Bonito Capital Corporation

A wholly owned subsidiary of Mandalay Resources Corporation

Ulu Gold Project

Nunavut, Canada

Spill Contingency Plan

March 2016

Bonito Capital Corporation
Mandalay Resources Corporation
76 Richmond Street East, Suite 330
Toronto, Ontario M5C 1P1

Document Control

Revision No	Date	Details
0	1997	Initial Spill Response Plan submitted to NWT Water Board
1.0	October 2001	Plan submitted to NWB
2.0	April 2004	Updated to reflect comments received from intervenors and to reflect new water licence
3.0	February 2006	Updated to reflect conditional approval comments received from NWB on November 8, 2005
4.0	December 2007	Updated to reflect conditional approval comments received from NWB on June 15, 2006
5.0	March 2013	Updated to reflect comments received from intervenors Plan approved under Water Licence 2BM-ULU1520
6.0	March 2016	Updated to reflect new water licence Updated contact and general information Added document control table Updated site history Updated Section 2.3.1 to allow for small camp occupation Added reference to Environment Canada fuel tank regulations in Section 2.3.3 Updated references to MSDS to Safety Data Sheets (SDS) Added list of reportable volumes of substances handled most during care and maintenance to Section 3 Provided addition reporting guidance in Section 4 Added other useful contacts to Section 4.2.3 Listed specific equipment available on short notice for spill response in Section 5.1 Updated reference section Updated Appendix 3 Reportable Spill Quantities

Executive Summary

This Spill Contingency Plan (Plan) has been prepared by Bonito Capital Corporation (BCC), a wholly owned subsidiary of Mandalay Resources Corporation (Mandalay) for the Ulu Exploration Project (Project) in accordance with its Water Licence 2BM-ULU1520 (Licence). The Project site is located in the Kitikmeot region of Nunavut approximately 12 km north of Hood River and 150 km north of Lupin Mine and has been in a state of care and maintenance since 2006.

Fuel storage for the Ulu Project is through three individual tank farms including: (1) Camp 3 Tank Farm (not currently in use); (2) Ulu Site Tank Farm; and (3) Day Tank Farm adjacent to the Power House. All bulk storage for petroleum products at the Project Site have been provided with secondary containment in the form of constructed tank farm facilities incorporating an impermeable liner and berm and an off-loading apron. The fuel products stored at site include: diesel (P40 and P50), Jet fuel (A or B), W30 lube oil, Ralube, and gasoline.

Various measures will be undertaken to prevent a spill including: annual inspection of earthworks, geological, and hydrological regimes; inspection of the sewage line, freshwater pump and distribution line; and fuel storage and handling procedures.

In the event of an accidental spill the response procedures outlined in this Plan will be followed including initial spill reporting and actions. Immediately reportable spills will be conveyed to the Nunavut 24-Hour Spill Report Line. Spill response resources are provided on site including heavy equipment, appropriately sized spill response kits, and copies of this Plan.

Detailed containment, recovery and disposal response measures for any spills of petroleum waste on land, snow, ice or open water are outlined in this Plan, as well as other potential accidents related to oil soaked snow, fires, emergency scenarios at the fuel tank farm, and failure of the sewage system.

ᑐᓴᒐᒃᓴᑦ ᓇᐃᓈᖅᓯᒪᔪᑦ

ᐅᓇ ᐱᔾᔪᑎᓕᒃ ᓇᓪᓕᐅᒃᑯᒦᒥᒃ ᐃᒻᒪᖃᑦᑕᐅᖅ ᒪᐅᓪᒐᑐᐃᓐᓇᖅ ᑯᕕᔪᖄᓪᓚᓂᖅᐸᑦ ᓴᓗᒻᒪᖅᓴᐃᒍᑎᒃᓴᓂᒃ ᓱᕚᖕᒐᒍᑦ ᐋᖏᒃᓯᒪᔭᕇᖅᑕᖏᑦ Bonito Capital Corporation−ᑯᑦ ᐃᒫᒃ ᐊᑎᖏᑦ ᓇᐃᓈᖅᑕᐅᓪᓗᑎᒃ ᑕᐃᔭᐅᓃᑦ (BCC−ᑯᑦ), ᓇᖕᒥᓂᖃᖃᑕᐅᔪᑦ ᐅᑯᐊ Mandalay Resources Corporation (Mandalay) ᐅᓗᒃᑯᑦ Ulu Exploration ᐱᓕᕆᐊᒃᓴᖏᑦ ᐊᔫᑕᐅᒋᐊᓕᖕᓂᒃ ᐅᑯᓂᖓ ᒪᓕᒃᑐᑦ ᐃᒥᓕᕆᔾᔪᑎᑦ ᓚᐃᓴᖏᑦ 2BM-ULU1520. ᓄᓇ ᐱᓕᕆᕖᒃᓴᖅ ᒫᓃᑦᑐᖅ ᕿᑎᕐᒥᐅᓂ ᓄᓇᕗᑦᒥ ᐃᒫᑎᒋ ᓯᕙᑐᓂᓕᒃ ᒥᒃᓴᐅᓭᑐᒥᒃ 12 km ᑲᓛᒥᑕᐃᑦ ᑲᓇᖕᓇᖕᒐᓂ ᒪᑐᒪ Hood River−ᐅᑉ ᐊᒻᒪᓗ ᐃᒫᒃ 150 km ᑲᓛᒥᑕᐃᑦ ᑲᓇᖕᓇᖕᒐᓂ ᓅᐸᓐ Lupin ᐅᔭᖅᒃᓴᖅᓯᐅᖅᕖᐊᓂ ᐊᒻᒪᓗ ᑕᐃᒪᐃᓕᖕᒐᔪᖅ ᒪᑭᒪᔭᐅᓪᓗᓂ ᑕᐃᒪᖕᒐᓂᑦ 2006−ᖑᔪᒪᑦ.

ᐅᖅᓱᐊᓗᖅᑲᐅᑎᒃᑯᕖᖕᒐᑦ ᐅᑯᐊ ᐅᓗᒃᑯᑦ Ulu−ᑯᑦ ᐱᓕᕆᕖᐊᑦᑕ ᐃᖕᒥᒃᑯᐊᖅᑐᑦ ᐱᙵᓱᑦ ᐅᖅᓱᐊᓗᖅᑲᐅᑏᑦ ᒪᑯᐊ ᐃᓚᒋᔭᑦ: (1) ᐊᓱᓂ ᓄᓇᓖᑦ ᐱᙵᓱᑦ 3 ᐅᖅᓱᐊᓗᖅᑲᐅᑏᑦ (ᒫᓐᓇ ᐊᑐᖅᑕᐅᖏᑦᑐᑦ); ᐊᐃᑉᐹ (2) Ulu ᓄᓇᖕᒐᓂ ᐅᖅᓱᐊᓗᖅᑲᐅᑦ; ᐱᖕᒐᔪᐊᑦ (3) ᐅᑉᓗᒃᑯᑦ ᐊᑐᖅᑕᐅᓱᖅ ᐅᖅᓱᐊᓗᒃᑯᕕᒃ ᖃᓂᒋᔭᖕᒐᓂ ᐃᑯᒪᖃᐅᑎᐅᑉ. ᑕᒪᕐᒥᒃ ᐅᖅᓱᐊᓗᒃᑯᕚᑦ ᐱᓕᕆᕖᖕᒥᑦᑐᑦ ᓴᓇᔭᐅᓯᒪᔪᖃᒻᒥᔪᖅ ᐃᓂᒃᓴᒥᒃ ᐅᖅᓱᐊᓗᒃᑯᕚᑦ ᖄᒥᒌᑯᑎᖕᒐᓂᒃ ᐊᓪᓕᕋᒻᒥᒃ ᐊᒻᒪᓗ ᑯᕕᕕᐅᒍᒫᕐᓂᐊᖅᑐᓂᒃ ᒪᐅᖕᒐᑐᐃᓐᓇᐅᖏᑦᑐᖅ. ᐅᖅᓱᐊᓗᐃᑦ ᐅᖅᓱᐊᓗᒃᑯᕕᖖᒌᑦᑐᑦ ᐃᓂᒥᓐᓂ ᒪᑯᐊ: ᐊᐅᓚᐅᑎᓯᐅᑦ (P40 ᐊᒻᒪᓗ P50), ᖃᖕᒐᑕᕋᖅᓯᐅᑦ (A ᐅᑯᐱᓗᑭᐊᖅ B), W30 ᐅᖅᓲᖅᑎᕈᑎᖃᐅᑦ, ᐃᒪᐃᑦᑐᓂᒃ Ralube−ᓂᒃ, ᒐᓴᓖᓪᓗ.

ᖃᓄᐃᑦᑐᑐᐃᓐᓇᐃᑦ ᐊᑐᖅᑕᐅᖃᑦᑕᙲᖅᑐᖅ ᑯᕕᔾᔭᐃᒃᑯᑏᑦ ᒪᐅᖕᒐᑐᐃᓐᓇᖅ ᐃᓚᒋᔭᐅᓪᓗᑎᒃ ᒪᑯᐊ: ᖃᐅᔨᓴᖅᑕᐅᖃᑦᑕᕐᓂᐊᖅᑐᑦ ᐊᕋᒍᑕᒫᑦ ᓄᓇᓕᕆᔩᓄᑦ, ᐅᔭᖓᓂᐊᖅᑏᓪᓗ ᖃᐅᔨᓴᕈᑎᒋᓂᖏᓐᓂᒃ ᓄᓇᒥᒃ ᐊᒻᒪᓗ ᐊᑯᑎᖏᓐᓂᒃ ᐃᒥᖅᑕᓖᑦ ᓄᓇᒥ; ᖃᐅᔨᓴᖅᑕᐅᖃᑦᑕᕐᓗᑎᒡᓗ ᐊᒃᑕᑯᑦ ᖁᖅᑕᑯᑦ ᐊᑯᑎᖏᑦ, ᐃᒥᖅᑕᖅᕕᐅᑉ ᒥᓪᓗᐊᖅᑯᖕᒐ ᐊᒻᒪᓗ ᐊᑯᑖ; ᐅᖅᓱᐊᓗᖅᑲᐅᑎᓕᕆᔾᔪᑎᑦ ᐊᒻᒪᓗ ᖃᓄᖅ ᐊᐅᓚᑦᓯᒍᑕᐅᑎᐊᓕᖕᓂᒃ ᒪᓕᒃᑕᐅᓃᓂᒃ ᐊᑐᐃᓐᓇᖃᓪᓗᑎᒃ ᑕᒪᒃᑯᓄᖕᒐᖕᒐᔪᓂᒃ.

ᐱᕈᓗᐊᕿᔪᖃᓐᓂᖅᐸᑦ ᒪᐅᖕᒐᑐᐃᓐᓇᖅ ᑯᕕᔪᖃᓐᓂᖅᐸᑦ ᐊᔪᑕᐅᔩᕐᓂᐊᖅᑐᑦ ᒪᓕᒃᑕᐅᓗᑎᒃ ᐋᖏᒃᓯᒪᔦᑦ ᐅᑯᓇᓂ ᐃᓚᒋᔭᐅᓗᑎᒃ ᐊᔫᑕᐅᖃᑦᑕᖅᓯᒪᔪᒥᓂᕐᓂᒃ ᑐᓴᖅᑎᑦᓯᒍᑎᓂᒃ ᑯᕕᔪᖃᑉᐸᑦ ᐊᒻᒪᓗ ᐊᐅᓚᑦᓯᒍᑎᒃᓴᓂᒃ. ᕿᓚᒥᒃᑯᑦ ᑐᓴᖅᑎᑦᓯᓴᐅᑎᒋᖃᑦᑕᕆᐊᓖᑦ ᑯᕕᔪᖃᑐᐊᕋᐃᑉᐹᑦ ᑕᒪᒃᑯᐊ ᒪᓕᒃᑕᐅᒋᐊᓖᑦ ᓄᓇᕗᑦᒥ ᐃᒃᑲᖅᑲᐃᑦ 24 ᐊᔫᑎᑎᓪᓗᒋᑦ ᖃᖕᒐᓕᒫᖅ ᐅᖃᐅᓯᖃᕆᐊᓖᑦ ᑖᒃᓴᐃᓐᓇᖅ ᑯᕕᔪᖃᑉᐸᑦ ᑐᓴᖅᑎᑦᓯᒍᑎᑦ ᐊᑯᑖᒍᑦ. ᒪᐅᖕᒐᑐᐃᓐᓇᖅ ᑯᕕᔪᖃᑉᐸᑦ ᖃᓄᖅ ᐊᔫᑕᐅᖄᕈᒫᕐᓂᐊᖅᑐᑦ ᐊᑐᐃᓐᓇᕆᔭᑦ ᑖᒃᑯᓂ ᓄᓇᒥ ᐃᓚᖃᖅᓱᑎᒃ ᒪᑯᓂᖕᒐ ᐃᒃᑕᕆᒃᑐᓂᒃ ᐊᒃᓴᕌᑎᓂᒃ ᓴᓇᕿᑎᓂᒃ, ᖃᓄᐃᓪᓗᐊᖅᑐᑦ ᐊᖏᓂᖏᑦ ᓈᒪᓈᖅᓯᒪᔦᑦ ᐃᓗᐃᑦᑐᑦ ᐊᑐᐃᓐᓇᕆᔦᑦ ᐊᔫᑕᐅᔩᕐᓂᐊᖅᑐᑦ, ᐱᑕᖃᒻᒥᖕᒪᑦ ᐅᑯᐊ ᑎᑎᖅᓯᒪᔪᑦ ᐊᔾᔨᖏᓐᓂᒃ ᒪᓕᒃᑕᐅᒋᐊᓖᑦ ᓱᕚᖕᒐᒍᑦ ᐋᖏᒃᓯᒪᔭᓂᒃ.

ᐊᑕᖏᖅᑐᑦ ᐱᔾᔪᑎᓖᑦ ᐅᖅᓱᐊᓗᖅᑲᐅᑎᓂᒃ, ᓴᓗᒻᒪᖅᓴᐃᒍᑎᒃᓴᓂᒃ, ᐊᒃᑕᕈᑎᒃᓴᓂᒃ ᐊᔫᑕᐅᔩᕐᓂᐊᖅᑐᓂᒃ ᖃᓄᐃᑦᑐᑐᐃᓐᓇᕐᓂᒃ ᑯᕕᔪᖃᖄᓪᓚᓂᖅᐸᑦ ᐅᖅᓱᐊᓗᖕᒥᒃ ᓄᓇᑐᐃᓐᓇᕐᒧᑦ, ᐊᐳᒻᒧᑦ, ᓯᑯᒧᑦ ᐅᑯᐱᓗᑭᐊᖅ ᐃᒫᓄ ᐊᐅᔭᐅᑎᓪᓗᒍ ᑕᒪᒃᑯᐊ ᐃᓅᓇᑎᒃ ᐅᑯᓈᓂᑦᑐᑦ ᑎᑎᖅᓯᒪᔭᓂ ᐊᔫᑕᐅᔩᕐᓂᐊᖅᑐᑦ, ᐊᓯᐊᒍᓪᓗ ᑯᕕᔪᖃᓪᓗᓂ ᐱᕈᓗᐊᕿᔪᖃᓐᓂᖅᐸᑦ ᐅᖅᓱᐊᓗᒃ ᐊᐳᒻᒨᖃᓂᖅᐸᑦ ᓯᑦᓯᕈᑎᓗᓂ ᐊᐳᒻᒧᑦ, ᐃᑭᑦᑐᖃᓐᓂᖅᐸᑦ, ᑐᐊᕖᕐᓇᖅᑐᒃᑯᑦ ᖃᓄᖅ ᐊᔫᑕᐅᔩᕐᓂᐊᖅᑐᑦ ᐆᒃᑑᑎᒋᓗᒋᑦ ᒪᑯᐊ ᐅᖅᓱᐊᓗᖅᑲᐅᑎᐊᓗᐃᑦ ᐊᒻᒪᓗ ᒪᐅᖕᒐᑐᐃᓐᓇᖅ ᑯᕕᔪᖃᓐᓂᖅᐸᑦ ᓱᕐᑯᒥᓐᓂᖅᐸᑕ ᖁᖅᕕᐊᑦ ᐊᕐᑯᑎᖏᓐᓂᒃ.

Aulapkaiyiini Naittuq

Una Kuvipkaihimakpat Qilamiuqtuqaqqat Havaakhaq (Havaaq) piliurhimayuq ukunanit Bonito Capital Kuapuriisinganit (qablunaatitut taiyauyuq naittumik BCC), avaliittumik nanminiriyauyuq ilanganit Mandalay Resources Corporation (Mandalay) Ulu Qinirhiayut Havaaq (Havaaq) angiqatigiikhutik Imanganik Laisinganik 2BM-ULU1520 (Laisinga). Tamna havakvinga ittuq Kitikmeonmi Nunavunmi ittuq 12 kilamiitamik tununngani Hood River-mit 150 kilamiitamiklu tununngani Lupin Uyarakhiuqvinganit munariyauyuqlu 2006mit.

Urhuqyuamut tutquumavinga Ulu Havaakhamut ittuq pingahuuyunik urhuqyuaqarvinik ukunanik piqaqtuqlu: (hivulliqpaa) Nayugaani 3 Urhuqyuaqarvinganik (tatja atuqtaunngittuq); (tuglia) Ulu Uyarakhiuqvinga Urhuqyuaqarvinganik; unalu (pingahua) Ubluani Urhuqyuaqarvinga qanittuq Pauwaqtuutimiknit. Tamaita angiyut tutquumavingit urhuqyuamut Havakvingani piqaqtuq ikitqiyauyumik ittumik piliurhimayunik urhuqyuaqarvinik atayuq kinilaittumik hilataani apqutinganilu uuminngalu uhiiyarvinganilu. Urhuqyuanga tutqurhimayuq uyarakhiurvikmi hapkuninnga pilik: urhuqyuaq (P40 uuminngalu P50), Tingmitinut Urhuqyuakhaanik (A-mut B-mutluuniit), W30 kiniqtaq, Ralube-lu kiniqtaq, kaasiliimiklu.

Table of Contents

Appendices

Figures

Tables

1. Introduction

Bonito Capital Corporation (BCC), a wholly owned subsidiary of Mandalay Resources Corporation (Mandalay), has prepared this Spill Contingency Plan (the Plan) with respect to the requirements within Water Licence Number 2BM-ULU1520 (Water Licence). The documents *NWT Environmental Protection Act, Spill Contingency Planning and Reporting Regulations*, July 22, 1998, *A Guide to the Spill Contingency Planning and Reporting Regulations*, June 2002 and *Guidelines for Spill Contingency Planning* (INAC 2007) were used as guide in preparing this Plan. An annual review of the Plan takes place and revisions are submitted as necessary with the annual report in accordance with Part B(8,e) of the Water Licence. In addition, this Plan takes into consideration comments received from intervening parties regarding Elgin's *Spill Contingency Plan (Care and Maintenance) for the Ulu Exploration Project*, dated March 2013 as stipulated in Part E(2) of the Water Licence.

The March 2013 plan was approved by the Nunavut Water Board (NWB) under Part D(13) of the Water Licence. The current Type B water licence 2BM-ULU1520 for the Ulu Gold Project (Ulu or the Ulu Project) is valid until May 12, 2020.

1.1. Background

Mandalay is a Canadian based company focused on producing assets in Australia, Chile and Sweden, a development project in Chile and the exploration and development of the past-producing Lupin gold mine and the Ulu gold project, both located in Nunavut, Canada.

Ulu has seen extensive exploration since its discovery in 1989 The Ulu site lease was purchased by Echo Bay Mines Ltd. from BHP in 1995 with the intent to develop the property into a satellite mine for additional feed to the Lupin mill. An underground development, diamond drilling and bulk sample program was conducted in 1996 and 1997 to provide infill geological information. Underground operations ceased in 1997 prior to the mine providing mill feed to Lupin. In 2002 Kinross Gold Corporation acquired the Ulu Project. Wolfden Resources Corporation purchased BCC and the Ulu Project from Kinross Gold Corporation in 2004. Wolfden undertook surface exploration and environmental studies, widened the airstrip and reactivated the portal to access the underground workings. Since 2006 the project has been in care and maintenance (43-101 Technical Report, 2015).

1.2. Company Information

During the current period of care and maintenance the Site has changed ownership. In 2007, Zinifex purchased Wolfden. Zinifex merged with Oxiana Limited and formed OZ Minerals. The assets of OZ Minerals were purchased by China Minmetals resulting in OZ Minerals becoming MMG Resources Inc. (MMG). MMG subsequently sold BCC to Elgin Mining Inc. and Mandalay purchased BCC from Elgin in September 2014. WPC Resources Inc. has since entered into a non-binding letter of intent with Mandalay to acquire BCC.

Company:	Bonito Capital Corp.
Project:	Ulu Gold Project, Nunavut
Company Address:	Suite 330, 76 Richmond Street East, Toronto, ON M5C 1P1
Telephone:	778-386-7340
Email:	klewis@elginmining.com
Attention:	Karyn Lewis, General Administration

Effective date: 31 March 2016

Distribution List:

Karyn Lewis	General Administration
Discovery Mining Services	Site Contractor
WPC Resources Corporation	Exploration Operator

Additional copies of this Plan are available from General Administration. This Plan will be posted in key locations at the site, and all employees and contractors will be made aware of its contents.

1.3.Environmental and Sustainable Development Policy

Bonito Capital Corporation (BCC) is committed to maintaining a safe, clean, compliant and respectful work environment. BCC looks to our employees, contractors and managers to adopt and grow a culture of social responsibility and environmental excellence. Together we achieve this by:

- Promoting environmental stewardship in all tasks. Nothing is too important that it cannot be done in a clean and responsible manner. We strive towards maintaining a zero-incident work place.
- Recognizing that we have a shared responsibility as stewards of the environment in which we operate. We will not walk away from a non-compliant act.
- Identifying, managing and mitigating environmental, business and social risks in an open, honest and transparent manner.
- Planning our work so it is done in the cleanest possible manner and executing work according to plan.
- Continually improving environmental and operational performance by setting and reviewing achievable targets.
- Providing appropriate and necessary resources in the form of training, personnel and capital, including that required for closure planning and reclamation.
- Managing our materials and waste streams, maintaining a high degree of emergency response preparedness and minimizing our operational footprint to maintain environmental protection at all stages of project development.

- Procuring goods and services locally, where available, and favouring suppliers with environmentally and socially responsible business practices.
- Seeking to understand, learn from and mitigate the root causes of environmental incidents and near misses when they do occur.
- Employing systems and technology to achieve compliance, increase efficiency and promote industry best practices in development, operations and environmental stewardship.
- Working with stakeholders to identify and pursue opportunities for sustainable social and economic development and capacity building.
- Conducting early and ongoing stakeholder engagement relevant to the stage of project and mine development and operation.
- Recognizing diversity in the workplace and building meaningful relationships with all stakeholders in a timely, collaborative and transparent manner.

Through implementation of this policy, BCC seeks to earn the public's trust and be recognized as a respectful and conscientious employer, neighbor and environmental steward.

1.4.Purpose and Scope of Plan

This Plan is designed to provide the necessary background information and plans of action in the event of a failure or an incident at the Ulu Project site resulting in a spill of a petroleum, allied petroleum product, or chemical during project activities. It is intended to outline the means for responding to failures and material spills within these systems in a way that will minimize potential health hazards, environmental damage and clean-up costs.

The objectives of the Plan are to:

- Define the reporting procedures and communication network to be used in the event of a system failure or material spill;
- Define procedures for the safe and effective containment and cleanup/disposal of a system failure or material spill; and
- Define specific individuals and their responsibilities.

1.5.Applicable Legislation and Guidelines

The documents "NWT Environmental Protection Act, Spill Contingency Planning and Reporting Regulations", July 22, 1998 and "A Guide to the Spill Contingency Planning and Reporting Regulations", June 2002, were used as guides in preparing this plan.

2 Project Information

2.1 Project Location

The Ulu Project is situated in the Kitikmeot Region, Nunavut, approximately 12 km north of Hood River and 150 km north of Lupin Mine. The geographic center of the property is 66° 54’27” N / 110° 58’24W as shown in Figure 1: Ulu Project Location Map.

Figure 1: Ulu Project Location Map

2.2 Project and Site Description

The Ulu Project site is completely self-contained with the exception of the transportation requirements for materials/supplies and workforce mobilization. There are three (3) main location areas as shown in Figure 2: Main Areas Ulu Site:

1. Ulu Camp, which houses the residential complex consisting of Weatherhaven accommodations, vehicle repair shop, vehicle parking, power house, emergency generators, office and change rooms, fuel storage tank farm, freshwater system, sewage treatment plant and sewage line, incinerator, ore storage area, waste pad, mine portal, surface mine sump (retention pond), and access roads as shown in Figure 3;
2. Camp 3, which is comprised of fuel tank farm, explosives magazine, detonator magazine, quarry and borrow pit eskers; and
3. Airstrip

The site is accessible year round only by aircraft. Bulk items were brought on site via the winter road. During active exploration activity, all supplies are flown in. The 50 person camp and kitchen were refurbished and updated in 2012. Figure 3 shows the Ulu Camp Area Site plan.

Figure 2: Main Areas Ulu Site

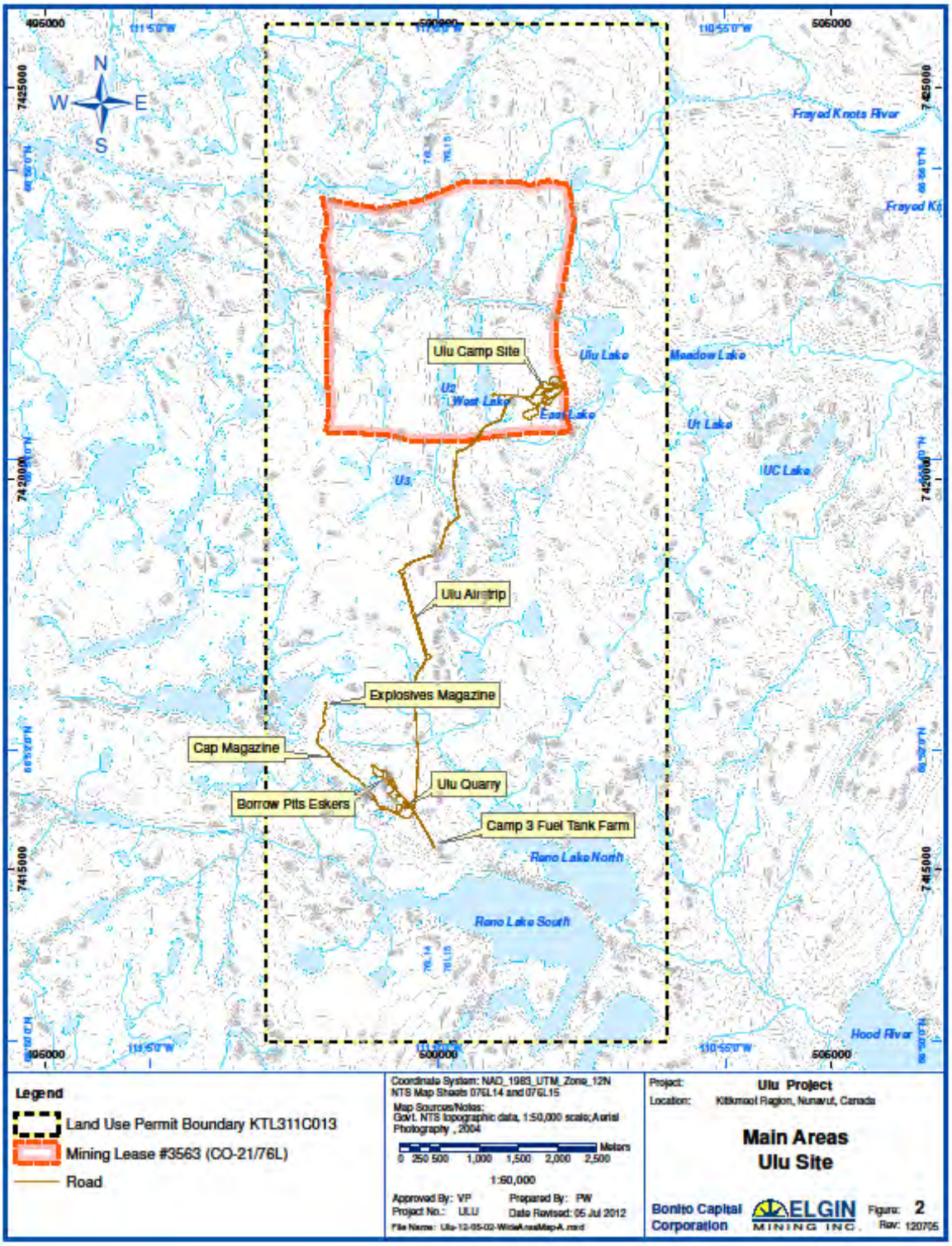
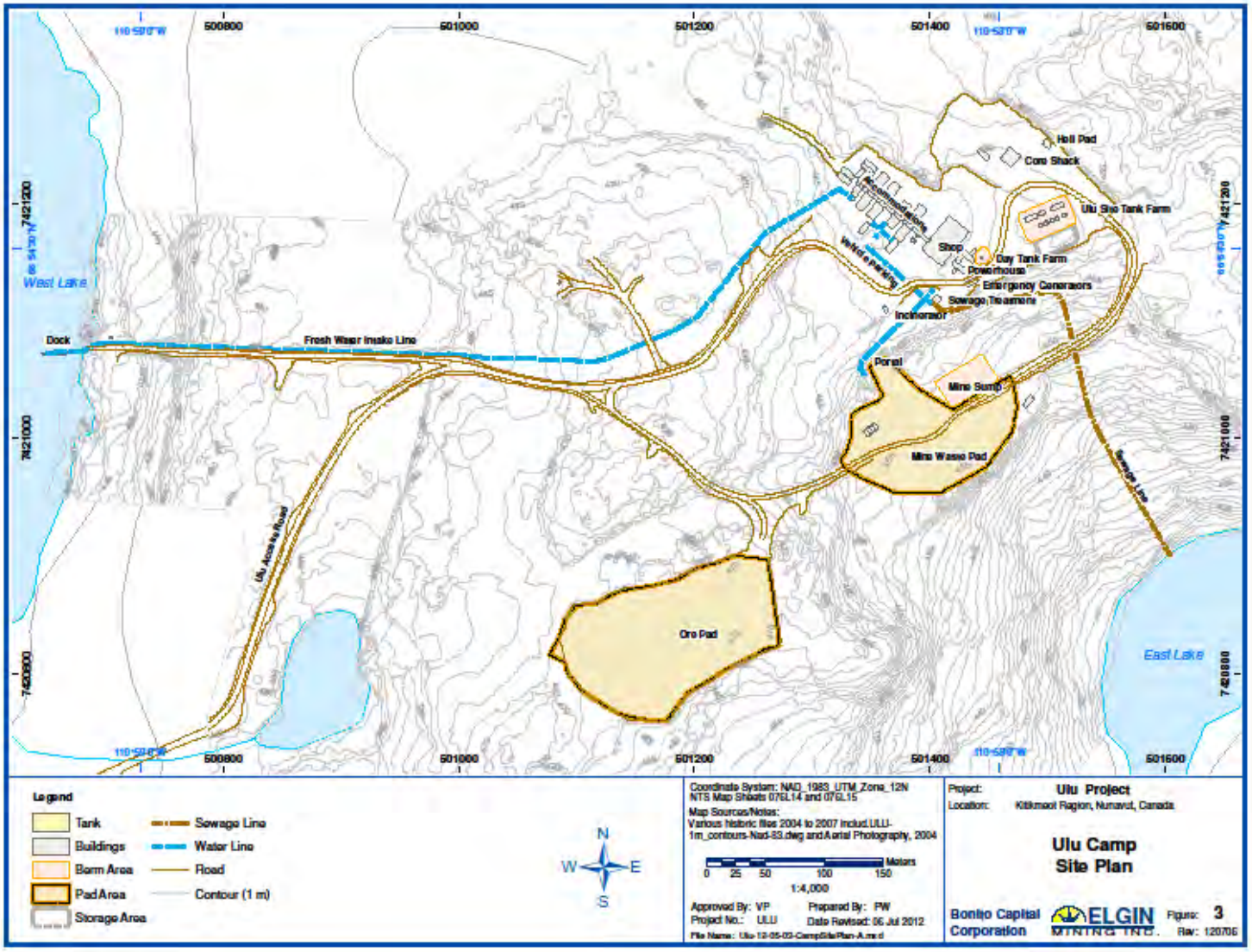


Figure 3: Ulu Camp Area Plan



2.3 Project Components

The site components used to support exploration activities consist of the Ulu camp, which includes the maintenance shop, fuel storage facility, water supply, and sewage treatment. Due to the care and maintenance status of the site, the ore storage pad and waste pad are not in use. The components that are in use are described below.

2.3.1 Sewage

Sanitary sewage and camp greywater treatment is carried out with a package facility employing a Rotating Biological Contactor (RBC). Once treated, the effluent is released to East Lake via a 550 metre, insulated two inch pipeline. Procedures are described in the *Sewage Treatment Plant Operation and Maintenance Plan*. Sewage sludge is disposed of in shallow above-ground sumps. Alternatively, when camp capacity requirements do not warrant the use of the plant latrine pits or compositing toilets may be used for sanitary sewage and a leaching pit established for camp greywater. Any latrine pit will be located at a distance of at least thirty one (31) metres above the ordinary high water mark of any water body, treated with lime and covered with native material to achieve the pre-existing natural contours of the land prior to demobilization.

2.3.2 Water Supply

All camp water is obtained from a nearby lake, referred to as West Lake. Water is supplied to the camp via an insulated two inch pipeline approximately 680 metres in length and powered by a seven horsepower submersible electric pump installed on a floating dock. Two storage tanks are present at the site; a 27,000 litre tank for general water use and a 63,000 litre tank for fire water storage. A maximum quantity of 100 m^3 per day can be withdrawn for all uses (domestic and drilling), as stipulated by the Water Licence.

2.3.3 Petroleum Products

Fuel storage for the Ulu Project is through three individual tank farms including: (1) Camp 3 Tank Farm; (2) Ulu Site Tank Farm; and (3) Day Tank Farm adjacent to the Power House. All bulk storage for petroleum products at the Project Site have been provided with secondary containment in the form of constructed tank farm facilities incorporating an impermeable liner and berm and an off-loading apron.

The tank farm at Camp 3, or main staging area, consists of two 1,324,895 litre tanks and six 52,995 litre tanks; these are currently not in use. At the Ulu site, fuel is stored in five 52,995 litre tanks. The Day tank farm consists of one 8,800 litre tank.

The main tank farms, at Camp 3 and the Ulu site, store P40 and P50 grade fuels. Historically, fuel was stored in the remote tank farm at Camp 3 until it was transferred to the Ulu camp as required. Environment Canada regulations are in place that govern the resupply of fuel at the tank farms. P50 grade fuel is stored in the Day Tank Farm.

The products that are located at the site include: diesel (P40 and P50), Jet fuel (A or B), W30 lube oil, Ralube, and gasoline.

2.4 Receiving Environment

The Ulu Property is located in the arctic tundra of Nunavut. The site is located on glacially modified outcrop. The terrain is rugged, consisting of exposed bedrock, usually reformed by frost action into blocky, angular boulders, relocated bedrock boulders and occasional glacial erratics. The dominant plant species in these areas is dwarf birch, Labrador tea, and heather. The two lakes of significance that flank the Ulu Project site are referred to as West Lake and Ulu Lake. East Lake, a smaller, shallow body of water, is immediately adjacent to the site. Sedge tundra occurs along the shorelines of lakes in the vicinity. The lakes in the Ulu area follow a drainage flow pattern to Ulu Lake through to Ulu Creek, and then into Frayed Knots River, which eventually flows into Hood River.

Camp 3, used for fuel storage and additional heavy equipment, is located approximately 7 kilometres to the southwest of Ulu camp, and 5 kilometres north of Hood River. The terrain is less rugged and hosts smoother topographical glacial features such as eskers and rolling moraines. The till cover is thicker, and the vegetation is respectively more diverse than at the Ulu camp area.

Due to the isolated location of the Project and its air-only access, the potential impacts to public access areas are minimal.

Environmentally sensitive areas, in addition to the surrounding tundra include: the East Lake area, which will collect all drainage from the camp including the sewage treatment plant effluent, mine portal (sump discharge if needed), and the ore storage pad; West Lake and its close proximity to the access road; and Reno Lakes with their relationship to Camp 3 and its fuel and explosives storage. All drainage within the Ulu Project area is within the Hood River watershed. Boulder filled channels at the outlets of the lakes provide for mainly subsurface drainage to the Hood River system after spring freshet.

The larger lakes in the Ulu Project study area are regarded as having some fish habitat. Aquatic biological inventories were not carried out at East Lake due to its small size and isolated position, which precluded the existence of fish. Potential sources of contaminants in these areas include general runoff from the site facilities (which may include petroleum products) and dust generation from vehicle traffic on nearby roads. Potential vehicle incidents along the access road between the main camp and Camp 3 also need to be considered as a source of contaminants.

3 Spill Prevention Measures

The following checks will be carried out by the Project Manager or designate:

Earthworks, Geological and Hydrological Regimes

- Geotechnical inspection by a qualified Geotechnical Engineer and submission of Geotechnical Engineering Report to Nunavut Water Board in accordance with Part D Item 10 of the Water Licence.

Sewage Line

- Visual inspection of the package sewage treatment plant.
- Visual inspection of the pipeline and heat trace checks at locations along the pipeline.
- Visual inspection of the pump (lift) station at the main camp.

Freshwater Pump and Distribution

- Building heater check; ambient room temperature.
- In-line heater check; discharge water temperature.
- Pump temperature.
- Doors and general condition.

Fuel Storage and Handling

- Visual inspection of the bulk fuel storage facilities at both the main camp and at Camp 3. General condition of the two sites, along with fuel transfer record keeping is essential. Fuel lines, valves and transfer aprons are to be checked on a weekly basis. Status of fuel transport vehicles is to be included in the inspections.
- Drip pans and/or other secondary containment will be used during refuelling.
- Refuelling will not take place below the high water mark of any water body and shall be done in such a manner as to prevent any hydrocarbons from entering any water body.

4 Spill Reporting and Action Procedures

An immediately reportable spill is defined as a release of a substance that exceeds the volumes outlined in Appendix A or is likely to be an impending threat to environmental or human health. It must be reported to the 24-Hour Spill Report Line. The reportable spills for substances handled most at Ulu are: fuel and lubricant spill over 100 litres as well as any spills of an undetermined amount; and all spills into a water body regardless of the amount.

All spills are cleaned, tracked and documented. Documentation must be submitted to the appropriate authority upon request or at a pre-determined reporting interval. If there is uncertainty regarding the spill volume, or if the material is a contaminant, then the spill will be reported to the 24-Hour Spill Report Line.

All site personnel are equipped with two-way radios. There are typically several VOIP telephones on site, one of which is often designated emergency line. There are satellite telephones should VOIP telephones not be operable.

4.1 Training

As part of their site orientation, all personnel on site will be made aware of this Plan, the location on site of copies of the Plan, spill kits and related materials they may encounter. Roles and responsibilities to spill response will also be included as part of orientation and training.

4.2 Initial Reporting and Action

A person encountering a spill must immediately report the spill to the Environmental Coordinator or Site Manager.

Site Manager via Radio, or telephone _____

Environmental Coordinator via Radio, or telephone _____

The initial notification will include the type and volume of contaminant, the location and approximate size of the spill, the actions already taken to stop and contain the spill and other observations including the presence of wildlife and weather conditions.

4.2.1 Action

- Report spill to a manager.
- Assess the spill – identify material and volume, and the risk to personnel and the environment.
- If there is no risk, attempt to control the spill – refer to Safety Data Sheet (SDS) for product identification and handling.
- If there is a risk, stand clear and prevent others from entering the area.

4.2.2 Reporting

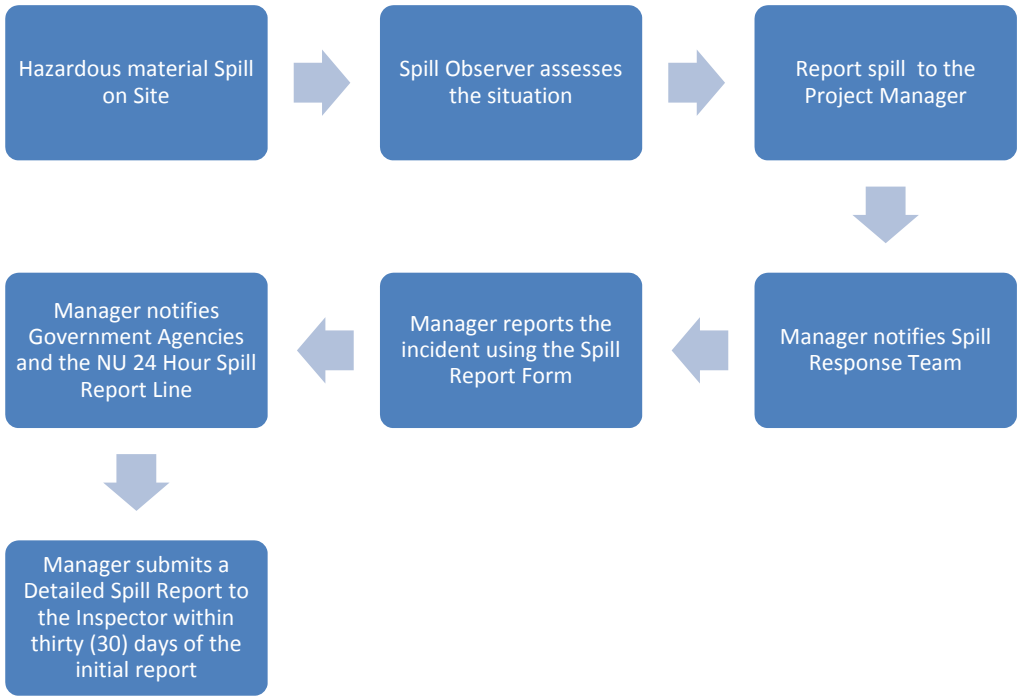
If the spill is immediately reportable, then the Site Manager or Environmental Coordinator will contact the NU 24-Hour Spill Report Line.

24-Hour Spill Report Line: Tel: 867-920-8130 Fax: 867-873-6924

The Site Manager will complete the NT/NU Spill Report Form contain in Appendix B of this Plan and fax or email the completed form to the NT/NU 24-Hour Spill Report Line at (867) 873-6924 or spills@gov.nt.ca within 24 hours. The Environmental Coordinator will submit a Detailed Spill report to an INAC Water Resources Inspector no later than thirty (30) days after the initial report of a spill.

The following Figure 4 outlines the Spill Response Flowchart.

Figure 4: Spill Response Flowchart



4.2.3 Important Contacts

Bonito Capital Corp.	**Telephone**	**Fax**
Karyn Lewis, General Administration	778-386-7340	
Nunavut	**Telephone**	**Fax**
Stephanie Autut, Executive Director, NWB	867-360-6338	867-360 6369
GN Environmental Protection, Iqaluit	867-975-5910	867-975-5980
Aboriginal Affairs and Northern Development Canada-Land Use and Water Use		
Baba Pedersen, Regional Officer, Kugluktuk	867-982-4306	867-982-4307
Eva Paul, Water Resources Officer, Iqaluit	867-975-4548	867-975-6445
Environment Canada	**Telephone**	**Fax**
Marc Dionne, Enforcement Officer, Yellowknife	867-669-4794; 867-446-0924	867-669-6831
Department of Fisheries and Oceans		
Eastern Arctic Area, Iqaluit	867-979-8000	867-979-8039
Other Useful Contacts		
Stanton Hospital Yellowknife	867-669-4100 or 1-800-661-0867	
Med Response	844-633-9999	
Worker's Safety and Compensation Commission		
24-Hour Emergency	1-800-661-0792	
RCMP Yellowknife	867-669-1111	
Discover Mining Services	867-920-4600	
Air Tindi Dispatch Yellowknife	867-880-8218	
Ekati Mine Security (extra help if required)	867-880-2201	

Regardless of the size of the spill, a Spill Report Form (Appendix B) will be completed, with the original retained at site, and a copied delivered to BCC's General Administrator.

After the spill has been reported to management, and the assessment is complete, then remedial action by a response team composed of employees and contractors, coordinated by the Site Manager or the. Environmental Coordinator will commence according to the appropriate action plan.

5 Spill Response Resources

A wide variety of spill control/recovery equipment and materials exists at the site for dealing with spills, as illustrated on Figures 4 and 5 and listed in Table 1.

Table 1 Spill Response Equipment List

#	Equipment		
1	FORD	B-600	48 SEAT SCHOOLBUS
2	FORD	F350	4 X 4 CREWCAB
1	FORD	XL350	4 X 4 CREWCAB
1	FORD	LW 9000	FLATDECK W/ HIAB CRANE
1	FOREMOST		DELTA COMMANDER
1	JCB ZOOM ZOOM		FORKLIFT
2	CATERPILLAR	920 988B	LOADER
1	CATERPILLAR	311	BACKHOE
1	CATERPILLAR	824C	DOZER
1	CATERPILLAR	120G	GRADER
1	SULLAIR	700 CFM	COMPRESSOR
1	GARDINER DENVER	825 CFM	COMPRESSOR
1	LEROI	375 CFM	COMPRESSOR
2	CATERPILLAR	600 KW	GENERATOR
2	CUMMINS	500 KW	GENERATOR
1	CUMMINS	300 KW	GENERATOR
4	DETROIT DIESEL	250 KW	GENERATOR
1	CATERPILLAR	800 KW	GENERATOR
1	GILSON	11 CM	ELECTRIC CEMENT MIXER
1	ACKLAND	300 AMP	ELECTRIC WELDER
1	ATLAS COPCO ROCKET	322.S	2-BOOM DRILL COMBO
1	TAMROCK	HS-205M	2-BOOM DRILL COMBO
1	TAMROCK	H-120	1-BOOM MICRO JUMBO
2	WAGNER	MT-444 MT-426	MINE TRUCK
1	ELPHINSTONE	R1700	7.5 CU. YD. SCOOP
3	WAGNER	ST-7.5 ST-3.5 ST-2D	SCOOPTRAM
1	KUBOTA		MINE TRACTOR
1	GETMAN	A-64	SCISSOR LIFT

5.1 Response Equipment

A backhoe, mine tractor and loader are stored in such a manner as to be readily available on short notice for spill response.

Emergency spill containment and recovery materials and supplies are available for immediate mobilization at any time. These materials are in the designated sea container labeled “Emergency Spill Kit” located immediately east of the core shack at the Ulu project site (Figure 5), and in the “Emergency Spill Response Trailer” located next to the fuel tank farm at Camp 3 (Figure 6).

The sea container has five (5) - 205 L Pioneer House Supply Spill Response Kits and four (5)– five (5) gallon oil kits. Each 205 L kit includes the following items:

- 150 – 16” x 20” oil absorbent pads;
- 2 – 5” x 10’ oil absorbent booms;
- 2 Pairs of Chemi-Pro gloves;
- 2 Pairs of clear safety goggles;
- 8 – 3” x 4’ oil absorbent socks;
- 4 – 6 mm disposal bags;
- 2 Pairs of disposable coveralls;
- 1 – 4 oz strong steel gapseal; and
- 1 – 205 L unrated metal containment drum.

Each five (5) gallon oil kit includes the following:

- 12 – 16” x 18” oil absorbent pads;
- 2 – 3” x 4’ oil absorbent booms;
- 1 Heavy duty disposal bag;
- 1 Pair of Chemi-Pro gloves;
- 3 lb all purpose absorbent;
- 1 – 20 L container pail.

5.2 Response Team Organization

The spill response team, assembled by the Site Manager or the Environmental Coordinator, will be composed of employees and contractors.

Figure 5: Emergency Spill Kit Location - Ulu Mine Site

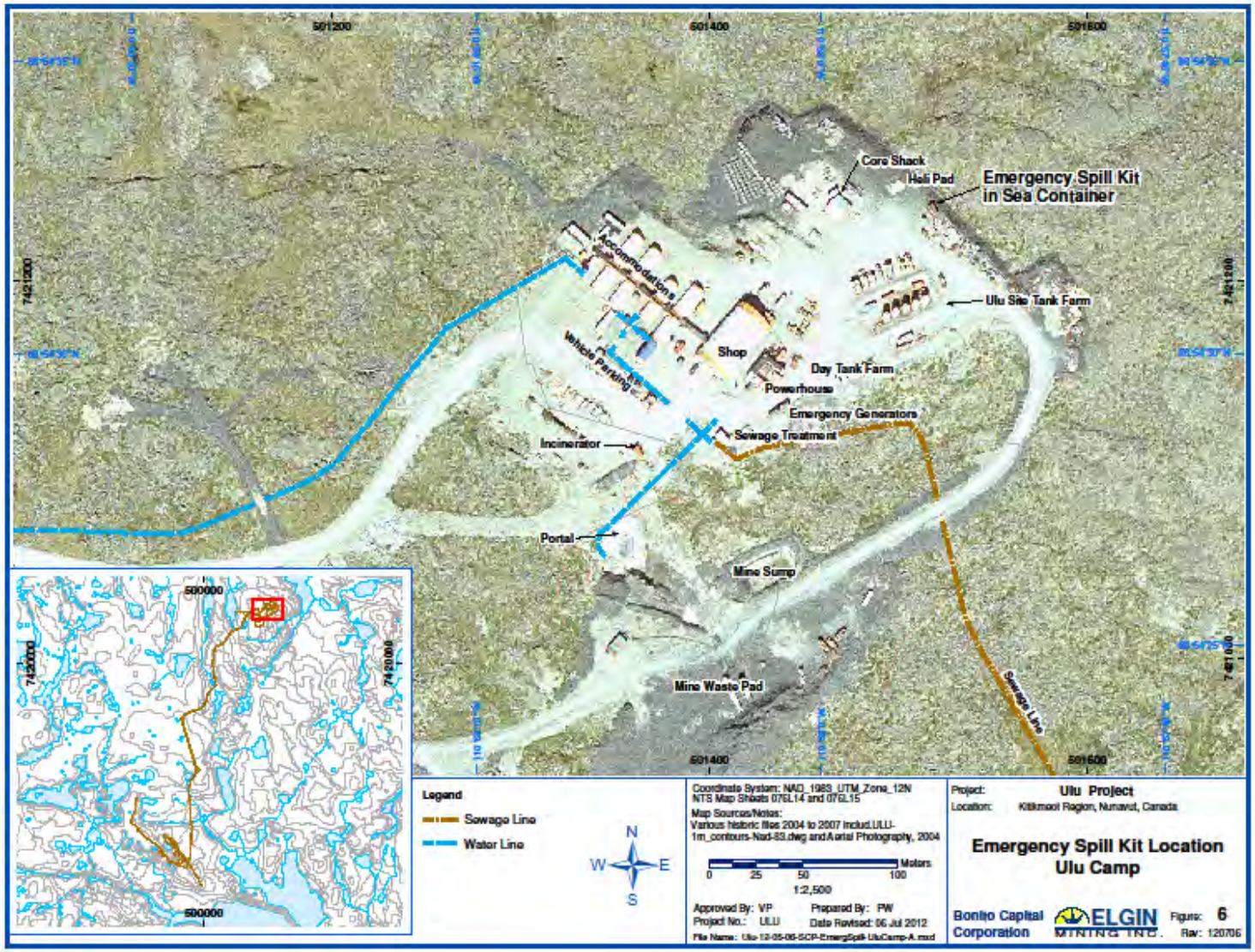


Figure 6: Emergency Spill Response Trailer Location – Camp 3

6 Petroleum Products

6.1 Response Information

The measures outlined in the response plans intend to minimize the potential impact to water and land following a spill. The immediate action is to preserve health and limit environmental damage. The Plans deal with the procedures/methods of spill containment, termination, remedial measures and clean-up of spills related to those products used during an exploration program.

6.1.1 Spill Containment

A spill could occur in one or a combination of the following areas: on land, snow, ice or in the water. Various proven practical methods of containment and recovery are well documented for use in northern climates; these are summarized below. For additional technical information, consult the Environment Canada Report *EPS 9/SP/2*, December 1986 and the *Field Guide for Oil Spill Response in Arctic Waters*, Environment Canada (1998).

The initial action is to prevent any direct health risk to response personnel. Persons not directly associated with the clean-up operations are to be directed to leave the immediate area. The area will be isolated and limited to traffic as directed by the response team.

Containment on Land

The greatest potential for the possibility for a spill on land is related to refueling the drill rig and heaters at the drill sites. All petroleum and hazardous waste products in the camp area are held within lined and bermed containment areas.

Petroleum products spilling onto snow covered ground may be contained by the construction of snow dykes. For fast initial containment of smaller spills, the dykes can be built manually with shovels. Larger spills may require the use of heavy equipment such as a loader.

The impermeability of dykes may be ensured by lining with a polyethylene liner, plastic tarpaulin or similar synthetic material. Alternatively, in freezing temperatures, water may be sprayed or poured over the dykes to further enhance the barrier to the spilled material. This method assumes that water is available or may be accessed from the spill site. Synthetically lined dykes are more effective than just snow or snow and ice-lined dykes.

During warmer months, containment dykes may be constructed from sand or gravel if these materials are available in an unfrozen form. Again, for smaller spills, the dykes can be fashioned manually with shovels where for larger spills, trucks or other heavy equipment (front-end loaders) will normally be required to transport and handle sand and gravel.

Trenching or ditching can be used as a method for containing and/or intercepting the flow of liquid spills on land. Ice, snow, loose sand, gravel and surface layers of organic material can usually be scraped or dug away until the underlying frozen substrate is reached. This can be effective in re-directing flow or simple containment prior to pumping or absorbing the spilled material. Trenching in solid frozen ground or rocky substrate is normally neither practical nor possible.

Containment on Snow

Containment on snow is readily achieved and is very effective due to its absorbent quality. Liquid spills will become immobile within the snow pack and easily removed for transport for recovery or disposal. Snow is readily fashioned into dykes or dams. Whenever possible, the snow pack should be left in place to avoid contaminating the underlying substrate.

Containment on Ice

Spills that occur on ice, from either direct spillage or migration to the ice, are greatly affected by the strength of the ice. If the spill does not penetrate the ice, and the ice is safe to work on, then the methods of containment are similar to that on land. Where the spill has penetrated the ice, the situation should be handled similar to that on open water. If, as in petroleum spills, the material floats, then every effort should focus on the recovery of the material using pumping/suction methods, and absorbents.

Containment on Open Water

A spill occurring on or into open water is very difficult to contain and every effort should be made to prevent the material from entering the water. If in the case of petroleum products, the material floats, then immediate deployment of surface booms should take place to control the spread of material. Pumping is the method of choice for removal of contained material.

6.1.2 Spill Recovery

Spilled petroleum products contained within a dyked or trenched area should be recovered by pumping into a standby tanker, portable storage tank or drums dependent on volume involved, or use of an independent vacuum truck. Pump and suction hoses should be screened to prevent snow, ice or debris from clogging the line or pump.

Any remaining material may be absorbed by use of a variety of natural and commercially available products, such as 3M brand Conweb and Phase III brand Oil Sponge Remedial.

The availability of shovels, rakes and pitchforks are invaluable in any spill clean-up and recovery operation. The use of heavy equipment for larger spill situations such as front-end loaders and haul trucks, make the removal of material easier. It also ensures that all materials, including absorbent sand, snow, etc. have been removed from the spill site.

6.1.3 Spill Disposal

Petroleum products such as fuel or oil that has been recovered by pumping into portable tanks, drums or a standby tanker can often be reclaimed and reused. Water and debris can be separated from the pure fuel by gravimetric means in a tank. In this manner disposal can be minimized and financial losses reduced.

In-situ combustion may be used as a final means of disposal after every effort has been made to remove the spilled fuel/oil. Approval for burning of petroleum products must be obtained prior to combustion. Burning should never be carried out on land where combustible organics are present and the oil has migrated into the soil. Removal is the method of choice in this case.

The most efficient means of igniting diesel oil for in-situ combustion is with a large size portable propane torch. Other highly flammable products such as gasoline or alcohol, or combustible products, such as wood may also be used to promote ignition of the spilled product. Spilled oil should be ignited where it has pooled naturally or been contained by dykes, trenches or depressions. Oil which has collected in slots in river ice may also be disposed of by in-situ combustion if sufficient holes are drilled in the ice (but not through to the water). Once holes are drilled, the oil which collects in the holes may be ignited.

Liquid oil wastes (which cannot be reclaimed), debris and oil residues left after in-situ combustion will be contained and disposed of off-site at an approved waste receiving facility.

Spilled chemical products will be recovered and reused wherever possible. Materials unable to be used will be collected and stored in containers and shipped off site for disposal, accompanied by an appropriate Waste Manifest.

6.1.4 Other Concerns

Oil-soaked Snow

In the event that an oil/petroleum spill occurs during the winter, impacted snow will be collected and contained as outlined above in Section 6.1.1. In the event that large quantities of snow become oil soaked, the appropriate heavy equipment will be used to collect, transport and re-locate the material to the fuel tank farm or another lined and bermed containment area. Where deemed necessary, the oil impacted snow will be covered to mitigate the potential for wind blown dispersion. In most cases, oil soaked snow would be allowed to melt, and the oil content would be pumped into separate containers and/or collected using hydrophobic oil absorbent materials, Once contained, impacted snow can be disposed of as per methodologies outlined on the appropriate spill contingency action sheet(s).

Fire

In the event that the accident/incident is in combination with a fire, extinguishing the fire may be required prior to initiating efforts to stop the spillage.

In order to control the resulting runoff (in cases where water is used), and the subsequent spreading of the spilled material, any indication of slope away from the area of the spill should be dyked for containment.

Petroleum and chemical fires have the potential to generate toxic fumes under poor combustion conditions. Approaching and dealing with any fire from upwind is recommended as well as caution with regard to breathing the vapours generated from the fire. Appropriate personal protective equipment (PPE) will be worn at all times.

Fuel Tank Farms

In the event of any emergency at the tank farms relating to fire, flooding or spills, all electrical power shall be shut off as quickly as possible within the tank farm area to minimize further damage. The ”Emergency Spill Response Trailer” is located immediately adjacent to Camp 3 fuel tank farm (Figure 6).

6.2 Detailed Response Plans

The following section contains the response plans for spills of material known to currently be present and accessible on site that will be used during activities at the Ulu Project.

Detailed response plans for each of the materials listed in previous sections are provided in the tables below.

Table 2 Detailed Response Plan for Diesel Fuel

24 HOUR SPILL REPORT LINE	(867) 920-8130
INITIAL SPILL RESPONSE	• The Project Manager, or Sr. Environmental Coordinator shall be informed of the incident and the response team action initiated. Spill reported via 24 hour emergency spill line, above; • Use proper PPE • STOP the flow of diesel fuel if possible; • ELIMINATE open flame ignition sources; • CONTAIN flow of oil by dyking, barricading or blocking flow by any means available. Use earth-moving equipment if nearby; • If flow has reached flowing natural stream, mobilize team to deploy river boom, skimmer and absorbent booms. • A detailed spill report shall be submitted
HAZARDS	• Slightly toxic by ingestion, highly toxic if aspirated, drying of skin on contact; • Flammable, treat as combustible. • Contains BTEX, known human carcinogens.
ACTION FOR FIRE	• Use CO_2, dry chemical, foam or water spray (fog), although water may spread the fire; • Use fog streams to protect rescue team and trapped people; • Use water to cool surface of tanks; • Divert the diesel fuel to an open area and let it burn off under control; • If the fire is put out before all diesel fuel is consumed, beware of re-ignition; • Where diesel fuel is running downhill, try to contain it as quickly as possible; • Rubber tires are almost impossible to extinguish after involvement with a fire. Have vehicles with burning tires removed from the danger area.
RECOVERY	• Recovered soils from contaminated fuel can be soaked up by sand and peat moss or snow if available, by natural products such as Phase III Oil Sponge Remedial, or by synthetic absorbents such as 3M Brand, Graboil or Conwed; • If necessary, contaminated soil should be excavated; • Diesel fuel entering the ground can be recovered by digging sumps or trenches; • Diesel fuel on a water surface should be recovered by skimmers and absorbent booms.
DISPOSAL	• Incineration under controlled conditions; obtain prior approval. • Dispose of offsite at an approved facility.
PROPERTIES	• Chemical composition: mixture of hydrocarbons in the range C_9 to C_{18}; • Clear to yellow, bright oily liquid with hydrocarbon odour; • Mostly insoluble, floats on water.
ENVIRONMENTAL CONCERNS	• BTEX components toxic to fish and other aquatic organisms; • Harmful to waterfowl; • May create unsightly film on water.
CONTAINERS	• Storage tanks and day tanks.

Table 3 Detailed Response Plan for Jet A fuel and Gasoline

24 HOUR SPILL REPORT LINE	(867) 920-8130
INITIAL SPILL RESPONSE	• The Project Manager, or Sr. Environmental Coordinator shall be informed of the incident and the response team action initiated. Spill reported via 24 hour emergency spill line, above; • Use proper PPE • STOP the flow of fuel if possible; • ELIMINATE all possible sources of IGNITION, eg. extinguish cigarettes, shut off motors (from a remote location if surrounded by vapours); • EVACUATE personnel from danger area; • CAREFULLY CONSIDER the hazards and merits of trying to contain the spill. Contain only if safe to do so, and obvious benefit of containment is apparent (ie. contain if flowing towards a creek or water body). Only if every effort is made to contain gasoline, or other considered approaches not feasible, is evaporation a suitable course of management. Allowing gasoline to evaporate required prior approval from appropriate authorities. • If spilled in an enclosed area, VENTILATE vapours. • A detailed spill report shall be submitted
HAZARDS	• EXTREME FIRE HAZARD, highly flammable; • Forms explosive mixture with air; is heavier than air and can migrate considerable distances to sources of ignition and flashback; • Easily ignited by flame or spark; • Avoid contact with oxidizing materials (eg. Lead Nitrate, acids); • Moderately toxic by ingestion, highly toxic if aspirated. • Contains a small amount of Benzene which is a suspect human carcinogen.
ACTION FOR FIRE	• Use CO_2, dry chemical, foam or water spray (fog), although water may spread the fire; • Use jet streams to wash away burning gasoline; • Use fog streams to protect rescue team and trapped people; • Use water to cool surface of tanks; • Divert to an open area and let it burn off under control; • If the fire is put out before all fuel is consumed, beware of re-ignition; • Where fuel is running downhill, try to contain it at the bottom prior to reaching lakes or streams; • Rubber tires are almost impossible to extinguish after involvement with a fire. Have vehicles with burning tires removed from the danger area.
RECOVERY	• Unburned fuel can be soaked up by sand and peat moss and snow when available, or by synthetic absorbents such as 3M Brand, Graboil or Conwed; • If necessary, contaminated soil should be excavated; • Fuel entering the ground can be recovered by digging sumps or trenches.
DISPOSAL	• Evaporation; • Incineration under controlled conditions; obtain prior approval. • Dispose of offsite at an approved facility.
PROPERTIES	• Chemical composition: mixture of hydrocarbons; Gasoline C_4-C_{12}, Jet A C_9-C_{16} • Light green, clear, amber coloured liquids; • Volatile; • Not soluble, floats on water
ENVIRONMENTAL CONCERNS	• Moderately toxic to fish and other aquatic organisms; • May create unsightly film on water.
CONTAINERS	• Tank at MTF. Drum shipping and storage is in limited quantities.

Table 4 Detailed Response Plan for Lubricating and Hydraulic Oils

24 HOUR SPILL REPORT LINE	(867) 920-8130
INITIAL SPILL RESPONSE	• The Project Manager or Sr. Environmental Coordinator shall be informed of the incident and the response team action initiated. Spill reported via 24 hour emergency spill line, above; • Use proper PPE • STOP the flow of oil if possible; • ELIMINATE open flame ignition sources; • CONTAIN flow of oil by dyking, barricading or blocking flow by any means available. Use earth-moving equipment if nearby; • A detailed spill report shall be submitted
HAZARDS	• Low toxicity by ingestion, mildly irritating to eyes • Combustible, low fire hazard; • Avoid contact with oxidizing materials (eg. Lead Nitrate, acids).
ACTION FOR FIRE	• Use CO_2, dry chemical, foam or water spray (fog), although water may spread the fire; • Use fog streams to protect rescue team and trapped people; • Use water to cool surface fire exposed containers; • Divert the oil to an open area and let it burn off under control; • If the fire is put out before all oil is consumed, beware of re-ignition; • Rubber tires are almost impossible to extinguish after involvement with a fire. Have vehicles with • Burning tires removed from the danger area.
RECOVERY	• After containment, recover as much oil as possible by pumping into drums; • Residual oil may be burned in-situ, upon approval; • Remaining unburned oil can be soaked up by sand, peat moss and snow when available, or by synthetic absorbents such as 3M Brand, Graboil or Conwed; • If necessary, contaminated soil should be excavated; • Oil on a water surface should be recovered by skimmers and absorbent booms.
DISPOSAL	• Incineration under controlled conditions, prior approval required; • Ship to offsite to an approved facility
PROPERTIES	• Chemical composition: mixture of hydrocarbons and conventional industrial oil additives; C_{20}-C_{66} • Generally viscous liquids, light to dark amber colours; • Not soluble, floats on water.
ENVIRONMENTAL CONCERNS	• Moderately toxic to fish and other aquatic organisms; • Harmful to waterfowl; • May create unsightly film on water and shorelines.
CONTAINERS	• Transported and stored in steel drums or cubes (these are self-contained units with an 8 drum capacity)

Table 5 Response Plan for Ethylene Glycol Spill

24 HOUR SPILL REPORT LINE	(867) 920-8130
INITIAL SPILL RESPONSE	• The Project Manager or Sr. Environmental Coordinator shall be informed of the incident and the response team action initiated. Spill reported via 24 hour emergency spill line, above; • Use proper PPE • STOP the flow of Antifreeze at source if possible; • ELIMINATE open flame ignition sources; • CONTAIN flow of liquid by dyking, barricading or blocking flow by any means available; • PREVENT antifreeze from entering any flowing streams. • A detailed spill report shall be submitted
HAZARDS	• Inhalation of mist may cause irritation of nose, throat and headache; • Moderately toxic by ingestion, can be fatal; • Avoid contact with strong oxidizing agents • Flammable, decomposition products include carbon dioxide and/or carbon monoxide.
ACTION FOR FIRE	• Use alcohol type or all purpose foam for large fires; CO_2, dry chemical or water spray (fog) for small fires. Do not force solid streams into the burning liquid.
RECOVERY	• Ethylene glycol antifreeze can be soaked up by peat moss or snow when available, or by synthetic absorbents such as Hazorb; • Small spills may be washed with copious amounts of water for dilution; • Access to spilled or recovered ethylene glycol by mammals should be prevented.
DISPOSAL	• Only incinerate in a furnace under controlled conditions where approved by appropriate federal, provincial and local regulations; • Ship to offsite to an approved facility
PROPERTIES	• Chemical composition: 96% ethylene glycol ($C_2H_6O_2$) • 4% water and rust inhibitors • Clear, syrupy liquid normally contains a dye for identification in water sources; • 100% soluble in water; • Flammable.
ENVIRONMENTAL THREAT	• Low to moderate toxicity for fish and other aquatic organisms; • Attractive smell and taste to some mammals, and toxic by ingestion.
CONTAINERS	• Storage tanks.
SUPPLIER	• DOW Chemical of Canada Ltd., Van Waters & Rogers Ltd.

7 Sewage System

The sewage system is operated at the main camp and consists of a modular Rotating Biological Contactor with effluent discharge to the East Lake basin. The system is checked on a regular basis; however, should a failure occur all overflow/releases would report directly to East Lake basin. Problems with the collection system and piping would be more widespread as the camp area is quite level, with a few small depressions and appropriate grading for miscellaneous collection.

Release from East Lake occurs naturally and flows toward Ulu Lake. The majority of flow after spring melt is takes place among the boulders in the outflow channel and below surface. Tentative plans include the addition of a containment berm to provide an additional barrier prior to reaching Ulu Lake.

If a failure should occur along the heat traced two (2) inch pipeline between the camp and East Lake, a shutdown of the system would be required and repairs undertaken. Any effluent that collects in the surface mine sump, if mixed with mine water, would be analyzed and discharged to the environment 10 days after NWB approval. The INAC Inspector would be notified.

Appropriate response team action would have repairs completed to the satisfaction of the supervisor in charge and effluent returning directly to East Lake.

Table 6 Response Plan for Sewage System Failure

24 HOUR SPILL REPORT LINE	(867) 920-8130
INITIAL SPILL RESPONSE	• Notify the Project Manager or Sr. Environmental Coordinator immediately via radio, phone or in person and initiate the response team; • Spill reported via the 24 hour emergency spill line, above; • If necessary, direct the initiation of shut down procedures for the pumping system in order to STOP the flow of sewage through to the environment (East Lake). If the failure is piping related, the sewage discharge will be shut down. Provisions, if in place may provide an alternative/temporary disposal to the surface mine portal sump for storage; • A detailed spill report shall be submitted.
HAZARDS	• The sewage stream from the site contains grey water from all sources (drys, all accommodation and shower facilities, kitchen and all washroom facilities on site). • There are no chemicals used in the process; • Due to the nature of the source, health risks are associated with bacterial infections and disease that may be transmitted through exposure.
ACTION FOR FIRE	• Non-flammable
RECOVERY	• Ground contamination; any sewage material that has escaped from the containment areas onto surrounding tundra shall be removed, where possible and disposed of within the designated area for burial of sewage sludge; • If required, esker material and/or crushed wasted rock shall be used to fill any depressions left after excavation of the spill material. • Solutions, where contained shall be pumped back into the sewage treatment system or sampled and released if suitable; • Water contamination; these areas are difficult to mitigate as movement of contaminated material (and water) may continue long after the initial incident; • Local authorities should be contacted regarding advice for cleanup or additional work to be carried out. INAC Water Resources, Env. Can., Dept. of Fisheries and Oceans.
DISPOSAL	• Contaminated materials are to be stored until disposal within the designated sewage sludge disposal area.
PROPERTIES	• The exploration site sewage system contains a mixture of camp waters including camp drys, accommodation washroom facilities and kitchen. • Water accounts for greater than 90% of the component which is used during day to day activities; • The remainder is organic solids which are treated within the package facility.
ENVIRONMENTAL CONCERNS	• Solution only mildly toxic to fish and other aquatic organisms due to the low dissolved oxygen that may occur due to biological loading; • Effluents could contain minor amounts of nutrients (nitrogen and phosphate components) that may promote plant growth in downstream water bodies.
CONTAINERS	• N/A
SUPPLIER	• N/A

8 References

Environment Canada, *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations*, June 2008. Letter from P. Smith, Environment Canada, to P. Beaulieu, NWB, *Re: 2BM-ULU0914 Spill Contingency Plan E,1*, dated September 23, 2011.

Letter and Technical Review Memorandum from I.Parsons, Aboriginal Affairs and Northern Development Canada, to P. Beaulieu, NWB, Re: *2BM-ULU0914 – Spill Contingency Plan - Ulu Mine Site – Elgin Mining Ltd.*, dated September 30, 2011.

Letter and Technical Review Memorandum from J. Allen, Aboriginal Affairs and Northern Development Canada, to P. Beaulieu, NWB, *Re: 2BM-ULU – Bonito Capital Corporation – Ulu Gold Project – Renewal Application*, dated August 22, 2014.

National Instrument 43-101 Technical Report prepared by Buena Tierra Developments Ltd, North Face Software Ltd. and Giroux Consultants Ltd., *Technical Report on the Ulu Gold Property Nunavut, Canada*, effective date April 14, 2015 as amended July 10, 2015.

Spill Contingency Planning and Reporting Regulations, N.W.T. Reg. (Nu.) 068-93. Source: http://www.canlii.org/en/nu/laws/regu/nwt-reg-nu-068-93/latest/nwt-reg-nu-068-93.html

Water Resources Division, Indian and Northern Affairs Canada, Yellowknife, *Guidelines for Spill Contingency Planning*, 2007. Source: http://www.ainc-inac.gc.ca/ai/scr/nt/ntr/pubs/SCP-eng.asp

Appendices

Appendix A. Reportable Spill Quantities

TDG Class	Substance for NU 24 Hour Spill Line	Immediately Reportable Quantities
1 2.3 2.4 6.2 6.2 7 None	Explosives Compressed gas (toxic) Compressed gas (corrosive) Infectious substances Sewage and wastewater (unless otherwise authorized) Radioactive Unknown substance	Any amount
2.1 2.2	Compressed gas (flammable) Compressed gas (non-corrosive, non-flammable)	Any amount of gas from containers with a capacity greater than 100 L
3.1 3.2 3.3	Flammable liquids	> 100 L
3.1 3.2 3.3	Flammable liquids, when released on a frozen water body that is being used as a working surface	> 20 L
4.1 4.2 4.3	Flammable solids Spontaneously combustible solids Water reactant	> 25 kg
5.1 9.1	Oxidizing substances Miscellaneous products or substances excluding PCB mixtures	> 50 L or 50 kg
5.2 9.2	Organic peroxides Environmentally hazardous	> 1 L or 1 kg
6.1 8 9.3	Poisonous substances Corrosive substances Dangerous wastes	> 5 L or 5 kg
9.1	PCB mixtures of 5 or more ppm	> 0.5 L or 0.5 kg
None	Other contaminants (e.g. crude oil, drilling fluid, produced water, waste or spent chemicals, used or waste oil, vehicle fluids, waste water, etc.)	> 100 L or 100 kg
None	Sour natural gas (i.e. contains H2S) Sweet natural gas	Uncontrolled release or sustained flow of 10 minutes or more
None	Report releases or potential releases of any size that: • Are near or in an open water body; • Are near or in a designated sensitive environment or habitat; • Pose an imminent threat to human health or safety; or • Pose an imminent threat to a listed species at risk or its critical habitat.	Any amount

In addition, all releases of harmful substances, regardless of quantity, are to be reported to the NU spill line if the release is near or into a water body, is near or into a designated sensitive environment or sensitive wildlife habitat, poses imminent threat to human health or safety, poses imminent threat to a listed species at risk or its critical habitat, or is uncontrollable.

Appendix B. Spill Reporting Form

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
Tel: (867) 920-8130 ● Fax: (867) 873-6924 ● Email: spills@gov.nt.ca

REPORT LINE USE ONLY

A	Report Date: MM DD YY	Report Time:	☐ Original Spill Report **OR** ☐ Update # _____ to the Original Spill Report	**Report Number:**
B	Occurrence Date: MM DD YY	Occurrence Time:		
C	Land Use Permit Number (if applicable):		Water Licence Number (if applicable):	
D	Geographic Place Name or Distance and Direction from the Named Location:		Region: ☐ NT ☐ Nunavut ☐ Adjacent Jurisdiction or Ocean	
E	Latitude: _____ Degrees _____ Minutes _____ Seconds		Longitude: _____ Degrees _____ Minutes _____ Seconds	
F	Responsible Party or Vessel Name:		Responsible Party Address or Office Location:	
G	Any Contractor Involved:		Contractor Address or Office Location:	
H	Product Spilled: ☐ Potential Spill	Quantity in Litres, Kilograms or Cubic Metres:	U.N. Number:	
I	Spill Source:	Spill Cause:	Area of Contamination in Square Metres:	
J	Factors Affecting Spill or Recovery:	Describe Any Assistance Required:	Hazards to Persons, Property or Environment:	
K	Additional Information, Comments, Actions Proposed or Taken to Contain, Recover or Dispose of Spilled Product and Contaminated Materials:			

L	Reported to Spill Line by:	Position:	Employer:	Location Calling From:	Telephone:
M	Any Alternate Contact:	Position:	Employer:	Alternate Contact Location:	Alternate Telephone:

REPORT LINE USE ONLY

N	Received at Spill Line by:	Position:	Employer:	Location Called:	Report Line Number:

Lead Agency: ☐ EC ☐ CCG/TCMSS ☐ GNWT ☐ GN ☐ ILA ☐ AANDC ☐ NEB ☐ Other: _____

Significance: ☐ Minor ☐ Major ☐ Unknown

File Status: ☐ Open ☐ Closed

Agency:	**Contact Name:**	**Contact Time:**	**Remarks:**
Lead Agency:			
First Support Agency:			
Second Support Agency:			
Third Support Agency:			

Appendix C. Safety Data Sheets

The following Safety Data Sheets (SDS) are provided herein:

- Diesel Fuel
- Jet A Fuel
- Gasoline
- Lubricating and Hydraulic oils (Ralube 40 CF, Duron)
- Ethylene Glycol (Antifreeze)

Material Safety Data Sheet

DIESEL FUEL

1 . Product and company identification

Product name : DIESEL FUEL

Synonym : Seasonal Diesel, #1 Diesel, #2 Heating Oil, #1 Heating Oil, D50, D60, P40, P50, Arctic Diesel, Farm Diesel, Marine Diesel, Low Sulphur Diesel, LSD, Ultra Low Sulphur Diesel, ULSD, Mining Diesel, Naval Distillate, Dyed Diesel, Marked Diesel, Coloured Diesel, Furnace special, Biodiesel blend, B1, B2, B5, Diesel Low Cloud (LC).

Code : W104, W293; SAP: 120, 121, 122, 125, 126, 129, 130, 135, 287, 288

Material uses : Diesel fuels are distillate fuels suitable for use in high and medium speed internal combustion engines of the compression ignition type. Mining Diesel has a higher flash point requirement, for safe use in underground mines.

Manufacturer : PETRO-CANADA
P.O. Box 2844
150 – 6th Avenue South-West
Calgary, Alberta
T2P 3E3

In case of emergency : Petro-Canada: 403-296-3000
Canutec Transportation: 613-996-6666
Poison Control Centre: Consult local telephone directory for emergency number(s).

2 . Hazards identification

Physical state : Bright oily liquid.

Odour : Mild petroleum oil like.

WHMIS (Canada) :

Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview : WARNING!

COMBUSTIBLE LIQUID AND VAPOUR. CAUSES EYE AND SKIN IRRITATION.

Combustible liquid. Severely irritating to the skin. Irritating to eyes. Keep away from heat, sparks and flame. Do not get in eyes. Avoid breathing vapour or mist. Avoid contact with skin and clothing. Use only with adequate ventilation. Wash thoroughly after handling.

Routes of entry : Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Inhalation : Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.

Ingestion : Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract.

Skin : Severely irritating to the skin.

Eyes : Irritating to eyes.

Potential chronic health effects

Chronic effects : No known significant effects or critical hazards.

Carcinogenicity : Diesel engine exhaust particulate is probably carcinogenic to humans (IARC Group 2A).

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

2 . Hazards identification

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Medical conditions aggravated by over-exposure : Avoid prolonged or repeated skin contact to diesel fuels which can lead to dermal irritation and may be associated with an increased risk of skin cancer.

See toxicological information (section 11)

3 . Composition/information on ingredients

Name	CAS number	%
Kerosine (petroleum), hydrodesulfurized / Fuels, diesel / Fuel Oil No. 2	64742-81-0 / 68334-30-5 / 68476-30-2	95 - 100
Fatty acids methyl esters	61788-61-2 / 67784-80-9 / 73891-99-3	0 - 5

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4 . First-aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognised skin cleanser. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5 . Fire-fighting measures

Flammability of the product : Combustible liquid

Extinguishing media

Suitable : Use dry chemical, CO_2, water spray (fog) or foam.

Not suitable : Do not use water jet.

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Products of combustion : Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), sulphur compounds (H2S), smoke and irritating vapours as products of incomplete combustion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

5 . Fire-fighting measures

Special remarks on fire hazards : Flammable in presence of open flames, sparks and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. This product can accumulate static charge and ignite.

Special remarks on explosion hazards : Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Runoff to sewer may create fire or explosion hazard.

6 . Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapour or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. Ensure the storage containers are grounded/bonded.

8 . Exposure controls/personal protection

Ingredient	Exposure limits
Kerosine (petroleum), hydrodesulfurized	**ACGIH TLV (United States). Absorbed through skin.** TWA: 200 mg/m³ 8 hour(s).
Fuels, diesel	**ACGIH TLV (United States). Absorbed through skin.** TWA: 100 mg/m³, (Inhalable fraction and vapour) 8 hour(s).
Fuel oil No. 2	**ACGIH TLV (United States). Absorbed through skin.** TWA: 100 mg/m³, (Inhalable fraction and vapour) 8 hour(s).

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Recommended: nitrile, neoprene, polyvinyl alcohol (PVA), Viton. Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. It should be realized that eventually any material regardless of their imperviousness, will get permeated by chemicals. Therefore, protective gloves should be regularly checked for wear and tear. At the first signs of hardening and cracks, they should be changed.

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

Physical state : Bright oily liquid.

Flash point : Diesel fuel: Closed cup: ≥40°C (≥104°F)
Marine Diesel Fuel: Closed Cup: ≥60°C (≥140°F)
Mining Diesel: Closed Cup: ≥52°C (≥126°F)

Auto-ignition temperature : 225°C (437°F)

Flammable limits : Lower: 0.7%
Upper: 6%

Colour : Clear to yellow (This product may be dyed red for taxation purposes).

Odour : Mild petroleum oil like.

Odour threshold : Not available.

pH : Not available.

Boiling/condensation point : 150 to 371°C (302 to 699.8°F)

Melting/freezing point : Not available.

Relative density : 0.80 to 0.88 kg/L @ 15°C (59°F)

Vapour pressure : 1 kPa (7.5 mm Hg) @ 20°C (68ºF).

Vapour density : 4.5 [Air = 1]

Volatility : Semivolatile to volatile.

Evaporation rate : Not available.

Viscosity : Diesel fuel: 1.3 - 4.1 cSt @ 40°C (104°F)
Marine Diesel Fuel: 1.3 - 4.4 cSt @ 40°C (104°F)

Pour point : Not available.

Solubility : Insoluble in cold water, soluble in non-polar hydrocarbon solvents.

10 . Stability and reactivity

Chemical stability : The product is stable.

Hazardous polymerisation : Under normal conditions of storage and use, hazardous polymerisation will not occur.

Materials to avoid : Reactive with oxidising agents and acids.

Hazardous decomposition products : May release COx, NOx, SOx, H2S, smoke and irritating vapours when heated to decomposition.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Kerosine (petroleum), hydrodesulfurized	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
	LC50 Inhalation Vapour	Rat	>5000 mg/m³	4 hours
Fuels, diesel	LD50 Dermal	Mouse	24500 mg/kg	-
	LD50 Oral	Rat	7500 mg/kg	-
Fuel oil No. 2	LD50 Oral	Rat	12000 mg/kg	-

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Diesel engine exhaust particulate is probably carcinogenic to humans (IARC Group 2A).

11 . Toxicological information

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Kerosine (petroleum), hydrodesulfurized	A3	-	-	-	-	-
Fuels, diesel	A3	3	-	-	-	-
Fuel oil No. 2	A3	3	-	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	UN1202	DIESEL FUEL	3	III		-
DOT Classification	Not available.	Not available.	Not available.	-		-

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Combustible liquid
Irritating material

Canada

WHMIS (Canada) : Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

15 . Regulatory information

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

Canada inventory : All components are listed or exempted.

United States inventory (TSCA 8b) : All components are listed or exempted.

Europe inventory : All components are listed or exempted.

16 . Other information

Label requirements : COMBUSTIBLE LIQUID AND VAPOUR. CAUSES EYE AND SKIN IRRITATION.

Hazardous Material Information System (U.S.A.) :

Health	2
Flammability	2
Physical hazards	0
Personal protection	H

National Fire Protection Association (U.S.A.) :

References : Available upon request.
™ Trademark of Suncor Energy Inc. Used under licence.

Date of printing : **7/6/2010.**

Date of issue : 6 July 2010

Date of previous issue : 7/3/2009.

Responsible name : **Product Safety - JDW**

Indicates information that has changed from previously issued version.

For Copy of (M)SDS : Internet: www.petro-canada.ca/msds

Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228

For Product Safety Information: (905) 804-4752

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Material Safety Data Sheet

JET A/A-1 AVIATION TURBINE FUEL

1 . Product and company identification

Product name : JET A/A-1 AVIATION TURBINE FUEL

Synonym : Jet A-1; Jet A-1-DI; Aviation Turbine Kerosene (ATK); JP-8; NATO F-34; Jet F-34; Turbine Fuel, Aviation, Kerosene Type (CAN/CGSB-3.32)

Code : W213, SAP: 149

Material uses : Used as aviation turbine fuel. May contain a fuel system icing inhibitor. In the arctic, Jet A-1 may also be used as diesel fuel and heating oil.

Manufacturer : PETRO-CANADA
P.O. Box 2844
150 – 6th Avenue South-West
Calgary, Alberta
T2P 3E3

In case of emergency : Petro-Canada: 403-296-3000
Canutec Transportation: 613-996-6666
Poison Control Centre: Consult local telephone directory for emergency number(s).

2 . Hazards identification

Physical state : Clear liquid.

Odour : Kerosene-like.

WHMIS (Canada) :

Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2A: Material causing other toxic effects (Very toxic).

The WHMIS classification of Jet A/A-1 is B3.
The WHMIS classification of Jet A/A-1-DI, JP-8, Jet F-34 and NATO F-34, which all contain FSII (Diethylene Glycol Monomethyl Ether), is B3, D2A.

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview : COMBUSTIBLE LIQUID AND VAPOUR. MAY CAUSE EYE AND SKIN IRRITATION. POSSIBLE BIRTH DEFECT HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE BIRTH DEFECTS, BASED ON ANIMAL DATA.

Combustible liquid. Slightly irritating to the eyes and skin. Keep away from heat, sparks and flame. Avoid exposure - obtain special instructions before use. Do not breathe vapour or mist. Avoid contact with eyes, skin and clothing. Contains material which may cause birth defects, based on animal data. Avoid exposure during pregnancy. Use only with adequate ventilation. Wash thoroughly after handling.

Routes of entry : Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Inhalation : Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.

Ingestion : Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract.

Skin : Slightly irritating to the skin.

Eyes : Slightly irritating to the eyes.

Potential chronic health effects

Chronic effects : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

2 . Hazards identification

Teratogenicity : Contains material which may cause birth defects, based on animal data.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Medical conditions aggravated by over-exposure : Repeated skin exposure can produce local skin destruction or dermatitis.

See toxicological information (section 11)

3 . Composition/information on ingredients

Name	CAS number	%
Complex mixture of petroleum hydrocarbons (C9-C16)*(Kerosene)	8008-20-6	99.9
Fuel System Icing Inhibitor (FSII) (if added**): (Diethylene Glycol Monomethyl Ether)	111-77-3	0.1 - 0.15
Anti-static, antioxidant and metal deactivator additives	Not applicable	<0.1

*Aromatic content is 25% maximum (benzene: nil).
**Please note that Jet A-1-DI, JP-8, Jet F-34 and NATO F-34 all contain Fuel System Icing Inhibitor.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4 . First-aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognised skin cleanser. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5 . Fire-fighting measures

Flammability of the product : Class II - combustible liquid (NFPA).

Extinguishing media

Suitable : Use dry chemical, CO_2, water spray (fog) or foam.

Not suitable : Do not use water jet.

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Products of combustion : Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), smoke and irritating vapours as products of incomplete combustion.

5 . Fire-fighting measures

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Special remarks on fire hazards : Flammable in presence of open flames, sparks, and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. This product can accumulate static charge and ignite. May accumulate in confined spaces.

Special remarks on explosion hazards : Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Containers may explode in heat of fire.

6 . Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Avoid exposure during pregnancy. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapour or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. Ensure the storage containers are grounded/bonded.

8 . Exposure controls/personal protection

Ingredient	Exposure limits
Kerosene	**ACGIH TLV (United States).** TWA: 200 mg/m³

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: A NIOSH-approved air-purifying respirator with an organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Recommended: polyvinyl alcohol (PVA), Viton. Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. It should be realized that eventually any material regardless of their imperviousness, will get permeated by chemicals. Therefore, protective gloves should be regularly checked for wear and tear. At the first signs of hardening and cracks, they should be changed.

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

Physical state : Clear liquid.

Flash point : Closed cup: ≥38°C (≥100.4°F) [Tag. Closed Cup]

Auto-ignition temperature : 210°C (410°F)

Flammable limits : Lower: 0.7%
Upper: 5%

Colour : Clear and colourless.

9 . Physical and chemical properties

Odour : Kerosene-like.

Odour threshold : Not available.

pH : Not available.

Boiling/condensation point : 140 to 300°C (284 to 572°F)

Melting/freezing point : Not available.

Relative density : 0.775 to 0.84 (Water=1)

Vapour pressure : 0.7 kPa (5.25 mm Hg) @ 20°C (68ºF).

Vapour density : 4.5 [Air = 1]

Volatility : Volatile.

Evaporation rate : Not available.

Viscosity : 1.0 - 1.9 cSt @ 40ºC (104ºF)

Pour point : <-51ºC (<-60°F)

Solubility : Insoluble in water. Partially miscible in some alcohols. Miscible with other petroleum solvents.

10 . Stability and reactivity

Chemical stability : The product is stable.

Hazardous polymerisation : Under normal conditions of storage and use, hazardous polymerisation will not occur.

Materials to avoid : Reactive with oxidising agents, acids and alkalis.

Hazardous decomposition products : May release COx, NOx, SOx, aldehydes, acids, ketones, smoke and irritating vapours when heated to decomposition.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Kerosene	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
	LC50 Inhalation Vapour	Rat	>5000 mg/m³	4 hours
Diethylene Glycol Monomethyl Ether	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	4000 mg/kg	-
	LC50 Inhalation Vapour	Rat	>50000 mg/m³	4 hours

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Kerosene	A3	3	-	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

11 . Toxicological information

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	UN1863	FUEL, AVIATION, TURBINE ENGINE	3	III		-
DOT Classification	Not available.	Not available.	Not available.	-		-

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Combustible liquid

Canada

WHMIS (Canada) : Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2A: Material causing other toxic effects (Very toxic).

The WHMIS classification of Jet A/A-1 is B3.
The WHMIS classification of Jet A/A-1-DI, JP-8, Jet F-34 and NATO F-34, which all contain FSII (Diethylene Glycol Monomethyl Ether), is B3, D2A.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

Canada inventory : All components are listed or exempted.

United States inventory (TSCA 8b) : All components are listed or exempted.

Europe inventory : All components are listed or exempted.

16 . Other information

Label requirements : COMBUSTIBLE LIQUID AND VAPOUR. MAY CAUSE EYE AND SKIN IRRITATION. POSSIBLE BIRTH DEFECT HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE BIRTH DEFECTS, BASED ON ANIMAL DATA.

Hazardous Material Information System (U.S.A.) :

Health	*	2
Flammability		2
Physical hazards		0
Personal protection		H

National Fire Protection Association (U.S.A.) :

References : Available upon request.
TM/MC Marque de commerce de Petro-Canada - Trademark

Date of printing : **11/20/2009.**

Date of issue : 20 November 2009

Date of previous issue : No previous validation.

Responsible name : **Product Safety - DSR**

Indicates information that has changed from previously issued version.

For Copy of (M)SDS : Internet: www.petro-canada.ca/msds

Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228

For Product Safety Information: (905) 804-4752

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Material Safety Data Sheet

GASOLINE, UNLEADED

1 . Product and company identification

Product name : GASOLINE, UNLEADED

Synonym : Regular, Unleaded Gasoline (US Grade), Mid-Grade, Plus, Super, WinterGas, SummerGas, Supreme, SuperClean WinterGas, RegularClean, PlusClean, Premium, marked or dyed gasoline, TQRUL, transitional quality regular unleaded, BOB, Blendstock for Oxygenate Blending

Code : W102E, SAP: 102 to 117

Material uses : Unleaded gasoline is used in spark ignition engines including motor vehicles, inboard and outboard boat engines, small engines such as chain saws and lawn mowers, and recreational vehicles.

Manufacturer : PETRO-CANADA
P.O. Box 2844
150 – 6th Avenue South-West
Calgary, Alberta
T2P 3E3

In case of emergency : Petro-Canada: 403-296-3000
Canutec Transportation: 613-996-6666
Poison Control Centre: Consult local telephone directory for emergency number(s).

2 . Hazards identification

Physical state : Clear liquid.

Odour : Gasoline

WHMIS (Canada) :

Class B-2: Flammable liquid
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview : WARNING!

FLAMMABLE LIQUID AND VAPOUR. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION. CANCER HAZARD - CONTAINS MATERIAL WHICH CAN CAUSE CANCER. CONTAINS MATERIAL WHICH CAN CAUSE HERITABLE GENETIC EFFECTS.

Flammable liquid. Irritating to eyes, respiratory system and skin. Keep away from heat, sparks and flame. Avoid exposure - obtain special instructions before use. Do not breathe vapour or mist. Avoid contact with eyes, skin and clothing. Contains material which can cause cancer. Risk of cancer depends on duration and level of exposure. Contains material which can cause heritable genetic effects. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.

Routes of entry : Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Inhalation : Inhalation of this product may cause respiratory tract irritation. Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.

Ingestion : Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract. Ingestion of this product may cause Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.

2 . Hazards identification

Skin : Irritating to skin.

Eyes : Irritating to eyes.

Potential chronic health effects

Chronic effects : This product contains an ingredient or ingredients, which have been shown to cause chronic toxic effects. Repeated or prolonged exposure to the substance can produce blood disorders.

Carcinogenicity : Contains material which can cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : Contains material which can cause heritable genetic effects.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Medical conditions aggravated by over-exposure : Repeated or prolonged contact with spray or mist may produce chronic eye irritation and severe skin irritation. Repeated skin exposure can produce local skin destruction or dermatitis.

See toxicological information (section 11)

3 . Composition/information on ingredients

Name	CAS number	%
Gasoline	86290-81-5	85-100
Ethanol	64-17-5	0.1-1
Benzene	71-43-2	0.5-1.5
Toluene	108-88-3	15-40*

**Montreal: may vary from 3-40%*
**Edmonton: may vary from 1-5%*

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4 . First-aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognised skin cleanser. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5 . Fire-fighting measures

Flammability of the product : Flammable liquid (NFPA) .

Extinguishing media

Suitable : Use dry chemical, CO_2, water spray (fog) or foam.

Not suitable : Do not use water jet.

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Products of combustion : Carbon oxides (CO, CO2), nitrogen oxides (NOx), polynuclear aromatic hydrocarbons, phenols, aldehydes, ketones, smoke and irritating vapours as products of incomplete combustion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Special remarks on fire hazards : Extremely flammable in presence of open flames, sparks, shocks, and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. Rapid escape of vapour may generate static charge causing ignition. May accumulate in confined spaces.

Special remarks on explosion hazards : Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Containers may explode in heat of fire. Vapours may form explosive mixtures with air.

6 . Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapour or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical

7 . Handling and storage

(ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. Ensure the storage containers are grounded/bonded.

8 . Exposure controls/personal protection

Ingredient	Exposure limits
Gasoline	**ACGIH TLV (United States).** TWA: 300 ppm 8 hour(s). STEL: 500 ppm 15 minute(s).
Ethanol	**ACGIH TLV (United States).** STEL: 1000 ppm 15 minute(s).
Benzene	**ACGIH TLV (United States). Absorbed through skin.** TWA: 0.5 ppm 8 hour(s). STEL: 2.5 ppm 15 minute(s).
Toluene	**ACGIH TLV (United States).** TWA: 20 ppm 8 hour(s).

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: A NIOSH-approved air-purifying respirator with an organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.

8 . Exposure controls/personal protection

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Recommended: polyvinyl alcohol (PVA), Viton. Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. It should be realized that eventually any material regardless of their imperviousness, will get permeated by chemicals. Therefore, protective gloves should be regularly checked for wear and tear. At the first signs of hardening and cracks, they should be changed.

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

Physical state : Clear liquid.

Flash point : Closed cup: -50 to -38°C (-58 to -36.4°F) [Tagliabue.]

Auto-ignition temperature : 257°C (494.6°F) (NFPA)

Flammable limits : Lower: 1.3% (NFPA)
Upper: 7.6% (NFPA)

Colour : Clear to slightly yellow or green, undyed liquid. May be dyed red for taxation purposes.

Odour : Gasoline

Odour threshold : Not available.

pH : Not available.

Boiling/condensation point : 25 to 220°C (77 to 428°F) (ASTM D86)

Melting/freezing point : Not available.

Relative density : 0.685 to 0.8 kg/L @ 15°C (59°F)

Vapour pressure : <107 kPa (<802.5 mm Hg) @ 37.8°C (100°F)

Vapour density : 3 to 4 [Air = 1] (NFPA)

Volatility : Not available.

Evaporation rate : Not available.

Viscosity : Not available.

Pour point : Not available.

Solubility : Hydrocarbon components virtually insoluble in water. Soluble in alcohol, ether, chloroform and benzene. Dissolves fats, oils and natural resins.

10 . Stability and reactivity

Chemical stability : The product is stable.

Hazardous polymerisation : Under normal conditions of storage and use, hazardous polymerisation will not occur.

Materials to avoid : Reactive with oxidising agents, acids and interhalogens.

Hazardous decomposition products : May release COx, NOx, phenols, polycyclic aromatic hydrocarbons, aldehydes, ketones, smoke and irritating vapours when heated to decomposition.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Gasoline	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	13600 mg/kg	-
Ethanol	LD50 Dermal	Rabbit	>15800 mg/kg	-
	LD50 Oral	Mouse	3450 mg/kg	-
	LC50 Inhalation Vapour	Rat	8850 mg/m³	4 hours
Benzene	LD50 Dermal	Rabbit	>8240 mg/kg	-
	LD50 Oral	Rat	930 mg/kg	-
	LC50 Inhalation Vapour	Rat	13228 ppm	4 hours
Toluene	LD50 Dermal	Rabbit	12125 mg/kg	-
	LD50 Oral	Rat	636 mg/kg	-
	LC50 Inhalation Vapour	Rat	7585 ppm	4 hours

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Gasoline	A3	2B	-	-	-	-
Ethanol	A3	-	-	-	-	-
Benzene	A1	1	A	+	Proven.	+
Toluene	A4	3	D	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : There is a wealth of information about the teratogenic hazards of Toluene in the literature; however, based upon professional judgement regarding the body of evidence, WHMIS classification as a teratogen is not warranted.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	UN1203	GASOLINE	3	II		-
DOT Classification	Not available.	Not available.	Not available.	-		-

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Flammable liquid
Irritating material
Carcinogen

Canada

WHMIS (Canada) : Class B-2: Flammable liquid
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

Canada inventory : All components are listed or exempted.

United States inventory (TSCA 8b) : All components are listed or exempted.

Europe inventory : All components are listed or exempted.

16 . Other information

Label requirements : FLAMMABLE LIQUID AND VAPOUR. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION. CANCER HAZARD - CONTAINS MATERIAL WHICH CAN CAUSE CANCER. CONTAINS MATERIAL WHICH CAN CAUSE HERITABLE GENETIC EFFECTS.

Hazardous Material Information System (U.S.A.) :

Health	*	2
Flammability		3
Physical hazards		0
Personal protection		H

16 . Other information

National Fire Protection Association (U.S.A.) :

References : Available upon request.
™ Trademark of Suncor Energy Inc. Used under licence.

Date of printing : **4/21/2010.**

Date of issue : 9 April 2010

Date of previous issue : No previous validation.

Responsible name : **Product Safety - RS**

Indicates information that has changed from previously issued version.

For Copy of (M)SDS : Internet: www.petro-canada.ca/msds

Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228

For Product Safety Information: (905) 804-4752

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Material Safety Data Sheet

RALUBE ™ 40 CFS

1 . Product and company identification

Product name : RALUBE ™ 40 CFS

Code : RL40CFS, 490-777

Material uses : An SAE 40 grade, 13 TBN railway diesel engine oil designed for use in General Electric and EMD powered units. It is also suitable as a general purpose diesel engine oil where API “CF” quality is required.

Manufacturer : Petro-Canada Lubricants Inc.
2310 Lakeshore Road West
Mississauga, Ontario
Canada L5J 1K2

In case of emergency : Suncor Energy: 403-296-3000
Canutec Transportation: 613-996-6666
Poison Control Centre: Consult local telephone directory for emergency number(s).

2 . Hazards identification

Physical state : Viscous liquid.

Odour : Hydrocarbon.

WHMIS (Canada) : Not controlled under WHMIS (Canada).

OSHA/HCS status : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

Emergency overview : No specific hazard.

Routes of entry : Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Inhalation : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Skin : Slightly irritating to the skin.

Eyes : Slightly irritating to the eyes.

Potential chronic health effects

Chronic effects : No known significant effects or critical hazards.

Carcinogenicity : Not listed as carcinogenic by OSHA, NTP or IARC.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Medical conditions aggravated by over-exposure : Repeated or prolonged contact with spray or mist may produce chronic eye irritation and severe skin irritation. Repeated skin exposure can produce local skin destruction or dermatitis.

See toxicological information (Section 11)

3 . Composition/information on ingredients

Name	CAS number	%
Mixture of severely hydrotreated and hydrocracked and/or solvent-refined base oil (petroleum).	Mixture	-

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

3 . Composition/information on ingredients

The base oil may be a mixture of the following CAS#s: 8042-47-5, 64741-95-3, 64742-01-4, 64742-46-7, 64742-47-8, 64742-53-6, 64742-54-7, 64742-55-8, 64742-62-7, 72623-83-7, 72623-84-8, 72623-85-9, 72623-86-0, 72623-87-1, 178603-64-0, 178603-65-1, 178603-66-2, 445411-73-4

4 . First-aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognised skin cleanser. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5 . Fire-fighting measures

Flammability of the product : May be combustible at high temperature.

Extinguishing media

Suitable : Use an extinguishing agent suitable for the surrounding fire.

Not suitable : None known.

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Products of combustion : Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), metal oxides, smoke and irritating vapours as products of incomplete combustion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Special remarks on fire hazards : Low fire hazard. This material must be heated before ignition will occur.

Special remarks on explosion hazards : Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

6 . Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

6 . Accidental release measures

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapour or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

8 . Exposure controls/personal protection

Ingredient	Exposure limits
Mixture of severely hydrotreated and hydrocracked and/or solvent-refined base oil (petroleum).	**ACGIH TLV (United States). Notes: (Mineral oil)** TWA: 5 mg/m³, (Inhalable fraction) 8 hour(s).

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: organic vapour filter

8 . Exposure controls/personal protection

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Recommended: neoprene, nitrile, polyvinyl alcohol (PVA), Viton®.

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

Physical state : Viscous liquid.

Flash point : Open cup: 267°C (512.6°F) [Cleveland.]

Auto-ignition temperature : Fire Point: 287 °C (548.6°F)

Flammable limits : Not available.

Colour : Brown.

Odour : Hydrocarbon.

Odour threshold : Not available.

pH : Not available.

Boiling/condensation point : Not available.

Melting/freezing point : Not available.

Relative density : 0.8845 kg/L @ 15°C (59°F)

Vapour pressure : Not available.

Vapour density : Not available.

Volatility : Not available.

Evaporation rate : Not available.

Viscosity : 142.2 cSt @ 40°C (104°F), 14.8 cSt @ 100°C (212°F), VI=104

Pour point : -27°C (-17°F)

Solubility : Insoluble in water.

10 . Stability and reactivity

Chemical stability : The product is stable.

Hazardous polymerisation : Under normal conditions of storage and use, hazardous polymerisation will not occur.

Materials to avoid : Reactive with oxidising agents, acids and alkalis.

Hazardous decomposition products : May release COx, NOx, SOx, methacrylate monomers, smoke and irritating vapours when heated to decomposition.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Mixture of severely hydrotreated and hydrocracked and/or solvent-refined base oil (petroleum).	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-

Conclusion/Summary : Not available.

11 . Toxicological information

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Mixture of severely hydrotreated and hydrocracked and/or solvent-refined base oil (petroleum).	A4	-	-	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

Other adverse effects : No known significant effects or critical hazards.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimised wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	Not regulated.	-	-	-		-
DOT Classification	Not available.	Not available.	Not available.	-		-

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Not regulated.

Canada

WHMIS (Canada) : Not controlled under WHMIS (Canada).

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

Canada inventory : All components are listed or exempted.

United States inventory (TSCA 8b) : All components are listed or exempted.

Europe inventory : All components are listed or exempted.

16 . Other information

Hazardous Material Information System (U.S.A.) :

Health	1
Flammability	1
Physical hazards	0
Personal protection	B

National Fire Protection Association (U.S.A.) :

References : Available upon request.
™ Trademark of Suncor Energy Inc. Used under licence.

Date of printing : **1/25/2011.**

Date of issue : 25 January 2011

Date of previous issue : 8/17/2010.

Responsible name : **Product Safety - DSR**

Indicates information that has changed from previously issued version.

For Copy of (M)SDS : The Canadian Controlled Products Regulations (CPR) (Under the Hazardous Products Act, part of the WHMIS legislation) only apply to WHMIS Controlled (i.e., hazardous) products. Therefore, the CPR and the 3-year update rule specified therein do not apply to WHMIS Non-Controlled products. Although this is true, customarily Petro-Canada reviews and updates Non-Controlled product MSDS if a customer requests such an update. These Non-Controlled product updates are given a lower priority than Controlled products but are handled as soon as practicable. If you would like to verify if the MSDS you have is the most current, or you require any further information, please contact:

Internet: lubricants.petro-canada.ca/msds

16 . Other information

Lubricants:
Western Canada, telephone: 1-800-661-1199; fax: 1-800-378-4518
Ontario & Central Canada, telephone: 1-800-268-5850; fax: 1-800-201-6285
Quebec & Eastern Canada, telephone: 1-800-576-1686; fax: 1-800-201-6285

For Product Safety Information: (905) 804-4752

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Material Safety Data Sheet

DURON ™ XL SYNTHETIC BLEND 15W-40 HEAVY DUTY ENGINE OIL

1 . Product and company identification

Product name : DURON ™ XL SYNTHETIC BLEND 15W-40 HEAVY DUTY ENGINE OIL

Code : DXL15, 420-059

Material uses : DURON XL Synthetic Blend 15W-40 is a superior quality heavy duty engine oil meeting global standards for high speed 4-stroke diesel engines. It can also be used in other applications including a wide range of compression and spark ignition engines, wet clutch transmissions and hydraulic systems.

Manufacturer : Petro-Canada Lubricants Inc.
2310 Lakeshore Road West
Mississauga, Ontario
Canada L5J 1K2

In case of emergency : Suncor Energy: 403-296-3000
Canutec Transportation: 613-996-6666
Poison Control Centre: Consult local telephone directory for emergency number(s).

2 . Hazards identification

Physical state : Viscous liquid.

Odour : Mild petroleum oil like.

WHMIS (Canada) : Not controlled under WHMIS (Canada).

OSHA/HCS status : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

Emergency overview : No specific hazard.

Routes of entry : Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Inhalation : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Skin : Slightly irritating to the skin.

Eyes : Slightly irritating to the eyes.

Potential chronic health effects

Chronic effects : No known significant effects or critical hazards.

Carcinogenicity : Not listed as carcinogenic by OSHA, NTP or IARC.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Medical conditions aggravated by over-exposure : Repeated or prolonged contact with spray or mist may produce chronic eye irritation and severe skin irritation. Repeated skin exposure can produce local skin destruction or dermatitis.

See toxicological information (Section 11)

3 . Composition/information on ingredients

Name	CAS number	%
Mixture of severely hydrotreated and hydrocracked base oil (petroleum).	Mixture	-

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

3 . Composition/information on ingredients

The base oil may be a mixture of the following CAS#s: 8042-47-5, 64742-46-7, 64742-47-8, 64742-53-6, 64742-54-7, 64742-55-8, 72623-84-8, 72623-85-9, 72623-86-0, 72623-87-1, 178603-64-0, 178603-65-1, 178603-66-2, 445411-73-4

4 . First-aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognised skin cleanser. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5 . Fire-fighting measures

Flammability of the product : May be combustible at high temperature.

Extinguishing media

Suitable : Use an extinguishing agent suitable for the surrounding fire.

Not suitable : None known.

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Products of combustion : Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), calcium oxides (CaOx), aldehydes, smoke and irritating vapours as products of incomplete combustion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Special remarks on fire hazards : Low fire hazard. This material must be heated before ignition will occur.

Special remarks on explosion hazards : Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

6 . Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

6 . Accidental release measures

Large spill : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapour or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

8 . Exposure controls/personal protection

Ingredient	Exposure limits
Mixture of severely hydrotreated and hydrocracked base oil (petroleum).	**ACGIH TLV (United States). Notes: (Mineral oil)** TWA: 5 mg/m³, (Inhalable fraction) 8 hour(s).

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: organic vapour filter

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Recommended: neoprene, nitrile, polyvinyl alcohol (PVA), Viton®.

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

8 . Exposure controls/personal protection

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

Physical state : Viscous liquid.

Flash point : Open cup: 233°C (451.4°F) [Cleveland.]

Auto-ignition temperature : Fire Point: 247°C (476.6°F)

Flammable limits : Not available.

Colour : Light amber.

Odour : Mild petroleum oil like.

Odour threshold : Not available.

pH : Not available.

Boiling/condensation point : Not available.

Melting/freezing point : Not available.

Relative density : 0.8695 kg/L @ 15°C (59°F)

Vapour pressure : Not available.

Vapour density : Not available.

Volatility : Not available.

Evaporation rate : Not available.

Viscosity : 112.8 cSt @ 40°C (104°F), 15.6 cSt @ 100°C (212°F), VI=143

Pour point : -48°C (-54.4°F)

Solubility : Insoluble in water.

10 . Stability and reactivity

Chemical stability : The product is stable.

Hazardous polymerisation : Under normal conditions of storage and use, hazardous polymerisation will not occur.

Materials to avoid : Reactive with oxidising agents, acids, halogens and halogen compounds.

Hazardous decomposition products : May release COx, H2S, SiOx, aldehydes, alkyl mercaptans, sulfides, methacrylate monomers, smoke and irritating vapours when heated to decomposition.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Mixture of severely hydrotreated and hydrocracked base oil (petroleum).	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
	LC50 Inhalation Dusts and mists	Rat	>5.2 mg/l	4 hours

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

11 . Toxicological information

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Mixture of severely hydrotreated and hydrocracked base oil (petroleum).	A4	-	-	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

Other adverse effects : No known significant effects or critical hazards.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimised wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	Not regulated.	-	-	-		-
DOT Classification	Not available.	Not available.	Not available.	-		-

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Not regulated.

Canada

WHMIS (Canada) : Not controlled under WHMIS (Canada).

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

Canada inventory : All components are listed or exempted.

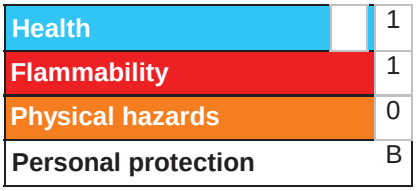
United States inventory (TSCA 8b) : All components are listed or exempted.

Europe inventory : At least one component is not listed in EINECS but all such components are listed in ELINCS.
Please contact your supplier for information on the inventory status of this material.

International lists : **Australia inventory (AICS)**: All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Korea inventory: All components are listed or exempted.
Philippines inventory (PICCS): All components are listed or exempted.

16 . Other information

Hazardous Material Information System (U.S.A.) :



National Fire Protection Association (U.S.A.) :

References : Available upon request.
™ Trademark of Suncor Energy Inc. Used under licence.

Date of printing : **10/26/2011.**

Date of issue : 26 October 2011

Date of previous issue : 6/14/2011.

Responsible name : **Product Safety - RS**

Indicates information that has changed from previously issued version.

For Copy of (M)SDS : The Canadian Controlled Products Regulations (CPR) (Under the Hazardous Products Act, part of the WHMIS legislation) only apply to WHMIS Controlled (i.e., hazardous) products. Therefore, the CPR and the 3-year update rule specified therein do not apply to WHMIS Non-Controlled products. Although this is true, customarily Petro-Canada reviews and updates Non-Controlled product MSDS if a customer requests such an update. These Non-Controlled product updates are given a lower priority than Controlled products but are handled as soon as practicable. If you would like to verify if the MSDS you have is the most current, or you require any further information, please contact:

Internet: lubricants.petro-canada.ca/msds

Lubricants:
Western Canada, telephone: 1-800-661-1199; fax: 1-800-378-4518
Ontario & Central Canada, telephone: 1-800-268-5850; fax: 1-800-201-6285
Quebec & Eastern Canada, telephone: 1-800-576-1686; fax: 1-800-201-6285

16 . Other information

For Product Safety Information: (905) 804-4752

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Material Safety Data Sheet

PETRO-CANADA ANTIFREEZE

1 . Product and company identification

Product name : PETRO-CANADA ANTIFREEZE

Synonym : Universal Antifreeze, Radiator Antifreeze, Diesel Antifreeze, Petro-Canada Antifreeze-Coolant, Petro-Canada Heavy Duty Antifreeze-Coolant, Pre-Mix Antifreeze, Petro-Canada Premium Radiator Antifreeze, Diesel Engine Coolant, Pre-Mixed Radiator Antifreeze/Coolant Petro-Canada.

Code : W269

Material uses : Used as an engine antifreeze coolant.

Manufacturer : PETRO-CANADA
P.O. Box 2844
150 – 6th Avenue South-West
Calgary, Alberta
T2P 3E3

In case of emergency : Petro-Canada: 403-296-3000
Canutec Transportation: 613-996-6666
Poison Control Centre: Consult local telephone directory for emergency number(s).

2 . Hazards identification

Physical state : Clear viscous liquid.

Odour : Odourless.

WHMIS (Canada) :

Class D-1B: Material causing immediate and serious toxic effects (Toxic).
Class D-2A: Material causing other toxic effects (Very toxic).

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview : CAUTION!

MAY BE HARMFUL IF SWALLOWED. MAY CAUSE EYE AND SKIN IRRITATION. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. POSSIBLE BIRTH DEFECT HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE BIRTH DEFECTS, BASED ON ANIMAL DATA. POSSIBLE DEVELOPMENTAL HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE ADVERSE DEVELOPMENTAL EFFECTS, BASED ON ANIMAL DATA.

May be harmful if swallowed. Slightly irritating to the eyes and skin. Avoid exposure - obtain special instructions before use. Do not breathe vapour or mist. Do not ingest. Avoid contact with eyes, skin and clothing. Contains material that may cause target organ damage, based on animal data. Contains material which may cause birth defects, based on animal data. Contains material which may cause developmental abnormalities, based on animal data. Avoid exposure during pregnancy. Wash thoroughly after handling.

Routes of entry : Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Inhalation : Inhalation of this product may cause respiratory tract irritation.

Ingestion : Harmful if swallowed. Ingestion of this product may cause gastro-intestinal irritation, nausea, vomiting, abdominal pain, and diarrhea. Ingestion of this product may cause Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.

Skin : Slightly irritating to the skin.

Eyes : Slightly irritating to the eyes.

Potential chronic health effects

2 . Hazards identification

Chronic effects : Contains material that may cause target organ damage, based on animal data.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : Contains material which may cause birth defects, based on animal data.

Developmental effects : Contains material which may cause developmental abnormalities, based on animal data.

Fertility effects : No known significant effects or critical hazards.

Target organs : The substance may be toxic to kidneys and liver. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

3 . Composition/information on ingredients

Name	CAS number	%
Ethylene glycol	107-21-1	45 - 99

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4 . First-aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognised skin cleanser. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5 . Fire-fighting measures

Flammability of the product : Non-flammable.

Extinguishing media

Suitable : Use an extinguishing agent suitable for the surrounding fire.

Not suitable : None known.

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

5 . Fire-fighting measures

Products of combustion : Carbon oxides (CO, CO2), smoke and irritating vapours as products of incomplete combustion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Special remarks on explosion hazards : Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

6 . Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Avoid exposure during pregnancy. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapour or mist. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

8 . Exposure controls/personal protection

Ingredient	Exposure limits
Ethylene glycol	**ACGIH TLV (United States).** CEIL: 100 mg/m³, (aerosol)

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

8 . Exposure controls/personal protection

Engineering measures : If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: organic vapour filter

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Recommended: neoprene, nitrile, polyvinyl chloride (PVC). Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. It should be realized that eventually any material regardless of their imperviousness, will get permeated by chemicals. Therefore, protective gloves should be regularly checked for wear and tear. At the first signs of hardening and cracks, they should be changed.

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

Physical state : Clear viscous liquid.
Flash point : Not available.
Auto-ignition temperature : Not available.
Flammable limits : Not available.
Colour : Yellow.
Odour : Odourless.
Odour threshold : Not available.
pH : Not available.
Boiling/condensation point : 129°C (264.2°F)
Melting/freezing point : -37°C (-34.6°F)
Relative density : 1.06 to 1.09
Vapour pressure : 0.008 kPa (0.06 mm Hg)
Vapour density : 2.1 [Air = 1]
Volatility : Not available.
Evaporation rate : Not available.
Viscosity : Not available.
Pour point : Not available.

9 . Physical and chemical properties

Solubility : Soluble in water, methanol and diethyl ether.

10 . Stability and reactivity

Chemical stability : The product is stable.

Hazardous polymerisation : Under normal conditions of storage and use, hazardous polymerisation will not occur.

Materials to avoid : Reactive with oxidising agents, acids and alkalis.

Hazardous decomposition products : May release COx, smoke and irritating vapours when heated to decomposition.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Ethylene glycol	LD50 Dermal	Rabbit	9530 mg/kg	-
	LD50 Oral	Rat	4700 mg/kg	-
	LC50 Inhalation Dusts and mists	Rat	2725 mg/m³	4 hours

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Ethylene glycol	A4	-	-	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	Not regulated.	-	-	-		-
DOT Classification	UN3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Ethylene glycol based coolant)	9	III		**Special provisions** In single containers of 5000 lbs capacity or less this product is exempt from DOT regulations (not regulated).

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Target organ effects

Canada

WHMIS (Canada) : Class D-1B: Material causing immediate and serious toxic effects (Toxic).
Class D-2A: Material causing other toxic effects (Very toxic).

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

Canada inventory : All components are listed or exempted.

United States inventory (TSCA 8b) : All components are listed or exempted.

Europe inventory : Not determined.

16 . Other information

Label requirements : MAY BE HARMFUL IF SWALLOWED. MAY CAUSE EYE AND SKIN IRRITATION. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. POSSIBLE BIRTH DEFECT HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE BIRTH DEFECTS, BASED ON ANIMAL DATA. POSSIBLE DEVELOPMENTAL HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE ADVERSE DEVELOPMENTAL EFFECTS, BASED ON ANIMAL DATA.

Hazardous Material Information System (U.S.A.) :

Health	*	2
Flammability		0
Physical hazards		0
Personal protection		H