YLW

Kelowna International Airport

Glycol Management and Mitigation Plan

Winter Season 2024-2025

1.0 TP 14052 - Guidelines for Aircraft Ground - Icing Operations Chapter 13 - Environmental

1.1 Glycol Management Plan

Prior to the beginning of each season, the Kelowna International Airport, air carriers and ground handling service providers will develop an updated Glycol Management and Mitigation Plan. This plan will detail how the deicing operation functions at Kelowna and includes all measures that have been established to protect the environment from the harmful effects of glycol.

The Plan will, as a minimum, address the following issues:

1. General Information on the companies that will be operating and using the deicing facility;
2. General Information about the airline consortium structure that is responsible for the tanks;
3. Details of the area where the deicing operation will take place;
4. Details on the storage and handling of deicing fluids;
5. Application Details including operator training;
6. How the effluent will be contained;
7. How the effluent will be disposed;
8. Contingency plans for spills and accidents;
9. Safety Issues;
10. Deicing fluid inventory control; and
11. Reporting plan - for reporting Glycol use.

1.2 Canadian Environmental Protection Act Guidelines

Under the Canadian Environmental Protection Act (CEPA) a total glycol discharge limit of 100 mg/L has been established. This is the accepted level of glycol at the discharge point into any receiving waters or surface water resulting from aircraft deicing at airports. The guidelines are applicable to all airports that are owned or operated by the federal government or located on land that is owned by the federal government.

Other relevant federal effluent guidelines include a limit of 20 mg/L for 5-day biochemical oxygen demand (BOD) of storm water samples (Environment Canada 1976), and the Canadian Council of Ministers of the Environment (CCME) water quality guidelines for dissolved oxygen.

1.3 Fisheries Act

The intent of the Fisheries Act is to protect the fisheries of Canada by prohibiting activities, which could either directly, or indirectly affect fish, fish habitat, or the use of fish. The sections of the Act, which could affect airport operations at any airport in Canada, deal with the destruction of fish passageways, the alteration of fish habitat (Section35) and the deposit of substances deleterious to fish (Section36). The Fisheries Act stipulates penalties and fines, which may be enacted for violators of the Act. This Act is far reaching and any violation, even minor violations can have serious consequences with the potential to immediately shut down operations.

1.4 CCME Environmental Code of Practice for Above Ground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products (2003)

Deicing fluids shall be stored, handled and managed in accordance with the requirements detailed in the CCME environmental code of practice for above ground and underground storage tank systems containing petroleum and allied petroleum products (2003). In addition, the storage, handling and management of the deicing fluids shall comply with all applicable provincial and local codes.

2.0 General Information

2.1 Kelowna Airport Operator

City of Kelowna
Airport Administration Office
1-5533 Airport Way
Kelowna, BC. V1V 1S1
250 807-4300

2.2 Air Operators

- *Air Canada*
- *Air North*
- *Carson Air*
- *Carson Group of Companies*
- *Central Mountain Air*
- *Flair Air*
- *Alaska Airlines / Skywest*
- *Jazz Air Inc.*
- *KF Aerospace*
- *North Cariboo Air*
- *Pacific Coastal Airlines*
- *WestJet/WestJet Encore*

2.3 Deicing Service Providers

- *Executive Aviation - 5583 Airport Way #4B, Kelowna, BC. V1V 1S1*
- *GAT (formerly Strategic Aviation) - 1595 Innovation Drive Unit 10, Kelowna, BC. V1V 2Y8*
- *KF Aerospace - 5655 Airport Way, Kelowna, BC. V1V 1S1*
- *Shell AeroCentre FBO - 6197 Airport Way, Kelowna, BC. V1V 2S2*
- *Inland Technologies (Glycol Recovery) - 14 Queen Street PO Box 253, Truro, NS B2N 5C1*

2.4 Committee Members/Representatives

- ***Air Canada/Jazz***

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- ***Carson Air***

Kevin Hillier, kevinhillier@carsonair.com

- ***Carson Group of Companies / Shell AeroCentre FBO***

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- **Executive Aviation**

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- ***Inland Technologies (GRV Operators)***

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- ***KF Aerospace***

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- ***GAT (formerly Strategic Aviation)***

Lisa Roufosse, GAT YLW, Interim General Manager, lisa.roufosse@wearegat.net, c-250 938 4925

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- ***WestJet/WestJet Encore***

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2.5 Deice Facility Management

The glycol facility at Kelowna is managed and operated by Kelowna Glycol Facilities Corporation (KGFC) as a consortium whose current members include Jazz Air Ltd., WestJet, WestJet Encore, Air Canada, Sunwing, Air Transat, Central Mountain Air, Pacific Coastal and Carson Group of Companies. The KGFC Consortium has further entered into an agreement with FSM Management Group to provide the administration services to the Corporation. The Corporation has hired Inland Technologies to manage the glycol storage facility on a day-to-day basis and order deicing fluids from the chosen supplier as well as for the equipment facility maintenance.

2.6 Deicing Season

At Kelowna, the official winter operations period takes place November 15, 2024 – March 15, 2025. Glycol Recovering operations will be in place from October 1, 2024 – April 30, 2025. Most activity will occur between the months of December through March. Under normal winter operations conditions, deice fluid is applied to remove frost, ice and snow contamination from aircraft surfaces. Kelowna could also experience several major snow events that require the application of both Types I and Type IV deice fluids.

Kelowna International Airport hours of operation are twenty-four hours per day, seven days per week; however, the anticipated winter 20224-2025 commercial scheduled operations occur between 0600 and midnight daily. Redeye departures after 2300hrs are scheduled for this coming winter season.

2.7 Glycol Mitigation Working Group

A Glycol Mitigation Working Group comprised of the City of Kelowna, KGFC and service providers strive to ensure mitigation measures are in place and meet as follows (these meetings are integrated into the KGFC meetings which involve all aspects of de-icing):

- Prior to deicing season – the purpose of this meeting is to discuss the upcoming deicing season and ensure glycol mitigation plans are in place. Discussion includes the previous year's exceedance report, training requirements, regulatory requirements, current/future glycol mitigation methods and glycol data reporting documents.
- Monthly throughout the deicing season – discuss challenges encountered from the previous month, water-monitoring results and additional mitigation opportunities. KGFC will strive for continuous improvement which will require all stakeholders to provide information to KGFC as it becomes available. KGFC will in turn compile submitted data on a timely basis in order to provide feedback to the Kelowna deicing stakeholders on what procedures worked, failed, or caused no change. This will enable the Kelowna Airport community to make positive change in a timely manner. A copy of the data compilation will be provided to all stakeholders. Update emails will be sent out periodically to all stakeholders representing the most recent findings available.
- At the end of the deice season – to discuss overall success of the glycol mitigation strategies including any challenges that were encountered, best practices and opportunities for improvement for the next season.

3.0 Site Specifications

3.1 Description of Deicing Area(s)

Deice activities are mainly conducted on each of ten operations stands on Apron 1, as well as the off-gate position S1; however, KF Aerospace deices aircraft on the northernmost portion of their main apron. On occasion, deicing activity has been approved on Apron 3 and at the Shell AeroCentre.

Areas designated for glycol use must implement measures to prevent glycol from entering the environment and the stormwater system as a harmful substance. Additionally, arrangements for glycol recovery services, such as truck recovery, must be made for all deicing applications.

No other areas are approved for deicing activities unless approved by YLW. This includes all tenant leased spaces.

The Apron 1 surface is comprised of a mixture of both asphalt and concrete with all joints sealed with an epoxy compound. The grade of the surface is such that the runoff flows to the east into a trench drain (Figure 1). This trench drain is equipped with glycol guard drain blockers to prevent any runoff in the trench drain from entering the stormwater system.

Both the KF Aerospace and Apron 3 surfaces are comprised of asphalt with the flow to the east and into the same storm drain system as indicated in the Airfield Drainage Plan (Appendix D)

3.2 Area Inspection, Maintenance and Repair

Kelowna Airport staff conduct daily pavement inspections that specifically look at damaged surfaces, missing epoxy and newly formed cracks. Kelowna conducts annual maintenance on all maneuvering areas which includes asphalt patch work, crack filling and line painting.

4.0 Glycol Storage and Handling

The current centralized glycol storage facility is located at the southeast section of Apron 1. The facility consists of three above ground storage tanks as indicated in Figure 2/2a and Table 1 below. Six parking stalls have been provided for deice trucks.

Glycol is delivered via transport truck through the long-term parking lot to the storage facility at which point product is transferred into the glycol storage tanks and monitored by the consortium Operators trained staff. All inventory and quality control measures are conducted by the Operator prior to transfer of product into the facilities glycol storage tanks. Brix readings are taken prior to the transfer of glycol into the facility. Fluid is also checked for colour and particulate. Documentation of all product deliveries is kept by Inland Technologies Canada Inc.

Inland Technologies Canada manages the process of transfer of product from the facility to each of the De-icing Service Providers: Executive Aviation, KF Aerospace and the Shell AeroCentre. GAT has placed the required insurance coverage with KGFC and thus is able to access the facility and dispense product into their own trucks as required. Brix testing is conducted on a daily basis by Inland Technologies and again by each accepting party after delivery of the products into their trucks is complete.

All glycol or hazardous material storage on airport property, including portable storage totes or other temporary containers, must be pre-approved by YLW. This requirement applies to all airport tenants, operators, and service providers. Approval will include a review of storage locations, containment measures, and operational procedures to prevent spills and ensure compliance with YLW's environmental management standards.

Figure 2

Figure 2a

Table 1 – Storage Facility Details					
Dow Chemical Canada- Aircraft Deicing Fluids Suite 2100, 450 1st Street SW, Calgary, AB, T2P 5H1 PH: 800.258.2426 Emergency – 613.996.6666 (CANUTEC) **Nachurs Alpine Solutions** – Safeway KA – Airside surface deicer					
Deicing/Anti-icing provider	**Storage Location**	**Storage Type**	**Volume (liters)**	**Containment**	**Detail**
SAE/ISO Type I – UCAR Aircraft Deicing Fluid Concentrate	South end of Apron 1	Above ground Tank	35,000	Double walled steel with a site containment berm	Appendix A
SAE Type IV (UCAR Endurance EG106)	South end of Apron 1	Above ground Tank	35,000	Double walled steel with a site containment berm	Appendix B
Potassium Acetate	South end of Apron 1	Above ground Tank	35,000	Double walled steel with a site containment berm	Appendix C

4.1 Glycol Spills

To prevent spills and ensure environmental protection, **designated glycol areas shall undergo daily inspections**, which include checks under vehicles for drips and other potential contamination. Any bins containing dripped glycol or contaminated materials must be removed immediately and shall not be left on-site for any length of time. This daily inspection process addresses both housekeeping and environmental concerns, ensuring the area is maintained to a high standard.

In the event of a glycol spill, the ground handling service provider responsible shall immediately attempt to stop the flow of product and refer to the site-specific Emergency Plan. If the spill is significant, Aircraft Rescue Fire Fighting (ARFF) services will respond and assume control of the scene. All spills must be reported to the Airport Operations Centre at **(250) 807-4350 Ext. 1.**

As with any emergency, consortium operations and ground handling staff may be called upon to assist Kelowna ARFF services in controlling the spill.

The Consortium Operator or ground handlers directly involved with the spill shall provide Kelowna Airport Operations a written report as to the details surrounding the spill within 18-hours following the conclusion of the event. Additionally, **if the nature of the spill and volume triggers regulatory reporting, the entity**

responsible for the spill is required to notify the appropriate regulatory agencies in addition to informing YLW. Kelowna Airport Operations may provide guidance to ensure compliance with these notification requirements.

Following the event, Kelowna Airport Operations will investigate the event and schedule a meeting with KGFC, the glycol facility operator, ground handling companies and other agencies as required to review the events, issue recommendations, offer improvements to procedures, or revise the emergency plan, as may be appropriate.

5.0 Application Details Including Operator Training

5.1 Specifications

Specifications requested for Dow Type I and IV fluids are summarized in the table below; both of which comply with current SAE specifications.

Table 2 – DOW Chemical Types I & IV Specifications

	Ethylene Glycol	LOUT (°C.)	Package Size
Type I – UCAR 54/46	54%	-33	Tanker
Type I - UCAR ADF Concentrate	92%	-45 depending on concentration	Tanker
Type IV UCAR Endurance EG106	50%	-25	Tanker/

Deicing operations and glycol application takes place depending on a number of factors:

- Outside air temperature (OAT) encroaches on 0°C, frost will form.
- Cold soaked fuel in aircraft wing tanks can cause cold soaked fuel frost which can require deicing even in temperatures as high as +14°C on some aircraft during periods of precipitation or high humidity.
- Deicing and anti-icing will be required when there is continual active precipitation in the air.

Ethylene based glycol is the ONLY glycol product permitted for aircraft deicing use at Kelowna. Propylene or Diethylene glycol products are STRICTLY prohibited for aircraft deicing at Kelowna as their use would

severely impact the recovery, disposal and recycling of the spent deicing fluids recovered from the Airport approved deicing areas.

5.2 Deicing Units

GAT

- Total of 4 trucks, 2 with forced air capability.
- SA-DT067: 2011 GSS (Ground Support Specialists) GS1400-SG, Type I Capacity (4541L), Type IV Capacity (757L), Enclosed Bucket equipped with low flow nozzle and forced air
- SA-DT068: 2011 GSS (Ground Support Specialists) GS1400-SG, Type 1 Capacity (4541L), Type 4 Capacity (757L), Enclosed Bucket equipped with low flow nozzle and forced air

Executive Aviation Ltd.

- Truck 12 - 2002 Premier, Type 1 (2800L) & Type 4 (378L). Open bucket with low flow nozzle
- Truck 13 - 2000 Premier, Type 1 (4500L) & Type 4 (1100L). Open bucket with low flow nozzle
- Truck 10 - 1996 GMC DC7, Type 1 (2500L) & Type 4 (1100L). Open bucket with low flow nozzle

KF Aerospace

- 1988 FMC-Trump D-240, Type 1 (1600 Gallon) Type 4 (400 Galloon), Unit is equipped with low flow nozzles.

Shell AeroCentre FBO

- 1998 FMC Trump LMD2000, Type 1 (4900L) & Type 4 (2270L), Enclosed bucket equipped with low flow nozzle and forced air

Inland Technologies

- Two Glyvac glycol recovery vehicles (GRV)

5.3 Measures Used to Minimize Glycol Use

There are a number of methods that may be applied to reduce the volume of glycol usage, in turn reducing the volume and concentration that is discharged as stormwater, as outlined below:

1. Temperature blending of deicing fluid
2. Prior to glycol application, manually remove snow using brooms, squeegees or forced air.
3. Deicing vehicles equipped with adjustable flow nozzles enable greater control of the amount of deicing fluid dispensed.

KGFC will have a reporting plan in place managed by FSM allowing all stakeholders at the airport to be informed of what operations and activities cause a lower glycol content in storm drain and allow the stakeholders to modify their operations sooner to minimize the exceedances of the airport community.

The reporting plan requires operational and weather data from Airlines, ground handlers, Kelowna Airport and Weather Canada in order to understand the full cause and effect of exceedances.

6.1 Drains and catch basins (Appendix D)

Surface flow on Apron 1 is to the east into a trench drain. The effluent flows through a large oil/water separator (OWS) and through a central storm pipe which eventually flows into Mill Creek.

In support of the GRV 2017/18 season operations, the Kelowna Airport installed 4 glycol guard drain closures (Jan 2018) in the pink snow area to reduce the amount of effluent reaching the storm water system and ultimately - Mill Creek.

In addition, in support of the 2018/19 glycol recovery program, Inland technologies has completed the installation of 4 additional glycol guard drain closures on the main apron and 10 customized drain blockers within the trench drain to the east of Apron 1 to allow glycol reaching that trench drain to be contained and recovered prior to reaching the OWS and ultimately Mill Creek.

The Inland Technologies GRV Operator(s) are responsible to close all installed glycol drain inserts and closures prior to a deicing spray event to allow for glycol to be directly collected by the GRVs prior to entering the storm water drainage system.

In Spring 2021, three additional drain guards were added to Apron 1. One at Taxiway Echo where effluent has been seen to run off the apron during heavy events, and two on OPs stand 10 along the apron edge.

6.2 Snow Removal Plan

Apron 1 snow removal consists of pushing snow to the northern edge of Apron 1 which forces the used deice fluid not already recovered at the gates, to collect and break down in this area where glycol leaching out from these snow piles is accessible to the GRVs to capture. Furthermore, Airport Operations will pile and haul snow to remote areas on airport property.

In addition, in support of the 2024-25 glycol recovery program head of stand snow clearing will be conducted on Op stands which are accommodating overnighting aircraft by Airport Operations. If there's a substantial snowfall, the Airport Operations snow removal crew will move the snow to the tail of the stand where the airside snow crew would remove it, in an effort to reduce the occurrence of pink snow.

All efforts will be made by Kelowna Airport snow removal staff to control the piling and/or storage of snow in areas where any subsequent glycol leaching/glycol runoff will have a direct path to the storm water system and ultimately Mill Creek.

6.3 Parking Plan

Six deice units are parked at the northeast section of Apron 1 adjacent to the deice facility. A glycol spill kit is located at this site.

6.4 Recovery Method

For the duration of the deice season, KGFC will be contracting Inland Technologies to deploy and operate Glyvac Glycol Recovery Vehicles (GRV).

The GRV(s) will be planned to operate 7 days per week during the hours of 05:30 to 13:30 and 1000 to 1800 and outside these hours on an as needed basis to cover major storm events. The core season is defined as 01 October to 30 April. Staff will be on site a half hour prior to non-precipitation events and one hour prior to all precipitation events. With regard to storm events after hours—Inland would request that the sprayers contact the full-time staff directly via the cell phone number(s) provided to ensure optimal recovery.

There will be 2 - 80,000 litre frac tanks staged airside to allow the GRVs to unload recovered glycol for temporary storage before the frac tank is pumped out periodically and hauled away via tanker truck for disposal/recycling.

Inland will also utilize special equipment to recover collected glycol from the trench drain to the east of Apron 1. This additional recovery opportunity will be possible due to the Kelowna Airport having procured and installed additional drain blocks for the vertical drops from this trench drain.

Plans for future development of Apron 1 include the construction of a self-contained drainage system that effluent will flow into and can be stored for breakdown and released to the sanitary or back into Mill Creek once levels are decreased below 100 mg/L.

7.0 Non-Compliances and/or Exceedances

7.1 Storm Water Monitoring/Sampling

Kelowna Airport Operations storm water samples will be retrieved through a 3rd party contract entered into directly between the Kelowna Airport and EcoScape. Samples will be collected at the EOP (end of pipe) where the airport runoff finally enters Mill Creek, as well at the automated water monitoring station location in the Long-Term Parking Lot. By sampling at the EOP location, the sampling program and results comply with governmental environmental recommendations and guidelines.

Samples may also be collected by Kelowna Airport staff from the automated storm water monitoring station at the southwest area of the airport. Additional sampling may be performed throughout the airport and in Mill Creek to better understand all aspects of glycol presences at Kelowna.

All samples will be delivered by EcoScape to Caro Analytics lab in Kelowna for quality testing. Sampling lab test results will be sent to both Kelowna Airport Operations staff and to KGFC for results analysis and tracking.

7.2 Reporting Plan

In the event of a negative result, whereby, the sample contains 100 mg/L or greater of glycol, KGFC will advise all participants of the Glycol Mitigation Working Group at the next scheduled meeting or sooner.

KGFC will have a reporting plan in place managed by FSM; allowing all stakeholders at the airport to be informed of what operations and activities cause a lower glycol content in the storm drainage system and allow the stakeholders to modify their operations sooner in an effort to minimize future exceedances.

The reporting plan requires operational and weather data from Airlines, ground handlers, Kelowna Airport and Weather Canada in order to understand the full cause and effect of exceedances.

This information will also be reported directly to Transport Canada Environmental Department – through the annual reporting process. Transport Canada further provides a report to Environment Canada.

8.0 Glycol Management and Mitigation Plan – Future Format

Transport Canada held a meeting in November 2015 with airports, carriers and service providers and provided a sample Glycol Operations Management Plan that they would like airports to adopt. Attached in Appendix E is a sample of the requirements.

APPENDIX A

Material Safety Data Sheet

Deicing Fluid Concentrate Type I

APPENDIX B

Material Safety Data Sheet

Deicing/Anti-icing Fluid Type IV

APPENDIX C

Material Safety Data Sheet

Potassium Acetate

APPENDIX D

Drainage Map

APPENDIX E

Glycol Operational Management Plan

Transport Canada