause birth defects or other reproductive harm.

Component	CAS #	Amount
Ethylene oxide	75-21-8	<= 0.02 PPM

US. Toxic Substances Control Act

All components of this product are on the TSCA inventory or are exempt from TSCA inventory requirements under 40 CFR 720.30

|| CEPA - Domestic Substances List (DSL)

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

16. Other Information

Hazard Rating System

NFPA	Health	Fire	Reactivity
	1	1	0

Recommended Uses and Restrictions

Aircraft delcing fluid We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact your sales or technical service representative.

Revision

Identification Number: 40431 / 1001 / Issue Date 10/19/2009 / Version: 3.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

N/A	Not available
WW	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ DES	Hazard Designation
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

The Dow Chemical Company urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have

Product Name: UCAR(TM) PG Aircraft Deicing Fluid Concentrate **Issue Date:** 10/19/2009

*obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current,
please contact us for the most current version.*



Material Safety Data Sheet

The Dow Chemical Company

Product Name: UCAR(TM) FlightGuard(TM) AD-49

Issue Date: 08/12/2010

Print Date: 22 Sep 2010

The Dow Chemical Company encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name

UCAR(TM) FlightGuard(TM) AD-49

COMPANY IDENTIFICATION

The Dow Chemical Company
2030 Willard H. Dow Center
Midland, MI 48674
USA

Customer Information Number:

800-258-2436

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact:

989-636-4400

Local Emergency Contact:

989-636-4400

2. Hazards Identification

Emergency Overview

Color: Green

Physical State: Liquid.

Odor: mild, sweet

Hazards of product:

Isolate area.

OSHA Hazard Communication Standard

This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects

Eye Contact: May cause slight temporary eye irritation. Corneal injury is unlikely.

Skin Contact: Prolonged contact is essentially nonirritating to skin. Repeated contact may cause flaking and softening of skin. Material may be handled at elevated temperatures; contact with heated material may cause thermal burns.

Skin Absorption: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

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Inhalation: At room temperature, exposure to vapor is minimal due to low volatility; vapor from heated material or mist may cause respiratory irritation and other effects.

Ingestion: Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.

Aspiration hazard: Based on physical properties, not likely to be an aspiration hazard.

Effects of Repeated Exposure: In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

3. Composition Information

Component	CAS #	Amount
Propylene glycol	57-55-8	52.85 %
Deionized water	7782-18-5	46.323 %

4. First-aid measures

Eye Contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

Skin Contact: Wash skin with plenty of water. Suitable emergency safety shower facility should be immediately available.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Ingestion: No emergency medical treatment necessary.

Notes to Physician: If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

Emergency Personnel Protection: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

5. Fire Fighting Measures

Extinguishing Media: To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam.

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam.

Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

Unusual Fire and Explosion Hazards: This material will not burn until the water has evaporated. Residue can burn.

Hazardous Combustion Products: Under fire conditions some components of this product may decompose. The smoke may contain unidentified toxic and/or irritating compounds. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide.

6. Accidental Release Measures

Steps to be Taken if Material is Released or Spilled: Small spills: Cat litter, Sawdust, Vermiculite, Zorb-all®. Collect in suitable and properly labeled containers. Large spills: Dike area to contain spill.

Recover spilled material if possible. Contain spilled material if possible. See Section 13, Disposal Considerations, for additional information.

Personal Precautions: Isolate area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental Precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

7. Handling and Storage

Handling

General Handling: Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion. Product shipped/handled hot can cause thermal burns.

Storage

Store in accordance with good manufacturing practices. Additional storage and handling information on this product may be obtained by calling your sales or customer service contact.

Shelf life: Use within
12 Months

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Propylene glycol	WEEL	TWA Aerosol.	10 mg/m3

Personal Protection

Eye/Face Protection: Use safety glasses (with side shields). When handling hot material: Use chemical goggles. Wear a face-shield which allows use of chemical goggles, or wear a full-face respirator, to protect face and eyes when there is any likelihood of splashes.

Skin Protection: Wear clean, body-covering clothing. When handling hot material, protect skin from thermal burns. Selection of specific items will depend on the operation.

Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Use gloves with insulation for thermal protection, when needed. Examples of preferred glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl chloride ("PVC" or "vinyl"). Avoid gloves made of: Polyvinyl alcohol ("PVA"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Respiratory Protection: Atmospheric levels should be maintained below the exposure guideline. When airborne exposure guidelines and/or comfort levels may be exceeded, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

Ingestion: Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

Engineering Controls

Ventilation: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit

requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

9. Physical and Chemical Properties

Physical State	Liquid.
Color	Green
Odor	mild, sweet
Odor Threshold	No test data available
Flash Point - Closed Cup	> 100 °C (> 212 °F) <i>Supplier</i>
Flammability (solid, gas)	Not applicable to liquids
Flammable Limits in Air	Lower: 2.6 %(V) <i>Literature</i> Upper: 12.6 %(V) <i>Literature</i>
Autoignition Temperature	371.0 °C (699.8 °F) <i>Supplier</i>
Vapor Pressure	0.1 hPa @ 20 °C <i>Supplier</i>
Boiling Point (760 mmHg)	> 100 °C (> 212 °F) <i>Supplier</i>
Vapor Density (air = 1)	No test data available
Specific Gravity (H2O = 1)	1.038 20 °C/20 °C <i>Calculated</i>
Freezing Point	-33 °C (-27 °F) <i>Supplier</i>
Melting Point	Not applicable to liquids
Solubility in water (by weight)	<i>Supplier</i> soluble in water
pH	6.5 - 7.5 <i>Supplier</i>
Decomposition Temperature	No test data available
Partition coefficient, n-octanol/water (log Pow)	No data available for this product.
Evaporation Rate (Butyl Acetate = 1)	< 0.5 <i>Estimated</i> .
Kinematic Viscosity	No test data available

10. Stability and Reactivity

Stability/Instability

Thermally stable at recommended temperatures and pressures.

Conditions to Avoid: Some components of this product can decompose at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

Incompatible Materials: Avoid contact with: Strong acids. Strong bases. Strong oxidizers.

Hazardous Polymerization

Will not occur.

Thermal Decomposition

Decomposition products depend upon temperature, air supply and the presence of other materials.

11. Toxicological Information

Acute Toxicity

Ingestion

Based on information for component(s): Propylene glycol. LD50, Rat > 20,000 mg/kg

Dermal

Based on information for component(s): Propylene glycol. LD50, Rabbit > 20,000 mg/kg

Inhalation

For component(s) tested. LC50, 8 h, Vapor, Rat > 1,314 ppm
No deaths occurred following exposure to a saturated atmosphere.

Eye damage/eye irritation

May cause slight temporary eye irritation. Corneal injury is unlikely.

Skin corrosion/irritation

Prolonged contact is essentially nonirritating to skin. Repeated contact may cause flaking and softening of skin. Material may be handled at elevated temperatures; contact with heated material may cause thermal burns.

Sensitization**Skin**

No relevant information found.

Respiratory

No relevant information found.

Repeated Dose Toxicity

In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

Chronic Toxicity and Carcinogenicity

Contains component(s) which did not cause cancer in laboratory animals.

Developmental Toxicity

Contains component(s) which did not cause birth defects or any other fetal effects in lab animals.

Reproductive Toxicity

Contains component(s) which did not interfere with reproduction in animal studies. Contains component(s) which did not interfere with fertility in animal studies.

Genetic Toxicology

In vitro genetic toxicity studies were negative for component(s) tested. Genetic toxicity studies in animals were negative for component(s) tested.

12. Ecological Information

ENVIRONMENTAL FATE**Data for Component: Propylene glycol****Movement & Partitioning**

Bioconcentration potential is low (BCF less than 100 or log Pow less than 3). Potential for mobility in soil is very high (Koc between 0 and 50). Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Henry's Law Constant (H): 1.2E-08 atm*m3/mole Measured

Partition coefficient, n-octanol/water (log Pow): -0.92 Measured

Partition coefficient, soil organic carbon/water (Koc): < 1 Estimated.

Persistence and Degradability

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

Biodegradation may occur under anaerobic conditions (in the absence of oxygen).

Indirect Photodegradation with OH Radicals

Rate Constant	Atmospheric Half-life	Method
1.28E-11 cm3/s	10 h	Estimated.

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method
81 %	28 d	OECD 301F Test
96 %	64 d	OECD 306 Test

Biological oxygen demand (BOD):

BOD 5	BOD 10	BOD 20	BOD 28
69 %	70 %	86 %	

Chemical Oxygen Demand: 1.53 mg/mg

Theoretical Oxygen Demand: 1.68 mg/mg

ECOTOXICITY

Typical for this family of materials. Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

13. Disposal Considerations

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Reclaimer. Incinerator or other thermal destruction device.

14. Transport Information

DOT Non-Bulk
NOT REGULATED

DOT Bulk
NOT REGULATED

IMDG
NOT REGULATED

ICAO/IATA
NOT REGULATED

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information**OSHA Hazard Communication Standard.**

This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	No
Delayed (Chronic) Health Hazard	No
Fire Hazard	No
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:
The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Component	CAS #	Amount
Propylene glycol	57-55-8	52.85%

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

US. Toxic Substances Control Act

All components of this product are on the TSCA inventory or are exempt from TSCA inventory requirements under 40 CFR 720.30

CEPA - Domestic Substances List (DSL)

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

16. Other Information

Hazard Rating System

NFPA	Health	Fire	Reactivity
	1	1	0

Recommended Uses and Restrictions

Aircraft deicing fluid. We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact your sales or technical service representative.

Revision

Identification Number: 1047478 / 1001 / Issue Date 08/12/2010 / Version: 1.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ DES	Hazard Designation
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

The Dow Chemical Company urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is

provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.



Material Safety Data Sheet

The Dow Chemical Company

Product Name: UCAR(TM) FlightGuard(TM) AD-49

Issue Date: 08/12/2010

Print Date: 22 Sep 2010

The Dow Chemical Company encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name

UCAR(TM) FlightGuard(TM) AD-49

COMPANY IDENTIFICATION

The Dow Chemical Company
2030 Willard H. Dow Center
Midland, MI 48674
USA

Customer Information Number:

800-258-2436

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact:

989-636-4400

Local Emergency Contact:

989-636-4400

2. Hazards Identification

Emergency Overview

Color: Green

Physical State: Liquid.

Odor: mild, sweet

Hazards of product:

Isolate area.

OSHA Hazard Communication Standard

This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects

Eye Contact: May cause slight temporary eye irritation. Corneal injury is unlikely.

Skin Contact: Prolonged contact is essentially nonirritating to skin. Repeated contact may cause flaking and softening of skin. Material may be handled at elevated temperatures; contact with heated material may cause thermal burns.

Skin Absorption: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

®(TM)*Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow

Inhalation: At room temperature, exposure to vapor is minimal due to low volatility; vapor from heated material or mist may cause respiratory irritation and other effects.

Ingestion: Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.

Aspiration hazard: Based on physical properties, not likely to be an aspiration hazard.

Effects of Repeated Exposure: In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

3. Composition Information

Component	CAS #	Amount
Propylene glycol	57-55-6	52.85 %
Deionized water	7732-18-5	46.323 %

4. First-aid measures

Eye Contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

Skin Contact: Wash skin with plenty of water. Suitable emergency safety shower facility should be immediately available.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Ingestion: No emergency medical treatment necessary.

Notes to Physician: If burn is present, treat as any thermal burn, after decontamination. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

Emergency Personnel Protection: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

5. Fire Fighting Measures

Extinguishing Media: To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam.

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam.

Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

Unusual Fire and Explosion Hazards: This material will not burn until the water has evaporated. Residue can burn.

Hazardous Combustion Products: Under fire conditions some components of this product may decompose. The smoke may contain unidentified toxic and/or irritating compounds. Combustion products may include and are not limited to: Carbon monoxide, Carbon dioxide.

6. Accidental Release Measures

Steps to be Taken if Material is Released or Spilled: Small spills: Cat litter, Sawdust, Vermiculite, Zorb-all®. Collect in suitable and properly labeled containers. Large spills: Dike area to contain spill.

Recover spilled material if possible. Contain spilled material if possible. See Section 13, Disposal Considerations, for additional information.

Personal Precautions: Isolate area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental Precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

7. Handling and Storage

Handling

General Handling: Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion. Product shipped/handled hot can cause thermal burns.

Storage

Store in accordance with good manufacturing practices. Additional storage and handling information on this product may be obtained by calling your sales or customer service contact.

Shelf life: Use within

12 Months

8. Exposure Controls / Personal Protection

Exposure Limits

Component	List	Type	Value
Propylene glycol	WEEL	TWA Aerosol	10 mg/m3

Personal Protection

Eye/Face Protection: Use safety glasses (with side shields). When handling hot material: Use chemical goggles. Wear a face-shield which allows use of chemical goggles, or wear a full-face respirator, to protect face and eyes when there is any likelihood of splashes.

Skin Protection: Wear clean, body-covering clothing. When handling hot material, protect skin from thermal burns. Selection of specific items will depend on the operation.

Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Use gloves with insulation for thermal protection, when needed. Examples of preferred glove barrier materials include: Butyl rubber, Natural rubber ("latex"), Neoprene, Nitrile/butadiene rubber ("nitrile" or "NBR"), Polyethylene, Ethyl vinyl alcohol laminate ("EVAL"), Polyvinyl chloride ("PVC", or "vinyl"). Avoid gloves made of: Polyvinyl alcohol ("PVA"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Respiratory Protection: Atmospheric levels should be maintained below the exposure guideline. When airborne exposure guidelines and/or comfort levels may be exceeded, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

Ingestion: Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

Engineering Controls

Ventilation: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit

requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

9. Physical and Chemical Properties

Physical State	Liquid.
Color	Green
Odor	mild, sweet
Odor Threshold	No test data available
Flash Point - Closed Cup	> 100 °C (> 212 °F) <i>Supplier</i>
Flammability (solid, gas)	Not applicable to liquids
Flammable Limits in Air	Lower: 2.6 %(V) <i>Literature</i> Upper: 12.6 %(V) <i>Literature</i>
Autoignition Temperature	371.0 °C (699.8 °F) <i>Supplier</i>
Vapor Pressure	0.1 hPa @ 20 °C <i>Supplier</i>
Boiling Point (760 mmHg)	> 100 °C (> 212 °F) <i>Supplier</i>
Vapor Density (air = 1)	No test data available
Specific Gravity (H ₂ O = 1)	1.038 20 °C/20 °C <i>Calculated</i>
Freezing Point	-33 °C (-27 °F) <i>Supplier</i>
Melting Point	Not applicable to liquids
Solubility in water (by weight)	<i>Supplier</i> soluble in water
pH	6.5 - 7.5 <i>Supplier</i>
Decomposition Temperature	No test data available
Partition coefficient, n-octanol/water (log Pow)	No data available for this product.
Evaporation Rate (Butyl Acetate = 1)	< 0.5 <i>Estimated</i> .
Kinematic Viscosity	No test data available

10. Stability and Reactivity

Stability/Instability

Thermally stable at recommended temperatures and pressures.

Conditions to Avoid: Some components of this product can decompose at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

Incompatible Materials: Avoid contact with: Strong acids. Strong bases. Strong oxidizers.

Hazardous Polymerization

Will not occur.

Thermal Decomposition

Decomposition products depend upon temperature, air supply and the presence of other materials.

11. Toxicological Information

Acute Toxicity

Ingestion

Based on information for component(s): Propylene glycol, LD50, Rat > 20,000 mg/kg

Dermal

Based on information for component(s): Propylene glycol, LD50, Rabbit > 20,000 mg/kg

Inhalation

For component(s) tested, LC50, 8 h, Vapor, Rat > 1,314 ppm.

No deaths occurred following exposure to a saturated atmosphere.

Eye damage/eye irritation

May cause slight temporary eye irritation. Corneal injury is unlikely.

Skin corrosion/irritation

Prolonged contact is essentially nonirritating to skin. Repeated contact may cause flaking and softening of skin. Material may be handled at elevated temperatures; contact with heated material may cause thermal burns.

Sensitization**Skin**

No relevant information found.

Respiratory

No relevant information found.

Repeated Dose Toxicity

In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects.

Chronic Toxicity and Carcinogenicity

Contains component(s) which did not cause cancer in laboratory animals.

Developmental Toxicity

Contains component(s) which did not cause birth defects or any other fetal effects in lab animals.

Reproductive Toxicity

Contains component(s) which did not interfere with reproduction in animal studies. Contains component(s) which did not interfere with fertility in animal studies.

Genetic Toxicology

In vitro genetic toxicity studies were negative for component(s) tested. Genetic toxicity studies in animals were negative for component(s) tested.

12. Ecological Information

ENVIRONMENTAL FATE**Data for Component: Propylene glycol****Movement & Partitioning**

Bioconcentration potential is low (BCF less than 100 or log Pow less than 3). Potential for mobility in soil is very high (Koc between 0 and 50). Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Henry's Law Constant (H): 1.2×10^{-8} atm·m³/mole Measured

Partition coefficient, n-octanol/water (log Pow): -0.92 Measured

Partition coefficient, soil organic carbon/water (Koc): < 1 Estimated.

Persistence and Degradability

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

Biodegradation may occur under anaerobic conditions (in the absence of oxygen).

Indirect Photodegradation with OH Radicals

Rate Constant	Atmospheric Half-life	Method
1.28×10^{-11} cm ³ /s	10 h	Estimated.

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method
81 %	28 d	OECD 301F Test
86 %	64 d	OECD 306 Test

Biological oxygen demand (BOD):

BOD 5	BOD 10	BOD 20	BOD 28
69 %	70 %	86 %	

Chemical Oxygen Demand: 1.53 mg/mg

Theoretical Oxygen Demand: 1.68 mg/mg

ECOTOXICITY

Typical for this family of materials. Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

13. Disposal Considerations

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Reclaimer. Incinerator or other thermal destruction device.

14. Transport Information

DOT Non-Bulk
NOT REGULATED

DOT Bulk
NOT REGULATED

IMDG
NOT REGULATED

ICAO/IATA
NOT REGULATED

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information**OSHA Hazard Communication Standard**

This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	No
Delayed (Chronic) Health Hazard	No
Fire Hazard	No
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

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The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

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US Toxic Substances Control Act

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

CEPA - Domestic Substances List (DSL)

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

16. Other Information**Hazard Rating System**

NFPA	Health	Fire	Reactivity
	1	1	0

Recommended Uses and Restrictions

Aircraft deicing fluid. We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact your sales or technical service representative.

Revision

Identification Number: 1047478 / 1001 / Issue Date 08/12/2010 / Version: 1.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

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N/A	Not available
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provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.



POLAR GUARD® ADVANCE
Type IV Aircraft Deicing/Anti-icing Fluid
MATERIAL SAFETY DATA SHEET

<p>1. PRODUCT NAME & DESCRIPTION</p> <p>CRYOTECH POLAR GUARD® ADVANCE Type IV Aircraft Deicing/Anti-icing Fluid Complies with Specification AMS 1428</p> <p>MANUFACTURED AND SUPPLIED IN THE USA BY: Cryotech Deicing Technology 6103 Orthoway Fort Madison, IA 52627 United States</p> <p>CRYOTECH CONTACT INFORMATION: Telephone: (800)346-7237 FAX: (319)372-2662 email: deicing@cryotech.com website: http://www.cryotech.com</p>	<p>5. FIRE FIGHTING MEASURES</p> <p>FLASH POINT (close cup): >100°C</p> <p>AUTO IGNITION: >400°C</p> <p>EXPLOSION LIMITS: No data available.</p> <p>EXTINGUISHING MEDIA: Water, foam, Carbon Dioxide, dry powder.</p> <p>SPECIFIC FIRE FIGHTING PROCEDURES: None</p> <p>HAZARDOUS DECOMPOSITION PRODUCTS: Incomplete combustion may produce Carbon Monoxide and other harmful gases/vapors.</p> <p>UNUSUAL FIRE HAZARDS: The product may become combustible after prolonged heating at the boiling point.</p> <p>NFPA RATINGS: Health 0; Flammability 1; Reactivity 0; Special NOA: (Least - 0, Slight - 1, Moderate - 2, High - 3, Extreme - 4) These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint Coating Association.</p>												
<p>2. CHEMICAL COMPOSITION</p> <p>The percent compositions are given to allow for the various ranges of the components present in the whole product and may not equal 100%.</p> <table border="1"><thead><tr><th>PERCENT</th><th>COMPONENT</th><th>CAS#</th></tr></thead><tbody><tr><td>100% CONTAINING</td><td>Cryotech Polar Guard® Advance</td><td></td></tr><tr><td>50%</td><td>Propylene Glycol</td><td>57-55-6</td></tr><tr><td>50%</td><td>Water and other proprietary ingredients</td><td>7732-18-5</td></tr></tbody></table> <p>CAS - Chemical Abstract Service Number</p>	PERCENT	COMPONENT	CAS#	100% CONTAINING	Cryotech Polar Guard® Advance		50%	Propylene Glycol	57-55-6	50%	Water and other proprietary ingredients	7732-18-5	<p>6. ACCIDENTAL RELEASE MEASURES</p> <p>Chemical Emergency: Spill, leak, fire, or accident call Chemtrec day or night (800)424-9300; Outside continental USA call (703)527-3887</p> <p>SPILL/LEAK PRECAUTIONS: Contain spillage and absorb on suitable material e.g. sawdust, sand or earth. Transfer to a container for disposal. See section 13. Wash the spillage area with plenty of water.</p>
PERCENT	COMPONENT	CAS#											
100% CONTAINING	Cryotech Polar Guard® Advance												
50%	Propylene Glycol	57-55-6											
50%	Water and other proprietary ingredients	7732-18-5											
<p>3. HAZARD IDENTIFICATION (also see Sections 11 and 12) CAUTION! MAY CAUSE EYE IRRITATION</p> <p>EYE CONTACT: This substance may be slightly irritating to the eyes.</p> <p>SKIN IRRITATION: This substance is not expected to cause prolonged or significant skin irritation.</p> <p>RESPIRATORY/INHALATION: This material does not present an inhalation hazard.</p> <p>INGESTION: If swallowed, this substance is considered practically non-toxic to internal organs.</p>	<p>7. HANDLING AND STORAGE</p> <p>STORAGE: Store in tightly sealed original containers, away from direct heat and strong oxidizing agents. Do not store in uncoated mild steel tanks.</p> <p>SPECIAL PRECAUTIONS: Avoid contact with skin and eyes. Avoid breathing mists/vapors when spraying.</p> <p>TEMPERATURE STORAGE LIMITS: Minimum -20°F (-30°C) Maximum 50°C (122°F)</p>												
<p>4. FIRST AID MEASURES</p> <p>Chemical Emergency: Spill, leak, fire, or accident call Chemtrec day or night (800)424-9300; Outside continental USA call (703)527-3887</p> <p>EYE CONTACT: Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. No additional first aid should be necessary. However, if irritation persists, see a doctor.</p> <p>SKIN CONTACT: No first aid procedures are required. As a precaution, wash skin thoroughly with soap and water. Remove and wash contaminated clothing.</p> <p>INHALATION: Since this material is not expected to be an immediate inhalation problem, no first aid procedures are required.</p> <p>INGESTION: If swallowed, give water or milk to drink and telephone for medical advice. DO NOT make the person vomit unless directed to do so by medical personnel. If medical advice cannot be obtained, then take the person and product container to the nearest medical emergency treatment center or hospital.</p>	<p>8. EXPOSURE CONTROLS/PERSONAL PROTECTION</p> <p>EYE PROTECTION: Wear eye protection if splashing is possible.</p> <p>SKIN PROTECTION: No special skin protection is usually necessary. Avoid prolonged or frequently repeated skin contact with this material. Skin contact can be minimized by wearing protective clothing.</p> <p>RESPIRATORY PROTECTION: No special respiratory protection is normally required.</p> <p>VENTILATION: No special ventilation is necessary.</p>												



POLAR GUARD® ADVANCE
Type IV Aircraft Deicing/Anti-icing Fluid
MATERIAL SAFETY DATA SHEET

9. PHYSICAL AND CHEMICAL PROPERTIES (typical values) APPEARANCE: Semi-transparent, green color. ODOR: None pH (20°C): 6.4 - 7.4 BOILING POINT: > 100°C FREEZING POINT: -37°C SPECIFIC GRAVITY (20°C): 1.04 VISCOSITY (20°C): (Brookfield LVT Spindle LV-1, 0.3rpm) 4,050 - 16,200 cP SOLUBILITY: Completely miscible in water	13. DISPOSAL CONSIDERATION Based on information available to Cryotech Deicing Technology, this product is neither listed as a hazardous waste nor does it exhibit any of the characteristics that would cause it to be classified or disposed of as an RCRA hazardous waste. If product should spill or be otherwise unsuitable for normal deicing applications, it may be absorbed on suitable materials and disposed of in sanitary landfill unless state or local regulations prohibit such disposal.
10. STABILITY & REACTIVITY HAZARDOUS DECOMPOSITION PRODUCTS: None known. STABILITY: Stable HAZARDOUS POLYMERIZATION: Polymerization will not occur. INCOMPATIBILITY: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc. SPECIAL PRECAUTIONS: READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL. Store away from strong oxidizing materials.	14. TRANSPORT INFORMATION Not restricted under any transport regulations.
11. TOXICOLOGICAL INFORMATION EYE IRRITATION: No product toxicology data available. The hazard evaluation was based on data from similar products. SKIN IRRITATION: No product toxicology data available. The hazard evaluation was based on data from similar products. RESPIRATORY/INHALATION: No product toxicology data available. The hazard evaluation was based on data from similar products. INGESTION: No product toxicology data available. The hazard evaluation was based on data from similar products.	15. REGULATORY INFORMATION ALL OF THE COMPONENTS IN THIS PRODUCT ARE ON THE FOLLOWING INVENTORY LISTS: U.S.A. (TSCA), Europe (EINECS), Canada (DSL/NDSL). TSCA SECTION 12(b): None of the chemicals in this product are listed under TSCA Section 12(b). OSHA HAZARD CLASSIFICATION: Hazardous Chemical (Irritant); None of the chemicals in the product are considered highly hazardous by OSHA. CERCLA HAZARDOUS SUBSTANCES: There is no CERCLA Reportable Quantity for this material. SARA 311 CATEGORIES: Immediate (Acute) Health Hazard: Yes Delayed (Chronic) Health Hazard: No Fire Hazard: Yes Sudden Release of Pressure Hazard: No Reactivity Hazard: No SARA 313: None of the chemicals in this product are subject to reporting requirements under SARA Section 313. CLEAN WATER ACT: None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA. STATE RIGHT-TO-KNOW: This product does not contain materials listed on the specific Toxic or Hazardous Substance Lists of the following states: PA, MA, ND. This product does not contain materials known to the State of California (Proposition 65) to cause cancer and/or reproductive harm. WHMIS (Canada) CLASSIFICATION: Not controlled
12. ECOLOGICAL INFORMATION COD (20°C): 0.82 kg O ₂ /kg fluid BOD ₅ (20°C): 0.4 kg O ₂ /kg fluid 5 day BOD/COD: 0.49	16. OTHER INFORMATION This Material Safety Data Sheet contains environmental, health and toxicology information for your employees. Please make sure this information is given to them. It also contains information to help you meet community right-to-know/emergency response reporting requirements under SARA Title III and many other laws. If you resell this product, this MSDS must be given to the buyer or the information incorporated in your MSDS. Discard any previous edition of this MSDS. Latest version of this MSDS can be obtained from Cryotech.

The above information is accurate to the best of our knowledge. However, since data, safety standards, and government regulations are subject to change and the conditions of handling and use or misuse are beyond our control, Cryotech Deicing Technology, a Division of General Atomics International Services Corporation makes no warranty, either express or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Cryotech Deicing Technology, a Division of General Atomics International Services Corporation assumes no responsibility for any injury or loss resulting from the use of the product described herein. User should satisfy himself that he has all current data relevant to his particular use.

Jesse Dobson

From: Paul Duvall <paul.duvall@fedex.com>
Sent: Monday, October 20, 2014 2:31 PM
To: Jesse Dobson
Cc: Mark Williams (MAA); Bridget Gallagher; Paul Duvall; Richard Payne; Lou Guido
Subject: RE: 2014-2015 Deicing Season at BWI Marshall Airport
Attachments: polar_guard_advance_msds.pdf

Jesse,

We will be using Cryotech Polar Plus I fluid. We have one truck with about 120 gallons of Kilfrost ABC-S Plus, and will be converting all type IV operations to Cryotech Polar Guard Advance after the depletion of the existing Kilfrost type IV. I am attaching the MSDS for the Cryotech Polar Guard Advance. Please let me know if you need any further information.

Paul

Paul K Duvall
FedEx SR. AMT
BWI Line Maintenance
410-850-0449
paul.duvall@fedex.com

From: Jesse Dobson [JDobson@bwiairport.com]
Sent: Monday, October 20, 2014 1:09 PM
To: Paul Duvall
Cc: Mark Williams (MAA); Bridget Gallagher
Subject: RE: 2014-2015 Deicing Season at BWI Marshall Airport

Paul,

Thanks for your quick response to our data request. Can you please confirm in writing that Fed Ex plans to keep using Cryotech Polar Plus Type I fluid, and Cryotech Kilfrost Type IV fluid? We have these products on file from previous deicing seasons at BWI-Marshall. Any changes in deicing fluids require the submittal of MSDS (SDS) documents to our department. If you can confirm that Fed Ex is using the same products, I will just recopy the documents from last season.

Jesse Dobson
Environmental Analyst IV
Office of Planning and Environmental Services Maryland Aviation Administration PO Box 8766 BWI Airport MD 21240
410-859-7806 - office
443-423-9016 - cell

-----Original Message-----
From: Paul Duvall [<mailto:paul.duvall@fedex.com>]
Sent: Monday, October 20, 2014 12:42 PM

To: Bridget Gallagher
Cc: Jesse Dobson; Mark Williams (MAA); Paul Duvall
Subject: RE: 2014-2015 Deicing Season at BWI Marshall Airport

Please find attached the requested report.

Paul

Paul K Duvall
FedEx SR. AMT
BWI Line Maintenance
410-850-0449
paul.duvall@fedex.com

From: Bridget Gallagher [BGallagher@bwiairport.com]
Sent: Friday, October 17, 2014 10:18 AM
To: James.Williams@united.com; jeffrey.jonus@united.com; Paul Duvall; ray.hamilton@wnco.com
Cc: Jesse Dobson; Mark Williams (MAA)
Subject: 2014-2015 Deicing Season at BWI Marshall Airport

Hello all:

As deicing season is fast approaching, the MAA requests that the attached "Annual Deicing Fluid Reconciliation Log" form, be completed and returned to the Division of Environmental Compliance at jdobson@bwiairport.com at your earliest convenience. Additionally, if any of your primary point of contacts have changed for your operations, please let us know. Thank you for your prompt attention to this matter.

As in years past, the MAA Tenant Directive 215.1 provides all of the information you'll need to know for safe and efficient deicing operations at BWI Marshall.

If you have any questions, Jesse Dobson of the Division of Environmental Compliance can be reached at 410-859-7806 or jdobson@bwiairport.com.

Thank you!

Bridey Gallagher
Airport Planner
Airport Design Consultants, Inc. (ADCI)

410-859-7713 (office)

On assignment to:
Office of Planning and Environmental Services Maryland Aviation Administration

Mailing Address
P.O. Box 8766
BWI Airport, MD 21240

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CRYOTECH POLAR PLUS® - CONCENTRATE
Type I Aircraft Deicing/Anti-icing Fluid
MATERIAL SAFETY DATA SHEET

<p>1. PRODUCT NAME & DESCRIPTION</p> <p>CRYOTECH POLAR PLUS® - CONCENTRATE (must be diluted prior to use) Type I Aircraft Deicing/Anti-icing Fluid Complies with Specification AMS 1424</p> <p>MANUFACTURED AND SUPPLIED IN THE USA BY: Cryotech Deicing Technology 6103 Orthoway Fort Madison, IA 52627 United States</p> <p>CRYOTECH CONTACT INFORMATION: Telephone: (800)346-7237 FAX: (319)372-2662 email: deicing@cryotech.com website: http://www.cryotech.com</p>	<p>2. FIRE FIGHTING MEASURES</p> <p>FLASH POINT (close cup): None below boiling point.</p> <p>AUTO IGNITION: 446°C</p> <p>EXPOSURE LIMITS: No data available.</p> <p>EXTINGUISHING MEDIA: Water, foam, Carbon Dioxide, dry powder</p> <p>FIRE FIGHTING PROCEDURES: None</p> <p>HAZARDOUS DECOMPOSITION PRODUCTS: Incomplete combustion may produce Carbon Monoxide and other harmful gases/vapors.</p> <p>UNUSUAL FIRE HAZARDS: The product may become combustible after prolonged heating at the boiling point.</p> <p>NFPA RATINGS: Health 0; Flammability 1; Reactivity 0; Special NDA: (Least - 0, Slight - 1, Moderate - 2, High - 3, Extreme - 4) These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint Coating Association.</p>																		
<p>3. CHEMICAL COMPOSITION</p> <p>The percent compositions are given to allow for the various ranges of the components present in the whole product and may not equal 100%.</p> <table border="1"><thead><tr><th>PERCENT</th><th>COMPONENT</th><th>CAS#</th></tr></thead><tbody><tr><td>100%</td><td>Cryotech Polar Plus® Concentrate Type I</td><td></td></tr><tr><td>CONTAINING</td><td></td><td></td></tr><tr><td>88%</td><td>Propylene Glycol</td><td>57-55-6</td></tr><tr><td><1%</td><td>Corrosion Inhibitors</td><td></td></tr><tr><td>12%</td><td>Water</td><td>7732-18-5</td></tr></tbody></table> <p>CAS - Chemical Abstract Service Number</p>	PERCENT	COMPONENT	CAS#	100%	Cryotech Polar Plus® Concentrate Type I		CONTAINING			88%	Propylene Glycol	57-55-6	<1%	Corrosion Inhibitors		12%	Water	7732-18-5	<p>4. ACCIDENTAL RELEASE MEASURES</p> <p>Chemical Emergency: Spill, leak, fire, or accident call Chemtrec day or night (800)424-9300; Outside continental USA call (703)527-3887</p> <p>SPILL/LEAK PRECAUTIONS: Contain spillage and absorb on suitable material e.g. sawdust, sand or earth. Transfer to a container for disposal See section 13. Wash the spillage area with plenty of water.</p>
PERCENT	COMPONENT	CAS#																	
100%	Cryotech Polar Plus® Concentrate Type I																		
CONTAINING																			
88%	Propylene Glycol	57-55-6																	
<1%	Corrosion Inhibitors																		
12%	Water	7732-18-5																	
<p>5. HAZARD IDENTIFICATION (also see Sections 11 and 12)</p> <p>ADDITIONAL HAZARD DATA:</p> <p>EYE CONTACT: This substance may be slightly irritating to the eyes.</p> <p>SKIN IRRITATION: This substance is not expected to cause prolonged or significant skin irritation.</p> <p>RESPIRATORY/INHALATION: This material does not present an inhalation hazard.</p> <p>INGESTION: If swallowed, this substance is considered practically non-toxic to internal organs.</p>	<p>7. HANDLING AND STORAGE</p> <p>STORAGE: Store in tightly sealed original containers, away from direct heat, sunlight and strong oxidizing agents.</p> <p>SPECIAL PRECAUTIONS: Avoid contact with skin and eyes. Avoid breathing mists/vapors when spraying.</p> <p>TEMPERATURE STORAGE LIMITS: Minimum -45°C (-50°F) Maximum 60°C (140°F)</p>																		
<p>8. FIRST AID MEASURES</p> <p>Chemical Emergency: Spill, leak, fire, or accident call Chemtrec day or night (800)424-9300; Outside continental USA call (703)527-3887</p> <p>EYE CONTACT: Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. No additional first aid should be necessary. However, if irritation persists, see a doctor.</p> <p>SKIN CONTACT: No first aid procedures are required. As a precaution, wash skin thoroughly with soap and water. Remove and wash contaminated clothing.</p> <p>INHALATION: Since this material is not expected to be an immediate inhalation problem, no first aid procedures are required.</p> <p>INGESTION: If swallowed, give water or milk to drink and telephone for medical advice. DO NOT make the person vomit unless directed to do so by medical personnel. If medical advice cannot be obtained, then take the person and product container to the nearest medical emergency treatment center or hospital.</p>	<p>9. EXPOSURE CONTROLS/PERSONAL PROTECTION</p> <p>EYE PROTECTION: Wear eye protection if splashing is possible.</p> <p>SKIN PROTECTION: No special skin protection is usually necessary. Avoid prolonged or frequently repeated skin contact with this material. Skin contact can be minimized by wearing protective clothing.</p> <p>RESPIRATORY PROTECTION: No special respiratory protection is normally required.</p> <p>VENTILATION: No special ventilation is necessary.</p>																		

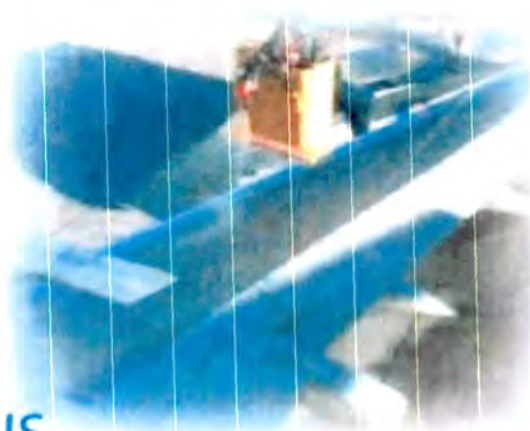
**CRYOTECH****CRYOTECH POLAR PLUS® - CONCENTRATE****Type I Aircraft Deicing/Anti-icing Fluid****MATERIAL SAFETY DATA SHEET**

<p>9. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>APPEARANCE: Clear, orange fluid.</p> <p>ODOR: None</p> <p>REFRACTIVE INDEX (20°C): 1.4230 - 1.4260</p> <p>pH (20°C): 8.3 - 9.3</p> <p>BOILING POINT: ~117°C</p> <p>FLAMMABILITY DATA: See Section 5.</p> <p>VAPOR PRESSURE (20°C): 10 mm Hg</p> <p>SPECIFIC GRAVITY (20°C): 1.043</p> <p>VAPOR DENSITY (AIR = 1): No data available.</p> <p>FREEZING POINT: below -60°C (-76°F)</p> <p>VISCOSITY (20°C): 25 cP</p> <p>SOLUBILITY: Completely miscible in water.</p>	<p>13. DISPOSAL CONSIDERATION</p> <p>Based on information available to Cryotech Deicing Technology, this product is neither listed as a hazardous waste nor does it exhibit any of the characteristics that would cause it to be classified or disposed of as an RCRA hazardous waste. If product should spill or be otherwise unsuitable for normal deicing applications, it may be absorbed on suitable materials and disposed of in sanitary landfill unless state or local regulations prohibit such disposal.</p>										
	<p>14. TRANSPORT INFORMATION</p> <p>Not restricted under any transport regulations.</p>										
<p>10. STABILITY & REACTIVITY</p> <p>HAZARDOUS DECOMPOSITION PRODUCTS: None known.</p> <p>STABILITY: Stable</p> <p>HAZARDOUS POLYMERIZATION: Polymerization will not occur.</p> <p>INCOMPATIBILITY: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.</p> <p>SPECIAL PRECAUTIONS: READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL. Store away from strong oxidizing materials.</p>	<p>15. REGULATORY INFORMATION</p> <p>ALL OF THE COMPONENTS IN THIS PRODUCT ARE ON THE FOLLOWING INVENTORY LISTS: U.S.A. (TSCA), Europe (EINECS), Canada (DSL/NDSL).</p> <p>TSCA SECTION 12(b): None of the chemicals in this product are listed under TSCA Section 12(b).</p> <p>OSHA HAZARD CLASSIFICATION: Hazardous Chemical (Irritant); None of the chemicals in this product are considered highly hazardous by OSHA.</p> <p>CERCLA HAZARDOUS SUBSTANCES: There is no CERCLA Reportable Quantity for this material.</p> <p>SARA 311 CATEGORIES:</p> <table><tr><td>Immediate (Acute) Health Hazard:</td><td>Yes</td></tr><tr><td>Delayed (Chronic) Health Hazard:</td><td>No</td></tr><tr><td>Fire Hazard:</td><td>Yes</td></tr><tr><td>Sudden Release of Pressure Hazard:</td><td>No</td></tr><tr><td>Reactivity Hazard:</td><td>No</td></tr></table> <p>SARA 313: None of the chemicals in this product are subject to reporting requirements under SARA Section 313.</p> <p>CLEAN WATER ACT: None of the chemicals in this product are listed as Priority Pollutants under the CWA.</p> <p>None of the chemicals in this product are listed as Toxic Pollutants under the CWA.</p> <p>STATE RIGHT-TO-KNOW: This product does not contain materials listed on the specific Toxic or Hazardous Substance Lists of the following states: PA, MA, NJ. This product may contain a chemical known to the State of California (Proposition 65) to cause cancer: Propylene Oxide (CAS 75-56-9). This product may contain a chemical known to the State of California (Proposition 65) to cause cancer and/or reproductive harm: Ethylene Oxide (CAS 75-21-8).</p> <p>WHMIS (Canada) CLASSIFICATION: Not controlled</p>	Immediate (Acute) Health Hazard:	Yes	Delayed (Chronic) Health Hazard:	No	Fire Hazard:	Yes	Sudden Release of Pressure Hazard:	No	Reactivity Hazard:	No
Immediate (Acute) Health Hazard:	Yes										
Delayed (Chronic) Health Hazard:	No										
Fire Hazard:	Yes										
Sudden Release of Pressure Hazard:	No										
Reactivity Hazard:	No										
<p>11. TOXICOLOGICAL INFORMATION</p> <p>Considered to have low oral toxicity. See also section 3.</p> <table><tr><td>LD₅₀</td><td>Rat - oral</td><td>> 10g/Kg (estimated)</td></tr><tr><td>LC₅₀</td><td>Pimephales Promelas</td><td>6,350 mg/L (96h)</td></tr><tr><td>LC₅₀</td><td>Daphnia Magnia</td><td>6,825 mg/L (48h)</td></tr></table>	LD ₅₀	Rat - oral	> 10g/Kg (estimated)	LC ₅₀	Pimephales Promelas	6,350 mg/L (96h)	LC ₅₀	Daphnia Magnia	6,825 mg/L (48h)		
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LC ₅₀	Daphnia Magnia	6,825 mg/L (48h)									
<p>12. ECOLOGICAL INFORMATION</p> <table><tr><td>COD (20°C):</td><td>1.57 kg O₂/kg fluid</td></tr><tr><td>BOD₅ (20°C):</td><td>0.65 kg O₂/kg fluid</td></tr><tr><td>5 day BOD/COD:</td><td>0.41</td></tr></table>	COD (20°C):	1.57 kg O ₂ /kg fluid	BOD ₅ (20°C):	0.65 kg O ₂ /kg fluid	5 day BOD/COD:	0.41	<p>16. OTHER INFORMATION</p> <p>This Material Safety Data Sheet contains environmental, health and toxicology information for your employees. Please make sure this information is given to them. It also contains information to help you meet community right-to-know/emergency response reporting requirements under SARA Title III and many other laws. If you resell this product, this MSDS must be given to the buyer or the information incorporated in your MSDS. Discard any previous edition of this MSDS.</p> <p>Latest version of this MSDS can be obtained from Cryotech.</p>				
COD (20°C):	1.57 kg O ₂ /kg fluid										
BOD ₅ (20°C):	0.65 kg O ₂ /kg fluid										
5 day BOD/COD:	0.41										

The above information is accurate to the best of our knowledge. However, since data, safety standards, and government regulations are subject to change and the conditions of handling and use or misuse are beyond our control, Cryotech Deicing Technology, a Division of General Atomics International Services Corporation makes no warranty, either express or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. Cryotech Deicing Technology, a Division of General Atomics International Services Corporation assumes no responsibility for any injury or loss resulting from the use of the product described herein. User should satisfy himself that he has all current data relevant to his particular use.



EXCEPTIONAL HOLDOVER PERFORMANCE



SPEC: KILFROST ABC-S PLUS

Propylene glycol based SAE Type IV aircraft deicing fluid meeting FAA-approved specification AMS 1428

BENEFITS

- Exhibits long holdover performance in all snow conditions
- Demonstrates exceptional shear stability
- Completely miscible with ABC-S, providing for a smoother transition for current ABC-S customers
- Easy to apply with existing equipment
- Manufactured in North America by Cryotech Deicing Technology

PERFORMANCE

- Superior sprayability - lack of foam during application
- Long-term fluid stability
- Lowest Operational Use Temperature (LOUT) is -28°C (-18.4°F)
- Fluid dryout and elimination exceed current revision of FAA approved specification AMS 1428

APPLICATION

- Critical surfaces: 1.0 - 1.5 liters per m² (1.0 - 1.5 mm)

ENVIRONMENT

- Triazole free
- Does not contain nonyl phenol ethoxalate surfactants
- Toxicity
 - LC₅₀ (freshwater fish) 1,725 mg/L (OECD 203, 96h)
 - LC₅₀ (daphnia) 1,350 mg/L (OECD, 202, Part 1, 48h)
 - EC₅₀ (bacteria) > 1,000 mg/L (DIN 38412, Part 341)
- Ecological: Fully biodegradable - 99% in 14 days (OECD 301E)
- Classified as non-hazardous

HANDLING

- Avoid contact with skin and eyes
- Avoid inhalation of mists/vapors when spraying
- Store in tightly sealed containers, away from direct heat and strong oxidizing agents
- Abstain from using uncoated mild steel tanks
- Contact Cryotech for information on bulk and/or heated storage



See page 2 for product specifications.
Additional technical and order information
available online at www.shopavfuel.com



ISO 9001
CERTIFIED



FM 39092

ISO 14001
CERTIFIED



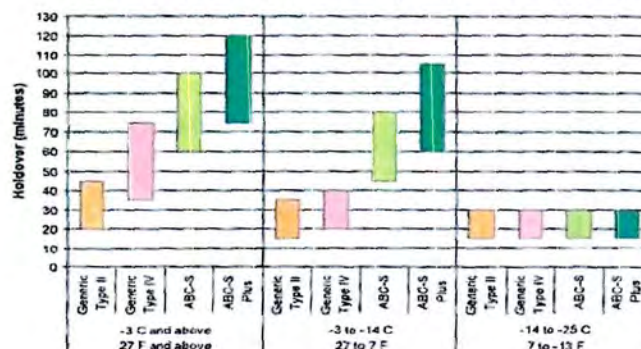
EMS 89384

AN ISO 9001:2000 & 14001:2004 CERTIFIED COMPANY

PRODUCT SPECIFICATIONS - KILFROST ABC-S PLUS

COMPOSITION	Contains minimum 50% propylene glycol
APPEARANCE	Green liquid
DENSITY	At 20°C (68°F) = 8.65 lbs/US gallon
VISCOSITY	Minimum on-wing viscosity 17,900 mPa.s In Service Limits 17,900 - 44,000 mPa.s (Brookfield LVT Spindle No. 2 @ 0.3 rpm @ 20°C (68°F)) Sales specification 25,000 - 30,000 mPa.s (Brookfield LVT Spindle No. 2 @ 0.3 rpm @ 20°C (68°F))
FLASH POINT	None below 100°C
FREEZING POINT	100/0 = Below -37°C (-34.6°F) 50/50 = -10°C (+14°F)
REFRACTIVE INDEX	At 20°C (68°F) = 1.3916 ± 0.0015
SURFACE TENSION	At 20°C (68°F) = 27 dynes/cm
STORAGE STABILITY	2 years in the original sealed container
TYPICAL pH	At 20°C (68°F) = 7.0 ± 0.5
SPECIFIC GRAVITY	At 20°C = 1.038 ± 0.015
PACKAGING	55 gallon drums (208 liters) - (4 minimum) 265 gallon tote (1003 liters) - (1 minimum) Bulk - (5000 gallons minimum)

Holdover Comparison in Snow 100/0 Fluids
(Data Source: FAA HOT Guidelines for Winter 2007-2008)



Revised - 02/08



Order and Technical Information available online at www.shopavfuel.com or contact us:

Ph: 1.877.283.8351 or 1.734.663.6466 . Email: parts@avfuel.com

MATERIAL SAFETY DATA SHEET

CLARIANT

MAXFLIGHT 04 Type IV

Page 1

Substance key: CLTFGMFIV

Revision Date: 10/01/2012

Version: 1 - 5 / USA

Date of printing: 10/04/2012

Section 01 - Product and company identification

Identification of the company:	Clariant Corporation 4000 Monroe Road Charlotte, NC, 28205 Telephone No.: +1 704 331 7000
Information of the substance/preparation:	BU ICS Product Stewardship 1-704-331-7710 Emergency tel. number: +1 800-424-9300 CHEMTREC

Trade name: MAXFLIGHT 04 Type IV
Material number: 243159
Synonyms: Maxflight Type IV
Primary product use: De-icing.
Chemical family: Glycols

Section 02 - Hazards identification

Emergency overview: Liquid
No Acute Health Hazards

Expected Route of entry:

Inhalation:	Not expected to be irritating to the respiratory tract.
Skin contact:	Not expected to be irritating to skin.
Eye contact:	May cause mild eye irritation
Ingestion:	Not expected to be toxic.
Skin absorption:	no

Health effects of exposure:

Propylene Glycol (57-55-6)

In addition to any hazardous ingredients listed in the OSHA Hazardous Ingredient Section of the Material Safety Data Sheet (MSDS), this product contains propylene glycol. As part of Clariant's Product Stewardship Program, we wish to notify you that the American Industrial Hygiene Association (AIHA) has recommended an 8 hour Time Weighted Average (TWA) Workplace Environmental Exposure Level (WEEL) for propylene glycol. See Section 08 - Exposure controls / personal protection for details.

Known effects on other illnesses: No known effects on other illnesses for this product

Listed carcinogen: IARC: No
NTP: No
OSHA: No
Other: No

HMIS:

Health: 0

Flammability: 1

Reactivity: 0

Personal protection: B

MATERIAL SAFETY DATA SHEET

CLARIANT

MAXFLIGHT 04 Type IV

Page 2

Substance key: CLTFGMFIV

Revision Date: 10/01/2012

Version : 1 - 5 / USA

Date of printing : 10/04/2012

Section 03 - Composition/information on ingredients

Hazardous ingredients:

None under 29 CFR 1910.1200

None under Title III of SARA

Non-hazardous ingredients:

Component	CAS-no. (Trade secret no.)	Concentration
1,2-Propanediol	57-55-6	40 - 60 %

Section 04 - First aid measures

After inhalation:

Get victim to fresh air. Give artificial respiration or oxygen if breathing has stopped. Get prompt medical attention. Do not give fluids if victim is unconscious.

After contact with skin:

Wash thoroughly with soap and water for 15 minutes. If skin irritation occurs, seek medical attention.

After contact with eyes:

Immediately flush eyes with running water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Seek prompt medical attention if redness or irritation occurs.

After ingestion:

If ingested, seek medical assistance immediately.

Advice to doctor / Treatment:

None known.

Section 05 - Fire fighting measures

Flashpoint:

> 212 °F

Method: S-PENSKY-MARTENS (closed cup)

Extinguishing media:

Carbon dioxide, water spray, dry chemical, alcohol resistant foam.

Special fire fighting procedure:

Exercise caution when fighting any chemical fire. Use NIOSH approved self-contained breathing apparatus and full protective clothing.

Unusual fire and explosion hazards:

Emits toxic fumes under fire conditions.

Section 06 - Accidental release measures

Steps to be taken in case of spill or leak:

Contain spill. Small spills may be flushed to the sewer or absorbed on suitable absorbants. Larger spills should be collected as liquid or absorbed. Clean-up may be accomplished by flushing with water if appropriate or remove contaminated soils. place in appropriate containers.

Spilled material may cause floor to be slippery.

MATERIAL SAFETY DATA SHEET

CLARIANT**MAXFLIGHT 04 Type IV**

Page 3

Substance key: CLTFGMFIV

Revision Date: 10/01/2012

Version : 1 - 5 / USA

Date of printing : 10/04/2012

Section 07 - Handling and storage

Advice on safe handling:

Keep containers closed. Avoid getting on skin or in eyes when handling product.

Further info on storage conditions:

Store in original container.

Store in a cool, dry, well-ventilated area.

Section 08 - Exposure controls / personal protection

Occupational exposure limits:

Component	CAS number:	Regulatory list	Type of value	Values / Remarks
propylene glycol	57-55-6	US. WEEL - Workplace Environmental Exposure Levels	8-hr TWA	10 mg/m3

Respiratory protection:

None required in normal use of product.

Hand protection:

Butyl Rubber, PVC Or Neoprene.

Eye protection:

Safety glasses or chemical splash goggles.

Other protective equipment:

None known

Advice on system design:

Local ventilation recommended - mechanical ventilation may be used.

IDLH:

Not Determined

Section 09 - Physical and chemical properties

Form:

Liquid

Color:

greenish

Odor:

mild

pH:

7.1

Solubility in water:

completely soluble

Density:

1.036 g/cm3

Boiling point :

> 212 °F

Evaporation number:

< 1.0

Reference substance: n-butyl acetate

Vapor pressure:

< 0.08 Torr

Section 10 - Stability and reactivity

MATERIAL SAFETY DATA SHEET

CLARIANT**MAXFLIGHT 04 Type IV**

Page 4

Substance key: CLTFGMFIV

Revision Date: 10/01/2012

Version: 1 - 5 / USA

Date of printing: 10/04/2012

Chemical stability: Stable.

Hazardous Polymerization: Will not occur.
Conditions to avoid: Strong oxidizing agents.
Heat and other sources of ignition.

Section 11 - Toxicological information

Product information:

Acute oral toxicity: LD50 > 2,000 mg/kg (rat)
The product has not been tested. The information is derived from the properties of the individual components.

Acute dermal toxicity: LD50 > 2,000 mg/kg (rat)
The product has not been tested. The information is derived from the properties of the individual components.

Skin irritation: Not tested

Eye irritation: Not tested

Sensitization: not tested.

Section 12 - Ecological information

Product information:

Fish toxicity: LC50 1,975 mg/l (48 h, Fathead minnow)

Daphnia toxicity: LC50 (48 h, Daphnia magna)

Chemical oxygen demand (COD): 785,000 mg/l

Biological oxygen demand (BOD): 520,000 mg/l
5 d

Remarks:

No data available.

Section 13 - Disposal considerations

Waste disposal information:

Small quantities may be treated in aerobic wastewater treatment systems. Larger quantities may be incinerated or landfilled after solidification in permitted systems.

RCRA hazardous waste:

No -- Not as sold.

RCRA number: NONE

Section 14 - Transport information

DOT

not restricted

MATERIAL SAFETY DATA SHEET

CLARIANT

MAXFLIGHT 04 Type IV

Page 5

Substance key: CLTFGMFIV

Revision Date: 10/01/2012

Version : 1 - 5 / USA

Date of printing : 10/04/2012

IATA not restricted
IMDG not restricted

Section 15 - Regulatory information

TSCA Status:

All components of this product are listed on the TSCA Inventory.

SARA (section 311/312):

Reactive hazard: no
Pressure hazard: no
Fire hazard: no
Immediate/acute: no
Delayed/chronic: no

SARA 313 information:

This product does not contain any toxic chemical listed under Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986.

Clean Water Act:

Contains no known priority pollutants at concentrations greater than 0.1%.

Volatile organic compounds VOC:

Remarks: Not tested

FDA:

Permitted for Use per Section: NONE

This product is not registered with the FDA.

Section 16 - Other information

Other precautions:

Keep containers tightly closed when not in use.

Label Information:

ATTENTION!

UPON EVALUATION, IT HAS BEEN DETERMINED THAT THIS PRODUCT IS NOT SUBJECT TO THE LABELING REQUIREMENTS OF OSHA REGULATION 29CFR 1910.1200. HOWEVER, GOOD WORK PRACTICES DICTATE THAT CARE BE TAKEN TO AVOID SKIN AND EYE CONTACT AND INGESTION. WASHING AFTER HANDLING IS ADVISED.

NFPA:

Health: 0

Flammability: 1

Reactivity: 0

This information is supplied under the OSHA Hazard Communication Standard, 29 CFR 1910.1200, and is offered in good faith based on data available to us that we believe to be true and accurate. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable to the material. However, each user should review these recommendations in the specific context of the intended use and determine whether

MATERIAL SAFETY DATA SHEET

CLARIANT

MAXFLIGHT 04 Type IV

Page 6

Substance key: CLTFGMFIV

Revision Date: 10/01/2012

Version : 1 - 5 / USA

Date of printing : 10/04/2012

they are appropriate for that use. No warranty, express or implied, is made regarding the accuracy of this data, the hazards connected with the use of the material, or the results to be obtained from the use thereof. We assume no responsibility for damage or injury from the use of the product described herein. Data provided here are typical and not intended for use as product specifications.

MATERIAL SAFETY DATA SHEET

CLARIANT

OCTAFLO EF Concentrate

Page 1

Substance key: CLTFGOEF1

Revision Date: 10/01/2012

Version: 1 - 4 / USA

Date of printing: 10/04/2012

Section 01 - Product and company identification

Identification of the company:	Clariant Corporation 4000 Monroe Road Charlotte, NC, 28205 Telephone No.: +1 704 331 7000
Information of the substance/preparation:	BU ICS Product Stewardship 1-704-331-7710 Emergency tel. number: +1 800-424-9300 CHEMTREC

Trade name: OCTAFLO EF Concentrate
Material number: 243150
Synonyms: SAE/AMS 1424 TY I Deicing Fluid
Chemical family: Glycol

Section 02 - Hazards identification

Emergency overview: Liquid
No Acute Health Hazards

Expected Route of entry:

Inhalation:	Not expected to be irritating to the respiratory tract.
Skin contact:	Not expected to be irritating to skin.
Eye contact:	May cause mild eye irritation
Ingestion:	Not expected to be toxic.
Skin absorption:	no

Health effects of exposure:

Propylene Glycol (57-55-6)
In addition to any hazardous ingredients listed in the OSHA Hazardous Ingredient Section of the Material Safety Data Sheet (MSDS), this product contains propylene glycol. As part of Clariant's Product Stewardship Program, we wish to notify you that the American Industrial Hygiene Association (AIHA) has recommended an 8 hour Time Weighted Average (TWA) Workplace Environmental Exposure Level (WEEL) for propylene glycol. See Section 08 - Exposure controls / personal protection for details.

Known effects on other illnesses: No known effects on other illnesses for this product.

Listed carcinogen: IARC: No
NTP: No
OSHA: No
Other: No

HMIS:

Health: 1

Flammability: 1

Reactivity: 0

Personal protection: B

Section 03 - Composition/information on ingredients

MATERIAL SAFETY DATA SHEET

CLARIANT

OCTAFLO EF Concentrate

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Substance key: CLTFGOEF1

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Hazardous ingredients:

None under 29 CFR 1910.1200

None under Title III of SARA

Non-hazardous ingredients:

Component	CAS-no. (Trade secret no.)	Concentration
1,2-Propanediol	57-55-6	70 - 90 %

Section 04 - First aid measures

After inhalation:

Get victim to fresh air. Give artificial respiration or oxygen if breathing has stopped. Get prompt medical attention. Do not give fluids if victim is unconscious.

After contact with skin:

Wash thoroughly with soap and water for 15 minutes. If skin irritation occurs, seek medical attention.

After contact with eyes:

Immediately flush eyes with running water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Seek prompt medical attention if redness or irritation occurs.

After ingestion:

If ingested, seek medical assistance immediately.

Advice to doctor / Treatment:

None known.

Section 05 - Fire fighting measures

Flashpoint: > 255 °F

Extinguishing media: water
foam
dry powder
carbon dioxide

Special fire fighting procedure:

Exercise caution when fighting any chemical fire. Use NIOSH approved self-contained breathing apparatus and full protective clothing.

Unusual fire and explosion hazards: Emits toxic fumes under fire conditions.

Section 06 - Accidental release measures

Steps to be taken in case of spill or leak:

Contain spill. Small spills may be flushed to the sewer or absorbed on suitable absorbents. Larger spills should be collected as liquid or absorbed. Clean-up may be accomplished by flushing with water if appropriate or remove contaminated soils, place in appropriate containers.

Spilled material may cause floor to be slippery.

MATERIAL SAFETY DATA SHEET

CLARIANT

OCTAFLC EF Concentrate

Page 3

Substance key: CLTFGOEF1

Revision Date: 10/01/2012

Version : 1 - 4 / USA

Date of printing : 10/04/2012

Section 07 - Handling and storage

Advice on safe handling:

Keep containers closed. Avoid getting on skin or in eyes when handling product.

Further info on storage conditions:

Store in original container.

Store in a cool, dry, well-ventilated area.

Section 08 - Exposure controls / personal protection

Occupational exposure limits:

Component	CAS number:	Regulatory list	Type of value	Values / Remarks
propylene glycol	57-55-6	US: WEEL - Workplace Environmental Exposure Levels	8-hr TWA	10 mg/m3

Respiratory protection: None required in normal use of product.

Hand protection: Butyl Rubber, PVC Or Neoprene.

Eye protection: Safety glasses or chemical splash goggles.

Other protective equipment: None known

Advice on system design: Local ventilation recommended - mechanical ventilation may be used.

IDLH:

Not Determined

Section 09 - Physical and chemical properties

Form: Liquid
Color: orange
Odor: almost odourless
pH: 8.0
Solubility in water: completely soluble
Density: > 1.037 g/cm3
Boiling point: = 255 °F

Section 10 - Stability and reactivity

Chemical stability: Stable.

Hazardous Polymerization: Will not occur.
Conditions to avoid: Strong oxidizing agents.
Heat and other sources of ignition.

MATERIAL SAFETY DATA SHEET

CLARIANT**OCTAFLC EF Concentrate**

Page 4

Substance key: CLTFGOEF1

Revision Date: 10/01/2012

Version: 1 - 4 / USA

Date of printing: 10/04/2012

Section 11 - Toxicological information**Product information:**

Acute oral toxicity: LD50 (rat)
not tested.

Skin irritation: Not tested

Eye irritation: Not tested

Section 12 - Ecological information**Remarks:**

No data available.

Section 13 - Disposal considerations**Waste disposal information:**

Small quantities may be treated in aerobic wastewater treatment systems. Larger quantities may be incinerated or landfilled after solidification in permitted systems.

RCRA hazardous waste:

No - Not as sold.

RCRA number: NONE

Section 14 - Transport information

DOT not restricted

IATA not restricted

IMDG not restricted

Section 15 - Regulatory information**TSCA Status:**

All components of this product are listed on the TSCA Inventory.

SARA (section 311/312):

Reactive hazard: no

Pressure hazard: no

Fire hazard: no

Immediate/acute: no

Delayed/chronic: no

SARA 313 information:

This product does not contain any toxic chemical listed under Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986.

Clean Water Act:

Contains no known priority pollutants at concentrations greater than 0.1%.

Volatile organic compounds VOC:

MATERIAL SAFETY DATA SHEET

CLARIANT

OCTAFLOC EF Concentrate

Page 5

Substance Key: CLIFGOEF1

Revision Date: 10/01/2012

Version: 1 - 4 / USA

Date of printing: 10/04/2012

Remarks: Not tested

FDA:

Permitted for Use per Section: NONE

Section 16 - Other Information

Other precautions:

Keep containers tightly closed when not in use.

Label information:

ATTENTION!

UPON EVALUATION, IT HAS BEEN DETERMINED THAT THIS PRODUCT IS NOT SUBJECT TO THE LABELING REQUIREMENTS OF OSHA REGULATION 29CFR 1910.1200. HOWEVER, GOOD WORK PRACTICES DICTATE THAT CARE BE TAKEN TO AVOID SKIN AND EYE CONTACT AND INGESTION. WASHING AFTER HANDLING IS ADVISED.

NFPA:

Health: 1

Flammability: 1

Reactivity: 0

This information is supplied under the OSHA Hazard Communication Standard, 29 CFR 1910.1200, and is offered in good faith based on data available to us that we believe to be true and accurate. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable to the material. However, each user should review these recommendations in the specific context of the intended use and determine whether they are appropriate for that use. No warranty, express or implied, is made regarding the accuracy of this data, the hazards connected with the use of the material, or the results to be obtained from the use thereof. We assume no responsibility for damage or injury from the use of the product described herein. Data provided here are typical and not intended for use as product specifications.



CHE 3024

HEALTH and SAFETY DATA

1.	PRODUCT NAME	DESCRIPTION
	Kilfrost DF PLUS (88)	Aircraft de-icing fluid, Type I. Complies with specifications ISO 11075 and AMS 1424C.
	SUPPLIED BY	EMERGENCY NUMBERS
	Kilfrost Limited Albion Works HALTWHISTLE Northumberland NE49 0HJ ENGLAND	Telephone: Working Hours: (01434) 320332 Other Times: (0169 77) 47456 FAX: (01434) 321463 e-mail: kilfrost.haltwhistle@virgin.net
2.	COMPOSITION	
	2.1	Aqueous monopropylene glycol mixture.
	2.2	Contains a minimum of 88% monopropylene glycol.
3.	HAZARD IDENTIFICATION	
	3.1	Inhalation Considered to be non-hazardous.
	3.2	Skin Unlikely to cause irritation.
	3.3	Eyes May cause temporary irritation.
	3.4	Ingestion Considered to be non-hazardous.
	3.5	Occupational Exposure Limits An exposure limit has been set for Monopropylene Glycol. (synonym Propane-1,2-diol). This applies in the UK only.
	UK (EH 40) OES	
	Total (vapour & particulates)	150 ppm (470 mg/m ³) (8hr TWA)
	Particulates	- ppm (10 mg/m ³) (8hr TWA)
	ACGIH	TLV - TWA
	FRANCE	VME
	GERMANY	MAK
		No limit assigned.
		No limit assigned.
		No limit assigned.

HEALTH and SAFETY DATA**CHE 3024****4. FIRST AID MEASURES**

- | | | |
|-----|--------------|---|
| 4.1 | Ingestion | Give large quantities of water to drink. Consult medical personnel. |
| 4.2 | Skin contact | Wash off in flowing water. Launder contaminated clothing before re-use. |
| 4.3 | Eye contact | Irrigate with water for 5 minutes. Obtain medical assistance if irritation persists. |
| 4.4 | Inhalation | Remove to fresh air if feeling unwell. Consult medical personnel if symptoms persist. |

5. FIRE FIGHTING MEASURES

- | | | |
|-----|-----------------------------------|--|
| 5.1 | Flash point (closed cup) | None below boiling point |
| 5.2 | Auto ignition temperature | 445°C |
| 5.3 | Explosion limits | No data. |
| 5.4 | Specific fire-fighting procedures | None. |
| 5.5 | Unusual fire hazards | The product may become combustible after prolonged heating at the boiling point. |
| 5.6 | Extinguishing media | Water, foam, Carbon Dioxide, dry powder. |
| 5.7 | Hazardous decomposition products | Incomplete combustion may produce Carbon Monoxide and other harmful gases/vapours. |

6. ACCIDENTAL RELEASE MEASURES

- | | |
|-----|---|
| 6.1 | Contain spillage and absorb on suitable material e.g. sawdust, sand or earth. Transfer to a container for disposal. See section 13. |
| 6.2 | Wash the spillage area with plenty of water. |

7. HANDLING AND STORAGE

- | | |
|-----|---|
| 7.1 | Avoid contact with skin and eyes. |
| 7.2 | Avoid breathing mists/vapours when spraying. |
| 7.3 | Store in tightly sealed original containers, away from direct heat and strong oxidising agents. |

HEALTH and SAFETY DATA

CHE 3024**8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

- 8.1 Maintain sufficient ventilation to comply with 'Occupational Exposure Standard'.
- 8.2 Wear eye protection if splashing is possible. An eye wash bottle should be available.
- 8.3 Gloves and protective overalls recommended if prolonged contact is likely.

9. PHYSICAL AND CHEMICAL PROPERTIES Typical Values

- | | | |
|------|--------------------------|----------------------|
| 9.1 | Appearance | Clear, orange fluid. |
| 9.2 | Odour | None. |
| 9.3 | pH (20°C) | 8.0 - 9.0 |
| 9.4 | Boiling point | 117°C |
| 9.5 | Flammability data | See 5.1 - 5.3 |
| 9.6 | Vapour pressure (20°C) | 10 mm Hg |
| 9.7 | Specific gravity (20°C) | 1.043 |
| 9.8 | Vapour density (air = 1) | 1.6 (estimated) |
| 9.9 | Freezing point | |
| | 100% | below -60°C |
| | 50% v/v | -25.3°C |
| 9.10 | Viscosity | |
| | 20°C | 38 mPas |
| | 0°C | 79 mPas |
| | -20°C | 290 mPas |
| 9.11 | Specific heat | |
| | 20°C | 2.9 J/g°C |
| | 70°C | 3.2 J/g°C |
| 9.12 | Solubility in water | Completely miscible. |

10. STABILITY AND REACTIVITY

- 10.1 Stable under normal storage conditions.
- 10.2 Incompatible materials - strong oxidising agents.
-

HEALTH and SAFETY DATA**CHE 3024****11. TOXICOLOGICAL INFORMATION**

- 11.1 Considered to have low oral toxicity. See also section 3.
11.2 LD₅₀ (rat - oral) > 10g/Kg (est)
11.3 LC₅₀ (Pimephales Promelas) 5,475 mg/L (96h)
11.4 LC₅₀ (Daphnia Magna) 10,000 mg/L (48h)

12. ECOLOGICAL INFORMATION

- 12.1 COD 0.11 Kg O₂/Kg fluid
12.2 BOD₅ 0.08 Kg O₂/Kg fluid
12.3 5 day BOD/COD 0.73

13. DISPOSAL CONSIDERATION

- 13.1 Controlled incineration or landfill in accordance with local, state or national regulations.

14. TRANSPORT INFORMATION

- 14.1 Not restricted under any transport regulations.

15. REGULATORY INFORMATION

- 15.1 Not classified as hazardous under any regulations.

16. OTHER INFORMATION

- 16.1 All components are registered in accordance with EINECS AND TSCA.

The information contained herein is based on the present state of our knowledge.
No responsibility is accepted that the information is sufficient or correct in all cases.

Date: 24 July 2001

UNITED**SAFETY MSDS EVALUATION SHEET**UMS # CHE3024Product Name: Kilfroost DF Plus (88)Manufacturer: KilfroostAircraft ChemicalApplication: SprayingWASH
HANDS
AT
BREAKS,
LUNCH,
AND AT
END OF
SHIFT

- ☐ Safety objects to the use of this material.
- ☒ Product approved by safety for use
- ☐ Insufficient information to evaluate product.
Not applicable
- ☐ Safety will obtain additional information for evaluation.
- ☐ MSDS returned to requesting facility to obtain further information.
- ☐ Further industrial hygiene investigation required.

PERSONAL PROTECTIVE EQUIPMENT☐ Safety Glasses-
Recommended☒ Face Shield
Required☒ Chem Goggles
Required☒ Gloves
Insulated PVC☐ Apron☐ Tyvek Suit☐ Respirator
None☐ Supplied Air☐ Air Purifying☐ Ventilation☒ Comments: PPE is only required if the worker is positioned outside an enclosure**ENVIRONMENTAL**Incompatibility with other materials: Strong oxidizersDisposal Requirements: OtherEnvironmental Impact: ☐ Air ☐ VOC ☐ Air Toxics ☒ Water ☒ LandComments: Do not allow to flow to storm drain systems. Contain and remove for recycling.**Approval**Occupational Safety Representative: Mike RatellePhone: 634-7496Date: 10/19/01Environmental Safety Representative: Steve SulgitPhone: 634-7200Date: 10/22/01

Type IV

**MATERIAL SAFETY DATA SHEET**
SAFEWING MP IV LAUNCH

Page 1

Substance key: 000000241110
Version: 1 - 1 / USARevision Date: 01/05/2007
Date of printing: 01/05/2007**Section 01 - Product Information****Identification of the company:**Clariant Corporation
4000 Monroe Road
Charlotte, NC, 28205
Telephone No.: +1 704 331 7000**Information of the substance/preparation:**
Product Safety 1-704-331-7710

Emergency tel. number: +1 800-424-9300 CHEMTREC

Trade name: SAFEWING MP IV LAUNCH**Primary product use:** Aircraft de-icing**Chemical family:** polymer-thickened deicer based on propylene glycol, corrosion inhibitors, surfactants and water - green coloured.**Section 02 - Composition Information on hazardous ingredients****Hazardous ingredients:**

Component	CAS-no. (Trade secret no.)	Concentration
1,2-Propanediol	57-55-6	> 1 %

Section 03 - Hazards identification**Emergency overview:**

NO KNOWN HAZARDS.

Expected Route of entry:**Inhalation:**

Not expected to be irritating to the respiratory tract.

Skin contact:

Not expected to be irritating to skin.

Eye contact:

Not expected to be irritating to the eyes.

Ingestion:

Not expected to be toxic.

Known effects on other illnesses:

None known.

Listed carcinogen:

IARC: No

NTP: No

OSHA: No

Other: No

HMIS:

Health: 1

Flammability: 1

Reactivity: 0

Personal protection: B

Section 04 - First aid measures

**MATERIAL SAFETY DATA SHEET**
SAFEWING MP IV LAUNCH

Page 2

Substance key: 000000241110
Version : 1 - 1 / USARevision Date: 01/05/2007
Date of printing : 01/05/2007**After inhalation:**

Get victim to fresh air. Give artificial respiration or oxygen if breathing has stopped. Get prompt medical attention. Do not give fluids if victim is unconscious.

After contact with skin:

Wash thoroughly with soap and water for 15 minutes. If skin irritation occurs, seek medical attention.

After contact with eyes:

Immediately flush eyes with running water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Seek prompt medical attention if redness or irritation occurs.

After ingestion:

Seek medical attention immediately.

Advice to doctor / Treatment:

None known.

Section 05 - Fire fighting measures

Flashpoint: > 212 °F
Method: ASTM D 92 (closed cup)

Lower explosion limit: Not applicable

Upper explosion limit: Not applicable

Self ignition: not self-igniting

Ignition temperature: > 752 °F
Method: DIN 51794

Hazardous combustion products:

In case of fires, hazardous combustion gases are formed: Carbon monoxide (CO)

Extinguishing media: water spray jet
alcohol-resistant foam
dry powder
carbon dioxide

Special fire fighting procedure:

Use self-contained breathing apparatus and full protective clothing.

Section 06 - Accidental release measures**Steps to be taken in case of spill or leak:**

Contain spill. Ensure adequate ventilation and wear appropriate personal protective equipment. Collect onto inert absorbent. Place in sealable container. Do not allow to contaminate water sources or sewers.

Section 07 - Handling and storage

**MATERIAL SAFETY DATA SHEET**
SAFEWING MP IV LAUNCH

Page 3

Substance key: 000000241110
Version : 1 - 1 / USARevision Date: 01/06/2007
Date of printing : 01/06/2007

Advice on safe handling:
Wash thoroughly after handling.
Keep container closed.

Section 08 - Exposure controls / personal protection

Respiratory protection: If airborne concentrations pose a health hazard, become irritating, or exceed recommended limits, use a NIOSH approved respirator in accordance with OSHA respiratory protection requirements under 29CFR1910.134.

Hand protection: Butyl Rubber, PVC Or Neoprene.

Eye protection: Safety glasses with side shields.

Other protective equipment: Clothing suitable to prevent skin contact.

Section 09 - Physical and chemical properties

Form: Liquid, viscous

Color: green

Odor: slightly perceptible

pH: 7 - 7.5 (20 °C)
Method: DIN 19261
Determined in the undiluted form

Solubility in water: soluble

Soluble in ... :

Solubility / qualitative: soluble in Glycol

Density: 1.04 g/cm³ (20 °C)
Method: DIN 51757

Melting point : -31 °F
Method: ASTM D 2386

Boiling temperature : 217 °F
Method: ASTM D 1120

Vapor pressure: not determined

Bulk density: Not applicable

Relative vapor density: not determined

Partitioning coef. octanol/water: Not applicable

Viscosity / (dynamic): approx. 10,000 - 20,000 mPa.s (20 °C)
Method: ASTM D 2196

Viscosity / (kinematic): not determined

**MATERIAL SAFETY DATA SHEET**
SAFEWING MP IV LAUNCH

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Substance key: 000000241110
Version : 1 - 1 / USARevision Date: 01/05/2007
Date of printing :01/05/2007**Section 10 - Stability and reactivity**

Thermal decomposition: > 400 °C
Method: DIN 51794

Chemical stability: Stable.

Hazardous Polymerization: Will not occur.

Section 11 - Toxicological information**Product information:**

Acute oral toxicity: not determined

Acute inhalation toxicity: not determined

Acute dermal toxicity: not determined

Other relevant toxicity information:

The product was classified on the basis of the calculation procedure of the Dangerous Preparations Directive (1999/45/EC).

Section 12 - Ecological information**Product information:**

Biodegradation: 98 % (1 d)
Method: OECD 301 E
Source: Analogy

Fish toxicity: LC50 2,443 mg/l (96 h, rainbow trout)
Method: EPA OPPTS Draft Guideline 850.1075 (1996)
LC50 2,443 mg/l (96 h, Fathead minnow)
Method: EPA OPPTS Draft Guideline 850.1075 (1996)

Daphnia toxicity: EC50 542 mg/l (48 h, Ceriodaphnia spec.)
Method: US-EPA OPPTS 850.1010

Algae toxicity: EC50 2,228 mg/l (96 h, Green algae - fresh water
(Pseudokirchneriella subcapitata))
Method: EPA OPPTS 850.5400 Algal toxicity, tiers I and II
(1998)

Bacteria toxicity: EC50 5.2 g/l (30 min)
Method: DIN EN ISO 11348-2

Dissolved organic carbon
(DOC): 245 mg/g
Method: DIN/EN 1484
Source: Analogy

Chemical oxygen demand
(COD): 830 mg/g
Method: DIN 38409-H41
Source: Analogy

**MATERIAL SAFETY DATA SHEET**
SAFEWING MP IV LAUNCH

Page 5

Substance key: 000000241110
Version: 1 - 1 / USARevision Date: 01/05/2007
Date of printing: 01/05/2007

Biological oxygen demand (BOD): 285 mg/g
Method: DIN/EN 1899-1
Source: Analogy

Remarks:

Biologically degradable, when diluted may be degraded in biological purification plants

Section 13 - Disposal considerations**Waste disposal information:**

Recommended disposal is by incineration in approved facilities.

RCRA hazardous waste:

No -- Not as sold.

Section 14 - Transport information

DOT	not restricted
IATA	not restricted
IMDG	not restricted

Section 15 - Regulatory information**TSCA Status:**

All components of this product are listed on the TSCA Inventory.

SARA (section 311/312):

Reactive hazard:	no
Pressure hazard:	no
Fire hazard:	no
Immediate/acute:	no
Delayed/chronic:	no

SARA 313 information:

This product is not subject to SARA Title III Section 313 reporting requirements under 40 CFR 372.

Clean Water Act:

Contains no known priority pollutants at concentrations greater than 0.1%.

Section 16 - Other information**Label information:****ATTENTION!**

UPON EVALUATION, IT HAS BEEN DETERMINED THAT THIS PRODUCT IS NOT SUBJECT TO THE LABELING REQUIREMENTS OF OSHA REGULATION 29CFR 1910.1200. HOWEVER, GOOD WORK PRACTICES DICTATE THAT CARE BE



MATERIAL SAFETY DATA SHEET
SAFEWING MP IV LAUNCH

Page 6

Substance key: 000000241110
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Date of printing :01/05/2007

TAKEN TO AVOID SKIN AND EYE CONTACT AND INGESTION. WASHING AFTER
HANDLING IS ADVISED.

This information is supplied under the OSHA Hazard Communication Standard, 29 CFR 1910.1200, and is offered in good faith based on data available to us that we believe to be true and accurate. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable to the material. However, each user should review these recommendations in the specific context of the intended use and determine whether they are appropriate for that use. No warranty, express or implied, is made regarding the accuracy of this data, the hazards connected with the use of the material, or the results to be obtained from the use thereof. We assume no responsibility for damage or injury from the use of the product described herein. Data provided here are typical and not intended for use as product specifications. (R) and TM indicate trademarks of Clariant AG, its business partners or suppliers.

**MAA Runway Deicing Agent --
Material Safety Data Sheets
(MSDS)**

**SAFETY DATA SHEET** Product #:

Name of Product:

Alpine RF-11

1000093

Revision Date: Oct 18, 2012

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Alpine RF-11
SYNONYMS: Deicing Fluid, Antiicing Fluid, Runway Deicer.
PRODUCT CODES: 1000093, 1000115

MANUFACTURER: NACHURS ALPINE SOLUTIONS
DIVISION: Marion
ADDRESS: 421 Leader Street
Marion, OH 43302, United States

EMERGENCY PHONE: United States: Chemtrec: 800-424-9300 (CCN# 15189)
Canada: CANUTEC: 613-996-6666
1 TECH 877-324-4402

CHEMICAL NAME: Potassium Acetate
CHEMICAL FAMILY: Organic acid, potassium salt
CHEMICAL FORMULA: CH_3COOK

PRODUCT USE: Deicing fluid, Antiicing fluid.

PREPARED BY: Nachurs Alpine Solutions Technical Services

SECTION 1 NOTES:

SECTION 2: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Use with care! May cause irritation.

ROUTES OF ENTRY: Inhalation, Ingestion, Injection, Absorption

POTENTIAL HEALTH EFFECTS

EYES:	May cause irritation.
SKIN:	May cause irritation.
INGESTION:	May cause irritation.
INHALATION:	May cause irritation.

ACUTE HEALTH HAZARDS: Possible skin irritation.

CHRONIC HEALTH HAZARDS: None known.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: None known.

CARCINOGENICITY:

OSHA:	No
ACGIH:	No
NTP:	No
IARC:	No
CA Prop 65:	No

SECTION 2 NOTES:

SAFETY DATA SHEET

Product #: 1000093

Name of Product: **Alpine RF-11**

Revision Date: Oct 18, 2012

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

INGREDIENT:			CAS No.
Potassium Acetate	50%		127-08-2
Water	50%		7732-18-5
Corrosion Inhibitor	<1%		Proprietary

SECTION 3 NOTES:

SECTION 4: FIRST AID MEASURES

EYES: Flush with water immediately and thoroughly for 15 minutes. If irritation persists, seek medical attention.

SKIN: Thoroughly wash with soap and water. If irritation persists, seek medical attention.

INGESTION: If victim is conscious and alert, give milk or water to drink. Seek medical attention.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. Seek medical attention.

NOTES TO PHYSICIANS OR FIRST AID PROVIDERS: Treat symptomatically.

SECTION 4 NOTES:

SECTION 5: FIRE-FIGHTING MEASURES

FLAMMABLE LIMITS IN AIR: Not flammable.

FLASH POINT: N/A

METHOD USED: N/A

AUTOIGNITION TEMPERATURE: N/A

NFPA HAZARD CLASSIFICATION

HEALTH: 1
FLAMMABILITY: 0
: 0
OTHER: 0

HMIS HAZARD CLASSIFICATION

HEALTH: 1
FLAMMABILITY: 0
: 0
PROTECTION: B

EXTINGUISHING MEDIA: Water or media suitable for surrounding material.

SPECIAL FIRE FIGHTING PROCEDURES: Proper safety equipment to include SCBA operated in positive pressure mode.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Carbon monoxide and/or carbon dioxide may be released.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide and/or carbon dioxide.

SECTION 5 NOTES:

SAFETY DATA SHEET

Product #: 1000093

Name of Product: **Alpine RF-11**

Revision Date: Oct 18, 2012

SECTION 6: ACCIDENTAL RELEASE MEASURES

ACCIDENTAL RELEASE MEASURES: Confine the spill to a diked area or sump, if possible, and recover as much of the product as possible. Place in suitable containers. Dispose in accordance with all federal, state, and local regulations.

SECTION 6 NOTES:

SECTION 7: HANDLING AND STORAGE

HANDLING AND STORAGE: Store in suitable containers made of mild steel, stainless steel, plastic or fiberglass.

OTHER PRECAUTIONS: Always use good safety and industrial hygienic practices.

SECTION 7 NOTES:

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Good hygienic operating protocols are always recommended.

VENTILATION: Provide local ventilation as necessary.

RESPIRATORY PROTECTION: Respiratory protection is not normally required unless excessive heat or reaction results in release of carbon dioxide or carbon monoxide. In enclosed spaces, these gases can displace oxygen causing possible suffocation, thus use a self-contained breathing apparatus. Do not use air purifying respirators.

EYE PROTECTION: Safety goggles and full face shield.

SKIN PROTECTION: Rubber gloves.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: N/A

WORK HYGIENIC PRACTICES: Wash hands thoroughly after handling.

EXPOSURE GUIDELINES: N/A

SECTION 8 NOTES:

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Clear, blue liquid.

ODOR: Mild odor.

PHYSICAL STATE: Liquid.

pH AS SUPPLIED: 9.0 - 11.0

BOILING POINT: Unknown

MELTING POINT: Unknown

SAFETY DATA SHEET

Product #: 1000093

Name of Product: **Alpine RF-11**

Revision Date: Oct 18, 2012

FREEZING POINT: F°: -72
C°: -58

VAPOR PRESSURE (mmHg): No data available.

VAPOR DENSITY (AIR = 1): No data available.

SPECIFIC GRAVITY (20°C): 1.28

DENSITY, LBS/GAL (20°C): 10.65

SOLUBILITY IN WATER: Complete

PERCENT SOLIDS BY WEIGHT: 50

PERCENT VOLATILE: 50%

VOLATILE ORGANIC COMPOUNDS (VOC): None

VISCOSITY:	Temperature °C	cSt.	cPs.
	20	4.7	6.0
	0	9.8	12.5
	-10	16.5	21.1
	-20	30.6	39.1

SECTION 9 NOTES:

SECTION 10: STABILITY AND REACTIVITY

	STABLE	UNSTABLE
STABILITY:	x	
CONDITIONS TO AVOID (STABILITY):	Extreme heat.	
INCOMPATIBILITY (MATERIAL TO AVOID):	Strong acids or strong oxidizing agents.	
HAZARDOUS DECOMPOSITION OR BY-PRODUCTS:	Carbon monoxide and/or carbon dioxide.	
HAZARDOUS POLYMERIZATION:	Will not occur.	

SECTION 10 NOTES:

SECTION 11: TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION: EPA 40CFR797.1300 Daphnid Acute Toxicity: 48 hour LC₅₀: 2825 mg/L
EPA 40CFR797.1400 Fish Acute Toxicity: 96 hour LC₅₀: 2925 mg/L

SECTION 11 NOTES:

SECTION 12: ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION: BOD: 0.21 kg O₂/kg
COD: 0.35 kg O₂/kg

SAFETY DATA SHEET

Product #: 1000093

Name of Product: **Alpine RF-11**

Revision Date: Oct 18, 2012

SECTION 12 NOTES:

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Reclaim and reuse as much as possible. Dispose in accordance with all federal, state, and local regulations.

RCRA HAZARD CLASS: No.

SECTION 13 NOTES:

SECTION 14: TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION:

GROUND TRANSPORTATION:

PROPER SHIPPING NAME: Alpine RF-11
HAZARD CLASS: N/A
ID NUMBER: N/A
PACKING GROUP: N/A
LABEL STATEMENT: N/A

WATER TRANSPORTATION (IMDG):

PROPER SHIPPING NAME: Alpine RF-11
HAZARD CLASS: N/A
ID NUMBER: N/A
PACKING GROUP: N/A
LABEL STATEMENTS: N/A

AIR TRANSPORTATION (IATA):

PROPER SHIPPING NAME: Alpine RF-11
HAZARD CLASS: N/A
ID NUMBER: N/A
PACKING GROUP: N/A
LABEL STATEMENTS: N/A

SECTION 14 NOTES:

SECTION 15: REGULATORY INFORMATION

CHEMICAL INVENTORY LISTS:

TSCA (U.S. Toxic Substances Control Act): Yes
TSCA Section 12(b): No
DSL (Canadian Domestic Substances List): Yes
EINCS (European Inventory of Existing Commercial Chemical Substances): Yes
AICS (Australia): Yes
IECSC (China): Yes
ENCJ (Japan): Yes

CERCLA (COMPREHENSIVE RESPONSE COMPENSATION, AND LIABILITY ACT): No

CLEAN AIR ACT (CAA): Contains no priority air pollutants.

CLEAN WATER ACT (CWA): Contains no priority water pollutants.

SAFETY DATA SHEET

Product #: I000093

Name of Product: Alpine RF-11

Revision Date: Oct 18, 2012

SECTION 15 NOTES:

SECTION 16: OTHER INFORMATION

DISCLAIMER: The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and NACHURS ALPINE SOLUTIONS will not be liable for any damages, losses, injuries or consequential damages which may result from the use or reliance on any information contained herein.

"NASi" is a trademark of Na-Churs Plant Food Company dba Nachurs Alpine Solutions.



CRYOTECH NAAC®
Solid Runway Deicer
Safety Data Sheet

Section 1: IDENTIFICATION

PRODUCT IDENTIFIER

CRYOTECH NAAC®

Solid Runway Deicer

Complies with Specification AMS 1431

RECOMMENDED USE OF CHEMICAL AND RESTRICTIONS ON USE

Deicing/anti-icing runways, taxiways, and airside pavements

DETAILS OF THE SUPPLIER OF THE SAFETY DATA SHEET

Name/Address: Cryotech Deicing Technology
6103 Orthoway
Fort Madison, IA 52627
United States

Contact Information: Telephone: (800) 346-7237
Fax: (319) 372-2662
Email: deicers@cryotech.com
Website: www.cryotech.com

EMERGENCY TELEPHONE NUMBER

CHEMTREC (800) 424-9300
Outside continental USA (703) 527-3887

Section 2: HAZARD(S) IDENTIFICATION

CLASSIFICATION ACCORDING TO OSHA HAZCOM 2012

Hazard Class Not classified as hazardous

LABEL ELEMENTS ACCORDING TO OSHA HAZCOM 2012

There are no OSHA required label elements for this product.

CLASSIFICATION ACCORDING TO WHMIS (Canada)

Hazard Class Not controlled

WHMIS Hazard Symbols Not applicable

WHMIS Signal Word Not applicable

POTENTIAL HEALTH EFFECTS

Eye Contact May cause temporary eye irritation. Corneal injury is unlikely.

Skin Contact Repeated contact may cause slight skin irritation or dry skin.

Inhalation May cause irritation or coughing.

Ingestion Ingestion of large quantities may cause nausea, vomiting, diarrhea and abdominal discomfort.

Effects of repeated exposure No effects other than described above are expected.

Prepared According to the OSHA Hazard Communication Standard (29 CFR 1910.1200)
by Cryotech Deicing Technology, 6103 Orthoway, Fort Madison, IA 52627
Form #MKT1002 Rev. July 14, 2014



CRYOTECH NAAC®
Solid Runway Deicer
Safety Data Sheet

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

MIXTURES

Ingredient	CAS No	Wt. %
Sodium Acetate – anhydrous	127-09-3	97
Corrosion Inhibitors		< 1

Section 4: FIRST- AID MEASURES

DESCRIPTION OF FIRST AID MEASURE

Eye	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. If easy to do, remove contact lenses, if worn. If irritation persists, seek medical attention.
Skin	As a precaution, wash skin thoroughly with soap and water. Remove and wash contaminated clothing.
Inhalation	If inhaled, remove to fresh air and get medical advice
Ingestion	If swallowed, give milk or water to drink and telephone for medical advice. Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

MOST IMPORTANT SYMPTOMS / EFFECTS

Eye	May cause eye irritation. Symptoms may include temporary discomfort or pain, excess blinking and tear production, with possible redness and swelling.
Skin	May cause itching or irritation of any cut or abraded skin. Symptoms of prolonged contact may include dry skin.
Inhalation	Inhalation of dust during handling may cause respiratory tract irritation and coughing. This product is not otherwise expected to be an inhalation hazard.
Ingestion	Ingestion of large quantities may cause nausea, vomiting, diarrhea and abdominal discomfort.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT

Specific treatments	If you feel unwell, seek medical advice immediately. Show the label or safety data sheet to medical personnel if possible.
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CRYOTECH NAAC®
Solid Runway Deicer
Safety Data Sheet

Section 5: FIRE FIGHTING MEASURES

FLAMMABILITY

Flash Point (close cup)	Nonflammable by OSHA/WHMIS criteria
Auto Ignition	Not applicable

EXTINGUISHING MEDIA

Suitable Extinguishing Media	Water, carbon dioxide, or dry chemical. Use extinguishing media appropriate for surrounding materials.
Unsuitable Extinguishing Media	Not applicable

SPECIAL HAZARDS

Hazardous Combustion Products	Normal combustion forms carbon dioxide and water.
Explosion Limits	Data not available. Not considered to be an explosion hazard.
Unusual Fire Hazards	None expected

SPECIAL PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIREFIGHTERS

Special Protective Equipment for Firefighters	Wear NIOSH approved self-contained breathing apparatus (SCBA) with positive air pressure.
---	---

Section 6: ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT, AND EMERGENCY PROCEDURES

Avoid eye/skin contact with spilled material. Refer to Section 7 for additional handling precautions.

Methods for Containment	If material is dissolved, contain and/or absorb spill with inert material (e.g. sawdust, sand, vermiculite).
Methods for Cleaning-Up	Scoop up material and transfer to disposal container. If needed, wash spillage area with plenty of water.

Section 7: HANDLING AND STORAGE

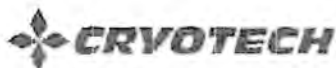
PRECAUTIONS FOR SAFE HANDLING

Handling	Avoid eye contact. Avoid breathing dust when handling.
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PRECAUTIONS FOR SAFE STORAGE, INCLUDING ANY COMPATIBILITIES

Storage	Store in tightly sealed original containers, away from direct heat and strong oxidizing agents. Do not store or handle product in systems constructed of wetted parts consisting of galvanized steel, zinc, or brass components.
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CRYOTECH NAAC®
Solid Runway Deicer
Safety Data Sheet

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE LIMITS

TWA PEL:

No specific limits have been established for this product. As a guideline, OSHA (United States) has established the following limits which are generally recognized for inert or nuisance dust. Particulates Not Otherwise Regulated (PNOR): 8-hr TWA limits of 15 mg/m³ (total particulate) and 5 mg/m³ (respirable fraction).

TWA TLV:

No specific limits have been established for this product. As a guideline, ACGIH (United States) has established the following limits which are generally recognized for inert or nuisance dust. Particulates (insoluble) Not Otherwise Classified (PNOC): 8-hr TWA limits of 10 mg/m³ (as total dust) and 3 mg/m³ (as respirable).

EXPOSURE CONTROLS

Engineering Controls

No special ventilation is usually necessary; however if operating conditions create high concentrations of this material, special ventilation may be needed to keep exposure to airborne contaminants below the exposure limit.

INDIVIDUAL PROTECTIVE MEASURES/PERSONAL PROTECTIVE EQUIPMENT

Eye Protection

Safety glasses or goggles are recommended if eye contact is possible.

Skin Protection

No special skin protection is usually necessary. Chemical-resistant gloves should be used if prolonged exposure is possible to prevent drying of skin.

Respiratory Protection

No special respiratory protection is usually necessary. Breathing of dust should be avoided. If operating conditions create high airborne concentrations of this material, the use of an approved respirator is recommended.

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by Cryotech Deicing Technology, 6103 Orthoway, Fort Madison, IA 52627

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CRYOTECH NAAC®
Solid Runway Deicer
Safety Data Sheet

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE	White to gray spherical pellet
ODOR	Odorless to slight vinegar odor
ODOR THRESHOLD	No data available
pH (20°C, 68°F)	8-10.5 (15% aqueous solution)
MELTING POINT	324°C (615°F)
BOILING POINT	Not applicable
FLASH POINT	Not applicable
EVAPORATION RATE	No data available
FLAMMABILITY/EXPLOSION LIMITS	Not applicable
VAPOR PRESSURE (20°C)	Not applicable
VAPOR DENSITY (AIR = 1)	Not applicable
RELATIVE DENSITY	1.5
SOLUBILITY IN WATER	Partially soluble in water
PARTITION COEFFICIENT; n-OCTANOL/WATER	No data available
AUTO-IGNITION TEMPERATURE	No data available
DECOMPOSITION TEMPERATURE	No data available
VISCOSITY (20°C)	Not applicable
OXIDIZING PROPERTIES	Not oxidizing
EXPLOSIVE PROPERTIES	Not explosive

Section 10: STABILITY AND REACTIVITY

REACTIVITY

No dangerous reactions known under conditions of normal use.

CHEMICAL STABILITY

Stable. Polymerization will not occur.

POSSIBILITY OF HAZARDOUS REACTIONS

No dangerous reactions known under conditions of normal use.

CONDITIONS TO AVOID

Avoid prolonged contact with reactive metals such as magnesium and zinc, especially in closed systems where hydrogen gas from the oxidation of these materials may accumulate over time.

INCOMPATIBLE MATERIALS

Strong oxidizing agents; strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS

May decompose into oxides of carbon.

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CRYOTECH NAAC®
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Section 11: TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

LD50 rat-oral: > 5 g/kg.

LIKELY ROUTES OF EXPOSURE

Skin contact, eye contact, ingestion.

SYMPTOMS RELATED TO THE PHYSICAL, CHEMICAL, AND TOXICOLOGICAL CHARACTERISTICS

Eye	May cause eye irritation. Symptoms may include temporary discomfort or pain, excess blinking and tear production, with possible redness and swelling.
Skin	May cause itching or irritation of any cut or abraded skin. Symptoms of prolonged contact may include dry skin.
Inhalation	Inhalation of dust during handling may cause respiratory tract irritation and coughing. This product is not otherwise expected to be an inhalation hazard.
Ingestion	Ingestion of large quantities may cause nausea, vomiting, diarrhea and abdominal discomfort.

DELAYED AND IMMEDIATE EFFECTS AND CHRONIC EFFECTS FROM SHORT- AND LONG-TERM EXPOSURE/NUMERICAL MEASURES OF TOXICITY

Skin Corrosion/Irritation	Based on available data, the classification criteria are not met.
Serious Eye Damage/Irritation	Based on available data, the classification criteria are not met.
Respiratory or Skin Sensitization	Based on available data, the classification criteria are not met.
Germ Cell Mutagenicity	Based on available data, the classification criteria are not met.
Carcinogenicity	This product does not contain any ingredients that are considered to be carcinogens by IARC, NTP, or OSHA.
Reproductive Toxicity	Based on available data, the classification criteria are not met.
STOT-Single Exposure	Based on available data, the classification criteria are not met.
STOT-Repeated Exposure	Based on available data, the classification criteria are not met.
Aspiration Hazard	Based on available data, the classification criteria are not met.

Section 12: ECOLOGICAL INFORMATION

ECOTOXICITY (AQUATIC AND TERRESTRIAL)

Not expected to cause long-term adverse effects in the aquatic or terrestrial environments.

PERSISTENCE AND DEGRADABILITY

Readily biodegradable. COD (TOD): 0.74 g O₂/g deicer; BOD₅ (20°C): 0.45 g O₂/g deicer

BIOACCUMULATIVE POTENTIAL

Bioaccumulation is not expected.

MOBILITY IN SOIL

Adverse effects not expected.

OTHER ADVERSE EFFECTS

None expected.



CRYOTECH NAAC®
Solid Runway Deicer
Safety Data Sheet

Section 13: DISPOSAL CONSIDERATIONS

WASTE TREATMENT AND METHODS OF DISPOSAL

Based on available information, this product is neither listed as a hazardous waste nor does it exhibit any of the characteristics that would cause it to be classified as a characterized hazardous waste under RCRA. This product may be absorbed onto suitable materials and disposed of in a sanitary landfill unless local, state, or provincial regulations prohibit such disposal.

Section 14: TRANSPORT INFORMATION

TRANSPORT INFORMATION

Not regulated as dangerous goods per US DOT or IATA.

Section 15: REGULATORY INFORMATION

INVENTORY LISTS

All of the components in this product are on the following inventory lists: USA (TSCA), Canada (DSL/NDSL); Europe (EINECS)

TSCA SECTION 12(b)

None of the chemicals in this product are listed under TSCA Section 12(b).

CERCLA HAZARDOUS SUBSTANCES

There is no CERCLA Reportable Quantity for this material.

SARA 311 CATEGORIES

Immediate (Acute) Health Hazard:	Yes
Delayed (Chronic) Health Hazard:	No
Fire Hazard:	No
Sudden Release of Pressure Hazard:	No
Reactivity Hazard:	No

SARA 313

None of the components in this product are subject to reporting under SARA Section 313.

CLEAN WATER ACT

None of the chemicals in this product are listed as Priority Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

STATE RIGHT-TO-KNOW:

This product does not contain components at levels which are required to be reported under the statutes of the following states: PA, MA, MN, and NJ.

This product does not contain materials known to the State of California (Proposition 65) to cause cancer and/or reproductive harm at levels which would require a warning under the statute.



CRYOTECH NAAC®
Solid Runway Deicer
Safety Data Sheet

NFPA 704	
Health	1
Fire	0
Physical Hazard	0
Hazard Rating 0-4 0-least hazardous, 4-most hazardous	

HMIS – Hazardous Materials Identification System	
Health	1
Fire	0
Physical Hazard	0
Hazard Rating: 0 = minimal, 1 = slight, 2 = moderate, 3 = serious, 4 = severe	

Section 16: OTHER INFORMATION

SDS REVISION DATE

Revision date: June 30, 2014

Expiration date: June 30, 2017

Latest version of this SDS can be obtained from Cryotech.

NOTE TO EMPLOYER

This Safety Data Sheet contains environmental, health and toxicology information for your employees. Please ensure this information is provided to them. It also contains information to help you meet community right-to-know/emergency response reporting requirements under SARA Title III and many other laws. If you resell this product, this SDS must be given to the buyer or the information incorporated in your SDS. Discard any previous edition of this SDS.

DISCLAIMER

The above information is accurate to the best of our knowledge. However, since data, safety standards, and government regulations are subject to change and the conditions of handling and use or misuse are beyond our control, GENERAL ATOMICS INTERNATIONAL SERVICES CORPORATION dba Cryotech Deicing Technology makes no warranty, either express or implied, with respect to the completeness or continuing accuracy of the information contained herein and disclaims all liability for reliance thereon. GENERAL ATOMICS INTERNATIONAL SERVICES CORPORATION dba Cryotech Deicing Technology assumes no responsibility for any injury or loss resulting from the use of the product described herein. User should satisfy himself that he has all current data relevant to his particular use.

End of Safety Data Sheet

Prepared According to the OSHA Hazard Communication Standard (29 CFR 1910.1200)

by Cryotech Deicing Technology, 6103 Orthoway, Fort Madison, IA 52627

Form #MKT1002 Rev. July 14, 2014

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APPENDIX C**Discharge Monitoring Reports**

PERMITTEE NAME/ADDRESS (Include

Facility Name/Location if different)

Name Maryland Aviation Administration

Address PO Box 8766

BWI Marshall Airport, MD 21240

(2546-AA)

Facility BWI Marshall Airport, Outfall 003

Location BWI Marshall Airport

Attn: Mark Williams (MAA), Jay Janney (MES)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16)

(17-19)

MD0063371

003 - B

PERMIT NUMBER
DISCHARGE NUMBER

Form Approved.

OMB No.

Approval expires

MONITORING PERIOD

YEAR	MO	DAY	YEAR	MO	DAY
14	07	01	14	09	30

FROM

TO

 *** NO DISCHARGE ☐ ***

NOTE: Read instructions before completing this form

State Discharge Permit: 10-DP-2546

Quarterly DMR

PARAMETER (32-37)		QUANTITY OR LOADING			QUALITY OR CONCENTRATION			NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)	
		(3 Card Only) (46-53)		(54-61)	(4 Card Only) (38-45)		(46-53)				(54-61)
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM				UNITS
NITROGEN, TOTAL (AS N) 00600 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	233.19 256.37	256.37	(26)	*****	1.20	1.20	(19)	0	Once/ Quarter	Grab
	PERMIT REQUIREMENT	Quarterly Average Report	Day Max Report	LBS/DAY	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab
NITROGEN, KJELDAHL TOTAL (AS N) 00625 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	****	*****	1.20	1.20	****	0	Once/ Quarter	Grab
	PERMIT REQUIREMENT	*****	*****	****	*****	Quarterly Average Report	Day Max Report	****		Once/ Quarter	Grab
NITRITE PLUS NITRATE TOTAL 1 DET. (AS N) 00630 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	****	*****	0.00	0.00	(19)	0	Once/ Quarter	Grab
	PERMIT REQUIREMENT	*****	*****	****	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab
PHOSPHOROUS, TOTAL (AS P) 00665 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	64.13 70.50	70.50	(26)	*****	0.33	0.33	(19)	0	Once/ Quarter	Grab
	PERMIT REQUIREMENT	Quarterly Average Report	Day Max Report	LBS/DAY	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab
OIL AND GREASE TOTAL RECOVERABLE 70030 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	****	*****	*****	0	(19)	0	Once/ Quarter	Grab
	PERMIT REQUIREMENT	*****	*****	****	*****	*****	15 Report	MG/L		Once/ Quarter	Grab
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

**Mark Williams, Environmental
Compliance Manager, MAA**

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN: AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. SS1001 AND 33 U.S.C. SS 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO \$10,000 AND OR MAXIMUM IMPRISONMENT OF BETWEEN 6 MONTHS AND 5 YEARS.)

SIGNATURE OF PRICIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

410 729-8200 14 10 28

AREA CODE NUMBER YEAR MONTH DAY

COMMENT AND EXPANATION OF ANY VIOLATIONS (Reference all attachments here)

The deicing season is defined as the first day of glycol usage associated with a precipitation event (snow, sleet, rain and or freezing rain) and ends March 31st or two weeks after the last day of glycol usage during a precipitation event (whichever is latest). Oil & grease is monitored quarterly during stormwater dischar

PERMITTEE NAME/ADDRESS (Include
Facility Name/Location if different)

Name Maryland Aviation Administration
Address PO Box 8766
BWI Marshall Airport, MD 21240
(2546-AA)

Facility BWI Marshall Airport, Outfall 007

Location BWI Marshall Airport

Attn: Mark Williams (MAA), Jay Janney (MES)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16)

(17-19)

MD0063371

007 - B

PERMIT NUMBER

DISCHARGE NUMBER

Form Approved.

OMB No.

Approval expires

*** NO DISCHARGE ☐ ***

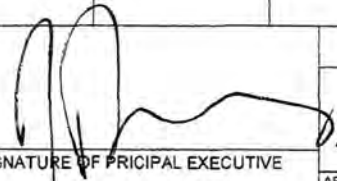
NOTE: Read instructions before completing this form

State Discharge Permit: 10-DP-2546

Quarterly DMR

MONITORING PERIOD					
YEAR	MO	DAY	YEAR	MO	DAY
14	07	01	14	09	30
FROM			TO		
(20-21)			(26-27)		
(22-23)			(28-29)		
(24-25)			(30-31)		

PARAMETER (32-37)		QUANTITY OR LOADING			QUALITY OR CONCENTRATION			NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)	
		(3 Card Only) (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM				
NITROGEN, TOTAL (AS N) 00600 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0.72 11.35	11.35	(26)	*****	0.490	0.490	(19)	0	Once/ Quarter	Grab
	PERMIT REQUIREMENT	Quarterly Average Report	Day Max Report	LBS/DAY	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab
NITROGEN, KJELDAHL TOTAL (AS N) 00625 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	****	*****	0.490	0.490	****	0	Once/ Quarter	Grab
	PERMIT REQUIREMENT	*****	*****	****	*****	Quarterly Average Report	Day Max Report	****		Once/ Quarter	Grab
NITRITE PLUS NITRATE TOTAL 1 DET. (AS N) 00630 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	****	*****	0.000	0.000	(19)	0	Once/ Quarter	Grab
	PERMIT REQUIREMENT	*****	*****	****	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab
PHOSPHOROUS, TOTAL (AS P) 00665 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	0.32 5.09	5.09	(26)	*****	0.220	0.220	(19)	0	Once/ Quarter	Grab
	PERMIT REQUIREMENT	Quarterly Average Report	Day Max Report	LBS/DAY	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab
OIL AND GREASE TOTAL RECOVERABLE 70030 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	****	*****	*****	0	(19)	0	Once/ Quarter	Grab
	PERMIT REQUIREMENT	*****	*****	****	*****	*****	15 Report	MG/L		Once/ Quarter	Grab
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER		I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN: AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. 851001 AND 33 U.S.C. 851319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO \$10,000 AND OR MAXIMUM IMPRISONMENT OF BETWEEN 6 MONTHS AND 5 YEARS.)		TELEPHONE		DATE	
Mark Williams, Environmental Compliance Manager, MAA				410 729-8200		14 10 28	
TYPED OR PRINTED				SIGNATURE OF PRICIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		AREA CODE NUMBER YEAR MONTH DAY	

COMMENT AND EXPANATION OF ANY VIOLATIONS (Reference all attachments here)

The deicing season is defined as the first day of glycol usage associated with a precipitation event (snow, sleet, rain and or freezing rain) and ends March 31st or two weeks after the last day of glycol usage during a precipitation event (whichever is latest). Oil & grease is monitored quarterly during stormwater dischar

MITTEE NAME/ADDRESS (Include
Name/Location if different)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

Form Approved.

OMB No.

Approval expires

Maryland Aviation Administration
PO Box 8766
BWI Marshall Airport, MD 21240
(2546-AA)
BWI Marshall Airport, Outfall 007
BWI Marshall Airport
Mark Williams (MAA), Jay Janney (MES)

(2-16)

MD0063371

PERMIT NUMBER

(17-19)

007 - B

DISCHARGE NUMBER

*** NO DISCHARGE ☐ ***

NOTE: Read instructions before completing this form

State Discharge Permit: 10-DP-2546

Quarterly DMR

MONITORING PERIOD					
YEAR	MO	DAY	YEAR	MO	DAY
FROM 14	01	01	TO 14	03	31
(20-21)	(22-23)	(24-25)	(26-27)	(28-29)	(30-31)

PARAMETER (32-37)		(3 Card Only) (46-53)			(4 Card Only) (38-45)			NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM			
ROGEN, AL (AS N) 30 1 0 0 LUENT GROSS VALUE	SAMPLE MEASUREMENT PERMIT REQUIREMENT	7.01 9.03 Quarterly Average Report	9.03 Day Max Report	(26) LBS/DAY	*****	0.940 Quarterly Average Report	0.940 Day Max Report	0	Once/ Quarter	Grab
ROGEN, KJELDAHL AL (AS N) 25 1 0 0 LUENT GROSS VALUE	SAMPLE MEASUREMENT PERMIT REQUIREMENT	***** ***** ***** *****	***** ***** ***** *****	**** **** **** ****	***** ***** ***** *****	0.940 Quarterly Average Report	0.940 Day Max Report	0	Once/ Quarter	Grab
RITE PLUS NITRATE AL 1 DET. (AS N) 30 1 0 0 LUENT GROSS VALUE	SAMPLE MEASUREMENT PERMIT REQUIREMENT	***** ***** ***** *****	***** ***** ***** *****	**** **** **** ****	***** ***** ***** *****	0.000 Quarterly Average Report	0.000 Day Max Report	0	Once/ Quarter	Grab
SPHOROUS, TOTAL (AS P) 35 1 0 0 LUENT GROSS VALUE	SAMPLE MEASUREMENT PERMIT REQUIREMENT	1.42 1.83 Quarterly Average Report	1.83 Day Max Report	(26) LBS/DAY	*****	0.190 Quarterly Average Report	0.190 Day Max Report	0	Once/ Quarter	Grab
AND GREASE AL RECOVERABLE 30 1 0 0 LUENT GROSS VALUE	SAMPLE MEASUREMENT PERMIT REQUIREMENT	***** ***** ***** *****	***** ***** ***** *****	**** **** **** ****	***** ***** ***** *****	***** ***** ***** *****	0 15 Report	0	Once/ Quarter	Grab
	SAMPLE MEASUREMENT PERMIT REQUIREMENT									
	SAMPLE MEASUREMENT PERMIT REQUIREMENT									

TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. 551001 AND 33 U.S.C. 55 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO \$10,000 AND OR MAXIMUM IMPRISONMENT OF BETWEEN 6 MONTHS AND 5 YEARS.)	SIGNATURE OF PRICIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	TELEPHONE	DATE			
Mark Williams, Environmental Compliance Manager, MAA TYPED OR PRINTED			410 729-8200	14	04	17	
			AREA CODE	NUMBER	YEAR	MONTH	DAY

MENT AND EXPANATION OF ANY VIOLATIONS (Reference all attachments here)

deciding season is defined as the first day of glycol usage associated with a precipitation event (snow, sleet, rain and or freezing rain) and ends March 31st or two weeks after the last day of glycol usage
ng a precipitation event (whichever is latest). Oil & grease is monitored quarterly during stormwater dischar

Form 3320-1 (Rev. 8095)

Previous editions may be used.

(REPLACES EPA FORM T-40 WHICH MAY NOT BE USED.)

PAGE 1 OF 1

Correction see cover letter

10/20/14

MITTEE NAME/ADDRESS (Include
ty Name/Location if different)

Maryland Aviation Administration
PO Box 8766
BWI Marshall Airport, MD 21240
(2546-AA)
BWI Marshall Airport, Outfall 003
BWI Marshall Airport
Mark Williams (MAA), Jay Janney (MES)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16)

(17-19)

MD0063371

003 - B

PERMIT NUMBER

DISCHARGE NUMBER

Form Approved.

OMB No.

Approval expires

*** NO DISCHARGE ***

NOTE: Read instructions before completing this form

MONITORING PERIOD

FROM YEAR MO DAY TO YEAR MO DAY
14 01 01 14 03 31
(20-21) (22-23) (24-25) (26-27) (28-29) (30-31)

State Discharge Permit: 10-DP-2546

Quarterly DMR

PARAMETER (32-37)		(3 Card Only) QUANTITY OR LOADING			(4 Card Only) QUALITY OR CONCENTRATION			NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM			
ROGEN, AL (AS N) 30 1 0 0	SAMPLE MEASUREMENT	19.00 4.02	4.02	(26)	*****	1.07	1.07	0	Once/ Quarter	Grab
LUENT GROSS VALUE	PERMIT REQUIREMENT	Quarterly Average Report	Day Max Report	LBS/DAY	*****	Quarterly Average Report	Day Max Report		Once/ Quarter	Grab
ROGEN, KJELDAHL AL (AS N) 25 1 0 0	SAMPLE MEASUREMENT	*****	*****	****	*****	1.07	1.07	0	Once/ Quarter	Grab
LUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	*****	Quarterly Average Report	Day Max Report		Once/ Quarter	Grab
RITE PLUS NITRATE AL 1 DET. (AS N) 30 1 0 0	SAMPLE MEASUREMENT	*****	*****	****	*****	0.00	0.00	0	Once/ Quarter	Grab
LUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	*****	Quarterly Average Report	Day Max Report		Once/ Quarter	Grab
SPHOROUS, TOTAL (AS P) 35 1 0 0	SAMPLE MEASUREMENT	3.01 0.79	0.79	(26)	*****	0.21	0.21	0	Once/ Quarter	Grab
LUENT GROSS VALUE	PERMIT REQUIREMENT	Quarterly Average Report	Day Max Report	LBS/DAY	*****	Quarterly Average Report	Day Max Report		Once/ Quarter	Grab
AND GREASE AL RECOVERABLE 30 1 0 0	SAMPLE MEASUREMENT	*****	*****	****	*****	*****	0	0	Once/ Quarter	Grab
LUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	*****	*****	15 Report		Once/ Quarter	Grab
	SAMPLE MEASUREMENT									
	PERMIT REQUIREMENT									
	SAMPLE MEASUREMENT									
	PERMIT REQUIREMENT									

TITLE PRINCIPAL EXECUTIVE OFFICER

Mark Williams, Environmental
Compliance Manager, MAA

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED
AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED
ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR
OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS
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THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. SS1001 AND
33 U.S.C. SS 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO
\$10,000 AND OR MAXIMUM IMPRISONMENT OF BETWEEN 6 MONTHS AND 5 YEARS.)

SIGNATURE OF PRICIPAL EXECUTIVE
OFFICER OR AUTHORIZED AGENT

TELEPHONE

DATE

410 729-8200
AREA CODE NUMBER

14 04 17
YEAR MONTH DAY

MENT AND EXPANATION OF ANY VIOLATIONS (Reference all attachments here)

deciding season is defined as the first day of glycol usage associated with a precipitation event (snow, sleet, rain and or freezing rain) and ends March 31st or two weeks after the last day of glycol usage
ng a precipitation event (whichever is latest). Oil & grease is monitored quarterly during stormwater dischar

Form 3320-1 (Rev. 8095)

Previous editions may be used.

(REPLACES EPA FORM T-40 WHICH MAY NOT BE USED.)

PAGE 3 OF 1

Correction See cover letter

PERMITTEE NAME/ADDRESS (Include
Facility Name/Location if different)

Name Maryland Aviation Administration

Address PO Box 8766

BWI Marshall Airport, MD 21240

(2546-AA)

Facility BWI Marshall Airport, Outfall 003

Location BWI Marshall Airport

Attn: Mark Williams (MAA), Jay Janney (MES)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16)

(17-19)

MD0063371

003 - B

PERMIT NUMBER
DISCHARGE NUMBER

Form Approved.

OMB No.

Approval expires

 *** NO DISCHARGE ☐ ***

NOTE: Read instructions before completing this form

State Discharge Permit: 10-DP-2546

Quarterly DMR

MONITORING PERIOD					
YEAR	MO	DAY	YEAR	MO	DAY
FROM 14	04	01	TO 14	06	30
(20-21)	(22-23)	(24-25)	(26-27)	(28-29)	(30-31)

PARAMETER (32-37)		QUANTITY OR LOADING (3 Card Only) (48-53)			QUALITY OR CONCENTRATION (4 Card Only) (38-45)				NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		AVERAGE (54-61)	MAXIMUM	UNITS	MINIMUM	AVERAGE (46-53)	MAXIMUM (54-61)	UNITS			
NITROGEN, TOTAL (AS N) 00600 1 0 0	SAMPLE MEASUREMENT	13.88 229.18	224.18	(26)	*****	1.60	1.60	(19)	0	Once/ Quarter	Grab
EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	Quarterly Average Report	Day Max Report	LBS/DAY	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab
NITROGEN, KJELDAHL TOTAL (AS N) 00625 1 0 0	SAMPLE MEASUREMENT	*****	*****	****	*****	1.60	1.60	****	0	Once/ Quarter	Grab
EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	*****	Quarterly Average Report	Day Max Report	****		Once/ Quarter	Grab
NITRITE PLUS NITRATE TOTAL 1 DET. (AS N) 00630 1 0 0	SAMPLE MEASUREMENT	*****	*****	****	*****	0.00	0.00	(19)	0	Once/ Quarter	Grab
EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab
PHOSPHOROUS, TOTAL (AS P) 00665 1 0 0	SAMPLE MEASUREMENT	2.73 60.25	60.25	(26)	*****	0.43	0.43	(19)	0	Once/ Quarter	Grab
EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	Quarterly Average Report	Day Max Report	LBS/DAY	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab
OIL AND GREASE TOTAL RECOVERABLE 70030 1 0 0	SAMPLE MEASUREMENT	*****	*****	****	*****	*****	0	(19)	0	Once/ Quarter	Grab
EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	*****	****	*****	*****	15 Report	MG/L		Once/ Quarter	Grab
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										
	SAMPLE MEASUREMENT										
	PERMIT REQUIREMENT										

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. SS1001 AND 33 U.S.C. SS 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO \$10,000 AND OR MAXIMUM IMPRISONMENT OF BETWEEN 6 MONTHS AND 5 YEARS.)	TELEPHONE		DATE		
Mark Williams, Environmental Compliance Manager, MAA		410	729-8200	14	07	28
TYPED OR PRINTED		SIGNATURE OF PRICIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		AREA CODE	NUMBER	YEAR MONTH DAY

COMMENT AND EXPANATION OF ANY VIOLATIONS (Reference all attachments here)

The deicing season is defined as the first day of glycol usage associated with a precipitation event (snow, sleet, rain and or freezing rain) and ends March 31st or two weeks after the last day of glycol usage during a precipitation event (whichever is latest). Oil & grease is monitored quarterly during stormwater discharge.

Correction See Cover Letter

10/28/14

PERMITTEE NAME/ADDRESS (Include

Facility Name/Location if different)

Name Maryland Aviation Administration

Address PO Box 8766

BWI Marshall Airport, MD 21240

(2546-AA)

Facility BWI Marshall Airport, Outfall 007

Location BWI Marshall Airport

Attn: Mark Williams (MAA), Jay Janney (MES)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16)

(17-19)

MD0063371

007 - B

PERMIT NUMBER

DISCHARGE NUMBER

Form Approved.

OMB No.

Approval expires

*** NO DISCHARGE ***

NOTE: Read instructions before completing this form

State Discharge Permit: 10-DP-2548

Quarterly DMR

MONITORING PERIOD					
YEAR	MO	DAY	YEAR	MO	DAY
FROM 14	04	01	TO 14	06	30
(20-21)	(22-23)	(24-25)	(26-27)	(28-29)	(30-31)

PARAMETER (32-37)		QUANTITY OR LOADING			QUALITY OR CONCENTRATION			NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		(3 Card Only) (46-53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM			
NITROGEN, TOTAL (AS N) 00600 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT PERMIT REQUIREMENT	12.04 111.84 Quarterly Average Report	111.84 Day Max Report	(26) LBS/DAY	***** *****	1.620 Quarterly Average Report	1.620 Day Max Report	(19) MG/L	0 Once/ Quarter	Grab
NITROGEN, KJELDAHL TOTAL (AS N) 00625 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT PERMIT REQUIREMENT	***** ***** *****	***** ***** *****	***** ***** *****	***** ***** *****	1.620 Quarterly Average Report	1.620 Day Max Report	***** ***** *****	0 Once/ Quarter	Grab
NITRITE PLUS NITRATE TOTAL 1 DET. (AS N) 00630 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT PERMIT REQUIREMENT	***** ***** *****	***** ***** *****	***** ***** *****	***** ***** *****	0.000 Quarterly Average Report	0.000 Day Max Report	(19) MG/L	0 Once/ Quarter	Grab
PHOSPHOROUS, TOTAL (AS P) 00665 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT PERMIT REQUIREMENT	2.68 24.85 Quarterly Average Report	24.85 Day Max Report	(26) LBS/DAY	***** *****	0.360 Quarterly Average Report	0.360 Day Max Report	(19) MG/L	0 Once/ Quarter	Grab
OIL AND GREASE TOTAL RECOVERABLE 70030 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT PERMIT REQUIREMENT	***** ***** *****	***** ***** *****	***** ***** *****	***** ***** *****	***** ***** *****	0 15 Report	(19) MG/L	0 Once/ Quarter	Grab
	SAMPLE MEASUREMENT PERMIT REQUIREMENT									
	SAMPLE MEASUREMENT PERMIT REQUIREMENT									

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN: AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. §§1001 AND 33 U.S.C. §§ 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO \$10,000 AND OR MAXIMUM IMPRISONMENT OF BETWEEN 6 MONTHS AND 5 YEARS.)	TELEPHONE		DATE		
Mark Williams, Environmental Compliance Manager, MAA		410 729-8200		14	07	09
TYPED OR PRINTED		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MONTH DAY

COMMENT AND EXPANATION OF ANY VIOLATIONS (Reference all attachments here)

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Correction See cover letter

10/28/14

PERMITTEE NAME/ADDRESS (Include
Facility Name/Location if different)

Name Maryland Aviation Administration

Address PO Box 8766

BWI Marshall Airport, MD 21240

(2546-AA)

Facility BWI Marshall Airport, Outfall 003

Location BWI Marshall Airport

Attn: Mark Williams (MAA), Jay Janney (MES)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16)

(17-19)

MD0063371

003 - B

PERMIT NUMBER

DISCHARGE NUMBER

Form Approved.

OMB No.

Approval expires

*** NO DISCHARGE ***

NOTE: Read instructions before completing this form

State Discharge Permit: 10-DP-2546

Quarterly DMR

MONITORING PERIOD						
YEAR	MO	DAY	YEAR	MO	DAY	
FROM 13	10	01	TO 13	12	31	
(20-21)	(22-23)	(24-25)	(26-27)	(28-29)	(30-31)	

PARAMETER (32-37)		(3 Card Only) (46-53)			(4 Card Only) (38-45)			QUALITY OR CONCENTRATION (46-53)			NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)								
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS													
NITROGEN, TOTAL (AS N) 00600 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	10.86 10.77	10.77	(26)	*****	1.17	1.17	(19)	0	Once/ Quarter	Grab										
	PERMIT REQUIREMENT	Quarterly Average Report	Day Max Report	LBS/DAY	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab										
NITROGEN, KJELDAHL TOTAL (AS N) 00625 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	****	*****	0.57	0.57	****	0	Once/ Quarter	Grab										
	PERMIT REQUIREMENT	*****	*****	****	*****	Quarterly Average Report	Day Max Report	****		Once/ Quarter	Grab										
NITRITE PLUS NITRATE TOTAL 1 DET. (AS N) 00630 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	****	*****	0.60	0.60	(19)	0	Once/ Quarter	Grab										
	PERMIT REQUIREMENT	*****	*****	****	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab										
PHOSPHOROUS, TOTAL (AS P) 00665 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	5.84 5.89	5.89	(26)	*****	0.64	0.64	(19)	0	Once/ Quarter	Grab										
	PERMIT REQUIREMENT	Quarterly Average Report	Day Max Report	LBS/DAY	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab										
OIL AND GREASE TOTAL RECOVERABLE 70030 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	****	*****	*****	0	(19)	0	Once/ Quarter	Grab										
	PERMIT REQUIREMENT	*****	*****	****	*****	*****	15 Report	MG/L		Once/ Quarter	Grab										
	SAMPLE MEASUREMENT																				
	PERMIT REQUIREMENT																				
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NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT, SEE 18 U.S.C. §§1001 AND 33 U.S.C. §§ 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO \$10,000 AND OR MAXIMUM IMPRISONMENT OF BETWEEN 6 MONTHS AND 5 YEARS.)								TELEPHONE		DATE										
Mark Williams, Environmental Compliance Manager, MAA																					
TYPED OR PRINTED																					
SIGNATURE OF PRICIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT									410	729-8200	14	01	28								
									AREA CODE	NUMBER	YEAR	MONTH	DAY								

COMMENT AND EXPANATION OF ANY VIOLATIONS (Reference all attachments here)

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Correction See cover Letter

10/28/14

PERMITTEE NAME/ADDRESS (Include

Facility Name/Location if different)

Name Maryland Aviation Administration

Address PO Box 8766

BWI Marshall Airport, MD 21240

(2546-AA)

Facility BWI Marshall Airport, Outfall 007

Location BWI Marshall Airport

Attn: Mark Williams (MAA), Jay Janney (MES)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

(2-16)

(17-19)

MD0063371

007 - B

PERMIT NUMBER

DISCHARGE NUMBER

Form Approved.

OMB No.

Approval expires

*** NO DISCHARGE ***

NOTE: Read instructions before completing this form

State Discharge Permit: 10-DP-2546

Quarterly DMR

MONITORING PERIOD						
YEAR	MO	DAY	YEAR	MO	DAY	
FROM 13	10	01	TO 13	12	31	
(20-21)	(22-23)	(24-25)	(26-27)	(28-29)	(30-31)	

PARAMETER (32-37)		(3 Card Only)			UNITS	(4 Card Only)			UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
		(46-53) AVERAGE	(54-61) MAXIMUM			(38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM				
NITROGEN, TOTAL (AS N) 00600 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	4.86 9.07	9.07	(26)	*****	0.980	0.980	(19)	0	Once/ Quarter	Grab	
	PERMIT REQUIREMENT	Quarterly Average Report	Day Max Report	LBS/DAY	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab	
NITROGEN, KJELDAHL TOTAL (AS N) 00625 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	****	*****	0.450	0.450	****	0	Once/ Quarter	Grab	
	PERMIT REQUIREMENT	*****	*****	****	*****	Quarterly Average Report	Day Max Report	****		Once/ Quarter	Grab	
NITRITE PLUS NITRATE TOTAL 1 DET. (AS N) 00630 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	****	*****	0.530	0.530	(19)	0	Once/ Quarter	Grab	
	PERMIT REQUIREMENT	*****	*****	****	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab	
PHOSPHOROUS, TOTAL (AS P) 00665 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	2.68 5.00	5.00	(26)	*****	0.540	0.540	(19)	0	Once/ Quarter	Grab	
	PERMIT REQUIREMENT	Quarterly Average Report	Day Max Report	LBS/DAY	*****	Quarterly Average Report	Day Max Report	MG/L		Once/ Quarter	Grab	
OIL AND GREASE TOTAL RECOVERABLE 70030 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT	*****	*****	****	*****	*****	0	(19)	0	Once/ Quarter	Grab	
	PERMIT REQUIREMENT	*****	*****	****	*****	*****	15 Report	MG/L		Once/ Quarter	Grab	
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT											
	SAMPLE MEASUREMENT											
	PERMIT REQUIREMENT											

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

Mark Williams, Environmental

Compliance Manager, MAA

TYPED OR PRINTED

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C. §§1001 AND 33 U.S.C. §§ 1319. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO \$10,000 AND OR MAXIMUM IMPRISONMENT OF BETWEEN 6 MONTHS AND 5 YEARS.)

SIGNATURE OF PRINCIPAL EXECUTIVE

OFFICER OR AUTHORIZED AGENT

TELEPHONE

DATE

410

729-8200

14

01

28

AREA CODE

NUMBER

YEAR

MONTH

DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

The deicing season is defined as the first day of glycol usage associated with a precipitation event (snow, sleet, rain and/or freezing rain) and ends March 31st or two weeks after the last day of glycol usage during a precipitation event (whichever is latest). Oil & grease is monitored quarterly during stormwater discharge.

Correction See cover Letter

10/22/14

K. MAA P2 TRAINING MATERIAL



Maryland Aviation Administration

STORMWATER POLLUTION PREVENTION TRAINING

OCTOBER 24, 2016
OCTOBER 26-27, 2016



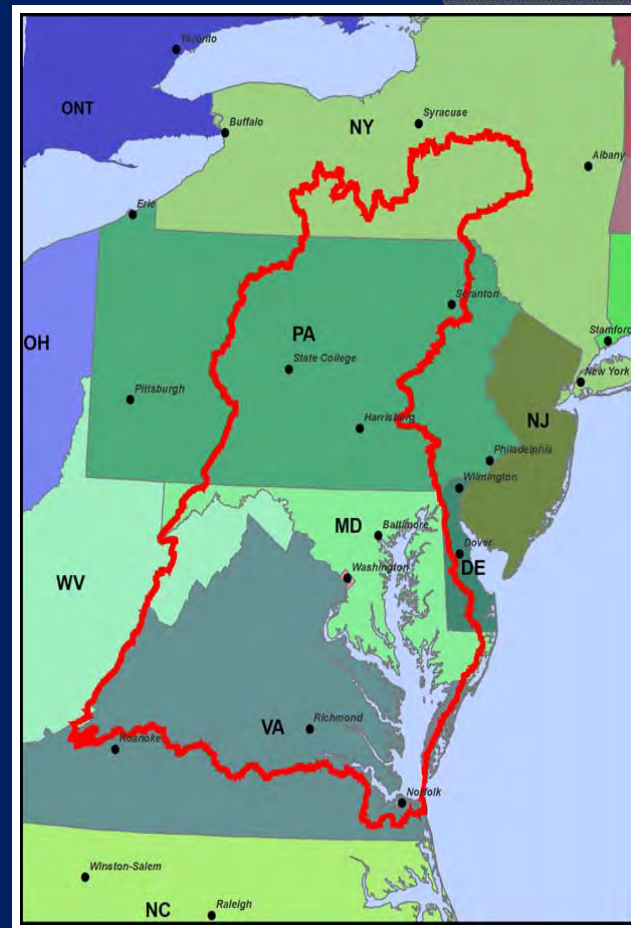
Training Topics

- Introduction
- Stormwater Pollution Prevention Plan (SWPPP)
- Pollution Sources and Best Management Practices (BMPs)
- Illicit Discharge Detection Elimination (IDDE)
- Deicing
- Summary

INTRODUCTION

Stormwater

- Results from rain, snow-melt, fog
 - Picks up and carries pollutants
 - Enters storm sewer systems
 - Releases to waters untreated
- MAA's stormwater flows into streams/local watersheds and ultimately into the Chesapeake Bay



Stormwater Pollution

- ◎ Stormwater which has come into contact with any pollutants, including:
 - Oil, fuels, grease, pesticides, deicing compounds, trash, dirt, sediment

- ◎ Pollution sources at MAA:
 - Fueling operations, washing equipment, trash handling and storage, chemical storage, deicing, erosion, etc.

MAA Regulatory Requirements

- ◎ National Pollution Discharge Elimination System (NPDES) Permit
 - Authorizes stormwater discharges associated with industrial activities
 - Regulates discharges to stormwater
 - Requires action to prevent pollution to stormwater
 - Stormwater Pollution Prevention Plan (SWPPP), annual training, and regular facility inspections
- ◎ BWI Marshall Airport operating under NPDES Permit issued in 2013
- ◎ MTN State Airport NPDES Permit updated in 2014
 - MDE General Permit for Discharges from Stormwater (12-SW) & 11-HT

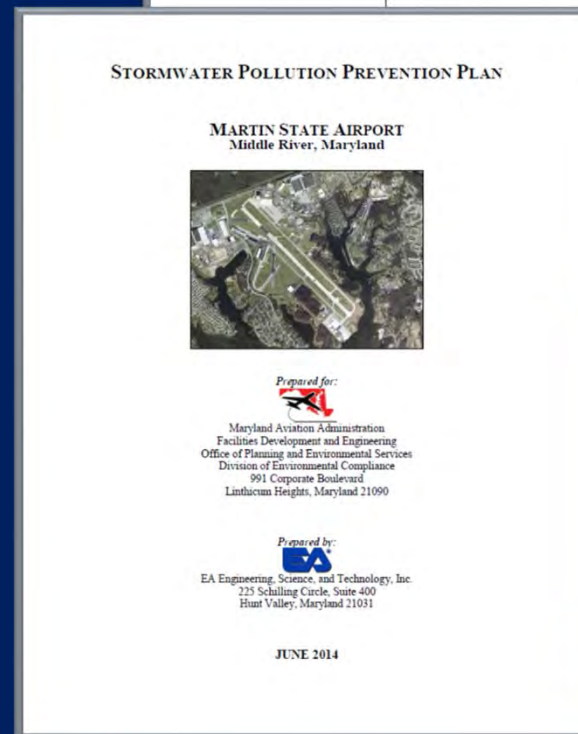
How does this impact you?

- ⦿ *A single drop of used motor oil can contaminate 1 MILLION drops of water*
- ⦿ *A single drop of solvent can contaminate 75,000 gallons of water*
 - Water is easy to contaminate but difficult and expensive to clean up. Contaminated water deters new businesses and industry from forming in the community.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

MAA's SWPPP

- Required by NPDES
- Provides the following information:
 - Drainage area site descriptions and maps
 - Potential pollutant sources
 - BMPs for preventing and controlling pollution
 - BMPs for specific activities
 - Spill prevention and response procedures
 - Employee training guidance
 - P2 Team Contact Info



Access the SWPPP When...

- ⦿ There is a potential for stormwater pollution
- ⦿ The SWPPP can be found at:
 - Office of Environmental Services (OES) – Environmental Manager's Office
 - Individual Manager's office
 - MTN Airport Operations Office
 - MAA's Intranet



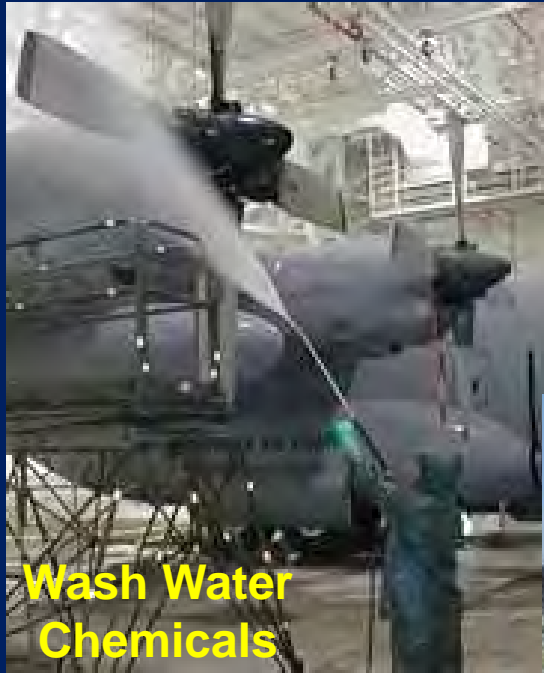
Pollution Prevention (P2) Team

- Meets at least annually
- Supports implementation of SWPPP
- Identifies changes in airport operations and whether SWPPP updates are needed
- Facilitates communication

Notify the P2 Team for concerns regarding potential stormwater pollution.

POLLUTION SOURCES AND BEST MANAGEMENT PRACTICES (BMPs)

What are the potential MAA stormwater pollution sources?



Potential Pollution Sources

- ⦿ Aircraft, Equipment, Vehicle, Building & Apron Washdown
- ⦿ Fueling Activities
- ⦿ Construction Activities
- ⦿ Illicit Discharges*
- ⦿ Spills / Leaks
- ⦿ Outdoor Materials Storage
 - Oils and Fluids
 - Paints
 - Solid Waste



Potential Pollution Sources

- ⦿ Aircraft & Runway Deicing Operations
- ⦿ Fire-Fighting Equipment Testing/Flushing
- ⦿ Sweeper Pit Run-off
- ⦿ Pesticide/Herbicide Usage
- ⦿ Runway Derubberizing/
Foreign Objects & Debris (FOD)



HOW CAN THE MAA PREVENT STORMWATER POLLUTION?

Baseline BMPs

- ⦿ Preventative Maintenance
- ⦿ Good Housekeeping
- ⦿ Spill Prevention
- ⦿ Sediment & Erosion Prevention & Control
- ⦿ Management of Stormwater Runoff
- ⦿ Visual Inspections
- ⦿ Pollution Prevention Training
- ⦿ Recordkeeping and Internal Reporting

Preventative Maintenance

- ◎ Regular inspections, Testing, Maintenance and Repair
 - Maintain equipment to prevent leaks and/or catastrophic failures
 - Maintain erosion and sediment control structures to prevent runoff of sediment into waterways
 - Maintain oil/water separators and catchment tanks to prevent the discharge of oil or hazardous materials into waterways

Must document appropriately!

Good Housekeeping

- ◎ Maintain a clean & orderly facility
 - Manage and store materials/waste properly
 - Ensure proper leak/spill prevention & response
 - Sweep up dust and sediment and dispose of properly
 - Place garbage and waste in appropriate receptacles
 - Recycle wastes when possible



Spill Prevention

- ⦿ Materials are stored properly within secondary containment
- ⦿ Regular inspections & care of spill response materials
 - Spill kit locations are well known
- ⦿ Use of drip pans when loading or unloading fuel, oil, antifreeze, etc.
- ⦿ Actively monitor fuel deliveries and fueling of equipment/vehicles



Sediment and Erosion Control

- MAA Planning & Construction manages construction site erosion
- MAA OES coordinates inspections of all MAA facilities
- Issues identified are tracked until corrected



Visual Inspections

- Routine inspection of the facility is required
 - Watch for
 - Obvious leaks or signs of container issues
 - Significant erosion or impaired stormwater management structures
 - Signs of storm water contamination
 - Report any issues immediately to the MAA OES



Vehicle/Equipment Washing

- Keep wash area clean
- Provide secondary containment
- Only wash in designated areas, using wash racks
- Display signs prohibiting discharge to drains



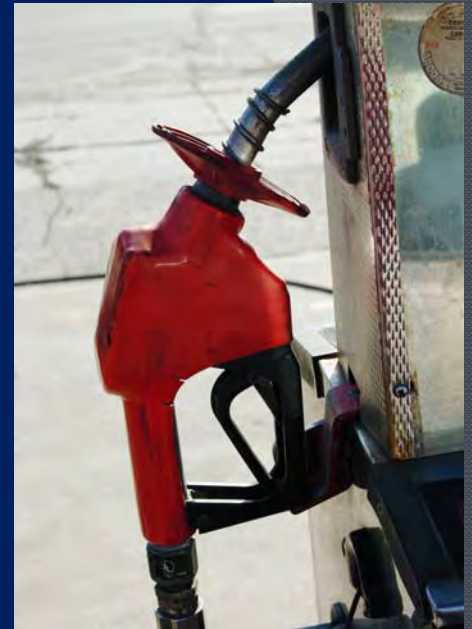
Wash Rack



Parts Washer

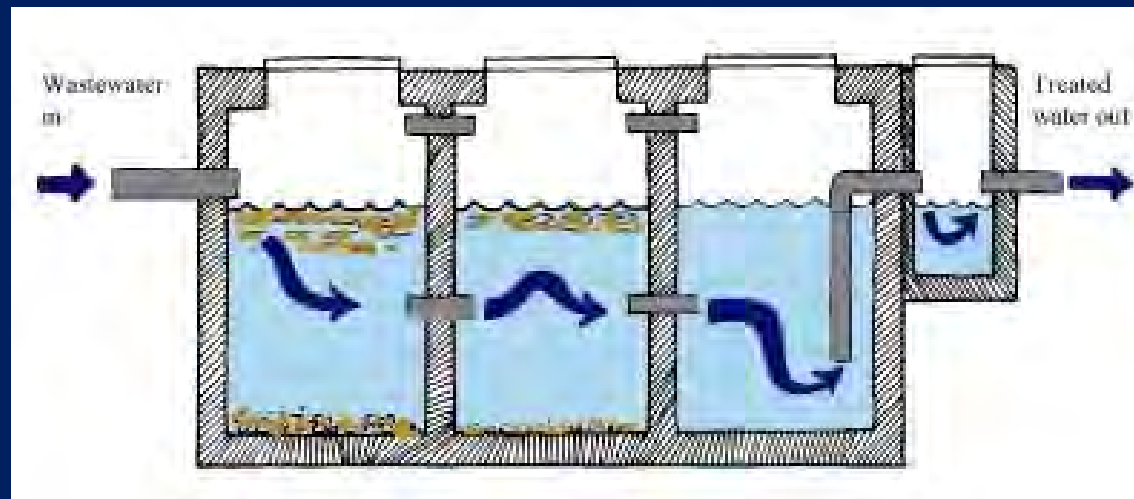
Vehicle/Equipment Fueling

- ③ Ensure absorbent or other spill prevention equipment is accessible in areas of fueling
- ③ Monitor fueling operations
 - Don't walk away when fueling equipment or vehicles
 - Ensure fueling equipment is in good condition
- ③ Use absorbent materials to soak up fuel spills and clean them up
 - Don't leave absorbent on the ground for long periods of time where it can wash away



Oil/Water Separators

- MAA has a inspection and maintenance program in place
- Separators are cleaned when sediment and oil levels > 20% of tank volume



Do not pour anything into the oil/water separator

ILLICIT DISCHARGE DETECTION ELIMINATION (IDDE) PROGRAM

IDDE

- ◎ MAA maintains a program to identify and eliminate illicit storm drain system connections and non-stormwater discharges
 - Report illicit discharges to MAA's OES
 - MES annually inspects for illicit discharges
 - During construction projects, report unknown connections to the storm water system to the OES



DEICING



Glycol Recovery

● Glycol Recovery Vehicles (GRVs)

- GRV collects glycol-containing materials/snow (NPDES Permit Requirement)
- Unrecovered or plowed glycol enters stormwater



Runway Deicer Application

- Consider current weather conditions and Runway Weather Information System (RWIS) prior to determining application rates
 - Usually only apply manufacturer-recommended application rates
 - Ensure metering equipment/controls are set to proper rates to prevent over-application
 - **More ≠ Better**

SUMMARY

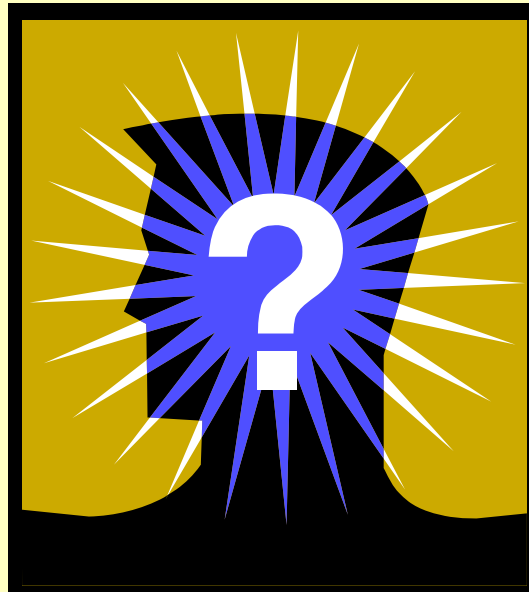
What is wrong with this picture?



Summary

- ◎ MAA may make authorized discharges to stormwater, but it must also protect stormwater
- ◎ Know and implement the BMPs specific to your daily job responsibilities
- ◎ Remember:
 - Keep pollutants out of the water.
 - Keep polluted water from leaving.

Questions?



Section Quiz

1. What are the two major rules that apply to stormwater pollution prevention?
 - a. Rule #1: Keep pollutants out of the water.
 - b. Rule #2: Keep polluted water from leaving.
2. Measures for reducing the amount of pollution are called Best Management Practices.
3. Vehicles can be washed anywhere, as long as the area is kept clean.
 - a. True
 - b. False
4. Should you pour liquid wastes into an oil/water separator? NO!

**L. BWI SWPPP 2016 UPDATE -
SUMMARY OF CHANGES**



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19 December 2016

Mr. Mark Williams
Maryland Department of Transportation Aviation Administration
Office of Environmental Services
991 Corporate Boulevard
Linthicum Heights, MD 21090

RE: Stormwater Pollution Prevention Plan (SWPPP) Update 2016 – Summary of Changes
EA Project No. 1536001

Dear Mr. Williams:

EA Engineering, Science, and Technology, Inc., PBC (EA) is pleased to provide this summary of changes made during updates to the Stormwater Pollution Prevention Plan (SWPPP) Update 2016 submitted on 11 November 2016. For your reference, a supplemental document is included with this transmittal that shows all document revisions made between the final 2011 and 2016 versions of the SWPPP.

Summary of Changes

- Title page – Updated EA address, updated delivery date to November 2016 (carried revision throughout document) and revised Mark William's title to Environmental Compliance Manager, the department to Office of Environmental Services, and the organization to Maryland Department of Transportation Aviation Administration (also carried through the rest of the document).
- Revisions Page – Revised table to include revisions completed in November 2016.
- Table of Contents – Updated to include Section 3.3 Stormwater Discharges Associated with Non-Industrial Activity from Small MS4s; Section 4.6. Identification of Nutrient Sources; and Section 5.4 Pollution Prevention Training.
- List of Appendices – Edited the list of appendices to match their order of appearance in the document and added Appendix J - Nutrient Source Identification for Stormwater Runoff Associated with Industrial Activities.
- List of Acronyms and Abbreviations – Reviewed and revised for consistency with acronyms utilized throughout the document.
- Section 1.2 – Language updated to reflect current permit (10-DP-2546) and include a summary of permitted discharges stated in the permit. Text revised to include brief overview of Total Maximum Daily Loads for total suspended solids, total nitrogen, and total phosphorus.



- Section 1.3 – Revised acronym for Hazardous Waste Contingency Plan (CP) and carried throughout paragraph; Brief description included
- Section 1.4 – Revised “in Sections 5.1.3 and 5.5.2.” to “throughout Section 5.”
- Section 2.0 – Reference to Pollution Prevention (P2) Team training updated to Section 5.4; P2 Team roster and contact information updated. Specifically, changed Robin Bowie’s title to Acting Director, MAA Office of Environmental Services; added John Hurt as the Acting Manager, MAA Environmental Planning Section; added Uday Gadhia as the Environmental Engineer, Maryland Environmental Service; and added Gregory Trusty as the Manager, MAA Airfield, Grounds & Equipment Maintenance Section.
- Section 3.1 – Updated general BWI facts and figures, based on latest information (terminal size, air traffic statistics, etc.) available at <http://bwiairport.com/en/about-bwi/factsfigures>.
- Section 3.2 – Updated individual drainage area sizes and descriptions for consistency with site inspection findings and updated GIS mapping; Updated sheet numbering for consistency with updated GIS mapping; Updated reported and largest spills based on 2013-2016 spill log included in Appendix G; Updated discussion of SWM facilities based on information from JETS database, AirPortal and MES. Updated drainage area graphics based on updated GIS mapping. Updated runway and taxiway naming conventions.
 - Section 3.2.2.1 – Added deicing pad names.
 - Section 3.2.2.2 – Changed description to include the renovated RSA. Updated Overflow A lot to Gold lot (carried through rest of document).
 - Section 3.2.3 – Added discussion for basis of wetlands outlines shown in this drainage area.
 - Section 3.2.3.6 – Verified monitoring points in drainage area discussion; Included discussion for the Greater Kitten Branch drainage area adjacent to the Kitten Branch drainage area; Added a description of current construction being performed on Taxiway C and a description of the Greater Kitten Branch drainage area (northwest of the Kitten Branch drainage area).
 - Section 3.2.3.7 – Verified monitoring points in drainage area discussion; Included discussion of demolition of Four Points by Sheraton Hotel. Revised Daily/Lot/Cell Phone Waiting Area to BWI Express parking lot (carried through rest of document).
 - Section 3.2.3.8 – Revised drainage area descriptions to include the BWI Express parking lot, BWI shuttle parking, and BWI employee parking lot.
 - Section 3.2.4.1 – Included discussion of CRCF facilities.
- Section 3.3 – Section added to include discussion of Storm Water Discharges Associated with Non-Industrial Activity from Small Municipal Separate Storm Sewer Systems, for conformance with Part I.U of the permit. *Stormwater Management Plan for Non-industrial Stormwater Discharges at BWI* (plan developed by others) added to Appendix C.
- Section 4.1 – Updated text corresponding to the tenant survey response rate. Revised Table 2 (Tenant Potential Pollutant Source Activities) to include Spills and Leaks.



- Sections 4.2 (Inventory of Exposed Materials) – Updated Table 3 based on site inspection findings.
- Section 4.3 – Revised to denote spills recorded from 2013-2016.
- Section 4.4, Table 4 (Potential Non-Stormwater Discharges) – Updated based on site inspection findings.
- Section 4.5 – Updated discussion of existing monitoring to include monitoring requirements and deicing season noted in permit.
- Section 4.6 – Section added to include discussion of nitrogen/phosphorus sources on-site, in accordance with Part I.R of the permit. *Nutrient Source Identification for Stormwater Runoff Associated with Industrial Activities* (plan developed by others) added to Appendix J.
- Section 5.0 – Included text from Section 5.1 to provide overview of seven BMPs identified in the USPEA guidance for developing SWPPPs.
- Section 5.1.4, Table 6 (Potential Future Construction-Related Erosion) – Updated based on Approved/In Progress and Phase I (2016-2020) construction areas indicated on the November 2014 Airport Layout Plan.
- Section 5.1.6 – Monthly inspection areas revised to include drainage area. Language added to describe increased inspection frequency for OWS in the Fuel Farm area.
- Section 5.4 – Pollution Prevention Training discussion moved from Section 5.1.7, to better reflect permit organization.
- Section 5.6.1 – “Compliance Implementation Program (CIP)” revised to “an internal audit program”.
- Section 6 – Updated definitions for consistency with the current permit
- Appendix A – Updated the NPDES Permit to current permit 10-DP-2546
- Appendix B – Updated BWI Site Maps, based on site stormwater features previously developed in AutoCAD format by EA, converted to GIS geodatabase as requested by MAA. MAA provided review comments to the Draft and Final SWPPP mapping on 10/7/2016 and 12/2/2016 respectively; however, revisions below reflect only significant and/or infrastructure changes that have occurred at BWI since the December 2011 SWPPP Update.
 - Existing stormwater GIS layers available in AirPortal obtained by EA and verified with feature information from AutoCAD to GIS conversion by EA.
 - Existing stormwater GIS layers available from MES’ Stormwater System verified with feature information by EA.
 - Site maps based on findings of site inspections by EA in July 2016.
 - Updated Site Maps in GIS presentation for consistent scale across site, including presentation of Greater Kitten Branch drainage area.



- Updated Site Map sheet numbering.
 - Updated Site Maps to include updated aerials (July 2016) provided by JMT.
 - Differentiated tenant-owned and MAA-owned ASTs and USTs by color.
 - Sheets 1, 3, 8, 9 – Added highlighting to show stream restoration areas
 - Sheet 3 – Added an additional generator next to building 155.
 - Sheet 4 – Removed a segment of storm drain (underneath the text “Tributary of Sachs Branch”).
 - Sheet 5: Removed a segment of storm drain that crossed State Highway 170 (eastbound).
 - Sheet 9 – Removed Ponds 1 and 2. Updated storm drain system around the newly constructed RSA at the north end of runway 15R-33L.
 - Sheet 10 – Added a new generator to the right of building 116.
 - Sheet 11 – Removed Pond 14.
 - Sheet 12 – Added two tenant-owned USTs (tenant) below the text “MP 601”. Two glycol storage tanks added to the bottom left corner. These storage tanks were labeled as “virgin” and given a brown symbol to differentiate from the “waste” glycolic storage tanks, indicated by a yellow symbol.
 - Sheet 14 – Added three UST symbols adjacent to the fueling stations. Added blue hatching to indicate the location of the underground stormwater storage.
 - Sheet 18 – Removed Pond 14 and a storm drain line above Pond 15.
 - Sheet 19 – Added two Storage Area symbols where hazardous waste sheds are located south of Building 172.
 - Sheet 21 – Added seven UST symbols adjacent to the fueling stations. Added blue hatching to indicate the location of the underground stormwater storage.
 - Sheet 24 – Extended the deicing hatching down the entire pier, adjacent to Taxiway T.
 - Sheet 25 – Removed the Storage Area symbol and added three tenant-owned ASTs below the text “Muddy Bridge Branch”. Captured the Taxiway configuration and labeling changes.
 - Sheet 29 – Removed Open Water labeling at the Fire Fighting Training Facility.
 - Sheets 31, 38 – Captured the Storm Drain and Infiltration Trench changes due to the 15R/33L construction.
- Appendix D – Updated Tenant Contact List as provided by MAA and provided a tenant contact list as reported by the tenants who responded to the 2016 survey.
 - Appendix E – Updated the Pollution Source Inventory based on the responses from the 2016 Tenant Survey.
 - Appendix G – Updated the Spill Log to reflect period of 2013-2016, as required by permit.
 - Appendix I – Updated Deicing Fluid Discharge Monitoring Documents, including Deicing Fluid Discharge Monitoring Plan and BWI Biomonitoring Study Plan (plans developed by others)
 - Appendix J – Added the Nutrient Management Plan as an appendix to the SWPPP.



- Appendix K – Updated the P2 training for 2016.
- Appendix L – Added this Summary of Changes document to the SWPPP.

It has been our pleasure providing MAA with the updated SWPPP and this summary of changes. If you have any questions, or require additional information, please do not hesitate to contact me at 410-584-7000 ext. 5295.

Sincerely yours,

EA ENGINEERING, SCIENCE,
AND TECHNOLOGY, INC., PBC

Regina Cagle Irr

Regina Cagle Irr, P.E.
Task Manager

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12/19/2016

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12-19-16

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