



March 12, 2021

Assol Kubeisinova
Nunavut Water Board
P.O. Box 119
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**Re: Responses to Intervenor Comments
Application for the Renewal of Baffinland's Type 'B' Water Licence No. 2BE-MRY1421**

Baffinland Iron Mines Corporation (Baffinland) provides the attached responses to comments received regarding the application for renewal of its current Type 'B' Water Licence 2BE-MRY1421 (the Licence). Baffinland reviewed comments from Crown Indigenous Relations and Northern Affairs Canada (CIRNAC)¹ and the Qikiqtani Inuit Association (QIA)², and provides responses in the attached Table 1.0.

Additionally, to address comments from the QIA regarding the Exploration Closure and Reclamation Plan and the Exploration Spill Contingency Plan, Baffinland provides updated draft versions of these documents for consideration, which can be finalized within sixty (60) days following issuance of the licence renewal. For ease of review, the draft versions have been provided with changes tracked to delineate additions to the plans.

Should you have any questions regarding the enclosed documents please do not hesitate to contact myself.

Regards,

A handwritten signature in black ink, appearing to read "Christopher Murray".

Christopher Murray
Environment and Regulatory Compliance Manager

Cc: Richard Dwyer, Karén Kharatyan (NWB)
Chris Spencer, Jared Ottenhof (QIA)
Bridget Campbell, Godwin Okonkwo (CIRNAC)
Megan Lord-Hoyle, Lou Kamermans, Amanda McKenzie, Thomas Iannelli, Massoud Robatian (Baffinland)

Attachments

Attachment 1: Table 1.0 – Baffinland Response to Comments
Attachment 2: DRAFT Exploration Spill Contingency Plan (BAF-PH1-830-P16-0037)
Attachment 3: DRAFT Exploration Closure and Reclamation Plan (BAF-PH1-830-P16-0038)

¹ CIRNAC (2021) Crown-Indigenous Relations and Northern Affairs Canada Review of the Licence Renewal Application for Baffinland Mary River Exploration, Type B Water Licence No. 2BE-MRY1421. Crown Indigenous Relations and Northern Affairs Canada, Letter dated March 1, 2021

² QIA (2021) Re: Baffinland Iron Mines Corporation's Type 'B' Water Licence 2BE-MRY1421 Renewal Application for the Mary River Exploration Project. Qikiqtani Inuit Association, Letter dated March 1, 2021

Attachment 1

Table 1.0 – Baffinland Response to Comments

Table 1.0 - Baffinland Responses to Comments
Mary River Exploration Program - Type B Water Licence Renewal

Comment ID	Comment	Recommendation / Request	Response
CIRNAC			
CIRNAC-R-01	CIRNAC has noted that in the previous 2014 Exploration Closure and Reclamation Plan, there were plans for the water pipelines to be removed. There are no plans for the removal of water pipelines in the 2021 Exploration Closure and Reclamation Plan.	CIRNAC recommends that Baffinland provide clarification as to why the information pertaining to the water pipelines has not been included in the 2021 version of the Exploration Closure and Reclamation Plan.	There are no changes to the reclamation of water pipelines in the updated Exploration Closure and Reclamation Plan. Removal of water lines is discussed in Section 5.2.1 (Page 36 and 37 of the PDF). Additionally, storage of water lines is identified under Section 7.1.2 (Page 40 of the PDF) for a temporary Care and Maintenance scenario. In the reclamation security estimate, the same reference to removal of water pipelines present in the 2014 plan is present in Appendix B, specifically on B.3.7.1 (Page 79 of the PDF).
CIRNAC-R-02	CIRNAC sees that there may be potential for the need of a sewage plant for the camps in Baffinland’s Project Description and Application. It is not clear if the sewage plant is to be included in the scope of this licence renewal. If so, information pertaining to its operation and removal should be reflected in the Application, the Exploration Closure and Reclamation Plan, the Spill Contingency Plan and the Security Estimate.	CIRNAC recommends that Baffinland clarify whether or not they want the sewage plant considered in the scope of this application. For the application to move forward with the sewage plant included, the sewage plant details need to be reflected in the Application, the Exploration Closure and Reclamation Plan, the Spill Contingency Plan and the Security Estimate.	There are no sewage treatment plants added to the scope of the Exploration Program currently under review and for which a renewal of the Type B Water Licence has been sought. In the event sewage treatment is required to be added in the future, Baffinland will seek the required modification to the Type B Water Licence and update the associated management plans accordingly at that time.
CIRNAC-R-03	CIRNAC has not reviewed the Trenching Plan because it was not in the application.	CIRNAC recommends that Baffinland provide confirmation and proof that other plans have been updated to fit this new application.	A Trenching Plan has not been developed for the Mary River Exploration Program. In accordance with Part F, Item 9 the Type B Water Licence, Baffinland will submit a stand alone Trenching Plan sixty (60) days in advance of any trenching operation.
QIA			
QIA-01	Baffinland states that “[s]cientific and engineering studies are also an integral part of Project development. These studies are intended to support engineering design, environmental studies, and support environmental management. The NWB will be informed of the extent of these studies as part of the Annual Work Plan, and/or the Annual Report.” No further detail is provided as to the extent of scientific and/or engineering studies and if those studies would inform improvements to the Type B Water Licence.	1. QIA requests that Baffinland commit to including any scientific and engineering studies performed on lands licenced within the Type B Licence in the Annual Report.	Drilling and other geophysical investigations to support ongoing exploration and infrastructure development will continue to be reported in the Annual Report under the Type B Licence.
QIA-02	In Section 3.4 of the Project Description, Baffinland proposes that NWB include a condition that would enable Baffinland to proceed with the development of satellite camps. It is not clear how this proposal relates to PART E Item 2 “The Licensee is required to provide thirty (30) days’ notice to the Board and an Inspector prior to constructing and operation of any of the camp facilities mentioned in Part E Item 1.”	1. QIA requests that Baffinland confirm what changes, if any, are being proposed to enable the development of satellite camps. 2. Per the Evrim Exploration Canada Corp. MVLWB Licence, additional details are included to inform locations of satellite camps: “The Permittee shall locate all camps on Durable Land or previously cleared areas and as approved by an Inspector.” Durable Land is land that can withstand repeated use, such as gravel or sand with minimal vegetative cover. QIA recommends this be considered to add greater certainty to the placement of satellite camps.	1. No changes are proposed to enable development of the satellite camps currently permitted under the existing Type B Licence. The scope of the Mary River Exploration Program remains the same as previously authorized under the Type B Water Licence in 2014. 2. The establishment of small mobile pioneer satellite camps will be temporary in nature, and will in all respects adhere to Part E of the Type B Water Licence, including Item 13 requiring equipment storage areas to be located on sand, gravel or other durable land.
QIA-03	Baffinland states in Section 6 “[f]uture camps will be located such as to minimize impacts on surface drainage. Baffinland will not erect temporary camps or store material on the surface of frozen streams or lakes including the immediate banks except what is for immediate use.” Multiple provisions of the current Type B Water Licence restrict impacts to at least thirty-one (31) metres above the ordinary high-water mark, therefore, it is not clear if Baffinland is suggesting an alternative use for temporary camps.	QIA requests that Baffinland confirm it will not construct future camps within thirty-one (31) metres of the ordinary high-water mark.	Future camps will not be constructed within thirty-one (31) metres of the high water mark of any water body, unless otherwise approved by the Board in writing.

Table 1.0 - Baffinland Responses to Comments
Mary River Exploration Program - Type B Water Licence Renewal

Comment ID	Comment	Recommendation / Request	Response
QIA-04	Baffinland states in section 8: “Baffinland will dispose of all drill waste, including water, chips, muds and salts (Calcium Chloride CaCl ₂), from land-based drilling, in a properly constructed sump or an appropriate natural depression located at a distance of at least thirty-one (31) metres from the ordinary high-water mark of any adjacent waterbody, where direct flow into a water body is not possible and no additional impacts are created.” QIA has previously expressed concerns with drill waste not being appropriately contained in a sump and instead flowing onto the surrounding land.	QIA requests that the NWB include in the Type B Water Licence the following term (Section 26(1)(g) Item 31) from the Evrim Exploration Canada Corp. Exploration Licence: “The Permittee shall not allow any Drilling Waste to spread to the surrounding lands and watercourses.”	This request is directed to the NWB. Baffinland notes that conditions to protect water bodies are already present throughout the Type B Water Licence 2BE-MRY1421, including Part F, Item 4 requiring all drilling wastes to be to be disposed in a sump or natural depression, at least 31m from the high water mark, to ensure direct flow into a water body is not possible.
QIA-05	Baffinland states in section 8: “Baffinland may, for the purpose of geotechnical or exploration investigations carry out drilling activities within thirty-one (31) metres of the high water mark of any water body or on ice, provided that such activities are consistent with the terms of this Licence and a request has been submitted and received by the NWB, ten (10) days in advance of drilling, that includes a thorough description of the proposed activities and the following: An appropriate scaled site map, complete with approximate GPS coordinates of planned drilling locations and the associated water bodies; Locations of waste deposition; and, Mitigation measures that are planned to be in place, prior to, during drilling and following if required to protect waters.”	The proposed project area includes activities on Inuit Owned Land parcels PI-14 and PI-15. Baffinland does not currently hold a valid Land Use Permit to conduct exploration activities on either parcel. QIA requests acknowledgement from Baffinland that a permit is required prior to any project activities occurring on PI-14 and PI-15.	Baffinland acknowledges that land use permits are required for any works on all Inuit Owned Land (IOL) that are not covered by the Exploration Areas defined in the Commercial Lease, including PI-14 and PI-15.
QIA-06	Baffinland states in section 8: “If the bottom of the permanently frozen ground, or permafrost, is broken through by the drill, the depth of the bottom of permafrost and location should be reported in the annual report to the Board for data management purposes.” The current Licence does not require Baffinland to report if an operator drills to the bottom of permafrost. It would also be beneficial to record the depth of the active layer to inform geotechnical recommendations.	1. QIA requests that Baffinland be required to report when permanently frozen ground, or permafrost, is broken through by the drill, the depth of the bottom of permafrost and location. 2. QIA requests that Baffinland also be required to report the depth of the active layer.	This request is directed to the NWB. Baffinland notes that records of geotechnical investigations, including depths of permafrost, are included with submissions to the NWB for the development of the proposed infrastructure. An example of this would be the geotechnical investigation completed for the Mary River Project Run of Mine (ROM) Stockpile, which was submitted with the issued for construction drawings to support development of the infrastructure under the Type A Water Licence.

Table 1.0 - Baffinland Responses to Comments
Mary River Exploration Program - Type B Water Licence Renewal

Comment ID	Comment	Recommendation / Request	Response
QIA-07	Baffinland indicates in section 17 of the renewal application that predicted environmental impacts of the undertaking and proposed mitigation measures are the same as those considered in the existing water licence. Baffinland makes no reference to adaptive management in its delivery letter, application, or project description. Given the focus of adaptive management to mitigate environmental impacts at the Mary River Project in the recent Phase 2 regulatory process, the inclusion of objectives, indicators, thresholds, and responses would have been a positive measure to ensure consistency.	QIA requests that objectives, indicators, thresholds, and responses intended to mitigate environmental impacts be included in the Spills Contingency Plan and Exploration Closure and Reclamation Plan.	Baffinland has included with this submission an updated Exploration Closure and Reclamation Plan (ECRP) and Exploration Spill Contingency plan (ESCP) to reflect the draft Adaptive Management Plan and the work completed to date with QIA on the integration of Adaptive Management through the joint Adaptive Management Working Group. These documents are presented in draft with tracked changes to highlight the sections added, and can be finalized following the renewal of the Type B Water Licence. Regarding the ECRP, closure planning by nature is inherently adaptive, as lessons learned throughout the monitoring and mitigation of project effects will inform the reclamation of the Project at closure. While the scope of the Exploration program and associated reclamation is considerably smaller than the approved Mary River Project, lessons learned from the Mine Closure Working Group, as well as the input of the Inuit Stewardship Plan and associated Inuit Committee will be beneficial to establish closure conditions that meet the desired end land use. Table 5.1 outlines the objectives, indicators, thresholds (criteria) and responses (actions/measurements) as they relate to closure planning. In addition, the preparation of the Annual Report for Exploration and Geotechnical Drilling will provide an opportunity to review project effects in comparison to criteria and predictions, and will inform the need for plan review and updates as outlined in Section 11. Regarding the ESCP, since the document is intended to provide guidance for emergency response, and not monitoring and management of on-going project effects, a trigger-action response plan (TARP) is not suited for the implementation of spill response procedures. However, long term review of and response to spill events and the associated root cause analysis will be useful to inform spill management on an ongoing basis and potential design or engineering controls that can be implemented to mitigate spill occurrences. Longer term review of and response to monitoring data is addressed in the annual review of plan effectiveness in Section 10 of the plan.
QIA-08	Baffinland states in section 20 of the renewal application “Baffinland continues to consult with the North Baffin communities and organizations regarding, ongoing construction and operational activities at the Project, shipping season, progress regarding employment from the North Baffin communities, environmental monitoring activities and results, exploration activities and future phases of the Project. Baffinland’s senior management team continued to participate in these meetings. The QIA and NWB Annual Report for Operations details a complete list of consultations and meetings held with regulators, stakeholders, and the public by Baffinland. The renewal application states that Baffinland reports on consultation in the QIA and NWB Annual Report for Operations.” The 2019 Type B Water Licence Annual Report refers to the 2019 Type “A” Water Licence Annual Report. Neither Annual Report provides outcomes of consultations regarding exploration activities or the areas licenced under the current Type “B” Water Licence. Furthermore, there is no list of concerns expressed and measures to address concerns.	QIA requests a detailed summary of consultation meetings that relate to the locations licenced under the current Type “B” Water Licence, including a list of concerns expressed and measures Baffinland proposes to address concerns.	Baffinland provides an overview of engagement activities in the QIA and NWB Annual Report for Operations. The activities listed are not specific to exploration, but rather encompass all activities related to the Mary River Project, which includes exploration licenced under the Type B Water Licence. This includes updates on construction and operational activities, environmental monitoring, and employment from North Baffin communities to name a few of the key topics. Most recently, Baffinland engaged with the Hamlet of Pond Inlet and the Mittamatalik Hunters and Trappers Association (MHTO) in spring and summer 2020 regarding activities on IOL parcels PI-14 and PI-15. These will be further documented in the 2020 Annual Report for Operations. Baffinland is committed to hearing and addressing any concerns, and encourages QIA to share any engagement activities it has conducted that have focused on exploration activities such that any issues identified can be properly addressed.

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Comment ID	Comment	Recommendation / Request	Response
QIA-09	Response procedures described include the use of berms, ditches, trenches, and floating booms. A description of potential equipment that may be needed to complete these activities is not provided, except for Section 5.2 which notes a boat would be used to place booms. It is not clear if the necessary equipment for the most likely spill scenarios described in Section 8 will be available on site and located such that the identified response times can be met.	QIA requests that a list of equipment necessary to respond to the likely spill scenarios should be provided and Baffinland should indicate if this equipment will be available on site and capable of responding within the defined response times.	In the event that a spill occurs, the list of equipment necessary to respond will depend on the level of the spill and the location (i.e. fresh water, marine, land or snow/ice). Baffinland has variety of spill response equipment readily available on-site to deploy within the defined response time. The response to Scenario 1 indicates the need for absorbent materials, mobile booms, and small mobile equipment, if necessary, to form dykes, berms, etc. All of this equipment is available, and if not already on-site, can be mobilized to the spill location if required. The response to Scenario 2 indicates the need for heavy equipment to form temporary berms and ditches. If necessary, the equipment can be mobilized to the spill location. The response to Scenario 3 indicates the need for small mobile equipment to form temporary berms and ditches, plastic liner to be placed within the containment structure, and absorbent materials. All of this equipment is available, and if not already on-site, can be mobilized to the spill location if required. If small mobile equipment is necessary, ERT and trained personnel will mobilize the necessary equipment to the spill location by use of a helicopter.
QIA-10	Section 5.4 describes wildlife protection procedures and management approach for impacted wildlife, however further details on the treatment approach for impacted wildlife are absent, as well as the reporting and adaptive management mechanisms that may be in place for wildlife incidents. It is not clear what treatment approaches could be taken, or who they would be carried out by. It is not known if certain Baffinland staff or onsite contractors are qualified to handle and rehabilitate wildlife or euthanize, as necessary.	QIA requests that the approach to impacted wildlife management be further defined and that the party conducting such action be identified. Reference to the project's available wildlife management and protection plan should also be provided to indicate how wildlife incidents are properly reported to relevant authorities and what mitigative responses may be implemented as a result.	Further definition cannot be added to the ESCP at this time. In the unfortunate event that a spill related to the Mary River Exploration program necessitates wildlife management, a tailored approach will be required specific to the impacted wildlife and the nature of the contaminant. Consultation with the Canadian Wildlife Services, among other parties listed in Section 5.4, will be integral to determining best practice based on the spill scenario.
QIA-11	The plan identifies that other hazardous materials, chemicals or wastes besides fuel, lubricants and oils will be present but does not identify approximate quantities (although types are listed in Appendix E), nor does it identify the likely spill scenarios and responses to be implemented. The plan notes that small volumes will limit the magnitude of spills that can occur. Nevertheless, a spill risk is potentially still present and should be further identified with appropriate responses for the contingency plan to be considered complete with regards to all types of spills that may occur.	QIA requests that the approximate quantities of hazardous materials on site be identified, as well as an analysis of the most likely spill scenario and responses.	All hazardous wastes generated under the Type B Water Licence activities are stored at the Mary River Project, within facilities licenced under the Type A Water Licence 2AM-MRY1325 and subject to the Spill Contingency Plan (BAF-PH1-830-P16-0036) for the Mary River Project. Quantities of hazardous wastes are surveyed and reported to QIA on a quarterly basis, and provided in the Annual Report for Operations.
QIA-12	The plan identifies the potential for spills of untreated sewage but does not identify approximate quantities, nor does it identify a likely spill scenario and responses to be implemented. A spill analysis should be included for the contingency plan to be considered complete.	QIA requests the approximate quantities of sewage generated onsite as well as an analysis of the most likely spill scenario and responses.	No sewage is generated under the Type B Licence as the remote temporary satellite camps have not been constructed or in use.

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Comment ID	Comment	Recommendation / Request	Response
QIA-13	Section 8.2 indicates sewage is to be disposed of in a latrine system, and greywater in a sump (if not directed to a sewage treatment facility) at a minimum distance of 31 m from water bodies. The 31 m distance was earlier identified as being consistent with the document “Design Rationale for Fuel Storage and Distribution Facilities” 3rd Edition 2006, published by the Department of Public Works of the Northwest Territories. Design guidelines for fuel storage are not likely to also be applicable to permanent disposal structures for sewage and greywater.	QIA requests that further details should be provided on the design of the latrine and sump to indicate if the design conforms to available guidelines or standards for sewage/greywater disposal structures.	No design is currently available, as the remote temporary satellite exploration camp infrastructure has not been constructed.
QIA-14	Likely spill scenarios for lubricants and oils include equipment rollover and spills during transfer. It stands to reason that if these scenarios are a risk for spills of oil/lubricants, they are also a risk for fuel spills, which could be even greater in volume; however, these scenarios are not identified among the likely scenarios for fuel spills.	QIA requests that spill scenarios for vehicle rollover and fuel transfer be assessed and included with the fuel spill analysis.	There are currently no mobile equipment utilized for exploration programs outside the Mary River mining operation that would have the potential for rollover. It should be noted that vehicle rollover spill scenarios are included in the Mary River Project Spill Contingency Plan (BAF-PH1-830-P16-0036) in Section 8.4.1 - Scenario 2. All employees and contractors are required to review the Spill Contingency Plan, and are trained during their onboarding on spill response. For each method of fuel storage and transfer, Standard Operating Procedures (SOP’s) related to fuel storage and transfer have been developed. Proper containment and emergency response equipment will be provided to meet or exceed regulatory requirements. The Mary River Project Emergency Response Plan and Spill Contingency Plan govern Mary River Exploration Project operations. Detailed procedures (site-wide application) and work instructions (task-specific) are in place, along with the Environmental Protection Plan (EPP) to deal with fuel transfer and refueling operations. Fuel transfer scenarios including "Overfill of a fuel tank for Diesel Heater" are discussed in the Exploration Spill Contingency Plan. Only personnel trained in proper refueling are permitted to do so. The fuel transfer operation will be halted whenever a leak is detected; and drip trays will be utilized during all fuel transfers.
QIA-15	Appendix C identifies locations of spill response kits and Appendix D identifies the typical contents of a spill response kit. However, it is not clear which type of response kit is to be sited at each location, nor is it identified if spill kits appropriate to the materials being transported or work conducted are also to be in equipment (e.g., trucks, rigs).	QIA requests that the type of spill kit stored at each location should be identified, along with spill kits located within site equipment	Baffinland has two types of spill kits readily available: a spill chest, which can absorb up to 170 gallons, and a heavy duty drum kit, which can absorb up to 75 gallons. A combinations of these spill kits are located around the Steensby and Mid-rail camps including at key locations near fuel storage and hazardous waste storage areas (Figure 1 and Figure 2 of the Exploration Spill Contingency Plan). Both of these spill kits provide the appropriate materials to respond to a variety of hazardous spills. The helicopters and the drilling equipment also have associated spill kits to respond if necessary. In the event that spill response contents are utilized, the spill kits will be replenished immediately as there is a seacan at the Mary River camp containing extra spill response supplies.
QIA-16	A clear description of the exploration project sites is absent thus it is not clear where specific structures will be located and the associated activities that are to occur.	1. QIA requests a detailed description of project sites including buildings and infrastructure that will be present, their locations and associated activities to be undertaken. 2. QIA requests that maps be provided which indicate the layout and location of all project infrastructure.	1. Detailed descriptions of the exploration camp sites is not available, as these are proposed satellite camps and have not been finalized. These camps will be temporary in nature, mobile, have a limited population and only be used on a short term basis. Activities to be undertaken are consistent with the operation of a small temporary pioneer camp. 2. Baffinland has provided the proposed locations of the satellite camps, however these locations are subject to finalization. No layout drawings of camp structures are available at this time. Consistent with the Type B Licence, Baffinland will provide a minimum of thirty (30) days notice prior to the establishment of any of the identified camp locations, and will provide details on the equipment and duration of activities. All camp locations on IOL will require prior approval of QIA through land access agreements and licences.

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Comment ID	Comment	Recommendation / Request	Response
QIA-17	No schedule/timeline is provided for when closure of each project component will occur, nor is it clear what the expected lifespan of the exploration project or component sites will be.	QIA requests a schedule / timeline for the operation and closure of each specific component of the exploration project. It is understood that there may be uncertainty regarding timelines and that these may be subject to change. Development of a schedule/timeline for closure and reclamation would aid in satisfying Part I, Item 2 of the Water Licence, which requires all reclamation work to be completed prior to the expiry of the Licence.	Section 7.8 of the Exploration Closure and Reclamation Plan provides an overview of the schedule of the closure activities, which are anticipated to last a period of no more than two (2) years. A detailed schedule cannot be completed at this time. Duration of exploration programs by nature cannot be well defined, as the results of programs may necessitate further investigation or may result in abandonment of a prospect. Geotechnical programs are executed on an as-needed basis to investigate and evaluate future infrastructure development as project plans advance. However, the inability to define a detailed schedule at this stage does not negate obligations under the Licence to complete all reclamation work prior to the expiry of the licence.
QIA-18	The Type B Water Licence Part I, Item 1 requires the Licensee to submit to the Board for approval within sixty (60) days following the issuance of this Licence, a revised, stand-alone, Closure and Restoration Plan prepared in accordance with applicable sections of the "Guidelines for Abandonment and Restoration Planning for Mines in the Northwest Territories (1990) and that must reflect the reduced scope of activities under this licence. However, sections of the Closure and Reclamation refer to the Interim Closure and Reclamation Plan for the Mary River Project for additional details, particularly for the closure and post-closure monitoring to be completed. Therefore, the water licence condition for a stand-alone document does not appear to be satisfied if the reader is required to refer to other documents for details on significant components of the closure plan for the exploration sites.	QIA requests details on the closure and post-closure monitoring to be completed at the exploration sites. Proposed duration, frequency, locations, scope, sampling, and resource requirements should be provided to evaluate if closure criteria are being met and closure objectives achieved.	Baffinland does not agree with the assertion that the terms of the Licence have not been fulfilled, as a stand alone Exploration Closure and Reclamation Plan was submitted to the NWB on July 15, 2014. Reference to other documents and plans does not infer that the plan has not fulfilled the condition to be "stand alone", rather it demonstrates the comprehensive nature of the management and mitigation plans in place for both the Exploration Program and mining operations for the Mary River Project. The two activities are intrinsically linked together, as all exploration and geotechnical investigations are currently based out of the Mary River Mine Site, and rely extensively on existing infrastructure and processes at the mining operation. The scope of post closure monitoring is anticipated to be minimal, and largely associated with the operation of the satellite camps, including the Steensby and Mid-Rail camps. Due to the nominal nature of the work to be completed, this scope is included in the Care & Maintenance, Closure and Post Closure Monitoring scope and costs for the Mary River Project under the Type A Water Licence and Commercial Lease.
QIA-19	For details regarding engagement, readers are referred to the Interim Closure and Reclamation Plan for the Mary River Project. This may not be consistent with the Water Licence conditions. In addition, the MVLWB Guidelines for Closure and Reclamation of Advanced Mineral Exploration and Mine Sites specify the inclusion of a record of engagement, as well as lessons learned from other projects and reclamation research plans that are to occur and which will support closure and reclamation of the site. These items are all absent from the Exploration Closure and Reclamation Plan.	1. Provide a record of engagement specific to closure that has occurred that includes any issues identified by the engaged parties and how the company has addressed them or modified the project in response. 2. Provide a summary of applicable lessons learned from other projects that can be applied to the exploration project. 3. Provide details of any reclamation research plans completed, in progress or proposed that will address uncertainties and support closure planning of the exploration sites.	1. As the Mary River Exploration Program is intrinsically linked with the Mary River Project, Baffinland refers to the ICRP as a source for details on closure engagement, both conducted in the past and planned for the future. Baffinland welcomes any details QIA can provide on engagement it has completed to date on exploration, and will work with QIA to continue to improve outreach and engagement to raise awareness of exploration activities conducted by Baffinland. 2. Lessons learned from other projects that can be applied to the Mary River Exploration program have not been identified. 3. Reclamation research programs specific to the Mary River Exploration program have not been developed, nor are there sufficient uncertainties to warrant such programs for the Mary River Exploration program. Reclamation research as detailed in the ICRP are relevant to components of the Exploration program where the active Mary River Mining Operation intersects with exploration activities (i.e. Deposit 1).
QIA-20	The location and number of proposed drill sites is not provided.	QIA requests a summary of the anticipated drilling program, including anticipated number of sites and proposed locations on a map.	Location and number of drill sites will be provided ten (10) days in advance of the work, in accordance with the Type B Licence. Notifications will include GPS coordinates for all boreholes, as well as a figure depicting their location.
QIA-21	The closure plan specifies disturbed areas are to be graded and scarified, but the total area of the disturbed areas is unclear.	QIA requests additional detail regarding the areas of each drill site and campsite as well as detailed maps delineating each area.	Details regarding drill sites and the temporary satellite camps is not available, as the drill sites are identified on an on-going basis and the temporary satellite camps have not been established. On this basis, estimates of disturbed areas are not available for remote sites. Details on the allocation of activities to reclaim disturbed areas is included in Appendix A and Appendix B.

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Mary River Exploration Program - Type B Water Licence Renewal

Comment ID	Comment	Recommendation / Request	Response
QIA-22	Details regarding the expected mobilization/demobilization requirements during reclamation are not provided. It is not clear how the exploration camps and drill sites will be accessed during construction, operation, and closure, either by winter road, helicopter, or boat. It is stated in Section 5 of the closure plan that transport of materials and equipment at closure will occur via helicopter or overland by cat train during the late winter period to Mary River Site, Milne Port or Steensby. However, should a cat train be used, it is not clear if this requires construction of a winter road.	1. QIA requests a description of how the sites are accessed, and how materials and equipment are to be mobilized/demobilized during closure, including the requirement for any winter road. 2. QIA further request additional detail regarding the requirements for personnel, equipment, fuel, accommodations, flights, etc.	1. Transport of materials and equipment at closure will occur via helicopter or overland by cat train (tracked vehicle hauling sleds, used when winter roads are not available) during the late winter period to Mary River Site, Milne Port or Steensby. Cat trains are specifically identified as winter roads would not be constructed. 2. Assumptions regarding personnel, mobilization and camp operations are included in Appendix B.
QIA-23	Section 5.2.3 states contaminated soils will be removed from the exploration site, however the approximate quantity of impacted soil that may be generated from the exploration sites is unclear.	QIA requests that an estimated volume of impacted soil be provided and itemized by site. This volume can be further refined following the completion of Phase I ESA's prior to closure.	An estimated volume of impacted soil has not been considered, as soil contamination is most likely to arise from spills, which will be remediated immediately and no further action required at closure.
QIA-24	The closure plan indicates sumps will be used for disposal of greywater. It is not clear how sewage will be managed.	1. QIA requests additional detail regarding the number of sumps and estimated volume of sewage. 2. Provide the location and design of sumps, and any applicable standards/guidelines they are to conform to with regards to design, operation, and closure. 3. Detail sewage management practices.	1. There are no greywater sumps constructed, or sewage managed, as the temporary satellite camps are not yet constructed. 2. Locations and designs of sumps are not available, as the temporary satellite camps are not yet constructed. 3. Sewage generated by current exploration activities are managed under the Freshwater Supply, Sewage and Wastewater Management Plan (BAF-PH1-830-P16-0010) for the Mary River Project, as all exploration activities are based out of the Mary River Mine Site.
QIA-25	The closure plan indicates structures, equipment, water lines, waste, etc. are all to be removed from site.	QIA requests that the quantity of materials and waste to be removed from site be provided in a summary table.	Quantities are outlined in the tables contained in Appendix A, with details regarding assumptions provided in Appendix B of the ECRP.

Attachment 2

DRAFT Exploration Spill Contingency Plan (BAF-PH1-830-P16-0037)

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Baffinland Iron Mines Corporation

MARY RIVER PROJECT EXPLORATION SPILL CONTINGENCY PLAN

BAF-PH1-830-P16-0037

Rev 1

DRAFT

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The Exploration Spill Contingency Plan supports/complements the Mary River Project Emergency Response Plan. For the distribution list of this Plan, see Table A. Additional copies of this Plan may be obtained from:

Baffinland Iron Mines Corporation

2275 Upper Middle Road East, Suite 300

Oakville Ontario L6H 0C3

Tel: (416) 364-8820 Fax: (416) 364-0193

TABLE A: Distribution List for the Mary River Exploration Project Spill Contingency Plan

Department of Environment - Environmental Protection Division PO Box 1000 Station 200 Iqaluit, Nunavut X0A 0H0 Tel : (877) 212-6638, (867) 975-6000 Fax : (867) 975-6099	Department of Fisheries and Oceans Central and Arctic Region 520 Exmouth Street Sarnia, Ontario N7T 8B1 Tel : (519) 383-1813, 1-866-290-3731 Fax : (519) 464-5128
Qikiqtani Inuit Association Igluvut Building, 2 nd Floor PO Box 1340 Iqaluit, Nunavut X0A 0H0 Tel : (867) 975-8400, 1-800-667-2742 Fax : (867) 979-3238	Crown-Indigenous Relations and Northern Affairs Canada – Field Operations Division Qimugjuk Building PO Box 2200 Iqaluit, NU X0A 0H0 Tel: (867) 975-4295 (Director, Lands and Field Operations) Fax: (867) 979-6445
Crown-Indigenous Relations and Northern Affairs Canada - Water Resources Division Building 918 PO Box 100 Iqaluit, NU X0A 0H0 Tel: (867) 222-9278 (Manager, Water Resources) Fax: (867) 975-4585	Mittimatalik Hunters and Trappers Organization PO Box 189 Pond Inlet, Nunavut X0A 0S0 Tel : (867) 899-8856 Fax : (867) 899-8095
Nunavut Impact Review Board 29 Mitik Street PO Box 1360 Cambridge Bay, Nunavut X0B 0C0 Tel : 1-866-233-3033 Fax : (867) 983-2594, (867) 983-2574	Nunavut Water Board PO Box 119 Gjoa Haven, Nunavut X0B 1J) Tel : (867) 360-6338 Fax : (867) 360-6369
Hamlet of Pond Inlet PO Box 180 Pond Inlet, Nunavut X0A 0S0 Tel : (867) 899-8934, (867) 899-8935 Fax : (867) 899-8940	

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

This Exploration **Spill Contingency Plan (SCP)** identifies potential spills of hazardous materials on land, ice, or fresh water that could arise during the exploration phases of the Mary River Project. Credible spill scenarios are identified and protocols for preventing, responding to, and recovering from releases to the environment involving regulated hazardous substances. This Exploration Project Spill Contingency Plan complements Baffinland's Mary River Project Spill Contingency Plan (BAF-PH1-830-P16-0036) as well as the Mary River Project Emergency Response Plan (ERP) (BAF-PH1-830-P16-0002). The SCP reflects the level of activity that occurs or will occur at the Mary River sites during exploration phases of the Mary River Project as approved under the Nunavut Water Board (NWB) Type 'B' Water Licence No. 2BE-MRY1421.

1.2 APPROACH TO SPILL RESPONSE

A spill is defined as the unauthorized discharge or release of a hazardous product out of its containment and into the environment. Potential hazards to humans, vegetation, water resources, fish and wildlife vary in severity, depending on several factors including nature of the material, quantity spilled, location and season. Diesel and Jet Fuels are the main products that may be spilled during the Mary River Exploration Project (the 'Project') and therefore spill response procedures focus primarily on these hazardous materials. Other chemicals that may be spilled include sewage water, anti-freeze, and small quantities of lubricants and oils.

All Project personnel shall be trained on the procedures to be followed to report a spill and initiate spill response. All personnel must comply with the following procedure upon initiation of a spill response involving a regulated substance:

1. Immediately warn other personnel working near the spill area.
2. Evacuate the area if the health and safety of personnel is threatened.
3. In the absence of danger, and before the spill response team arrives at the scene, take any safe and reasonable measure to stop, contain and identify the nature of the spill.
4. Notify the Supervisor, who will initiate the spill response operations and will contact the Environmental Department at Mary River.

Upon initiation of a spill response, as determined by the Environment Department, the following procedure shall be completed by the spill response team:

Source Control – If safe to do so, reduce or stop the flow of product. This may include simple actions such as turning off a pump, closing a valve, or sealing a puncture with something nearby (e.g., a rag, piece of

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wood, tape), raising a leaking or discharging hose to a level higher than the product level inside the tank, or transferring the product from leaking containers.

Contain and Control the Free Product – If safe to do so, prevent or minimize the spread of the spilled product. Accumulate/concentrate spilled product in an area to facilitate recovery. Barriers positioned down-gradient of the spill will slow or stop the progression of the spill. Barriers can consist of absorbent booms, dykes, berms, or trenches (dug in the ground or in snow/ice).

Protection – Evaluate the risk of the impacted area to the surrounding environment. Protect sensitive ecosystems and natural resources at risk by isolating the area and/or diverting the spilled material away from sensitive receptors. Protection may be achieved by the effective use of various types of barriers.

Report the Spill to the Environment Department – Provide important information such as date and time of the spill, type and amount of product discharged, photographic records, location and approximate size of the spill, actions already taken to stop and contain the spill, meteorological conditions and any perceived threat to human health or the environment. Reports shall be completed as per Baffinland’s Incident Investigation Form (BAF-PH1-810-FOR-0005).

Spill Clean-up – Recover and contain as much free product as possible. Remove all contaminated soil and dispose of in proper engineered lined containment facility.

1.3 CONSIDERATION OF INUIT QAUJIMAJATUQANGIT

An Inuit Stewardship Plan (ISP) will be developed by the QIA, that will describe how Inuit monitoring activities tie into the adaptive management system and other management, mitigation, and monitoring plans. The ISP will also describe how Inuit monitoring will relate to the protection and promotion of Inuit rights defined under the *Nunavut Agreement* and described under legal agreements with Baffinland related to management and stewardship of Inuit owned lands and resources. The ISP will be the framework for Inuit-led monitoring of impacts and changes within communities and on the land, waters and ice as a result of the Project. The ISP will embed a “boots on the ground” approach to monitoring whereby Inuit will be hired and trained as professional monitors for monitoring under the ISP. Through the ISP, Inuit will govern the use of Inuit knowledge and observations regarding the Project.

Further updates to this plan are expected as an outcome of the development of the ISP that articulates Inuit monitoring objectives, indicators, thresholds and responses (OITRs) related to the desired end land use and aesthetics of the landscape.

In the interim, Table 2.1 identifies the opportunities that Baffinland has explored to incorporate IQ into this Plan.

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TABLE 1-1: INCORPORATION OF IQ INTO THIS MANAGEMENT PLAN

<u>Element</u>	<u>Description</u>
<u>Environmental sensitivities and receptors</u>	<u>Confirmation required with Inuit through QIA-Baffinland AMP Working Group; interim Inuit objectives, indicators, thresholds and responses to be identified in this Management Plan and subject to later revision through the ISP and AMP reviews on a scheduled basis</u>
<u>Indicators and thresholds</u>	<u>Confirmation required with Inuit through QIA-Baffinland AMP Working Group</u>
<u>Mitigation measures</u>	<u>Confirmation required with Inuit through QIA-Baffinland AMP Working Group</u>
<u>Monitoring</u>	<u>Confirmation required with Inuit through QIA-Baffinland AMP Working Group</u>
<u>Adaptive management</u>	<u>Confirmation required with Inuit through QIA-Baffinland AMP Working Group</u>
<u>Validation of IQ Integration</u>	<u>To be verified by Inuit Committee</u>
<u>Management review</u>	<u>To be verified by Inuit Committee</u>

An important aspect of integrating IQ is validating such integration with Inuit. For this reason, only potential opportunities for IQ integration have been identified. A more fulsome effort to incorporate IQ into this draft plan will be undertaken in the future, based on feedback from the Inuit Committee (to be established) and a standing Baffinland-QIA Adaptive Management Working Group, and consistent with the Adaptive Management Plan (Baffinland, 2020).

1.4 PRINCIPLES OF ADAPTIVE MANAGEMENT

1.4.1 DEFINING THE ADAPTIVE MANAGEMENT PROCESS

Adaptive management is a planned and systematic process for continuously improving environmental management practices by learning about their outcomes (Canadian Environmental Assessment Agency, 2016). Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project.

Baffinland has developed a draft Adaptive Management Plan (AMP) that provides the framework by which adaptive management is to be incorporated into Project operations (Baffinland, 2020). The Project-wide adaptive management process begins with a planning phase, followed by iterative phases of implementing and monitoring the actions included in the plan(s), evaluating the effectiveness of actions included in the plans based on results of monitoring and other feedback mechanisms, and adjusting management strategies and actions and responses based on monitoring. The cycle begins anew with implementation and monitoring of a revised plan, which integrates the outcomes of the previous cycle. This cycle can occur, in real-time or over an extended period according to the nature of the situation or area of focus. In this way, a properly designed and well-implemented adaptive management process

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progressively diminishes uncertainty, as management strategies and processes are refined throughout a project's operational lifecycle.

As the Exploration Spill Contingency Plan is document intended to provide guidance for emergency response, and not monitoring and management of on-going project effects, a trigger-action response plan (TARP) is not appropriate for the implementation of spill response procedures. However, long term review of and response to spill events and the associated root cause analysis will be useful to inform spill management on an ongoing basis and potential design or engineering controls that can be implemented to mitigate spill occurrences. Longer term review of and response to monitoring data is addressed in the annual review of plan effectiveness in Section 10.

Implementation of the AMP will be overseen by a Baffinland-QIA Adaptive Management Working Group. Ongoing inputs from the Inuit Stewardship Plan as well as Baffinland's ongoing project monitoring will also form the basis of amendments and refinements to the objectives, indicators, thresholds, and response requirements over time.

2 BAFFINLAND'S CORPORATE POLICIES

Baffinland's Sustainable Development Policy identifies Baffinland's commitment internally and to the public to operate in a manner that is environmentally responsible, safe, fiscally responsible and respectful of the cultural values and legal rights of Inuit. The Sustainable Development Policy is provided in Appendix A.

Baffinland's Health, Safety and Environment Policy is the company's commitment to achieve a safe, health and environmentally responsible workplace. The policy is provided in Appendix A.

All employees and contractors are expected to comply with the contents of both above mentioned policies.

3 ROLES AND RESPONSIBILITIES

Section 3 of the ERP provides the specific roles and responsibilities inherent to personnel involved in emergency response depending on the nature of the emergency and on the job classification or employee. Other associated emergency plans describe the roles and responsibilities specific to those plans. In addition to the roles and responsibilities described in these plans, the roles and responsibilities specific to this SCP are described below.

3.1 CHIEF OPERATING OFFICER (COO) / GENERAL MANAGER

The COO and General Manager are responsible for the following:

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- Responsible for the oversight of all Project operations and allocating the necessary resources for the operation, maintenance and management of Project infrastructure, including allocating the necessary resources for spill prevention and spill response.
- Ensure adherence to this SCP, and that all departmental Manager/ Superintendents understand the contents of this Plan.
- The General Manager, under the COO, is responsible for ensuring the preparation, submission and execution of this Plan and other associated emergency plans, and for ensuring that departments contact the appropriate external authorities as per this Plan, and other associated emergency plans, in the event of a spill.

3.2 EXPLORATION DEPARTMENT

The Exploration Department is responsible for the following:

- Aware of environmental concerns with drilling include surface disturbances, drilling fluid and cutting disposal, impacts on dust, noise and water quality, and habitat encroachment.
- Ensure all drilling muds and other additives be approved by the Environment Department prior to being transported and used on site for any exploration drilling program.
- Ensure hoses and pipes used for drilling and fuel transfer shall be inspected and equipped with properly functioning and approved check valves that are spaced to prevent backflow of fuel in the case of failures.
- Ensure personnel are trained on the Spill Contingency Plans and Emergency Response Plans for various response action levels based on type of hazardous product spilled, volume spilled and type of receiving environment.
- Ensure all spills shall be reported to the Environment Department immediately and documented by submitting the necessary documentation within 12 hours of the spill to using the Baffinland Incident Investigation Form (BAF-PH1-810-FOR-0005) and NT-NU Spill Report Form.
- Ensure secondary containment measures are implemented to minimize the potential effects of spills and leakages during re-fueling and drilling;
- If a spill occurs implement spill response clean up measures as outlined in the Spill Contingency Plan and/or as directed by the Environment Department.

3.3 ENVIRONMENT DEPARTMENT

The Environment Department is responsible for the following:

- Conducting inspections of site infrastructure and surrounding areas to identify any signs of leaks from fuel systems or from other Project infrastructure such as sewage treatment operations and surface water management infrastructure.

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- Implementing wildlife protection measures as necessary in response to spills, capturing and handling oiled wildlife, disposing of dead wildlife, consulting with Canadian Wildlife Services (CWS), and obtaining any permits needed to haze, salvage, hold and clean, or euthanize impacted wildlife.
- Providing direction during spill response and clean-up activities and installing containment and control measures, such as silt fences, as necessary.
- Analysis of spills which occur on site to determine reporting requirements based on factors such as the spill type, quantity and location.
- Conducting water quality sampling in accordance with the Type 'A' Water Licence, applicable legislation (i.e. MDMER), and Project management plans, and reviewing internal and external laboratory results to determine compliance with legislated discharge criterion.
- Participating in table-top exercises, functional drills and exercises under this Plan to evaluate the capacity of emergency response and preparedness.
- External reporting of spills or releases in exceedance of legislative thresholds on behalf of the COO, and participation in follow-up investigations as necessary.
- Reviewing and understanding this SCP and associated plans.

3.4 EMERGENCY RESPONSE TEAM (ERT)

The ERT is responsible for the following emergency response, as per the ERP, and for the following:

- Initiating emergency response to uncontrolled spills and/or releases at site.
- Implementing emergency response training.
- Facilitating table-top exercises, functional drills, and full-scale exercises to evaluate the capacity of emergency response and preparedness.
- Performance evaluation of the table-top tests, functional drills and exercises, and that of the general workforce, and documentation of lessons learned.
- Reviewing and understanding this SCP and associated plans.

3.5 ALL EXPLORATION MANAGERS, SUPERINTENDENTS, AND SUPERVISORS

All Exploration managers, superintendents, and supervisors are responsible for reviewing and understanding this SCP and associated plans, and for directing departmental personnel on the appropriate mitigation measures and strategies for managing spills, surface water flows and effluents in their Project area. Exploration managers, superintendents, and supervisors are also responsible for ensuring spills are reported to the Environment Department and that internal spill reports are documented and submitted through Baffinland's Incident Reporting System.

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3.6 ALL PROJECT PERSONNEL

All Project personnel are responsible for following spill and emergency response as per this SCP and associated emergency plans. All Project personnel are also responsible for immediately warning other personnel working near an area where a spill has occurred, evacuating an area if the health and safety of personnel is threatened, taking any safe and reasonable measures to stop and contain a spill, and for notifying the Environment Department of the spill. All project personnel are also responsible for reviewing and understanding this SCP and associated plans, including the ERP, and for complying with the procedures provided in this SCP upon initiation of a spill.

4 LEVELS OF EMERGENCY SPILL RESPONSE

To effectively manage emergency response, Baffinland has adopted a tiered emergency classification system that includes three (3) levels of emergency. Each level of emergency, based on the significance of the event, requires varying degrees of response, effort and support. The impact on normal business operations will also differ depending on the level of the emergency, as will the requirements for investigation and reporting. The criteria used to determine what level of emergency is occurring is stipulated in Baffinland's ERP. The emergency spill response classifications are defined by the following three (3) levels:

Level 1 (Low) – Minor accidental release of a deleterious substance with:

- No threat to public safety; and/or
- Negligible environmental impact to the receiving environment.

Level 2 (Medium) – Major accidental release of a deleterious substance with:

- Some threat to public safety; and/or
- Moderate environmental impact to the receiving environment.

Level 3 (High) – Uncontrolled hazard which:

- Jeopardizes Project personnel safety; and/or
- Results in significant environmental impacts to the receiving environment.

The level of emergency response to an emergency event is determined through an assessment of the emergency situation including an evaluation of the specific substance released, quantity spilled, receiving environment impacted, and risk to human health. This assessment also includes specific consideration to whether a spill occurred within or outside of engineered secondary containment. The following matrix provides guidance for Project personnel with regard to the level of response that is assigned to each of the spill classifications.

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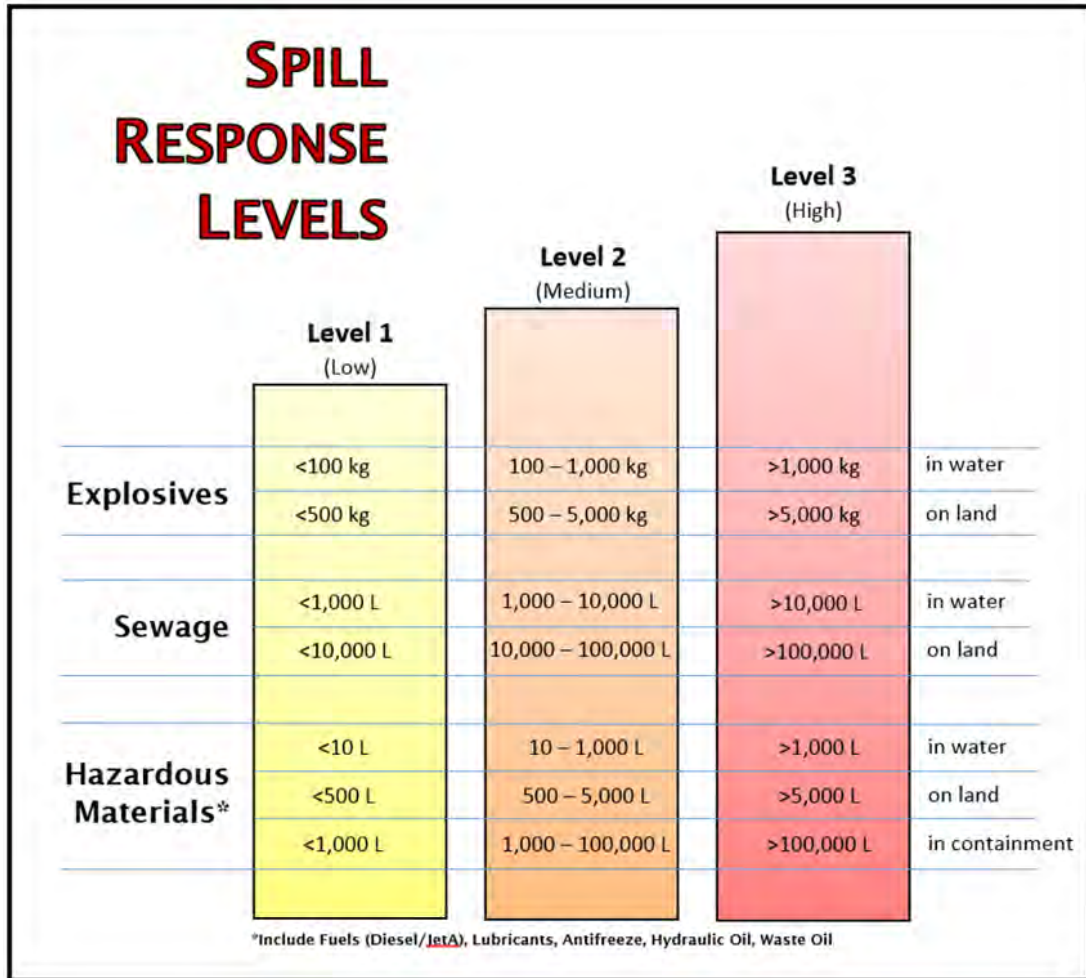


FIGURE 4-1: SPILL RESPONSE LEVELS

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5 RESPONSE PROCEDURES

5.1 SPILLS ON LAND

Most spills which occur on site occur on land, and are small and can be easily controlled, contained and cleaned up with materials available at the scene, including absorbent pads and/or other materials included in on site spill kits as per the spill response procedure described in Section 1.2

Larger spills on land will require additional resources and actions such as the general procedures detailed in the Project's ERP.

The main spill control techniques for uncontrolled releases involve the use of two (2) types of barriers: dykes and trenches. Barriers should be placed down gradient (down-slope) from the source of the spill, and as close as possible to the source of the spill. Barriers slow the progression of the spill and also serve as containment to allow for the recovery of the spill.

Depending on the volume spilled, the site of the spill and available material, a dyke may be built with soil, booms, lumber, snow, etc. A plastic liner should be placed at the foot of and over the dyke to protect the underlying soil or other material and to facilitate recovery of the spill. Construct dykes in such a way as to accumulate a thick layer of free product in a single area (V-shaped or U-shaped).

Trenches are useful in the presence of permeable soil and when the spilled product is migrating below the ground surface. A plastic liner should be placed on the down-gradient edge of the trench to protect the underlying soil. Liners should not be placed at the bottom of the trench to allow water to continue flowing underneath the layer of floating oil (if applicable).

The use of large quantities of absorbent materials to recover large volumes of spilled fluids should be avoided. Large volumes of free-product should be recovered and containerized, as much as possible, by using vacuums and pumps appropriate to the material. Mixtures of water and fuel may be processed through the use of an oil-water separator. Absorbent sheets should be used to soak up residual fuel on water, on the ground (soil and rock), and on vegetation.

5.2 SPILLS ON FRESH WATER

Responses to spills on fresh water include the general procedures previously detailed. Various containment, diversion and recovery techniques are discussed in the following sections. The following elements must be considered when conducting response operations:

- Type of water body or water course (lake, stream, river),
- Water depth and surface area,

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- Wind speed and direction,
- Type of shoreline; and
- Seasonal considerations (open-water, freeze-up, break-up, frozen).

Containment of a hydrocarbon slick requires the deployment of mobile floating booms to intercept, control, contain and concentrate (i.e., increase thickness) the floating oil. For a large lake, typically, one end of the boom is anchored to shore while the other is towed by a boat and used to circle the diesel fuel slick and return it close to shore for recovery using a skimmer. Reducing the surface area of the slick increases its thickness and thereby improves recovery. Mechanical recovery equipment (i.e., skimmers and oil/water separators) will be mobilized to site if required from the Mary River or Milne Inlet Sites.

If fuel is spilled in a smaller water body such as a small lake or pond, it may not be possible to deploy booms using a boat. In this case, measures are taken to protect sensitive and accessible shoreline (spills resulting from traffic incidents). The fuel slick is monitored to determine the direction of migration. In the absence of strong winds the oil will likely flow towards the discharge of the lake. Measures are taken to block and concentrate the oil slick at the lake discharge using booms where it will subsequently be recovered using a portable skimmer, a vacuum, or sorbent materials.

In small slowly-flowing rivers, streams, channels, inlets or ditches, inverted weirs (i.e., siphon dams) are used to stop and concentrate moving diesel fuel for collection while allowing water to continue to flow unimpeded. In the case of floating fuel, in a stream, heading for a culvert (i.e., at a road crossing) a culvert block is used to stop and concentrate moving fuel for collection while allowing water to continue to flow unimpeded. In both cases fuel will then be recovered using a portable skimmer or sorbent materials.

In the case of spills in larger rivers, with fast moving currents, diversion booming is used to direct the oil slick ashore for recovery. Single or multiple booms (i.e., cascading) may be used for diversion. Typically, the booms are anchored across the river at an angle. The angle will depend on the current velocity. Choosing a section of a river that is both wider and shallower makes boom deployment easier. Diversion booming may also be used to direct an oil slick away from a sensitive area to be protected.

5.3 SPILLS ON SNOW AND ICE

In general, snow and ice will slow the movement of hydrocarbons. The presence of snow may also hide the slick and make it more difficult to follow its progression. Snow is generally a good natural sorbent, as hydrocarbons have a tendency to be soaked up by snow through capillary action. However, the use of snow as absorbent material is to be limited as reasonably practical. Snow and frozen ground also prevent hydrocarbons from migrating down into soil or at least slow the migration process. Ice prevents seepage of fuel into the underlying water body.

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Response to spills on snow and ice includes the general procedures previously detailed. Most response procedures for spills on land may be used for spills on snow and ice. The use of dykes (i.e., compacted snow berms lined with plastic sheeting) or trenches (dug in ice) slow the progression of the fuel and also serve as containment to allow recovery of the fuel.

Free-product is recovered by using a vacuum, a pump, or sorbent materials. Contaminated snow and ice is scraped up manually or using heavy equipment depending on volumes. The contaminated snow and ice is placed in containers or within lined berms on land. The contaminated water and product will be treated on site utilizing available oily water treatment systems. If oily water treatment systems are not available at Project sites, they will be mobilized to site from Mary River Project sites as required. Free phase product that is recovered will be utilized as a source of fuel on site if possible or shipped offsite for processing. Any other or contaminated water and product than cannot be utilized or treated safely on site will be temporarily stored in secondary containment on site until transfer off site for processing.

5.4 WILDLIFE PROTECTION PROCEDURES

In response to a spill event, techniques used to prevent wildlife from becoming oiled or contaminated, by preventing animals from entering the contaminated area, will consist of hazing and other deterrents. This will be accomplished using a combination of both audible and visual devices that could include but not be limited to:

- Audio deterrents, i.e. bear bangers;
- Visual scare tactics, i.e. flagging, helicopters, vessels;
- Physical barriers, i.e. berms or fences;
- Wildlife monitors; i.e. personnel guarding area; and,
- Exclusion.

To minimize environmental impact, these deterrents are most effective when initiated immediately.

The size of the spill and location in relation to sensitive wildlife areas must be assessed at the time of the event as to correctly apply the appropriate level of deterrence. Only workers trained in the safe and proper use of certain hazing equipment will be permitted to haze wildlife. Personal Protective Equipment (PPE) will be worn by all personnel using equipment, as per manufactures instructions, and in accordance with the minimum PPE requirements outlined in Baffinland's Personal Protective Equipment Standard. Other workers in the vicinity of such devices must also adhere to the hearing protection requirements described in the Personal Protective Equipment Standard or remain a safe distance away.

Hazing should be administered in such a way as to prevent wildlife from entering an area where they may become endangered. It is also important to ensure that hazing efforts do not cause already contaminated animals to scatter away before they are able to receive treatment. Techniques should be applied as soon

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as possible to prevent wildlife from interacting with spilled product or contaminated areas and becoming oiled or contaminated.

All emergency response vessels shall be equipped with deterrent devices to ensure timely response in case of a spill occurrence off-shore. To prevent habituation, variation of hazing techniques will be used such as changing the location, appearance and types of hazing or using a combination of hazing techniques.

Efforts shall be made to collect alive or dead oiled wildlife. In the event of a spill occurring in or around a water body, shorelines and beaches shall be inspected for contaminated wildlife to be collected. Emergency Response vessels shall be equipped with dip-nets, large plastic collecting bags for dead wildlife, and cardboard boxes or cloth bags for live oiled wildlife. To ensure that live oiled wildlife are dealt with humanely, capture and handling of wildlife shall only be done by trained individuals. Gloves shall be worn when handling contaminated wildlife (leather gloves for raptors and mammals, latex/rubber gloves for ducks and small shorebirds). Wildlife will be kept individually within cloth bags or ventilated cardboard boxes and label the date and time animal was found, name of finder, location and name of species, if known. Wildlife treatment facilities will then be contacted for advisement on treatment. All contaminated wildlife will be held in a warm quiet place until treatment. The Canadian Wildlife Services (CWS) will be consulted to determine the most humane treatment strategy to be implemented for live oiled wildlife, whether rehabilitation or euthanization.

For wildlife mortalities each carcass shall be bagged and labelled individually. The date and time animal was found, name of finder, location and name of species, if known shall be documented. CWS shall be consulted and approval obtained prior to disposing of any dead wildlife. Contact information for experts in bird hazing and bird exclusion, oiled bird rehabilitation, and, permits needed to haze, salvage, hold and clean, or euthanize birds, are shown in ~~TABLE 5-1~~ **TABLE 5-1**.

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TABLE 5-1: EMERGENCY CONTACTS IN CASE OF SPILLS AFFECTING WILDLIFE

Name	Location	Phone Number	Purpose
Canadian Wildlife Services (CWS)	Eastgate Offices 9250 - 49th Street Edmonton, Alberta T6B 1K5	1-780-951-8600	Knowing and providing information on the migratory bird resource and species at risk (under CWS jurisdiction) in the area of a spill (this includes damage assessment and restoration planning after the event). Minimizing the damage to birds by deterring oiled birds from becoming oiled. Ensuring the humane treatment of captured migratory birds and species at risk by determining the appropriate response and treatment strategies which may include euthanization or cleaning and rehabilitation.
Cobequid Wildlife Rehabilitation Centre	Brookfield, NS	1-902-893-0253	Provide veterinary care and rehabilitation for wildlife.
Nunavut Emergency Management	P.O. Box 1000, Station 700 Iqaluit, NU X0A 0H0	1-800-693-1666	Nunavut Emergency Management is responsible for developing the territorial emergency response plans, coordinating general emergency operations at the territorial and regional levels, and supporting community emergency response operations.
International Bird Rescue	International	1-888-447-7143	Wildlife rehabilitation specialists, can manage all aspects of wildlife response.

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6 DISPOSAL OF CONTAMINATED MATERIAL

Quatrex bags, overpack drums, or other appropriate containers as approved by the Environmental Department will be used to contain and transport contaminated soil for treatment. Depending on the nature of the spilled contaminant (hydrocarbon based spills), the soil may be treated for remediation at Baffinland's Landfarm and Contaminated Snow Containment Facility (Landfarm Facility) at Milne Port (refer to Section 6.1 below). Soil contaminated from the spill of other hazardous chemicals will be treated as a hazardous waste and shipped offsite to a licensed facility for treatment and/or disposal. For additional information, refer to Baffinland's Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011).

Used sorbent material is burned in Project incinerators as per incinerator standard operating procedures and contaminated snow from sewage releases are disposed in Polishing and Waste Stabilizations Ponds for treatment during the summer months.

6.1 MILNE PORT SOIL LANDFARM AND CONTAMINATED SNOW CONTAINMENT FACILITY

The Milne Port Landfarm Facility consists of two geomembrane lined containment cells. The larger (3,383 m³) west cell (Landfarm) was constructed for the containment and bio treatment of hydrocarbon contaminated soils. Treated soils that meet the appropriate criteria will be used as landfill cover material or other purposes following approval from the appropriate regulators and stakeholders.

The smaller (929 m³) east cell was constructed for the containment of hydrocarbon contaminated snow generated during the winter months. Contaminated snow collected will be treated during the summer months using an on-site mobile Oily Water Treatment Facility (OWTF). During treatment, monitoring will be completed to ensure compliance with prescribed water quality guideline criteria outlined in Baffinland's Type 'A' Water Licence.

7 TRAINING REQUIREMENTS

All new employees receive general spill training as part of the Project's onboarding on site orientation. In addition, the Project's EPP is a reference document which provides concise guidance to Project personnel regarding the implementation of appropriate standards for protecting the environment and minimizing adverse environmental effects. EPP training for personnel occurs as part of Baffinland's continuous education and awareness training. Emergency spill response training subject to the requirements of this Plan shall be completed in conjunction with Baffinland's ERP, whereby Baffinland's Health, Safety and Security Superintendent, with support from the Environmental Superintendent, will identify Project training needs and the resources required to provide the necessary skills to personnel tasked with duties in emergency and spill response. Circumstantially, emergency spill responses often occur in parallel with emergency responses (i.e. an overturned fuel tanker accident along the Tote Road not only causes

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imminent hazards to site personnel, but also to the surrounding environment); to facilitate efficient response to overall emergency response and preparedness, Project personnel trained to respond to health and safety emergencies (ERT) shall also receive sufficient training to effectively respond to accidental releases of hazardous materials. Emergency and spill response training shall be developed and implemented throughout the lifecycle of Project to ensure the following requirements are fulfilled:

- Meets or exceeds the requirements of NWT/Nunavut Mines Health and Safety Regulations;
- Enables responders to competently operate the equipment employed for emergency and spill response purposes; and,
- Includes practices, drills and full scale exercises for responding to the types of emergencies that are reasonably predictable for the operation.

8 POTENTIAL SPILL ANALYSIS

To prepare for emergency spill response, potential spill analysis was conducted on various worst-case scenarios. The exercise serves to identify potential risk areas, as well as to determine the fate of spilled products and their environmental effects. This section examines spill scenarios as they relate to the types of activities associated with the Mary River Exploration Project.

Several types of materials have been identified as capable of causing environmental, health, and safety concerns should a spill occur while being transported, used, stored and/or handled. These include: fuel, untreated sewage and effluent, lubricants, oils and oily water. These materials are planned to be utilized daily during the exploration activities warranting the evaluation of potential spill scenarios. All other hazardous materials, chemicals or wastes are handled/used/stored in smaller quantities and packaged/transported in small containers that limit the magnitude of the spills that can occur.

8.1 FUEL SPILLS ON LAND

TABLE 8-1: CURRENT FUEL INVENTORY*

Location	Fuel Currently on Site		Total Fuel Inventory
Mid-Rail	None.	Jet- A	0 L
	None.	Diesel	
Steensby Inlet	350 Barrels @ 205 L	Jet- A	209,920 L
	624 Barrels @ 205 L	Diesel	

*Note: Currently on-site December 2020.

Small storage tanks and fuel cache (fuel barrels) are already installed/stored and authorized at Steensby Inlet Camp and Mid Rail Camp. It is anticipated that a total of up to 20,000L of fuel (combination of Jet-A and Diesel) stored in double-walled tanks and barrels could be delivered and stored at any one time at

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other satellite camps as required. All fuel stored in double walled containers and barrels are required to have secondary containment.

Any fuel stored onsite is required for the Project will be designed to have bermed spill containment with capacity equal to the volume of the largest container plus 10% of the volume of the remaining container or 110% volume of the largest container, whichever is greatest. In all cases Baffinland shall prevent any chemicals, petroleum products or wastes associated with the project from entering water. All sumps and fuel caches shall be located at a distance of at least thirty-one (31) metres from the ordinary high water mark of any adjacent water body and inspected on a regular basis. The above basis is consistent with the document “Design Rationale for Fuel Storage and Distribution Facilities” 3rd Edition 2006, published by the Department of Public Works of the Northwest Territories. The lining in the bermed area is an impervious high-density polyethylene (HDPE) membrane. Any fuel storage external to fuel farms are required to either use double-walled ‘ISO’ tanks or another form of secondary containment structure to ensure secondary containment of all fuel storage is maintained.

All long-term refuelling stations are equipped with a lined and bermed area to contain minor spills or leaks during refuelling. The liner (e.g., 40 mm hypolon liner or equivalent) is protected by sand bedding. Vehicles and mobile equipment drive onto this bedding for refuelling. In the event that mobile equipment refuelling is completed outside of the lined containment, drip trays will be utilized by experienced/trained operators, with spill kits located in close proximity in case of emergency.

All fuel storage areas are equipped with spill kits for emergency response (see Appendix C for locations at Mid Rail and Steensby Camps) and a current copy of the Mary River Exploration Project Spill Contingency Plan will be maintained that identifies spill kit locations and response plans. The spill kit contains the appropriate type, size and quantity of equipment for the volume/type of product present in the storage location as well as reflects the environment likely to be affected by a spill (i.e., ground, river, lake, and ocean). For a list of spill response supplies, see Appendix D.

For each method of fuel storage and transfer, Standard Operating Procedures (SOP’s) related to fuel storage and transfer have been developed. Proper containment and emergency response equipment will be provided to meet or exceed regulatory requirements. The Mary River Project ERP and this SCP govern Mary River Exploration Project operations.

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8.1.1 POTENTIAL FUEL SPILL SCENARIOS

8.1.1.1 SCENARIO 1: DROPPED FUEL DRUMS OR TANKS WHILE SLINGING

Fuel required for exploration activities may need to be transported to remote locations including Steensby Port, Mid Rail and other satellite camps using a helicopter and sling. It is possible that a spill may occur during the transfer of these drums which will most likely be the result of equipment failure or operator error. However, proper maintenance procedures will be in place to reduce the risk of equipment malfunctions and proper training procedures will be implemented to mitigate the risk of this event.

Description of Incident	Spill from dropping fuel drums or tanks while slinging
Potential Causes	Operator error. Equipment Malfunction such as sling failure.
Product Spilled	Fuel
Maximum Volume Spilled	205 Litres
Estimated Time to Spill Entire Volume	5 minutes -25 minutes
Immediate Receiving Medium	Land. Water. Ice
Most Probable Direction of Spill Migration	Depends on location
Distance and Direction to Closest Body of Water	Depends on location
Resources to Protect	Nearby water bodies.
Emergency Response Level	Level 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to water body)
Estimated Emergency Spill Response Time	5 minutes-15 minutes

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Spill Response Procedures	If a spill occurs during slinging, all transfer activities will be halted immediately and clean up of the spill with the available spill kit will commence. a) In the event the spill occurs on land the Environmental department at Mary River will be contacted and the spill will be reported. The spill will be contained through the use of temporary berms and ditches until it can be collected and stored until transportation to a oily water treatment plant or an appropriate storage facility. Any contaminated soil will be removed and stored until it can be processed at the Mary River Project landfarm at Milne Port or off-site. Other contaminated material will be stored in a dedicated containment area before it can be shipped off site. Used sorbent material generated may be transferred to Mary River Project incinerators to be burned on Mary River Project sites. b) In the event the spill occurs on water the Environmental department at Mary River will be contacted and the spill will be reported. Booms and other spill control devices will be deployed downstream and spilled product will be collected and removed from the water body. Recovered and contaminated material will be stored in a dedicated containment area before it can be shipped off site. Used sorbent material generated may be transferred to Mary River Project incinerators to be burned on Mary River Project sites. c) In the event the spill occurs on ice/snow the Environmental department at Mary River will be contacted and the spill will be reported. The use of dykes (i.e., compacted snow berms lined with plastic sheeting) or trenches (dug in ice) to slow the progression of the fuel and also serve as containment to help facilitate recovery. Free-product will be recovered by using a vacuum, a pump, or sorbent materials. Contaminated snow and ice is scraped up manually or using heavy equipment depending on volumes. The contaminated snow and ice is placed in containers or within lined berms on land. The contaminated water and product may be treated on site utilizing available oily water treatment systems or shipped off site for treatment at Mary River Project sites or other licensed facilities. Used sorbent material generated may be transferred to Mary River Project incinerators to be burned on Mary River Project sites.

8.1.1.2 SCENARIO 2: SEAL BROKEN ON ENGINE FUEL FILTER

It is possible for a spill to occur if there is a broken seal on the engine fuel filter (I.e Generator) or equivalent as a result of equipment malfunction. To ensure the likelihood of this event is low, proper maintenance procedures will be in place to reduce the risk of equipment malfunctions and training procedures for vehicle inspections by operator are implemented.

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Description of Incident	Seal Broken on Engine Fuel Filter
Potential Causes	Equipment malfunction- Operator error
Product Spilled	Diesel Fuel
Maximum Volume Spilled	Up to 80 Litres
Estimated Time to Spill Entire Volume	5 minutes- 15 minutes
Immediate Receiving Medium	Depending on the location either on land or in a water body.
Most Probable Direction of Spill Migration	Depending on location
Distance and Direction to Closest Body of Water	Depending on location
Resources to Protect	Nearby water bodies
Emergency Response Level	Level 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to water body and to public safety)
Estimated Emergency Spill Response Time	15 minutes – 60 minutes
Spill Response Procedures	In the event the spill occurs on land the emergency response team will be contacted and the spill will be reported. The spill will be contained through the use of temporary berms and ditches until it can be collected and stored until transportation to a oily water treatment plant or an appropriate storage facility. Any contaminated soil will be removed and stored until it can be processed at the Mary River Project landfarm at Milne Port or off-site. Other contaminated material will be stored in a dedicated containment area before it can be transferred off site. Used sorbent material generated may be transferred to Mary River Project incinerators to be burned on Mary River Project sites.

8.1.1.3 SCENARIO 3: OVERFILL OF FUEL TANK FOR THE DIESEL HEATER

Detailed procedures (site-wide application) and work instructions (task-specific) are in place, along with the Environmental Protection Plan (CEPP) to deal with refuelling operations. Diesel heaters will be located at Steensby Port, Mid Rail Camp and potentially at other exploration camps. The most likely source of spills is during refuelling or refilling of these diesel heaters with fuel. Only personnel trained in proper refuelling will have access to these tanks. The fuel transfer operation will be halted whenever a leak is detected; drip trays will be utilized during all fuel transfers. All diesel heaters will be placed in areas which have secondary containment, and with the use of proper refuelling techniques and drip trays, fuel spills are unlikely to occur. In the event that a spill does occur a spill kit, containing adequate supplies given the volume of the tank it accompanies, will be available in close proximity. Given the volume of these tanks, access to readily available spill clean-up materials and trained personnel, it is anticipated that staff will be able to identify, contain and mitigate any potential spills in an effective and time sensitive manner.

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Description of Incident	Overfill of a fuel tank for Diesel Heater
Potential Causes	Operator error- Equipment failure
Product Spilled	Diesel fuel
Maximum Volume Spilled	10-20L
Estimated Time to Spill Entire Volume	5 minutes
Immediate Receiving Medium	Soil or surrounding environment. It is important to note that diesel heaters will be placed 31 meters from surrounding water bodies.
Most Probable Direction of Spill Migration	The direction of spill migration will depend on the specific location of the diesel heater. That said diesel heaters will be placed on relatively flat laydown areas, where the potential flow of spills will be more readily managed.
Distance and Direction to Closest Body of Water	Varies
Resources to Protect	Varies
Emergency Response Level	Level 2 (medium)– Refer to ERP (depends on quantity and whether there is potential for impact to water body and to public safety)
Estimated Emergency Spill Response Time	15 minutes
Spill Response Procedures	In the event that there is a spill from overfilling the diesel heater tank temporary berms, ditches, trenches and sumps will be set up down gradient of the spill. The down gradient wall of trenches will be lined with plastic material to ensure that exposed soil does not come in contact with the fuel. Absorbent material will be utilized where required. Once the spill has been contained it will be collected and brought to an appropriate storage/treatment facility. Any contaminated soil will be removed and stored until it can be processed at the Mary River Project landfarm at Milne Port or off-site. Other contaminated material will be stored in a dedicated containment area before it can be transferred off site. Used sorbent material generated may be transferred to Mary River Project incinerators to be burned on Mary River Project sites

8.2 UNTREATED SEWAGE

During the Project, sewage produced at Steensby Port, Mid Rail and other satellite camps will be treated using a latrine system. These systems will be located at a distance of at least thirty-one (31) meters 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 abandonment.

All grey water generated at pioneer camps or future satellite camps, not directed to a sewage treatment facility, will be channeled to a sump located at a distance of at least thirty-one (31) metres above the ordinary High Water Mark of any water body, at a site where direct flow into a water body is not possible and no additional impacts are created, unless otherwise approved by the Board in writing.

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8.3 LUBRICANTS AND OILS

Lubricants and machinery oils will be used on site during Project operations. Lubricants and oils have the ability to contaminate waterways and soils if exposed to the environment. That being said, the risk of a lubricant or oil spill on site is expected to be minimal. All lubricants and oils will be handled by trained personnel following proper procedures and guidelines. The vast majority of the time lubricants will be stored and transported in small quantities and in the event of a spill appropriate spill response equipment and procedures will be readily available.

8.3.1 POTENTIAL SPILL SCENARIOS RELATED TO LUBRICANTS AND OILS

8.3.1.1 SCENARIO 1: CONTAINMENT PUNCTURE DURING TRANSPORT

The most likely spill scenario to occur with regards to lubricants and oils is a puncture of an individual storage unit during transport. Lubricants and oils will be 10-20 Litre pails within a sea can container. When Lubricants or oils are required a single unit will be removed from the contained via forklift. In the event that the container is punctured by the forklift a maximum spill volume of 1,000 litres could potentially occur. The likelihood of this occurring is minimal as all equipment operators will be trained in proper lubricant and oil transfer procedures, in addition to this in the event that a container is punctured the operator will see the puncture immediately and will be able to take steps to contain the spill and implement mitigation procedures.

Description of Incident	Lubricant or oil container is punctured by a forklift during transport
Potential Causes	Operator error- Equipment failure
Product Spilled	Lubricant or oil
Maximum Volume Spilled	205 L
Estimated Time to Spill Entire Volume	5 minutes
Immediate Receiving Medium	Land
Most Probable Direction of Spill Migration	Depends on area
Distance and Direction to Closest Body of Water	Depends on area
Resources to Protect	Any nearby water bodies.
Emergency Response Level	Level 1 (low) or 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to water body)
Estimated Emergency Spill Response Time	>5 minutes
Spill Response Procedures	If the forklift driver is not injured, he will act as a first responder and immediately initiate the spill contingency plan utilizing the spill kit kept in the vicinity. The spill will be contained through the use of temporary berms and ditches until it can be collected and transported to the oily water treatment plant or an appropriate storage facility. Any contaminated soil will be removed and stored until it can be processed at the Mary River Project landfarm at Milne Port or off-site. Other contaminated material will be stored in a dedicated containment area before it can be transferred off site. Used sorbent material generated may be transferred to Mary River Project incinerators to be burned on Mary River Project sites.

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8.3.1.2 SCENARIO 2: SPILL DURING EQUIPMENT ROLLOVER

It is possible that the equipment carrying a lubricant or oil container could rollover or has a collision causing a spill of the entire container. In the event that this occurs it will be managed the same way as detailed above. The event of a rollover is unlikely given the safe driving procedures, speed limits, road signage and training procedures in place. In addition to this all lubricant and oil containers will be securely fastened inside the vehicle in which they are being transferred making a spill unlikely.

Description of Incident	Spill during equipment rollover
Potential Causes	Operator error. Equipment failure. Poor visibility or adverse weather. Collision.
Product Spilled	Lubricant or oil
Maximum Volume Spilled	<50L
Estimated Time to Spill Entire Volume	instantaneous
Immediate Receiving Medium	Land
Most Probable Direction of Spill Migration	Depends on area
Distance and Direction to Closest Body of Water	Depends on area
Resources to Protect	Any nearby water bodies.
Emergency Response Level	Level 1 (low) or 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to water body)
Estimated Emergency Spill Response Time	15 minutes – 60 minutes
Spill Response Procedures	If the driver is not injured, he will act as a first responder and immediately initiate the spill contingency plan utilizing the spill kit kept in the vicinity. The spill will be contained through the use of temporary berms and ditches until it can be collected and transported to the oily water treatment plant or an appropriate storage facility. Any contaminated soil will be removed and stored until it can be processed at the Mary River Project landfarm at Milne Port or off-site. Other contaminated material will be stored in a dedicated containment area before it can be transferred off site. Used sorbent material generated may be transferred to Mary River Project incinerators to be burned on Mary River Project sites. In the event a spill occurs in a water body the lubricants and oils will be contain and recovered downriver as described in section ~~53~~, with shorelines protected using sorbent booms. All free-product will be collected for temporary storage and soiled shorelines cleaned-up. If the forklift driver is not injured, he will act as a first responder and immediately initiate the spill contingency plan as defined in section Error! Reference source not found.2 utilizing the spill kit kept in the vicinity. Once the spill is contained the contents of the reservoir emptied and collected product will be discharged to the oily water treatment plant if available or stored for transfer off site.

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8.3.1.3 SCENARIO 3: SPILLS DURING TRANSFER

It is possible that a minor spill may occur during the transfer of lubricants or oil to equipment. This will most likely be the result of equipment failure such as the pump or hoses or operator error.

As proper maintenance procedures will be in place to reduce the chance of equipment malfunctions, along with proper training procedures it is unlikely a spill will occur in this event. In addition to this drip tray will be utilized in all oil and lubricant transfers in the field.

Description of Incident	Spill during transfer
Potential Causes	Operator error. Pump failure. Hose failure.
Product Spilled	Lubricant or oil
Maximum Volume Spilled	205 L
Estimated Time to Spill Entire Volume	5 minutes – 15 minutes
Immediate Receiving Medium	Land
Most Probable Direction of Spill Migration	Depends on location
Distance and Direction to Closest Body of Water	Depends on location
Resources to Protect	Nearby water bodies.
Emergency Response Level	Level 1 (low) or 2 (medium) – Refer to ERP (depends on quantity and whether there is potential for impact to water body)
Estimated Emergency Spill Response Time	5 minutes – 15 minutes
Spill Response Procedures	If this spill occurs in a building it will be contained as all buildings are fully lined and no contaminants will be able reach the natural environment. The spill will be cleaned up by qualified personnel and disposed of as a hazardous material. If a spill occurs during transfer all transfer activities will be halted immediately and clean up of the spill with the available spill kit will commence. The spill will be contained using berms, ditches, sumps and booms where necessary. The downstream wall of trenches will be lined with plastic material to ensure unexposed soil does not come in contact with the lubricant. Absorbent material will be utilized where required. Once the spill has been contained it will be collected and brought to an appropriate storage/treatment facility. Any contaminated soil will be removed and stored until it can be processed at the Mary River Project landfarm at Milne Port or off-site. Other contaminated material will be stored in a dedicated containment area before it can be transferred off site. Used sorbent material generated may be transferred to Mary River Project incinerators to be burned on Mary River Project sites.

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9 REPORTING REQUIREMENTS

During the term of the Type 'B' Water Licence, if an unauthorized discharge of waste occurs, or if a discharge is foreseeable, then the following actions will be taken:

- a. Employ the approved Spill Contingency Plan;
- b. Report the spill immediately to the 24-Hour Spill Line at (867) 902-8130, or by email to Spill Reporting Nunavut (spills@gov.nt.ca) using the NT-NU Spill Report form in Appendix G, and to the Inspector at (867) 975-4295.

For each spill occurrence, submit the Inspector, no later than thirty (30) days after initially reporting the event, a detailed report that will include the amount and type of spilled product, the GPS location of the spill, and the measures taken to contain and clean up the spill site. In addition to these reporting requirement any spill or release near or to a Water body, regardless of quantity or type of release of harmful substances shall be reported to the NWT/NU Spill Line.

All reporting requirements, procedures and protocols for all spills are provided in the Mary River Project Emergency Response Plan, Section 8.

Spill reports are written by the department responsible for the spill and are provided to the Environment Department through Baffinland's Incident Reporting System. After the initial field emergency response to a spill event, an internal Incident Investigation Report is filled out. Should the quantity of the spill, or receiving environment for the spill meet the reporting requirements outlined in Table 9.1, the incident is reported to the 24-hour Northwest Territories-Nunavut (NT-NU) Spill Report Line, or other applicable reporting process. The department responsible will complete a 5 WHYS analysis for all spills that are reported to the 24-hour NT-NU Spill Report Line, or other applicable reporting process.

Spills of regulated substances in excess of reporting thresholds which occur outside of secondary or tertiary containment will be reported to the NT-NU Spill Line, Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC), and/or ECCC, as applicable, depending on the nature of the spill. Secondary and tertiary containment will be assessed for each spill occurrence and may include engineered facilities designed to provide containment, buildings with an impermeable floor, and lined areas. Any externally submitted spill report associated with a release on Inuit Owned Land shall also simultaneously be submitted to QIA in accordance with the Commercial Lease. The submission of the report externally to the NT-NU Spill Report Line is the responsibility of the Environmental Superintendent on behalf of the COO as per Baffinland's ERP. A copy of a standard NT-NU Spill Report Form is provided in Appendix G.

9.1 GOVERNMENT OF NUNAVUT'S ENVIRONMENTAL PROTECTION ACT

Under Section 9 of the Spill Contingency Planning and Reporting Regulations, under the Government of Nunavut's *Environmental Protection Act*, quantities of hazardous substances spilled which require

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reporting are set out in Schedule B of the Spill Contingency Planning and Reporting Regulations. A release of any substance in a quantity equal to or greater than the Schedule B criterion will be immediately reported via the NT-NU 24-Hour Spill Report Line.

Flammable liquids (such as diesel and jet fuel) and sewage are substances more commonly released on the Project. A spill of flammable liquids and sewage will be reported under the Spill Contingency Planning and Reporting Regulations (Schedule B, Item 20; "other contaminants") if the spill exceeds external reporting thresholds. Table 8-1 below provides guidance pertaining to spill reporting and associated clean-up procedures for these substances as a reference for site personnel.

In accordance with the Spill Contingency Planning and Reporting Regulations, a person reporting a spill shall give as much of the following information as possible:

- Date and time of spill;
- Location of spill;
- Direction spill is moving;
- Name and phone number of a contact person close to the location of the spill;
- Type of contaminant spilled and quantity spilled;
- Cause of spill;
- Whether spill is continuing or has stopped;
- Description of existing contaminant;
- Action taken to contain, recover, clean-up and dispose of spilled contaminant;
- Name, address and phone number of person reporting spill; and,
- Name of owner or person in charge, management or control of contaminants at time of spill.

Departments responsible for a spill are required to complete clean-up activities using the resources required. In the event of a Level 2 or 3 spill response, initial assistance and resources shall be provided by the ERT.

TABLE 9-1: GENERAL SPILL REPORTING AND CLEAN-UP REQUIREMENTS FOR FUELS AND SEWAGE

Spill on Land		
Volume	Required Documentation	Spill Clean-up
Less than 1 L	- Verbal or email report	Environment Department will advise if needed.
Greater than 1 litre and less than 100 litres	- Photos of Spill and Clean-up - Baffinland Incident Investigation Report	Spills greater than 30 litres will have an Environmental Monitor present to advise clean-up efforts.
Greater than 100 L	- Photos of Spill and Clean-up	Environmental Superintendent or his/her designate will lead

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	- Baffinland Incident Investigation Report with 5 WHYS analysis completed by department responsible - NT-NU Spill Report - Notification to regulators and the NT-NU Spill Line	and advise clean-up efforts.
Spill on Water Body or Watercourse		
Volume	Required Documentation	Spill Clean-up
Any volume	- Photos of Spill and Clean-up - Baffinland Incident Investigation Report with 5 WHYS analysis completed by department responsible - NT-NU Spill Report - Notification to regulators and the NT-NU Spill Line	Environmental Superintendent or his/her designate will lead and advise clean-up efforts.

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10 REVIEW OF PLAN EFFECTIVENESS

An important element of Baffinland's management system is reviewing the continued suitability, adequacy and effectiveness of each management plan. This will occur through an annual review process as well as scheduled updates.

10.1.1 ANNUAL REVIEW OF COMPLIANCE AND UNANTICIPATED EFFECTS

Baffinland conducts internal inspections and audits throughout the year, and immediate corrective actions are taken as appropriate to address instances of non-compliance, as well as unanticipated effects observed. Follow-up corrective actions may also be required. These immediate and follow-up corrective actions are documented in the annual report.

One follow-up corrective action may be to revise mitigation measures or monitoring programs described in the applicable management plans. During the annual reporting cycle, specifically the development of the Annual Report for Operations submitted to the QIA and NWB, Baffinland staff will review instances of non-compliance as well as unanticipated effects and determine if a review of plan effectiveness is appropriate. Should there be a significant unanticipated effect, determined by the Inuit Committee and/or community observations, a review of plan effectiveness will be completed. This process is articulated on Figure 101.1.

Part of this annual review cycle is the incorporation of IQ, which may include feedback from the Inuit Committee and/or community observations. This process may occur annually whether repeat non-compliance and/or unanticipated effects are identified (Figure 101.1).

Plan updates may be required based on the outcomes of spill investigations and root cause analyses. Plan updates will be recorded in the Document Revision Record located at the front of the Plan.

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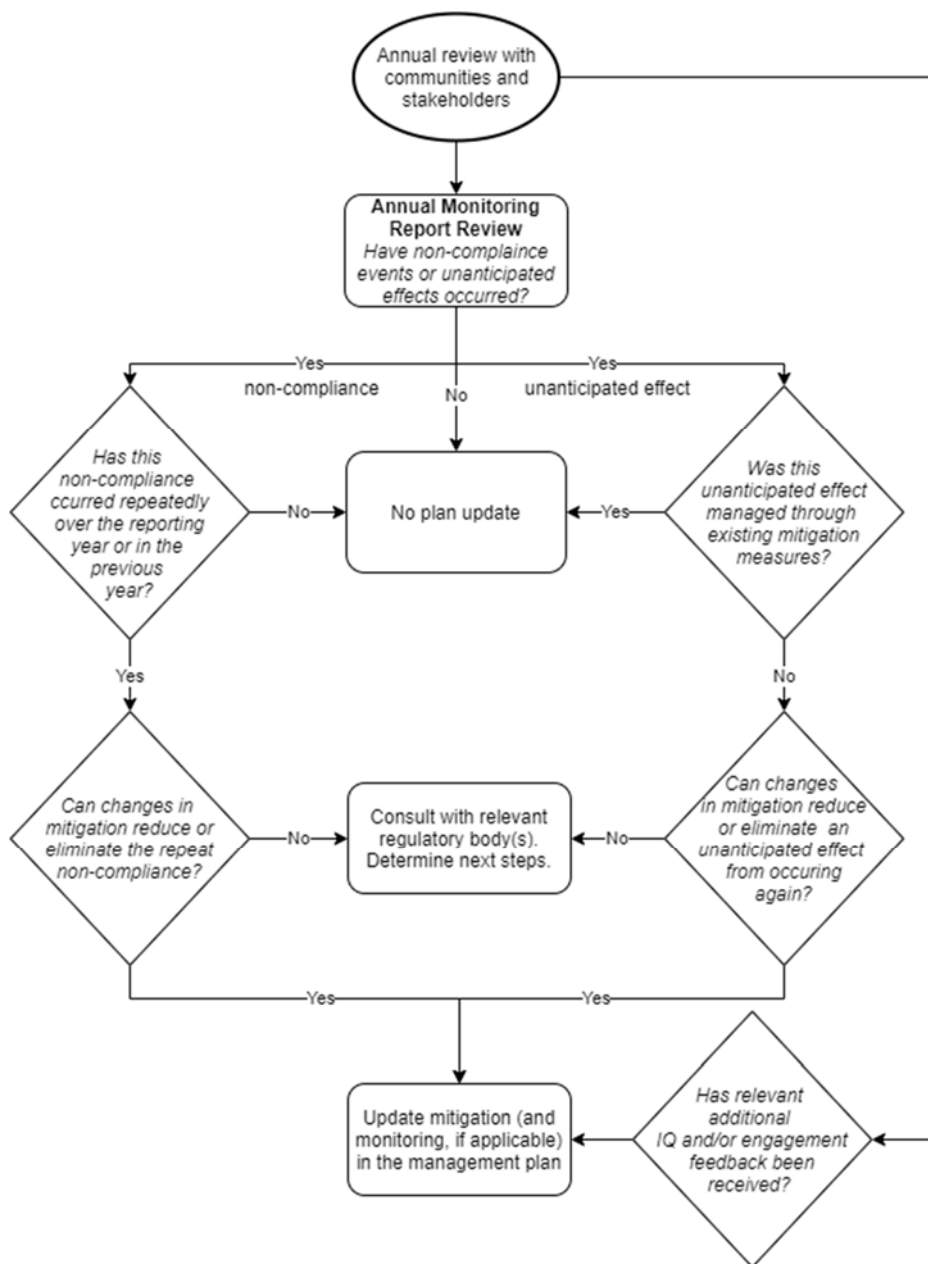


Figure 10-1: Annual Review of Plan Effectiveness

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Appendix A **Sustainable Development Policy, and Health, Safety and Environmental Policy**

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SUSTAINABLE DEVELOPMENT POLICY

At Baffinland Iron Mines Corporation (Baffinland), we are committed to conducting all aspects of our business in accordance with the principles of sustainable development & corporate responsibility and always with the needs of future generations in mind. Baffinland conducts its business in accordance with the Universal Declaration of Human Rights and ArcelorMittal's Human Rights Policy which applies to all employees and affiliates globally.

Everything we do is underpinned by our responsibility to protect the environment, to operate safely and fiscally responsibly and with utmost respect for the cultural values and legal rights of Inuit. We expect each and every employee, contractor, and visitor to demonstrate courageous leadership in personally committing to this policy through their actions. The Sustainable Development and Human Rights Policy is communicated to the public, all employees and contractors and it will be reviewed and revised as necessary on a regular basis. These four pillars form the foundation of our corporate responsibility strategy:

1. Health and Safety
2. Environment
3. Upholding Human Rights of Stakeholders
4. Transparent Governance

1.0 HEALTH AND SAFETY

- We strive to achieve the safest workplace for our employees and contractors; free from occupational injury and illness, where everyone goes home safe everyday of their working life. Why? Because our people are our greatest asset. Nothing is as important as their health and safety. Our motto is "Safety First, Always".
- We report, manage and learn from injuries, illnesses and high potential incidents to foster a workplace culture focused on safety and the prevention of incidents.
- We foster and maintain a positive culture of shared responsibility based on participation, behaviour, awareness and promoting active courageous leadership. We allow our employees and contractors the right to stop any work if and when they see something that is not safe.

2.0 ENVIRONMENT

- Baffinland employs a balance of the best scientific and traditional Inuit knowledge to safeguard the environment.
- Baffinland applies the principles of pollution prevention, waste reduction and continuous improvement to minimize ecosystem impacts, and facilitate biodiversity conservation.
- We continuously seek to use energy, raw materials and natural resources more efficiently and effectively. We strive to develop more sustainable practices.

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- Baffinland ensures that an effective closure strategy is in place at all stages of project development to ensure reclamation objectives are met.

3.0 UPHOLDING HUMAN RIGHTS OF STAKEHOLDERS

- We respect human rights, the dignity of others and the diversity in our workforce. Baffinland honours and respects the unique cultural values and traditions of Inuit.
- Baffinland does not tolerate discrimination against individuals on the basis of race, colour, gender, religion, political opinion, nationality or social origin, or harassment of individuals freely employed.
- Baffinland contributes to the social, cultural and economic development of sustainable communities in the North Baffin Region.
- We honour our commitments by being sensitive to local needs and priorities through engagement with local communities, governments, employees and the public. We work in active partnership to create a shared understanding of relevant social, economic and environmental issues, and take their views into consideration when making decisions.
- We expect our employees and contractors, as well as community members, to bring human rights concerns to our attention through our external grievance mechanism and internal human resources channels. Baffinland is committed to engaging with our communities of interest on our human rights impacts and to reporting on our performance.

4.0 TRANSPARENT GOVERNANCE

- Baffinland will take steps to understand, evaluate and manage risks on a continuing basis, including those that may impact the environment, employees, contractors, local communities, customers and shareholders.
- Baffinland endeavours to ensure that adequate resources are available and that systems are in place to implement risk-based management systems, including defined standards and objectives for continuous improvement.
- We measure and review performance with respect to our safety, health, environmental, socio-economic commitments and set annual targets and objectives.
- Baffinland conducts all activities in compliance with the highest applicable legal & regulatory requirements and internal standards.
- We strive to employ our shareholder's capital effectively and efficiently and demonstrate honesty and integrity by applying the highest standards of ethical conduct.

4.1 FURTHER INFORMATION

Please refer to the following policies and documents for more information on Baffinland's commitment to operating in an environmentally and socially responsible manner:

Health, Safety and Environment Policy
Workplace Conduct Policy
Inuktitut in the Workplace Policy

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Site Access Policy
 Hunting and Fishing (Harvesting) Policy
 Annual Report to Nunavut Impact Review Board
 ArcelorMittal Canada Sustainability and Corporate Responsibility Report

If you have questions about Baffinland's commitment to upholding human rights, please direct them to contact@baffinland.com.

Brian Penney
 Chief Executive Officer
 March 2019

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HEALTH SAFETY AND ENVIRONMENT (HSE) POLICY

This Baffinland Iron Mines Corporation Policy on Health, Safety and Environment is a statement of our commitment to achieving a safe, healthy and environmentally responsible workplace. We will not compromise this policy for the achievement of any other organizational goals.

We implement this Policy through the following commitments:

- Continual improvement of safety, occupational health and environmental performance
- Meeting or exceeding the requirements of regulations and company policies
- Integrating sustainable development principles into our decision-making processes
- Maintaining an effective Health, Safety and Environmental Management System
- Sharing and adopting improved technologies and best practices to prevent injuries, occupational illnesses and environmental impacts
- Engaging stakeholders through open and transparent communication.
- Efficiently using resources, and practicing responsible minimization, reuse, recycling and disposal of waste.
- Reclamation of lands to a condition acceptable to stakeholders.

Our commitment to provide the leadership and action necessary to accomplish this policy is exemplified by the following principles:

- As evidenced by our motto “Safety First, Always” and our actions Health and safety of personnel and protection of the environment are values not priorities.
- All injuries, occupational illnesses and environmental impacts can be prevented.
- Employee involvement and active contribution through courageous leadership is essential for preventing injuries, occupational illnesses and environmental impacts.
- Working in a manner that is healthy, safe and environmentally sound is a condition of employment.
- All operating exposures can be safeguarded.
- Training employees to work in a manner that is healthy, safe and environmentally sound is essential.
- Prevention of personal injuries, occupational illnesses and environmental impacts is good business.
- Respect for the communities in which we operate is the basis for productive relationships.

We have a responsibility to provide a safe workplace and utilize systems of work to meet this goal. All employees must be clear in understanding the personal responsibilities and accountabilities in relation to the tasks we undertake.

The health and safety of all people working at our operation and responsible management of the environment are core values to Baffinland. In ensuring our overall profitability and business success every Baffinland and business partner employee working at our work sites is required to adhere to this Policy.



Brian Penney
Chief Executive Officer
April 2018

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Appendix B

Concordance Table

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Condition	Commitment	Reference Section
Part G Item 1	The Licensee shall submit, to the Board for approval, a revised, stand-alone, Spill Contingency Plan within sixty (60) days from the date of issuance of this Licence. The revised Spill Contingency Plan shall be prepared in the format set out by the Consolidation of Spill Contingency Planning and Reporting Regulations (R-068-93) and must address the reduced scope of activities under this licence	Exploration Project Spill Contingency Plan
Part G Item 2	The Licensee shall prevent any chemicals, petroleum products or wastes associated with the project from entering Water. All Sumps and fuel caches shall be located at a distance of at least thirty-one (31) metres from the ordinary high water mark of any adjacent water body and inspected on a regular basis.	Section 8.1
Part G Item 3	The Licensee shall prevent any chemicals, petroleum products or wastes associated with the project from entering Water. All Sumps and fuel caches shall be located at a distance of at least thirty-one (31) metres from the ordinary High Water Mark of any Water body and inspected on a regular basis.	Section 8.1
Part G Item 4	The Licensee shall conduct any equipment maintenance and servicing in designated areas and shall implement special procedures (such as the use of drip pans) to manage motor fluids and other waste and contain potential spills.	Section 8.1.1
Part G Item 5	If during the term of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall: a. Employ the approved Spill Contingency Plan; b. Report the spill immediately to the 24-Hour Spill Line at (867) 920-8130 and to the Inspector at (867) 975-4295; and c. For each spill occurrence, submit to the Inspector, no later than thirty (30) days after initially reporting the event, a detailed report that will include the amount and type of spilled product, the GPS location of the spill, and the measures taken to contain and clean up the spill site.	Section 9
Part G Item 6	The Licensee shall, in addition to Part H, Item 5, report to the NWT/NU Spill Line if the release is near or into a Water body, regardless of the quantity or type of releases of harmful substances.	Section 9

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Appendix C

Current Site Layouts for Mid-Rail Camp, Steensby Camp and Property Map showing Potential Exploration Camp Locations

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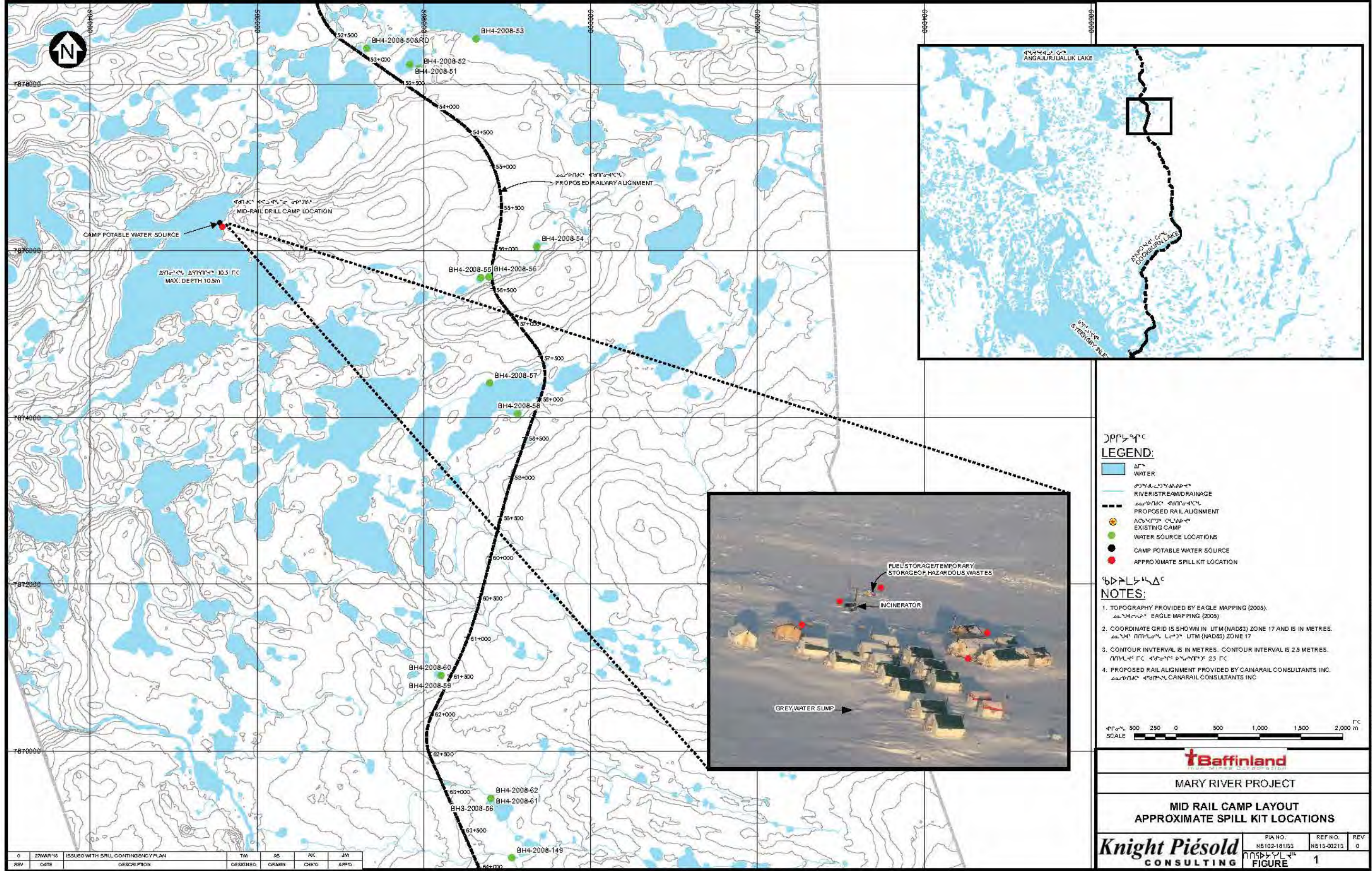
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The following site layouts for Mid-Rail and Steensby Port emphasize the spill response elements of the site. The drawings identify spill response equipment, fuel storage areas, water bodies and infrastructure. The following figures are as follows:

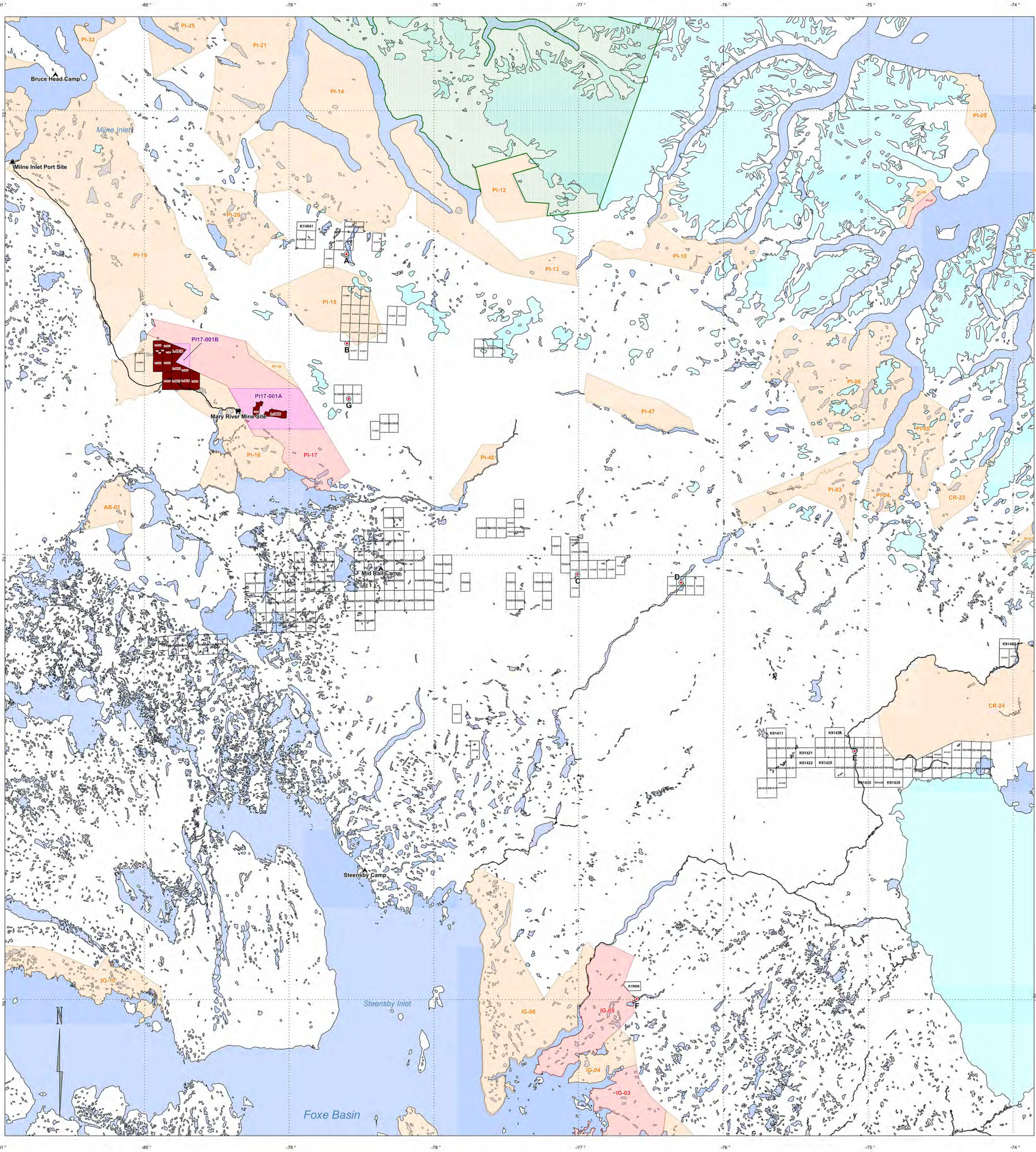
1. Figure 1- Mid-Rail Camp Approximate Spill Kit Locations
2. Figure 2- Steensby Port Approximate Spill Kit Location.

The following drawing is a Property Map of Northern Baffin Island showing location Potential Exploration Camps onsite.

3. Drawing 1 – Current Land Tenure, Property Map, Northern Baffin Island



SAVED: 11/02/2015 11:53:03 PM g:\m05_03.mxd, Mon 27, 2015 4:11 PM 46,176,620





Date: 2020-10-28

Author: Jon Hey, P. Geo

Office: Exploration

Drawing: 1

Scale: 1:446,300

Projection: Longitude / Latitude (WGS 84)

Current Land Tenure

030.02

kilometers

- LEGEND

BIM Infrastructure

Tote Road

Potential Camp (location not exact)

Baffinland Land Tenure

Mineral Claim

Mining Lease

NTI-BIM Exploration Agreement
- Inuit Owned Land

Type 1 - Surface Rights Only

Type 2 - Surface and Subsurface Rights Including Minerals

Federal Land

National Park

Geographic Features

Permanent Snow & Ice

Waterbody

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Appendix D

Spill Response Supplies

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D.1 TYPICAL SPILL RESPONSE KITS AT BAFFINLAND'S MARY RIVER EXPLORATION PROJECT

Kit No./Details	Contents	Quantity
SPILL CHEST Absorbs up to 170 Gallons Heavy duty plastic Yellow Container Can be moved with a forklift	Sorbent Pads (19" x 17" x 3/8") Sorbent Socks (3" x 4ft) Sorbent Booms (5" x 10ft) Sorbent Pillows (15" x 9ft) Sorbent Roll (38" x 144ft) Nitrile Gloves (pair) Disposal Bag Epoxy Putty Barricade Tape (roll)	100 8 4 16 1 2 4 1 1
HEAVY DUTY DRUM KIT Absorbs up to 75 Gallons Heavy duty plastic Yellow Container Drum sizes include 65 & 94 US gallons or an economy 45 gallon steel drum	Sorbent Pads (19" x 17" x 3/8") Sorbent Booms (5" x 10ft) Xsorb (6 quart) Nitrile Gloves (pair) Disposal Bag Disposable Coveralls Drain Cover Splash resistant goggles	100 4 1 2 4 2 1 2

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Appendix E

Hazardous Materials List

The information contained herein is proprietary to Baffinland Iron Mines Corporation and is used solely for the purpose for which it is supplied. It shall not be disclosed in whole or in part, to any other party, without the express permission in writing by Baffinland Iron Mines Corporation.

Note: This is an UNCONTROLLED COPY. All staff members are responsible to ensure the latest revision is used.

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	Exploration	Document #: BAF-PH1-830-P16-0037	

E.1 List of MSDS of Hazardous Materials Used on site

- Agricultural Lime (4p.)
- AMC 1300
- AMC Floc Bloc
- AMC Ezee Pac
- AMC K ion
- AMC Torque Guard
- AMC Xan Bore
- Calcium Chloride Flake (4p.)
- CP-43 Diesel (6p.)
- EZ-MUD (6p.)
- Gasoline (6p.)
- Jet A (7p.)
- Lubtrac Rod Grease (4p.)
- W-OB POLYMER (4p.)
- Acetylene (6p.)
- CAT Arctic DEO Synthetic SAE 0W-20 (7p.)
- CAT Extended Life Coolant (7p.)
- Co-op D-MO Gold 10W30 Diesel Motor Oil (5p.)
- Ecopure EP61 Glass and Surface Cleaner (6p.)
- Ecopure EP70 Washroom Cleaner (5p.)
- Gojo Original Formula Hand Cleaner (2p.)
- Hertel Plus Disinfectant (5p.)
- Howes Lubricator Diesel Treat (6p.)
- Kleen-Flo Gas Line Antifreeze (2p.)
- Kleen-Flo Lock Deicer (2p.).pdf
- Kleen-Flo Non-Chlorinated Break and Part Cleaner (2p.)
- Kleen-Flo Safe-T-Brake Air Brake Antifreeze (2p.)
- Lubri Plus Break Fluid DOT3 (7p.)
- Lubriplate Low-Temperature Multi-Purpose Grease (6p.)
- Lubriplate No. 630-2 Multi-purpose Lithium Grease (5p.)
- Oxygen (6p.)
- Pennzoil SAE 0W-20 Fuel Synthetic Motor Oil (8p.)
- Permatex Fast Orange Hand Cleaner (4p.)
- Propane (7p.)

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Appendix F

Material Safety Data Sheets

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Section 1. Chemical product and company identification

Product name	: Acetylene
Supplier	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
Product use	: Synthetic/Analytical chemistry.
Synonym	: Ethyne; Ethine; Narcylen; C ₂ H ₂ ; Acetylen; UN 1001; Vinylene
MSDS #	: 001001
Date of Preparation/ Revision	: 4/7/2014.
<u>In case of emergency</u>	: 1-866-734-3438

Section 2. Hazards identification

Physical state	: Gas.
Emergency overview	: WARNING! FLAMMABLE GAS. MAY CAUSE FLASH FIRE. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. CONTENTS UNDER PRESSURE. Keep away from heat, sparks and flame. Do not puncture or incinerate container. May cause target organ damage, based on animal data. Use only with adequate ventilation. Keep container closed. Contact with rapidly expanding gases can cause frostbite.
Target organs	: May cause damage to the following organs: lungs, upper respiratory tract, central nervous system (CNS).
Routes of entry	: Inhalation
<u>Potential acute health effects</u>	
Eyes	: Contact with rapidly expanding gas may cause burns or frostbite.
Skin	: Contact with rapidly expanding gas may cause burns or frostbite.
Inhalation	: Acts as a simple asphyxiant.
Ingestion	: Ingestion is not a normal route of exposure for gases
<u>Potential chronic health effects</u>	
Chronic effects	: May cause target organ damage, based on animal data.
Target organs	: May cause damage to the following organs: lungs, upper respiratory tract, central nervous system (CNS).
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)	

Section 3. Composition, Information on Ingredients

<u>Name</u>	<u>CAS number</u>	<u>% Volume</u>	<u>Exposure limits</u>
Acetylene	74-86-2	100	NIOSH REL (United States, 1/2013). CEIL: 2662 mg/m ³ CEIL: 2500 ppm

Section 4. First aid measures

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.

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. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
Frostbite	: Try to warm up the frozen tissues and seek medical attention.
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	: As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

Flammability of the product	: Flammable.
Auto-ignition temperature	: 305°C (581°F)
Flash point	: Closed cup: -18.15°C (-0.7°F).
Flammable limits	: Lower: 2.5% Upper: 100%
Products of combustion	: Decomposition products may include the following materials: carbon dioxide carbon monoxide
Fire hazards in the presence of various substances	: Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge, heat and oxidizing materials.
Fire-fighting media and instructions	: In case of fire, use water spray (fog), foam or dry chemical. In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk. Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.
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.

Section 6. Accidental release measures

Personal precautions	: Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.
Environmental precautions	: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
Methods for cleaning up	: Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

- Handling** : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Keep container closed. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- Storage** : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

- Engineering controls** : 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, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Personal protection

- 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. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.
- 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.
When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- 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.
The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93
- 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. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

Product name

acetylene

NIOSH REL (United States, 1/2013).CEIL: 2662 mg/m³

CEIL: 2500 ppm

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight	: 26.04 g/mole
Molecular formula	: C ₂ H ₂
Melting/freezing point	: -81°C (-113.8°F)
Critical temperature	: 35.25°C (95.5°F)
Vapor pressure	: 635 (psig)
Vapor density	: 0.907 (Air = 1)
Specific Volume (ft ³ /lb)	: 14.7058
Gas Density (lb/ft ³)	: 0.0691

Section 10. Stability and reactivity

Stability and reactivity	: The product is stable.
Incompatibility with various substances	: Extremely reactive or incompatible with the following materials: oxidizing materials.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

Chronic effects on humans	: May cause damage to the following organs: lungs, upper respiratory tract, central nervous system (CNS).
Other toxic effects on humans	: No specific information is available in our database regarding the other toxic effects of this material to humans.

Specific effects

Carcinogenic effects	: No known significant effects or critical hazards.
Mutagenic effects	: No known significant effects or critical hazards.
Reproduction toxicity	: No known significant effects or critical hazards.

Section 12. Ecological information

Aquatic ecotoxicity

Not available.

Products of degradation	: Products of degradation: carbon oxides (CO, CO ₂) and water.
Environmental fate	: Not available.
Environmental hazards	: This product shows a low bioaccumulation potential.
Toxicity to the environment	: Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

Section 14. Transport information

Acetylene

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1001	ACETYLENE, DISSOLVED	2.1	Not applicable (gas).		<u>Limited quantity</u> Yes. <u>Packaging instruction</u> Passenger aircraft Quantity limitation: Forbidden. Cargo aircraft Quantity limitation: 15 kg
TDG Classification	UN1001	ACETYLENE, DISSOLVED	2.1	Not applicable (gas).		<u>Explosive Limit and Limited Quantity Index</u> 0 <u>Passenger Carrying Ship Index</u> 75 <u>Passenger Carrying Road or Rail Index</u> Forbidden <u>Special provisions</u> 38, 42
Mexico Classification	UN1001	ACETYLENE, DISSOLVED	2.1	Not applicable (gas).		-

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

Section 15. Regulatory information**United States**

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption:** Not determined
United States inventory (TSCA 8b): This material is listed or exempted.
SARA 302/304: No products were found.
SARA 311/312 Hazards identification: Fire hazard, Sudden release of pressure, Delayed (chronic) health hazard
Clean Air Act (CAA) 112 accidental release prevention - Flammable Substances:
Acetylene

Acetylene

State regulations

- Clean Air Act (CAA) 112 regulated flammable substances: acetylene
- : **Connecticut Carcinogen Reporting:** This material is not listed.
 - Connecticut Hazardous Material Survey:** This material is not listed.
 - Florida substances:** This material is not listed.
 - Illinois Chemical Safety Act:** This material is not listed.
 - Illinois Toxic Substances Disclosure to Employee Act:** This material is not listed.
 - Louisiana Reporting:** This material is not listed.
 - Louisiana Spill:** This material is not listed.
 - Massachusetts Spill:** This material is not listed.
 - Massachusetts Substances:** This material is listed.
 - Michigan Critical Material:** This material is not listed.
 - Minnesota Hazardous Substances:** This material is not listed.
 - New Jersey Hazardous Substances:** This material is listed.
 - New Jersey Spill:** This material is not listed.
 - New Jersey Toxic Catastrophe Prevention Act:** This material is not listed.
 - New York Acutely Hazardous Substances:** This material is not listed.
 - New York Toxic Chemical Release Reporting:** This material is not listed.
 - Pennsylvania RTK Hazardous Substances:** This material is listed.
 - Rhode Island Hazardous Substances:** This material is not listed.

Canada

WHMIS (Canada)

- : Class A: Compressed gas.
- Class B-1: Flammable gas.
- Class F: Dangerously reactive material.
- CEPA Toxic substances:** This material is not listed.
- Canadian ARET:** This material is not listed.
- Canadian NPRI:** This material is listed.
- Alberta Designated Substances:** This material is not listed.
- Ontario Designated Substances:** This material is not listed.
- Quebec Designated Substances:** This material is not listed.

Section 16. Other information

United States

Label requirements

- : FLAMMABLE GAS.
- MAY CAUSE FLASH FIRE.
- MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
- CONTENTS UNDER PRESSURE.

Canada

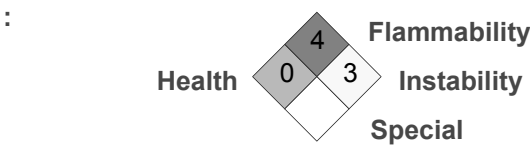
Label requirements

- : Class A: Compressed gas.
- Class B-1: Flammable gas.
- Class F: Dangerously reactive material.

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

Health	1
Flammability	4
Physical hazards	2

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



Notice to reader

Acetylene

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.



Canada Colors and Chemicals Limited

**152 Kennedy Road South
Brampton, Ontario
Canada
L6W 3G4**

General Inquiry Number: (905) 459-1232

**Material Safety Data Sheet
Attached**



5, Boutet Street
Victoriaville, Qc
G6P 8T6

This product is distributed by
Canada Colors and Chemicals Limited
General Inquiry: (905) 459-1232
24 Hour Emergency: (416) 444-2112



CCC: Product Code: 279213

CCC: Product Name: CALCIUM CHLORIDE FLAKE 77% -SW ML

FLAKE CALCIUM CHLORIDE

Material Safety Data Sheet

A. PRODUCT INFORMATION

TRADE NAME (PRODUCT IDENTIFIER): Flake Calcium Chloride Powdered Calcium Chloride		CLASSIFICATION & SYMBOL : Class D2B 	
CHEMICAL NAME AND/OR SYNONYM: Calcium Chloride Dihydrate		FORMULA : CaCl ₂ 2 H ₂ O	CAS NO: 10043-52-4
BNQ Standard 2410-300 / 2009 Certificat # 1156			
Canadian Standard CAN-CGSB-15.1-92			
PRODUCT USE : De-icer, Dust control, mud drilling lubricant, Freeze-proofing of ores and aggregates, thawing agent, concrete conditioner. Food Grade Calcium category is used as additive, refrigerants and heat exchange agent.			
MANUFACTURER/IMPORTER: Sel Warwick Inc. 5, Boutet Street Victoriaville, Qc, G6P 8T6		SUPPLIER/DISTRIBUTOR: TETRA Technologies Inc 369, Feed Mill Road Eldorado, AZ 71730 USA	
EMERGENCY TELEPHONE NO: 819-758-5229			

B. PREPARATION INFORMATION

PREPARED BY : Sel Warwick Inc. 5, Boutet Street, Victoriaville Telephone : 819-758-5229	PREVIOUS ISSUE DATE : December 2010
	CURRENT ISSUE DATE: June 2012

C. TOXICOLOGICAL PROPERTIES

INHALATION: Dust or mist inhalation may irritate nose, throat and lungs	
INGESTION : Low in toxicity. May irritate gastrointestinal tract and cause nausea and vomiting	
SKIN : May cause skin irritation. Prolonged contact when moisture is present may result in superficial burns. Contact with abraded skin or cuts can cause severe necrosis	
EYES: May irritate or burn eyes	
ACUTE TOXICITY: Moderate toxic LD ₅₀ (oral-rat) 1000 mg/kg LD ₅₀ (oral-mouse) 1940 mg/kg	EXPOSURE LIMITS: Ontario Ministry of Labour Time-Weighted Average Exposure Value (TWAEV) for Nuisance Particulate 10 mg/m ³
CHRONIC TOXICITY : Not applicable	
OTHER :	BIOLOGICAL EXPOSURE INDICES (BEI) : Not applicable

D. PHYSICAL DATA

MATERIAL IS AT NORMAL CONDITIONS: Liquid ☐ Solid ☒ Gas ☐	APPEARANCE AND COLOR : Small White Flakes Very hygroscopic	ODOR THRESHOLD : Odorless
BOILING POINT : Not available FREEZING POINT : °C (MELTING POINT) : 176°C	SPECIFIC GRAVITY : g/cc (H ₂ O =1) Not available	VAPOR DENSITY: (AIR=1) Not applicable
SOLUBILITY IN WATER : 97.7 g/100 ml @ 0°C 326 g / 100 ml @ 60°C	PH Neutral to slightly Alkaline	VAPOR PRESSURE: (mm Hg @ 20°C) Not applicable (PSIG)
EVAPORATION RATE : (Ether = 1.0) Not applicable Slow <0.3 Fast > 3.0 Medium 0.3 – 3.0	% VOLATILES BY VOLUME: (At 20°C) Not applicable	MOLECULAR WEIGHT: 147.02 COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

E. REACTIVITY DATA

STABILITY: Stable	CONDITIONS TO AVOID : Not applicable
INCOMPATIBILITY (MATERIALS TO AVOID): Reacts violently with bromine trifluoride (BrF ₃), or a mixture of boron trioxide and calcium oxide (B ₂ O ₃ + CaO). Sulfuric acid : yields hydrogen chloride gas, which is corrosive, irritating and reactive. Water-reactive materials, such as sodium : causes an exothermic reaction. Methyl vinyl ether : starts runaway polymerization reaction. Zinc as in galvanized iron : yields hydrogen gas with solutions, which may explode under these conditions.	
HAZARDOUS DECOMPOSITION PRODUCTS: Fumes of Chlorides (Cl) are given off at temperature above 1600 °C	
HAZARDOUS POLYMERIZATION : Will not occur ☐	OTHER PRECAUTIONS: Will undergo violent polymerization with methyl vinyl ether. The anhydrous, monohydrate, dihydrate and tetrahydrate forms of calcium chloride, when dissolved in water, produce considerable amounts of heat.

F. FIRE OR EXPLOSION HAZARD

CONDITIONS OF FLAMMABILITY : Not applicable	FLASH POINT: Not applicable METHOD
HAZARDOUS COMBUSTION PRODUCTS: None	
% BY VOL. IN AIR UPPER FLAMMABLE LIMIT : N/A LOWER FLAMMABLE LIMIT: N/A AUTOIGNITION TEMPERATURE : °C	EXPLOSION HAZARDS : See Section E incompatibility
SENSITIVITY TO MECHANICAL IMPACT : Not applicable	
SENSITIVITY TO STATIC DISCHARGE: Not applicable	
FIRE EXTINGUISHING PROCEDURES: Use extinguisher media appropriate for surrounding fire. For fire fighting wear NIOSH-approved self- contained breathing apparatus.	

G. HAZARDOUS INGREDIENTS (MIXTURES ONLY)

MATERIAL OR COMPONENTS/C.A.S. #	CONCENTRATION	HAZARD DATA
Not applicable		

H. PREVENTIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT :

RESPIRATORY PROTECTION :

For dusty or misty conditions, wear NIOSH approved dust or mist respirator

EYES AND FACE:

For dusty or misty conditions, or when handling solutions where there is reasonable probability of eye contact, wear chemical safety goggles and hard hat. Under these conditions, do not wear contact lenses.

HANDS, ARMS AND BODY :

As a minimum, wear long-sleeve shirt, trousers, rubber boots and gloves for routine product use. Cotton gloves permitted for dry product, impervious gloves when using solutions.

STORAGE :

Cool, dry area. Prolonged storage may cause product to cake and become wet from atmospheric moisture.

NORMAL HANDLING:

Avoid contact with eyes, skin or clothing. Avoid breathing dust. Use good personal hygiene and housekeeping

ENGINEERING CONTROLS:

Ventilation: Provide general and/or local exhaust ventilation to maintain dust or fume levels below exposure limits.

Eye wash facility should be provided in storage and general work area.

ENVIRONMENTAL:

DEGRADABILITY:

Not applicable

AQUATIC TOXICITY:

Harmful to aquatic life at concentrations greater than 500 ppm.
CaCl₂ does not bioaccumulate TL_m96 > 1000 mg/l

SPILL OR LEAK (Always wear personal protective equipment):

Shovel up dry chemical and place in metal drum with cover. Cautiously spray residue with plenty of water. Keep contaminated water from entering sewers and water courses.

WASTE DISPOSAL:

Consistent with the requirements of local waste disposal authorities.

I. FIRST AID MEASURES

INHALATION:

Promptly remove to fresh air. Get medical attention.

INGESTION:

If conscious, immediately give 2 to 4 glasses of water, and induce vomiting under medical supervision.

SKIN:

Remove contaminated clothing. Wash with plenty of soap and running water. Get medical attention if irritation persists.

EYES:

Flush eyes promptly with plenty of running water, continuing for at least 15 minutes. Get medical attention.

THIS MATERIAL SAFETY DATA SHEET IS OFFERED FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION AS REQUIRED BY FEDERAL HAZARDOUS PRODUCTS ACT AND RELATED LEGISLATION. THE INFORMATION IS BELIEVED TO BE ACCURATE BUT SEL WARWICK INC. PROVIDES NO WARRANTIES, EITHER EXPRESSED OR IMPLIED.



Date:
Supercedes:

03 March 2004
15 October 2001

MATERIAL SAFETY DATA SHEET

IN CASE OF EMERGENCY CALL CHEMTREC AT 1-800-424-9300

1. PRODUCT IDENTIFICATION AND COMPANY IDENTIFICATION:

Product Name: **GOJO® ORIGINAL FORMULA™ HAND CLEANER**

Company Name & Address: GOJO Industries, Inc.
One GOJO Plaza, Suite 500
Akron, OH 44311

Emergency Phone: **1-800-424-9300 CHEMTREC**

Non-Emergency Phone: (330) 255-6000

MSDS Request Phone: (330) 255-6000 x8804

2. INFORMATION ON INGREDIENTS:

HAZARDOUS INGREDIENTS	CAS NUMBER	OSHA PEL	ACGIH TLV	% RANGE
Mineral Spirits	8052-41-3	500 ppm	100 ppm	<40

Other ingredient(s) with notification requirements:	CAS NUMBER	List
Mineral Spirits	8052-41-3	MA 1; NJ 1; PA 1; CN 1
Sodium Hydroxide	1310-73-2	PA 1
Propylene Glycol	57-55-6	CN 1; PA 1

3. HAZARDS IDENTIFICATION:

EMERGENCY OVERVIEW

When used according to instructions, the product applicable to this MSDS is safe and presents no immediate or long-term health hazard. However, abnormal entry routes, such as gross ingestion, may require immediate medical attention.

Potential Health Effects:

HMIS: Health 1 Flammability 1 Reactivity 0 Personal Protection None

Eye Contact: May cause eye irritation.

Skin Contact: No irritation or reaction expected.

Inhalation: Not applicable.

Ingestion: May cause upset stomach, nausea (Abnormal entry route).

Carcinogenicity: Not listed as a carcinogen by NTP, IARC, OSHA or ACGIH.

4. FIRST AID MEASURES:

Eye Contact: Do not rub eyes. Flush eyes thoroughly with water for 15 minutes. If condition worsens or irritation persists, contact physician.

Skin Contact: Not applicable.

Inhalation: Not applicable.

Ingestion: Do not induce vomiting. Contact a physician or Poison Control Center.

5. FIRE FIGHTING MEASURES:NFPA: Health 0 Fire 1 Reactivity 0

Flashpoint °F/°C (PMCC method): >212°F/100°C

Unusual Fire and Explosion Hazards: None known.

Special Fire Fighting Procedures: None known.

Extinguishing Media: X Water Fog X Alcohol Foam X CO₂ X Dry Chemical Other**6. ACCIDENTAL RELEASE MEASURES:**

No special requirements. Water clean up and rinse. CAUTION – WILL CAUSE SLIPPERY SURFACES.

7. HANDLING AND STORAGE:

Store at normal room temperature away from reach of small children. Keep containers sealed. Use older containers first. Avoid freezing conditions.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION:

Eye Protection: None required under normal conditions.

Skin Protection: None required under normal conditions.

Respiratory Protection: None required under normal conditions.

Ventilation: None required under normal conditions.

Protective Equipment or Clothing: None required under normal conditions.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance and Odor White opaque gel, characteristic solvent odor

pH (undiluted): 9 typical

VOC, %: <40

10. STABILITY AND REACTIVITY:

Stable/Non reactive product.

11. TOXICOLOGICAL INFORMATION:

No acute or chronic toxic effects expected when used according to directions.

12. ECOLOGICAL CONSIDERATIONS:

No ecological or special considerations when used according to directions. Not considered environmentally harmful from normal dilution, expected usage and typical drainage to sewers, septic systems and treatment plants.

13. DISPOSAL CONSIDERATIONS:

No special considerations when disposed according to local, state and Federal regulations.

14. TRANSPORT INFORMATION:

Not classified as a hazardous material.

15. REGULATORY AND OTHER INFORMATION:

Complies with current FDA regulations for cosmetic and/or over-the-counter drug products.

Notice: The information herein is based on data considered to be accurate as of the date of preparation of this material safety data sheet. However, no warranty or representation, expressed or implied, is made as to the accuracy or completeness of the foregoing data and safety information. The user assumes all liability for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.

Material Safety Data Sheet

HP 6040-1314 Grease

MSDS No. HP 6040-1314

Date of Preparation: 4/4/01

Revision Date: 4/4/01

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: HP 6040-1314 Grease

General Use: Lubricating Grease

Manufacturer: Nye Lubricants, Inc.

12 Howland Road

Fairhaven, MA 02719 U.S.A.

Telephone: (508) 996-6721 (8:00AM - 5:00PM ET weekdays)

Nights and weekends (Medical Emergencies ONLY): CHEMTREC (800) 424-9300

Section 2 - Composition / Information on Ingredients

Ingredient Name

CAS Number

% wt or % vol

Polytetrafluoroethylene, PTFE*

9002-84-0

12.0

Product formulation is Proprietary

No ingredients are known to be hazardous under normal usage.

*Not a hazardous material under normal usage, but PTFE can produce toxic fumes if pyrolyzed.

Ingredient	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH IDLH
	TWA	STEL	TWA	STEL	TWA	STEL	
Oil Mist	5 mg/m ³	NE	5 mg/m ³	NE	5 mg/m ³	10 mg/m ³	2500 mg/m ³

NE= None Established

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Summary of risks: May irritate eyes. Prolonged or repeated skin contact may cause irritation. Inhalation of oil mist or vapors from material at high temperatures may irritate respiratory passages.

Polytetrafluoroethylene (PTFE), when thermally decomposed (over 290°C), may cause polymer fume fever.

Thermal decomposition of PTFE (over 290°C) will generate hydrogen fluoride.

HMIS

H 1

F 1

R 0

PPE[†]

[†]Sec. 8

Potential Health Effects

Eye Contact: May cause irritation.

Skin Contact: Repeated or prolonged skin contact may cause irritation. Thermal decomposition of PTFE (over 290°C) will generate hydrogen fluoride, which is corrosive, causing burns on contact with skin and other tissue.

Inhalation: Oil mist and vapors at high temperatures may irritate respiratory passages. Inhalation of decomposition products of PTFE (over 290°C) may cause polymer fume fever, a temporary flu-like illness accompanied by fever, chills, and sometimes cough, of approximately 24 hours duration. Repeated episodes of polymer fume fever may cause lung damage. Inhalation of fluorine compounds as decomposition products of PTFE (over 290°C) may cause lung irritation and pulmonary edema.

Ingestion: May cause gastrointestinal irritation.

Primary Route(s) of Entry: Inhalation at high temperatures, eye contact, skin contact.

Target Organs: Respiratory passages at high temperatures, eyes, skin.

Medical Conditions Aggravated by Long-Term Exposure: Individuals with pre-existing diseases of the lungs may have increased susceptibility to the toxicity of excessive exposures from thermal decomposition products.

Carcinogenicity: IARC, NTP, and OSHA do not list HP 6040-1314 Grease or its ingredients as carcinogens.

Section 4 - First Aid Measures

Eye Contact: Flush thoroughly with water for at least 15 minutes. Get immediate medical attention.

Skin Contact: Remove contaminated clothing. Wash exposed area with soap and water. Get medical attention if symptoms persist.

Inhalation: If symptoms develop, remove affected person from source of exposure into fresh air. Get immediate medical attention. If person is not breathing, give artificial respiration. If breathing is difficult, administer oxygen if available.

Ingestion: Get immediate medical attention. Do not induce vomiting unless instructed to do so by a physician.

Section 5 - Fire-Fighting Measures

Flash Point: over 400°F (204°C)

Flash Point Method: CC, ASTM D93

Lower Flammable Limit (LFL): N/A

Upper Flammable Limit (UFL): N/A

Extinguishing Media: CO₂, Foam, Dry Chemical, Water Spray

Unusual Fire or Explosion Hazards: None

Hazardous Combustion Products: Hydrogen fluoride, carbonyl fluoride, carbon monoxide and small amount of other toxic fumes.

Fire-Fighting Instructions: Wear a NIOSH approved positive pressure self-contained breathing apparatus with full protective clothing. Do not release runoff from fire control methods to sewers or waterways.

Section 6 - Accidental Release Measures

Spill Response: Observe precautions from other sections. Contain any spill with dikes or absorbents to prevent migration and entry into drains, sewers or bodies of water. Wipe or scrape up grease and place it in a proper container for disposal. Wash walking surfaces thoroughly to reduce slipping hazard. Follow applicable OSHA (29 CFR 1910.120), state and local regulations.

Section 7 - Handling and Storage

Handling Precautions: Exercise ordinary care in handling industrial lubricants. Avoid contamination of cigarettes or other tobacco products. Wash hands thoroughly before eating or smoking. Remove contaminated clothing and clean before reuse. Users should be alert to the possibility that very small percentages of the population may display unexpected allergic reactions to otherwise innocuous industrial lubricants and raw materials.

Storage Requirements: Do not store in open or unlabeled containers. Store away from incompatibles.

Section 8 - Exposure Controls / Personal Protection

Eye Protection: Avoid eye contact. Wear safety glasses or chemical goggles in accordance with OSHA 29 CFR 1910.133.

Skin Protection: Avoid skin contact. Wear chemical protective gloves. Depending upon conditions of use, additional protection may be necessary such as a face shield, apron, etc.

Ventilation: Local ventilation is generally not necessary under normal conditions of use with adequate general ventilation. Ventilation and other forms of engineering controls are the preferred means for controlling chemical exposures.

Respiratory Protection: Avoid breathing oil mist. Respiratory protection is generally not necessary under normal conditions of use with adequate general ventilation.

Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Other Precautionary Information: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Appearance and Odor: Smooth, blue grease with slight odor

Vapor Pressure: Negligible

Vapor Density: Not Determined

Formula Weight: Not Calculated

Specific Gravity (H₂O=1, at 4 °C): Not Determined

pH: Not Determined

Water Solubility: Insoluble

Boiling Point: Not volatile

Dropping Point: Non-melting

% Volatile: None

Evaporation Rate: Not Determined

Section 10 - Stability and Reactivity

Stability: HP 6040-1314 Grease is stable at room temperature in closed containers under normal storage and handling conditions.

Polymerization: This product will not undergo hazardous polymerization.

Chemical Incompatibilities: Strong oxidizing materials

Conditions to Avoid: Pyrolysis

Hazardous Decomposition Products: Thermal oxidative decomposition of HP 6040-1314 Grease can produce hydrogen fluoride, carbonyl fluoride, carbon monoxide as well as small amounts of other toxic fumes.

Section 11- Toxicological Information

Toxicity Data: None available.

Section 12 - Ecological Information

Environmental Fate and Effects: No data has been established for this product.

Section 13 - Disposal Considerations

Disposal: Contact a licensed waste-disposal contractor for detailed recommendations.

Disposal Regulatory Requirements: Many states classify waste lubricants as "hazardous", which means disposal only by a licensed firm. Follow applicable Federal, state, and local regulations.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101): Not Regulated

Section 15 - Regulatory Information

TSCA:

All components of this product are listed on the TSCA inventory.

EPA Regulations:

SARA 311/312 Hazard Class (40 CFR 370)

Immediate (Acute) Health Hazard	No	Sudden Release of Pressure Hazard	No	Reactive Hazard	No
Delayed (Chronic) Health Hazard	No	Fire Hazard	No		

SARA 313 Toxic Chemicals (40 CFR 372)

No ingredients listed

CAS Number %

SARA Extremely Hazardous Substances (40 CFR 355)

No ingredients listed

CAS Number %

Threshold Planning Quantity (TPQ)

CERCLA Hazardous Substances (40 CFR 302)

No ingredients listed

CAS Number %

Reportable Quantity (RQ)

Section 16 - Other Information

Prepared By: WMM

Disclaimer: While the information and recommendations set forth herein are believed to be accurate as of the date hereof, Nye Lubricants, Inc. makes no warranty with respect thereto and disclaims all liability with respect thereon.



U.S. MATERIAL SAFETY DATA SHEET

Howes Lubricator Diesel Treat

Page 1 of 6

Section 1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Howes Lubricator Diesel Treat

Part Number(s): 103060, 103061, 103062, 103063,
103064, 103065, 103066, 103068

Company Identification: R.B. Howes & Co., Inc.
60 Ocean State Drive
North Kingstown, RI 02852
Tel: 800-438-9080 or 401-294-5500

Emergency Telephone Number: Chemtrec 1-800-424-9300 or 703-527-3887 (24 hours)

Section 2. HAZARDS IDENTIFICATION

Emergency Overview

Combustible. Light amber oil-like liquid with distinctive odor. Prolonged or repeated skin contact may cause skin irritation. Ingestion harmful or fatal if not treated. Prolonged exposure to heavy concentrations of vapors may cause irritation to mucus membranes and airway. Respiratory diseases such as asthma and skin conditions such as rashes, cuts or similar skin diseases are generally aggravated by exposure. Do not handle near excessive heat, sparks, flame or strong oxidants. Incompatible with (material to avoid) strong oxidants like liquid chlorine or concentrated oxygen. This material could be a slipping hazard if spilled.

OSHA Regulatory Status

This product contains components that are considered to be hazardous under OSHA's Hazard Communication Standard (29 CFR 1900.1200).

Potential Health Effects

Eye Contact: May cause redness and mild irritation.

Skin Contact: Prolonged contact may cause mild irritation.

Ingestion: Can cause cramps and nausea.

Inhalation: Prolonged exposure may irritate the respiratory tract.

Carcinogen: OSHA: no
IARC: Ethylbenzene & Vinyl Acetate, Group 2B, possible human carcinogenic
NTP: no

Section 3. COMPOSITION/INFORMATION ON INGREDIENTS

<u>Component</u>	<u>CAS #</u>	<u>% by Volume</u>
Petroleum Distillates	64742-46-7	1.00 – 70.0
Aliphatic Hydrocarbon	8052-41-3	1.00 – 50.0
1,2,4 Trimethylbenzene	95-63-6	0.50 – 1.50
1,3,5 Trimethylbenzene	108-67-8	0.01 – 0.60
Trimethylbenzene	25551-13-7	0.01 – 0.30
Ethylbenzene	100-41-4	0.01 – 0.05
Vinyl Acetate	108-05-4	0.01 – 0.05

Section 4. FIRST AID MEASURES

Eye contact:

Flush eyes with plenty of water for several minutes. Get medical attention if irritation persists.

Skin contact:

Wash skin with plenty of soap and water for several minutes. Get medical attention if irritation persists.

Ingestion:

Do not induce vomiting. Water may be given slowly. Contact physician immediately.

Inhalation:

If irritation or headache occurs, remove to fresh air. If signs/symptoms continue, get medical attention.

Additionally:

In all cases, if symptoms persist, contact physician.

Section 5. FIRE FIGHTING MEASURES

Flash point:

150°F / 65.5°C (Rapid Flash Point Closed-Cup, ASTM D3243)

Autoignition temperature:

Data not available.

Upper flammable limit:

Data not available.

Lower flammable limit:

Data not available.

Extinguishing media:

Foam, CO₂, water fog or spray.



U.S. MATERIAL SAFETY DATA SHEET

Howes Lubricator Diesel Treat

Page 3 of 6

Fire fighting equipment:

Recommend wearing self contained breathing apparatus. Avoid breathing vapors or fumes. Cool exposed containers with water spray.

Unusual fire and explosion hazard:

Combustible liquid. May form combustible mixtures at or above the flash point. Empty product containers may contain product residue. Do not pressurize, cut, heat, weld or expose containers to flame or other sources of ignition.

National Fire Protection Association (NFPA)

Flammability (red): 2

Health (blue): 1

Reactivity (yellow): 0

Special (white):

Section 6. ACCIDENTAL RELEASE MEASURES

Use appropriate personal protective equipment (PPE). (see section 8) Soak up the spill with oil absorbents, sand or other non-combustible material. Place residue in suitable, covered and properly labeled container. Dispose in accordance with federal, state and local laws.

Section 7. HANDLING AND STORAGE

Keep away from sources of ignition. Keep container closed when not in use.

Section 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

OSHA Permissible Exposure Limits (PEL's):

8-hour Time Weighted Averages (TWA)

Petroleum Distillates	TWA: 2000 ppm
Aliphatic Hydrocarbon	TWA: 500 ppm
1,2,4 Trimethylbenzene	TWA: 25 ppm
1,3,5 Trimethylbenzene	TWA: 25 ppm
Trimethylbenzene	TWA: 25 ppm
Ethylbenzene	TWA: 100 ppm
Vinyl Acetate	TWA: 10 ppm

Engineering Controls

Good general ventilation should be sufficient to control airborne levels.

Respiratory Protection

Respirator use is not expected to be necessary under normal conditions of use. If application creates mist, wear a NIOSH approved respirator.

Skin Protection

For brief contact, no precautions other than wearing long sleeves should be needed. Use chemical resistant gloves such as neoprene.

Eye/Face Protection

Safety glasses with side shield, anti-splash goggles or face shield.

Hygiene Recommendations

Avoid breathing mist or vapor. Avoid contact with skin and eyes. Keep an eyewash kit available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

Section 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Light amber
Odor:	Distinctive
Physical State:	Liquid
Flash:	150°F / 65.5°C (Rapid Flash Point Closed-Cup, ASTM D3243)
VOC:	823 (g/l)
pH:	Not determined
Vapor Pressure:	<.1mm Hg
Vapor Density:	>1 (air = 1)
Boiling Point:	327°F / 164°C
Freezing Point:	Not determined
Solubility in Water:	Insoluble
Specific Gravity:	<.9 (H2O = 1)

Section 10. STABILITY AND REACTIVITY

Chemical Stability:	Stable under normal ambient temperature (70°F / 21°C) and pressure (14.7 psi / 760 mmHg).
Conditions to Avoid:	Combustible when exposed to excessive heat, sparks, flames or strong oxidants.
Incompatible Materials:	Contact with strong oxidizers like chlorine or concentrated oxygen.
Hazardous Decomposition Products:	Under fire conditions: Carbon oxides (CO, CO2)
Hazardous Polymerization:	Hazardous polymerization will not occur.

Section 11. TOXICOLOGICAL INFORMATION

	<u>Oral (rat) LD50</u>	<u>Dermal (rabbit) LD50</u>	<u>Inhalation (rat) LC50</u>
Petroleum Distillates	5,000 mg/kg	3,000 mg/kg	
Aliphatic Hydrocarbon	5,000 mg/kg	3,000 mg/kg	5,500 mg/m3
1,2,4 Trimethylbenzene	5,000 mg/kg	3160 mg/kg	18,000 mg/m3
1,3,5 Trimethylbenzene	23,000 mg/kg		24,000 mg/m3
Trimethylbenzene	8,970 mg/kg		
Ethylbenzene	3,500 mg/kg	17,800 mg/kg	55,000 mg/m3
Vinyl Acetate	2,900 mg/kg	2,335 mg/kg	11,400 mg/m3

Section 12. ECOLOGICAL INFORMATION

No ecotoxicological studies have been conducted on this product.

Section 13. DISPOSAL CONSIDERATIONS

Waste management should be in compliance with federal, state and local laws.

Section 14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties and mode of transportation.

49 CFR §173.150(f) Exceptions for Class 3 flammable and combustible liquids.

Howes part number(s): 103060, 103061, 103062, 103063, 103064, 103065, 103066, 103068

Non-bulk packaging ($\leq$ 119 gal. liquid; $\leq$ 882 lbs. solid):

This product is non hazardous when packaged in non-bulk packaging.

Howes part number(s): N/A

Bulk packaging ($>$ 119 gal. liquid; $>$ 882 lbs. solid):

This product is hazardous when packaged in bulk packaging and the Proper Shipping Name would be:

Proper Shipping Name:	Petroleum distillates, n.o.s.
UN Identification Number:	UN1268
Hazard Class – Primary:	3
Packing Group:	III
Flash Point:	150°F / 65.5°C



U.S. MATERIAL SAFETY DATA SHEET

Howes Lubricator Diesel Treat

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49 CFR §172.101 (Appendix B) List of Marine Pollutants

This product is not a marine pollutant as defined in 49 CFR §171.8.

Section 15. REGULATORY INFORMATION

U.S. Regulations:

Clean Air Act (CAA) 112(r) Accidental Release Prevention Substances: Vinyl Acetate.

Clean Water Act (CWA) 307 Priority Pollutants: Ethylbenzene.

Clean Water Act (CWA) 311 Hazardous Substances: Ethylbenzene, Vinyl Acetate.

CERCLA 302 Hazardous Substances: Ethylbenzene RQ 1,000 lbs.

Proposition 65 California Safe Drinking Water and Toxic Enforcement Act of 1986: (Known to cause cancer) Ethylbenzene.

SARA 302/304 Emergency Planning and Notification Substances: No products were found.

SARA 313 Toxic Chemical Notification: Ethylbenzene, 1,2,4 Trimethylbenzene,
Vinyl Acetate.

TSCA Inventory Status: All components are included or are exempted from listing on the US Toxic Substances Control Act Inventory.

Section 16. OTHER INFORMATION

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

Health (Blue)	1
Flammability (Red)	2
Reactivity (Yellow)	0
Personal Protection (White)	B

MSDS PREPARATION

Prepared By:	VP of Logistics
Issue Date:	August 26, 2011
Supersedes Date:	March 31, 2011

The recommendations and data presented herein are based on sources considered to be reliable. Any use inconsistent with our recommendations may affect the risk characterization. However, no warranty is expressed or implied regarding the accuracy of the data or the results obtained from the use of this information or the use of the product. R.B. Howes & Co., Inc. expressly disclaims all liability for loss or damage, including consequential loss, or injury to persons (including death) arising directly or indirectly from reliance upon the information or misuse of the material.

KLEEN-FLO TUMBLER INDUSTRIES LIMITED		MATERIAL SAFETY DATA SHEET		PAGE 1
SECTION I-MATERIAL IDENTIFICATION AND USE				
Material Name/Identifier:	Lock- De-Icer	Stock No.	615	
Manufacturer's Name:	Kleen-Flo Tumbler Industries Ltd	Street Address:	75 Advance Blvd.	
City:	Brampton	Province:	Ontario	
Postal Code:	L6T 4N1	Emergency Phone #:	CANUTEC:- 613-996-6666 (24HR)	
Chemical Name:	N/A (mixture)	Chemical Family:	N/A	
Chemical Formula:	N/A (Mixture)	Trade Names & Synonyms:	None	
Material Use:	De-icer	Molecular Weight:	N/A (Mixture)	
SECTION II-HAZARDOUS INGREDIENTS OF MATERIAL				
Hazardous Ingredients	C.A.S.	Approximate Concentration	LD50 Species & Route	LC50 Species & Route
Isopropyl Alcohol	67-63-0	60-100%	5045 mg/kg rat-oral	16000 ppm (4hr) rat-inh.
Naphthenic Oil	64742-53-6	7-13%	5000mg/kg rat-oral	N/Av.
SECTION III-PHYSICAL DATA FOR MATERIAL				
Physical State:	Liquid	Odour/Appearance:	Clear, pale,yellow liquid	
Specific Gravity:	0.8	Odour Threshold(p.p.m.):	N/E	
Boiling Point:	82°C	Evaporation Rate:	N/E	
Freezing Point:	N/E	Solubility in Water:	Partly Soluble	
% Volatile(by volume):	N/E	Vapour Pressure(mm)Hg:	N/Av.	
Vapour Density(Air=1):	>1	Coefficient of Water/Oil Distribut:	N/E	
pH	N/Av.			
SECTION IV-FIRE AND EXPLOSION HAZARD OF MATERIAL				
Flammability Yes/No	Yes	If yes under which conditions?: Open flames and sparks, heat		
Auto Ignition Temperature:	N/E	Means of Extinction: Dry chemical; Carbon dioxide, Foam		
Flashpoint and Method:	15°C TCC	Hazardous Combustion Products: Carbon dioxide and		
		Carbon monoxide		
Upper Flammable limit (%vol)	12	Lower Flammable Limit (% by volume):	1	
Explosion Data:	Sensitivity to Mechanical Impact: N/Av.	Sensitivity to Static Discharge:	N/Av.	
SECTION V-REACTIVITY DATA				
Chemical Stability Yes/No:	Yes	If NO under which conditions?:		
Incompatibility to Other Substances Yes/No:	Yes	If so which ones?: Strong oxidizing agents, May react with alumin		
Reactivity and under what conditions?	Normally stable, but can become unstable at elevated temperatures & pressure			
Hazardous Decomposition Products:	Carbon monoxide, carbon dioxide produced upon combustion.			
N/E: not established				
N.Ap.: Not applicable				
N/Av.: not available				

SECTION VI-TOXICOLOGICAL PROPERTIES OF PRODUCT

Route of Entry: ALL Routes	--SKIN CONTACT --SKIN ABSORPTION --EYE CONTACT --INHALATION --INGESTION		
Effects of Acute Exposure:	Eye, Skin irritation. May cause headache, dizziness, nausea, drowsiness and central nervous system depression.		
Effects of Chronic Exposure:	None known		
LD 50 of Product:	N/E	LC 50 of Product:	N/E
Irritancy of Product:	Eye, skin irritant	Exposure Limits of Product: IPA 400 ppm STEL (ACGIH)	
Sensitization of Product:	N/E	Toxicologically Synergistic Materials:	N/E
--CARCINOGENICITY --REPRODUCTIVE EFFECTS --TERATOGENICITY --MUTAGENICITY			none known

SECTION VII-PREVENTIVE MEASURES

Personal Protective Equipment to be used:

Gloves(specify):	Nitrile, Viton, Chemical resistant gloves	Eye(specify):	Safety Glasses
Respiratory(specify):	Not required during normal use	Clothing:	Not required
Respiratory Protection:	If used indoors or on a continuous basis, use of NIOSH approved cartridge type respirator is recommended		
Engineering Controls:	Local ventilation		
Leak and Spill Procedure:	Use non-reactive absorbent material and non sparking tools to contain spills.		
	Incise of large spill use explosion proof and grounded equipments.		
Waste Disposal:	Dispose of at an approved waste disposal facility. Or as per municipal or provincial regulation.		
Storage Requirements:	Keep in a cool well ventilated place. Keep away from heat, spark or flame		
Handling Procedures and Equipment:	Handle with care. Keep away from children. Do not inhale or ingest.		
DSL Listing	All components are listed in the inventory.		
TDG Classification:	Consumer Commodity		
WHMIS Classification:	Consumer Commodity	Complies with CCCR 2001	

SECTION VIII-FIRST AID MEASURES

Eye:	Flush with water for at least 15 minutes. Seek medical attention immediately if irritation persists.
Skin:	Remove contaminated clothing. Wash with soap and water. See doctor if irritation persists.
Inhalation:	Move patient to fresh air and restore breathing if required. Call a physician if discomfort persists.
Ingestion:	DO NOT INDUCE VOMITING. Seek medical help immediately.

SECTION IX-PREPARATION DATE OF M.S.D.S.

Additional Info/Comments:		Sources Used: Supplier's data
Phone Number:	(905) 793-4311	Prepared By: Quality Control Laboratory
Date Prepared:	January 2, 2012	Kleen-Flo Tumbler Industries Limited

THIS SHEET SUPERSEDES ANY OTHER M.S.D.S. PREVIOUSLY PREPARED

N/E: not established	N.Ap.: Not applicable	N/Av.: not available

KLEEN-FLO TUMBLER INDUSTRIES LIMITED		MATERIAL SAFETY DATA SHEET		PAGE 1
SECTION I-MATERIAL IDENTIFICATION AND USE				
Material Name/Identifier:	Ice Melter/Quick Melt	Stock No.	781/784	
Manufacturer's Name:	Kleen-Flo Tumbler Industries Ltd	Street Address:	75 Advance Blvd.	
City:	Brampton	Province:	Ontario	
Postal Code:	L6T 4N1	Emergency Phone #:	CANUTEC:- 613-996-6666 (24HR)	
Chemical Name:	Magnesium chloride hexahydrate	Chemical Family:	Magnesium salt	
Chemical Formula:	MgCl2 . 6H2O	Trade Names & Synonyms:	N/Av.	
Material Use:	De-Icer & Dust Control	Molecular Weight:	167	
SECTION II-HAZARDOUS INGREDIENTS OF MATERIAL				
Hazardous Ingredients	C.A.S.	Approximate Concentration	LD50 Species & Route	LC50 Species & Route
Magnesium chloride	7786-30-3	60 - 100 %	8100 mg/kg	N/Av.
This material is not known to contain any chemical listed as a carcinogen or suspected carcinogen by th US OSHA, IRAC or the US National Toxicology Program at a concentration greater than 0.1%.				
SECTION III-PHYSICAL DATA FOR MATERIAL				
Physical State:	granular chips	Odour/Appearance:	Odourless, translucent, off white flakes.	
Bulk density;	1.085 g/ml	Odour Threshold(p.p.m.):	N/Av.	
Boiling Point (dehydration):	N/Av.	Evaporation Rate:	N/E	
Freezing Point:	N/Av.	Solubility in Water:	Solunble	
% Volatile(by volume):	N/Av.	Vapour Pressure(mm)Hg:	N/Av.	
Vapour Density(Air=1):	N/Av.	Coefficient of Water/Oil Distribut:	N/Av.	
pH	neutral to slightly alkaline			
SECTION IV-FIRE AND EXPLOSION HAZARD OF MATERIAL				
Flammability Yes/No	No	If yes under which conditions?:	N.Ap.	
Auto Ignition Temperature:	N/E	Means of Extinction:	N/Av.	
Flashpoint and Method:	N/Ap.	Hazardous Combustion Products:	None	
Upper Flammable limit (%vol)	N/E	Lower Flammable Limit(% by vol):	N/E	
Explosion Data:	Sensitivity to Mechanical Impact: N/Av.	Sensitivity to Static Discharge:	N/Av.	
SECTION V-REACTIVITY DATA				
Chemical Stability Yes/No	Yes	If No, under which conditions?		
Incompatibility to Other Substances Yes/No:	Yes	If so which ones? Concentrated Acids, Sulfuric, Nitric etc.		
Reactivity and under what conditions?	N/E			
Hazardous Decomposition Products:	Release hydrogen chloride vapors if heated ove 300 oF			
N/E: not established	N/Av.: not available		N.Ap.: not applicable	



MATERIAL SAFETY DATA SHEET

HERTEL PLUS DISINFECTANT

Effective date: 10-Apr-2013

SECTION 1 : IDENTIFICATION

Product name:	HERTEL PLUS DISINFECTANT
Product Use:	Disinfectant - Degreaser
Chemical family :	Mixture
Supplier's name:	LAVO Inc
Address :	11900 Boul. Saint-Jean Baptiste Montréal, Québec Canada H1C 2J3
Telephone :	1-800-361-6898 or 514-526-7783
Emergency phone :	CANUTEC (transport) 1-613-996-6666

SECTION 2 : HAZARD IDENTIFICATION

Emergency Overview	CAUTION / IRRITANT MAY CAUSE EYES IRRITATION. MAY CAUSE SKIN IRRITATION.
POTENTIAL HEALTH EFFECTS: Signs and symptoms of short-term (acute) exposure	
Eyes :	May cause irritation.
Skin :	May cause irritation.
Ingestion :	May cause stomach distress, nausea or vomiting.
Inhalation :	May cause respiratory tract irritation.
Target organs:	Eyes. Skin.
Effects of long-term (chronic) exposure :	Prolonged or repeated contact may cause drying, cracking and de-fatting of the skin.
Signs and symptoms:	Symptoms may include redness, oedema, drying, de-fatting and cracking of the skin. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting.
Potential environmental effect :	Components of this product have been identified as having potential environmental concerns.

SECTION 3 : COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	CAS	Percentage
Ethoxylated Alcohols C12-C16	68551-12-2	<5 %
Dipropylene glycol methyl ether	34590-94-8	<5 %
Sodium Metasilicate	6834-92-0	<1.5%
Alkyl dimethyl benzyl ammonium Chlorite	68424-85-1	<0.5%
Ethanol	64-17-5	<0.5%

SECTION 4 : FIRST AID MEASURES

Eye contact :	Immediately flush with cool water. Remove contact lenses, if applicable, and continue flushing for 15 minutes. Obtain medical attention if irritation develops or persists.
Skin contact:	Flush with cool water. Obtain medical attention if irritation persists.
Ingestion :	Do not induce vomiting. Never give anything by mouth if victim is unconscious, or is convulsing. Obtain medical attention.
Inhalation :	If symptoms develop move victim to fresh air. If symptoms persist, obtain medical attention.
Notes for physician :	Treat symptomatically.
General advice :	If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Avoid contact with eyes and skin. Keep out of reach of children.



MATERIAL SAFETY DATA SHEET

HERTEL PLUS DISINFECTANT

Effective date: 10-Apr-2013

SECTION 5 : FIRE FIGHTING MEASURES

Fire hazards/conditions of flammability:	Not flammable by WHMIS criteria"
Extinguishing media:	Treat for surrounding material.
Protection of firefighters	
Specific hazards arising from the chemical:	Not available.
Protective equipment for firefighters:	Firefighters should wear full protective clothing including self contained breathing apparatus.
Hazardous combustion products :	Not available.

SECTION 6 : ACCIDENTAL RELEASE MEASURES

Personal precautions:	Keep unnecessary personnel away. Do not touch or walk through spilled material. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Keep people away from and upwind of spill/leak..
Environmental precautions:	Do not discharge into lakes, streams, ponds or public waters.
Methods for containment:	Stop leak if you can do so without risk. Prevent entry into waterways, Sewers, basements or confined areas.
Methods for cleaning up :	Before attempting clean up, refer to hazard data given above. Small spills may be absorbed with non-reactive absorbent and placed in suitable, covered, labeled containers. Prevent large spills from entering sewers or waterways. Contact emergency services and supplier for advice. Never return spills in original containers for re-use.

SECTION 7 : HANDLING AND STORAGE

Safe Handling procedures:	Use good industrial hygiene practices in handling this material. Avoid contact with eyes and skin.
Storage requirements :	Keep out of reach of children.
Storage temperature:	5-30 C. Do not freeze. Avoid high temperature.

SECTION 8 : EXPOSITION CONTROL/PERSONAL PROTECTION

Exposition limit values	ACGIH TLV	
Ingredients	CAS	TWA
Ethoxylated Alcohols C12-C16	68551-12-2	Not available
Dipropylene glycol methyl ether	34590-94-8	100ppm Dermal
Sodium Metasilicate	6834-92-0	Not available
Alkyl dimethyl benzyl ammonium Chlorite	68424-85-1	Not available
Ethanol	64-17-5	1000ppm
Engineering controls:	General ventilation normally adequate.	
Eye/Face protection:	Safety glasses or a facial screen if eye contact is possible.	
Skin and body protection:	Rubber gloves. Confirm with a reputable supplier first.	
Respiratory protection:	Where exposure guideline levels may be exceeded, use an approved NIOSH respirator.	
General hygiene considerations:	Handle in accordance with good industrial hygiene and safety practice. When using do not eat or drink. Wash hands before breaks and immediately after handling the product.	



MATERIAL SAFETY DATA SHEET

HERTEL PLUS DISINFECTANT

Effective date:10-Apr-2013

SECTION 9 : PHYSICAL AND CHEMICAL PROPERTIES

Physical state	Liquid	Appearance	Viscous colored liquid
Odor	Fragrant various	Odor threshold	Not available
pH	12.0 – 13.0	Water Solubility	Completely miscible
Boiling point	Not available	Evaporation Rate	Not available
Freezing point	Not available	Viscosity	Not available
Vapour Pressure	Not available	Auto-ignition temperature	Not available
Flash point / Poor point	Not available	Flammability limits in air, lower	Not available
Density	1.00 – 1.02	Flammability limits in air, upper	Not available
Repartition Coefficient water/oil	Not available	Vapor density	Not available

SECTION 10 : STABILITY AND REACTIVITY

Reactivity:	This product may react with strong acids.
Possibility of hazardous reactions:	Hazardous polymerization does not occur.
Chemical stability:	Stable under recommended storage conditions.
Conditions to avoid:	Do not mix with other chemicals.
Incompatible materials:	Acids.
Hazardous decomposition products:	May include and are not limited to: Oxides of carbon. Oxide of nitrogen.

SECTION 11 : TOXICOLOGICAL INFORMATION

Ingredients	CAS	LC50(4hr)inh, rat	LD50 (Oral, rat)	LD50 (Rat, dermal)
Ethoxylated Alcohols C12-C16	68551-12-2	1.5 à 20.7 mg/L	>1700 mg/kg	>2000mg/kg
Dipropylene glycol methyl ether	34590-94-8	>661ppm	>5000 mg/kg	9510mg/kg (rabbit)
Sodium Metasilicate	6834-92-0	Not available	1153mg/kg	>4640mg/kg
Alkyl dimethyl benzyl ammonium Chlorite	68424-85-1	Not available	530 mg/kg	530 mg/kg
Ethanol	64-17-5	400mg/L	7060 mg/kg	>1990 mg/kg

Effects of acute exposure:

<i>eyes :</i>	May cause irritation.
<i>Skin :</i>	May cause irritation.
<i>Inhalation:</i>	May cause respiratory tract irritation.
<i>Ingestion :</i>	May cause stomach distress, nausea or vomiting.

Sensitization to material : Non-hazardous by WHMIS criteria.

Chronic effects: Non-hazardous by WHMIS criteria.

Carcinogenicity : Non-hazardous by WHMIS criteria.

ACGH – Threshold limit values – Skin notations

Ethanol: 64-17-5	A3 – Confirmed animal carcinogen with unknown relevance to humans.

IARC – Group 1 (carcinogenic to humans)

Ethanol: 64-17-5	Monograph 100E (in preparation) (alcoholic beverages); Monograph 96 (2010) (alcoholic beverages)

Reproductive effects: Non-hazardous by WHMIS criteria.

Teratogenicity : Non-hazardous by WHMIS criteria.

Mutagenicity: Non-hazardous by WHMIS criteria.

Synergistic Products : Not available.



MATERIAL SAFETY DATA SHEET

HERTEL PLUS DISINFECTANT

Effective date: 10-Apr-2013

SECTION 12 : ECOLOGICAL INFORMATION

Eco toxicity :	CAS	Ecotoxicity - Freshwater Fish - Acute Toxicity Data
Ethoxylated Alcohols C12-C16	68551-12-2	96h [static] LC50 Oncorhynchus mykiss: 1 à 10 mg/L
Dipropylene glycol methyl ether	34590-94-8	96h [static] LC50 Pimephales promelas: >10000 mg/L
Sodium Metasilicate	6834-92-0	Not available
Alkyl dimethyl benzyl ammonium Chlorite	68424-85-1	96h LC50 Striped bass (morone saxatis): 19.1 mg/L
Ethanol	64-17-5	96h [static] LC50 (Oncorhynchus mykiss): 12.0 – 16.0 mL/L; 96h [static] LC50 (Pimephales promelas): >100 mg/L; 96h LC50 (Pimephales promelas): 13400 - 15100 mg/L flow through
Eco toxicity :	CAS	Ecotoxicity - Water Flea - Acute Toxicity Data
Ethoxylated Alcohols C12-C16	68551-12-2	48h [static] EC50 Daphnia magna: 0.1 à 2.7 mg/L
Dipropylene glycol methyl ether	34590-94-8	48h LC50 Daphnia Magna : 1919 mg/L
Sodium Metasilicate	6834-92-0	Not available
Alkyl dimethyl benzyl ammonium Chlorite	68424-85-1	Not available
Ethanol	64-17-5	48h LC50 Daphnia magna: 9268 – 14221 mg/L; 24h EC50 Daphnia magna: 10800 mg/L; 48h [static] EC50 Daphnia magna: 2 mg/L
Bioaccumulation Potential:	Not available.	
Mobility in environmental media :	Not available.	
Environmental effects:	Not available.	
Aquatic toxicity:	Not available.	
Partition coefficient	Not available.	
Chemical fate information :	Not available.	
Other adverse effects ;	Not available.	

SECTION 13 : DISPOSAL CONSIDERATIONS

Disposal instructions:	Dispose in accordance with all applicable federal, state, provincial and local regulations.
Waste from residues / Unused products:	Not available.
Contaminated packaging :	Not available.

SECTION 14 : TRANSPORT INFORMATION

Transportation of Dangerous Goods (TDG - Canada):	Not regulated as dangerous goods.

SECTION 15 : REGULATORY INFORMATION

Canadian federal regulations: 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.		
Canada WHMIS – Ingredient disclosure list:		
Ingredients	CAS	%
Sodium Metasilicate	6834-92-0	1%
Ethanol	64-17-5	0.1%
WHMIS classification :		Class D 2B
WHMIS status:		Controlled
		WHMIS labeling:
Canadian Inventory Status: All components of this product are either on the Domestic Substances List (DSL), the Non-Domestic Substances List (NDLS) or exempt.		

WHMIS labeling:





MATERIAL SAFETY DATA SHEET

HERTEL PLUS DISINFECTANT

Effective date: 10-Apr-2013

SECTION 16 : OTHER INFORMATION	
HMIS Rating;	Chronic hazard: 0- Minimal 1-Slight 2-Moderate 3-Serious Health : 1 Flammability : 0 Reactivity : 0
Disclaimer of liability:	The information in the Material Safety Data Sheet is offered for your consideration and guidance when exposed to this product. Lavo Inc. expressly disclaims all expressed or implied warranties for the accuracy or completeness of the data contained herein and assumes no responsibilities for any involved damages by above data. Product's users have to do their own tests to establish the applicability of the information for a specific use of the product. MSDS data does not apply to use with any other product or in any other process.
Other information :	For an updated MSDS, please contact the supplier/manufacturee listed on the first page of the document. References: MSDS of suppliers SIMDUT regulation
Prepared by :	Lavo Inc. 11900 Boul. Saint-Jean Baptiste Montreal, QC, Canada H1C 2J3 Téléphone : 1- 800-361-6898 www.lavo.ca
Issuing date :	10-Apr-2013
Due date :	Apr-2016

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, Conventional Gasoline.
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 MAY 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 may 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.
<u>Potential acute health effects</u>	
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 may 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

<u>Name</u>	<u>CAS number</u>	<u>%</u>
Gasoline	86290-81-5	85-100
Toluene	108-88-3	15-40*
Benzene	71-43-2	0.5-1.5
Ethanol	64-17-5	0.1-0.3

*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, CO₂, 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 (NO_x), 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. 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. Remove contaminated clothing and protective equipment before entering eating areas. Avoid exposure - obtain special instructions before use. 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

7 . Handling and storage

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
Gasoline	ACGIH TLV (United States). TWA: 300 ppm 8 hour(s). STEL: 500 ppm 15 minute(s).
Toluene	ACGIH TLV (United States). TWA: 20 ppm 8 hour(s).
Benzene	ACGIH TLV (United States). Absorbed through skin. TWA: 0.5 ppm 8 hour(s). STEL: 2.5 ppm 15 minute(s).
Ethanol	ACGIH TLV (United States). STEL: 1000 ppm 15 minute(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	-
Toluene	LD50 Dermal	Rabbit	12125 mg/kg	-
	LD50 Oral	Rat	636 mg/kg	-
	LC50 Inhalation Vapour	Rat	7585 ppm	4 hours
Benzene	LD50 Dermal	Rabbit	>8240 mg/kg	-
	LD50 Oral	Rat	930 mg/kg	-
	LC50 Inhalation Vapour	Rat	13700 ppm	4 hours
Ethanol	LD50 Oral	Rat	7060 mg/kg	-
	LC50 Inhalation Vapour	Rat	>32380 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	-	-	-	-
Toluene	A4	3	D	-	-	-
Benzene	A1	1	A	+	Proven.	+
Ethanol	A3	-	-	-	-	-

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. 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. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. 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.

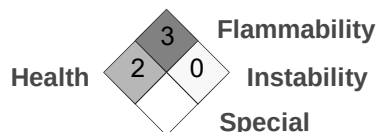
16 . Other information

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

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

Health	*	2
Flammability		3
Physical hazards		0
Personal protection		H

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



References : Available upon request.
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Date of printing : 10/10/2012.

Date of issue : 10 October 2012

Date of previous issue : 4/9/2010.

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

According to the Controlled Product Regulations

1. MATERIAL AND COMPANY IDENTIFICATION

Material Name : Pennzoil Platinum SAE 0W-20 Full Synthetic Motor Oil
Uses : Engine oil. Passenger Car Motor Oil
Product Code : 001D7527

Manufacturer/Supplier : Pennzoil-Quaker State Canada Inc.
1101 Blair Road
Burlington ON L7M 1T3
Canada

Telephone : 1-800-263-6200
Fax : 1-800-463-0358

Emergency Telephone Number
CHEMTREC (24 hr) : 1-800-424-9300
Canutec (24 hr) : 1-877-242-7400

2. COMPOSITION/INFORMATION ON INGREDIENTS

Preparation Description : Blend of synthetic hydrocarbon, polyalphaolefins and additives.

Refer to Chapter 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

WHMIS Class/Description : THIS PRODUCT IS NOT A WHMIS CONTROLLED SUBSTANCE.

Physical Description : Blend of synthetic hydrocarbon, polyalphaolefins and additives.
Routes of Exposure : Skin and eye contact are the primary routes of exposure although exposure may occur following accidental ingestion.

Health Hazards : Not expected to be a health hazard when used under normal conditions. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis. Used oil may contain harmful impurities.

Signs and Symptoms : Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.

Safety Hazards : Not classified as flammable but will burn.
Environmental Hazards : Not classified as dangerous for the environment.

4. FIRST AID MEASURES

General Information : Not expected to be a health hazard when used under normal conditions.

Inhalation : No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.

Skin Contact : Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent

Effective Date 10-26-2010

Material Safety Data Sheet

According to the Controlled Product Regulations

Eye Contact	: irritation occurs, obtain medical attention. : Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
Ingestion	: In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.
Advice to Physician	: Treat symptomatically.

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Flash point	: > 230 °C / 446 °F (COC)
Upper / lower Flammability or Explosion limits	: Typical 1 - 10 %(V)
Auto ignition temperature	: > 320 °C / 608 °F
Hazardous Combustion Products and Specific Hazards	: Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.
Suitable Extinguishing Media	: Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable Extinguishing Media	: Do not use water in a jet.
Protective Equipment for Firefighters	: Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

6. ACCIDENTAL RELEASE MEASURES

Protective Measures	: Avoid contact with skin and eyes. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.
Clean Up Methods	: Slippery when spilled. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.
Additional Advice	: Local authorities should be advised if significant spillages cannot be contained.

7. HANDLING AND STORAGE

General Precautions	: Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
Handling	: Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety

Material Safety Data Sheet

According to the Controlled Product Regulations

- Storage : footwear should be worn and proper handling equipment should be used.
- Recommended Materials : Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Storage Temperature: 0 - 50 °C / 32 - 122 °F
- Unsuitable Materials : For containers or container linings, use mild steel or high density polyethylene.
- Additional Information : PVC.
- Additional Information : Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

If the American Conference of Governmental Industrial Hygienists (ACGIH) value is provided on this document, it is provided for information only.

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Oil mist, mineral	ACGIH	TWA		5 mg/m3	

Consult local authorities for acceptable exposure limits within their jurisdiction.

- Exposure Controls : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.
- Personal Protective Equipment : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
- Respiratory Protection : No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65°C(149 °F)].
- Hand Protection : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical

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	resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
Eye Protection	: Wear safety glasses or full face shield if splashes are likely to occur.
Protective Clothing	: Skin protection not ordinarily required beyond standard issue work clothes.
Monitoring Methods	: Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Environmental Exposure Controls	: Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Clear white. Liquid at room temperature.
Odour	: Slight hydrocarbon.
Odour threshold	: Data not available
pH	: Not applicable.
Initial Boiling Point and Boiling Range	: > 280 °C / 536 °F estimated value(s)
Pour point	: -34.44 °C / -29.99 °F
Vapour pressure	: < 0.5 Pa at 20 °C / 68 °F (estimated value(s))
Specific gravity	: 0.88 - 0.89
Density	: 880 - 890 kg/m3 at 15 °C / 59 °F
Water solubility	: Negligible.
n-octanol/water partition coefficient (log Pow)	: > 6 (based on information on similar products)
Kinematic viscosity	: > 30 mm2/s at 40 °C / 104 °F
Vapour density (air=1)	: > 1 (estimated value(s))
Evaporation rate (nBuAc=1)	: Data not available

10. STABILITY AND REACTIVITY

Stability	: Stable.
Conditions to Avoid	: Extremes of temperature and direct sunlight.
Materials to Avoid	: Strong oxidising agents.
Hazardous Decomposition Products	: Hazardous decomposition products are not expected to form during normal storage.
Hazardous Polymerisation	: Data not available
Sensitivity to Mechanical Impact	: Data not available
Sensitivity to Static Discharge	: Data not available

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11. TOXICOLOGICAL INFORMATION

Basis for Assessment : Information given is based on data on the components and the toxicology of similar products.

Routes of Exposure : Skin and eye contact are the primary routes of exposure although exposure may occur following accidental ingestion.

Oral	LD 50: 5,000 mg/kg, Rat
Dermal	LD 50: 5,000 mg/kg, Rabbit

Acute Oral Toxicity : Expected to be of low toxicity: LD50 > 5000 mg/kg

Acute Dermal Toxicity : Expected to be of low toxicity: LD50 > 5000 mg/kg

Acute Inhalation Toxicity : Not considered to be an inhalation hazard under normal conditions of use.

Skin Irritation : Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.

Eye Irritation : Expected to be slightly irritating.

Respiratory Irritation : Inhalation of vapours or mists may cause irritation.

Sensitisation : Not expected to be a skin sensitiser.

Repeated Dose Toxicity : Not expected to be a hazard.

Mutagenicity : Not considered a mutagenic hazard.

Carcinogenicity : Components are not known to be associated with carcinogenic effects.

Reproductive and Developmental Toxicity : Not expected to be a hazard.

Additional Information : Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal.
ALL used oil should be handled with caution and skin contact avoided as far as possible.
Continuous contact with used engine oils has caused skin cancer in animal tests.

12. ECOLOGICAL INFORMATION

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

Acute Toxicity : Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract).

Mobility : Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.

Persistence/degradability : Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product

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- Bioaccumulation** : contains components that may persist in the environment.
: Contains components with the potential to bioaccumulate.
- Other Adverse Effects** : Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

13. DISPOSAL CONSIDERATIONS

- Material Disposal** : Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
- Container Disposal** : Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
- Local Legislation** : Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. TRANSPORT INFORMATION

Canadian Road and Rail Shipping Classification

This product is not regulated under the Canadian Transportation of Dangerous Goods Regulations for transport by road and rail.

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

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

WHMIS Class/Description : THIS PRODUCT IS NOT A WHMIS CONTROLLED SUBSTANCE.

Inventory Status

- EINECS** : All components listed or polymer exempt.
- TSCA** : All components listed.
- DSL** : All components listed.

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16. OTHER INFORMATION

- MSDS Version Number** : 1.0
- MSDS Effective Date** : 10-26-2010
- MSDS Revisions** : A vertical bar (|) in the left margin indicates an amendment from the previous version.
- MSDS Regulation** : The content and format of this (M)SDS is in accordance with the Controlled Product Regulations.
- MSDS Distribution** : The information in this document should be made available to all who may handle the product.
- Disclaimer** : The information contained herein is based on our current knowledge of the underlying data and is intended to describe the product for the purpose of health, safety and environmental requirements only. No warranty or guarantee is expressed or implied regarding the accuracy of these data or the results to be obtained from the use of the product.

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MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: CAT ARCTIC DEO SYN 0W-30
Product Description: Synthetic Base Stocks and Additives
Product Code: 202020109005, 478347-60, 97AT41
Intended Use: Engine oil

COMPANY IDENTIFICATION

Supplier: EXXON MOBIL CORPORATION
3225 GALLOWES RD.
FAIRFAX, VA. 22037 USA

24 Hour Health Emergency 609-737-4411
Transportation Emergency Phone 800-424-9300
ExxonMobil Transportation No. 281-834-3296
MSDS Requests 713-613-3661
Product Technical Information 800-662-4525, 800-947-9147
MSDS Internet Address <http://www.exxon.com>, <http://www.mobil.com>

SECTION 2 COMPOSITION / INFORMATION ON INGREDIENTS

Reportable Hazardous Substance(s) or Complex Substance(s)

Name	CAS#	Concentration*
ZINC DITHIOPHOSPHATE	68649-42-3	< 2.5%

* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

SECTION 3 HAZARDS IDENTIFICATION

This material is not considered to be hazardous according to regulatory guidelines (see (M)SDS Section 15).

POTENTIAL HEALTH EFFECTS

Low order of toxicity. Excessive exposure may result in eye, skin, or respiratory irritation. High-pressure injection under skin may cause serious damage.

NFPA Hazard ID: Health: 0 Flammability: 1 Reactivity: 0
HMIS Hazard ID: Health: 0 Flammability: 1 Reactivity: 0

NOTE: This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

SECTION 4 FIRST AID MEASURES

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INHALATION

Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

SKIN CONTACT

Wash contact areas with soap and water. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

INGESTION

First aid is normally not required. Seek medical attention if discomfort occurs.

SECTION 5

FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

Appropriate Extinguishing Media: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

Inappropriate Extinguishing Media: Straight Streams of Water

FIRE FIGHTING

Fire Fighting Instructions: Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

Hazardous Combustion Products: Aldehydes, Sulfur oxides, Smoke, Fume, Oxides of carbon, Incomplete combustion products

FLAMMABILITY PROPERTIES

Flash Point [Method]: >200C (392F) [ASTM D-92]

Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0

Autoignition Temperature: N/D

SECTION 6

ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations. In the event of a spill or accidental release, notify relevant authorities in accordance with all

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applicable regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

SPILL MANAGEMENT

Land Spill: Stop leak if you can do it without risk. Recover by pumping or with suitable absorbent.

Water Spill: Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

SECTION 7

HANDLING AND STORAGE

HANDLING

Avoid contact with used product. Prevent small spills and leakage to avoid slip hazard.

Static Accumulator: This material is a static accumulator.

STORAGE

Do not store in open or unlabelled containers.

SECTION 8

EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMIT VALUES

Exposure limits/standards for materials that can be formed when handling this product: When mists / aerosols can occur, the following are recommended: 5 mg/m³ - ACGIH TLV, 10 mg/m³ - ACGIH STEL, 5 mg/m³ - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

ENGINEERING CONTROLS

The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Control measures to consider:

No special requirements under ordinary conditions of use and with adequate ventilation.

PERSONAL PROTECTION

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Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

Respiratory Protection: If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

Hand Protection: Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

No protection is ordinarily required under normal conditions of use.

Eye Protection: If contact is likely, safety glasses with side shields are recommended.

Skin and Body Protection: Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

No skin protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid skin contact.

Specific Hygiene Measures: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

ENVIRONMENTAL CONTROLS

See Sections 6, 7, 12, 13.

SECTION 9

PHYSICAL AND CHEMICAL PROPERTIES

Typical physical and chemical properties are given below. Consult the Supplier in Section 1 for additional data.

GENERAL INFORMATION

Physical State: Liquid

Form: Clear

Color: Yellow

Odor: Characteristic

Odor Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 C): 0.85

Flash Point [Method]: >200C (392F) [ASTM D-92]

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Flammable Limits (Approximate volume % in air): LEL: 0.9 UEL: 7.0

Autoignition Temperature: N/D

Boiling Point / Range: N/D

Vapor Density (Air = 1): N/D

Vapor Pressure: [N/D at 20 °C] | < 1 kPa (7.5 mm Hg) at 38C

Evaporation Rate (n-butyl acetate = 1): < 1

pH: N/A

Log Pow (n-Octanol/Water Partition Coefficient): > 3.5

Solubility in Water: Negligible

Viscosity: [N/D at 40 °C] | 11.3 cSt (11.3 mm²/sec) at 100C

Oxidizing Properties: See Sections 3, 15, 16.

OTHER INFORMATION

Freezing Point: N/D

Melting Point: N/A

Pour Point: -45°C (-49°F)

DMSO Extract (mineral oil only), IP-346: < 3 %wt

SECTION 10

STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

CONDITIONS TO AVOID: Excessive heat. High energy sources of ignition.

MATERIALS TO AVOID: Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11

TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

Route of Exposure	Conclusion / Remarks
Inhalation	
Toxicity (Rat): LC50 > 5000 mg/m3	Minimally Toxic. Based on test data for structurally similar materials.
Irritation: No end point data.	Negligible hazard at ambient/normal handling temperatures. Based on assessment of the components.
Ingestion	
Toxicity (Rat): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Skin	
Toxicity (Rabbit): LD50 > 5000 mg/kg	Minimally Toxic. Based on test data for structurally similar materials.
Irritation (Rabbit): Data available.	Negligible irritation to skin at ambient temperatures. Based on test data for structurally similar materials.
Eye	
Irritation (Rabbit): Data available.	May cause mild, short-lasting discomfort to eyes. Based on test data for structurally similar materials.

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CHRONIC/OTHER EFFECTS

For the product itself:

Diesel engine oils: Not carcinogenic in animals tests. Used and unused diesel engine oils did not produce any carcinogenic effects in chronic mouse skin painting studies.

Oils that are used in gasoline engines may become hazardous and display the following properties:
Carcinogenic in animal tests. Caused mutations in vitro. Possible allergen and photoallergen. Contains polycyclic aromatic compounds (PAC) from combustion products of gasoline and/or thermal degradation products.

Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

Synthetic base oils: Not expected to cause significant health effects under conditions of normal use, based on laboratory studies with the same or similar materials. Not mutagenic or genotoxic. Not sensitizing in test animals and humans.

Additional information is available by request.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

1 = NTP CARC

3 = IARC 1

5 = IARC 2B

2 = NTP SUS

4 = IARC 2A

6 = OSHA CARC

SECTION 12

ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

MOBILITY

Base oil component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

PERSISTENCE AND DEGRADABILITY

Biodegradation:

Base oil component -- Expected to be inherently biodegradable

BIOACCUMULATION POTENTIAL

Base oil component -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

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SECTION 13

DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products.

REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

Empty Container Warning Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

SECTION 14

TRANSPORT INFORMATION

LAND (DOT) : Not Regulated for Land Transport

LAND (TDG) : Not Regulated for Land Transport

SEA (IMDG) : Not Regulated for Sea Transport according to IMDG-Code

AIR (IATA) : Not Regulated for Air Transport

SECTION 15

REGULATORY INFORMATION

OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

NATIONAL CHEMICAL INVENTORY LISTING: IECSC, KECI, DSL, TSCA, PICCS, ENCS

Special Cases:

Inventory	Status
AICS	Restrictions Apply
ELINCS	Restrictions Apply

EPCRA: This material contains no extremely hazardous substances.

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SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

SARA (313) TOXIC RELEASE INVENTORY:

Chemical Name	CAS Number	Typical Value
ZINC DITHIOPHOSPHATE	68649-42-3	< 2.5%

The Following Ingredients are Cited on the Lists Below:

Chemical Name	CAS Number	List Citations
DIPHENYLAMINE	122-39-4	5, 18
ZINC DITHIOPHOSPHATE	68649-42-3	13, 15, 17

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

SECTION 16	OTHER INFORMATION

N/D = Not determined, N/A = Not applicable

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:

Revision Changes:

Section 06: Notification Procedures - Header was modified.

Section 13: Empty Container Warning was modified.

Section 08: Hand Protection was modified.

Section 11: Dermal Lethality Test Data was modified.

Section 11: Oral Lethality Test Data was modified.

Section 15: List Citations Table was modified.

Section 15: List Citation Table - Header was modified.

Section 15: National Chemical Inventory Listing was modified.

Section 16: Code to MHCs was modified.

Section 06: Notification Procedures was modified.

Section 15: TSCA Class 2 Statement was deleted.

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affiliates in which they directly or indirectly hold any interest.

Internal Use Only

MHC: 0B, 0B, 0, 0, 0, 0

PPEC: A

DGN: 7052921XUS (1009344)

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Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

CAT® ELC₂ (EXTENDED LIFE COOLANT) PREMIX 50/50 WITH EMBITTERMENT

Product Use: Antifreeze/Coolant

Product Number(s): CPS226387

Company Identification

Chevron Products Company
a division of Chevron U.S.A. Inc.
6001 Bollinger Canyon Road
San Ramon, CA 94583
United States of America

Transportation Emergency Response

CHEMTREC: (800) 424-9300 or (703) 527-3887

Health Emergency

Chevron Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623

Product Information

email : lubemsds@chevron.com
Product Information: 800-LUBE-TEK

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Ethylene Glycol	107-21-1	30 - 60 %weight
Sodium 2-ethylhexanoate	19766-89-3	1 - 5 %weight

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

- HARMFUL OR FATAL IF SWALLOWED
- CONTAINS MATERIAL THAT MAY CAUSE HARM TO THE UNBORN CHILD
- CONTAINS MATERIAL THAT MAY CAUSE ADVERSE REPRODUCTIVE EFFECTS BASED ON ANIMAL DATA
- CAUSES DAMAGE TO:
 - KIDNEY

IMMEDIATE HEALTH EFFECTS

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1 of 7

CAT® ELC₂ (EXTENDED LIFE
COOLANT) PREMIX 50/50 WITH
EMBITTERMENT
MSDS : 10674

Eye: Not expected to cause prolonged or significant eye irritation.

Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin.

Ingestion: Toxic; may be harmful or fatal if swallowed.

Inhalation: The vapor or fumes from this material may cause respiratory irritation. Symptoms of respiratory irritation may include coughing and difficulty breathing. Breathing this material at concentrations above the recommended exposure limits may cause central nervous system effects. Central nervous system effects may include headache, dizziness, nausea, vomiting, weakness, loss of coordination, blurred vision, drowsiness, confusion, or disorientation. At extreme exposures, central nervous system effects may include respiratory depression, tremors or convulsions, loss of consciousness, coma or death.

DELAYED OR OTHER HEALTH EFFECTS:

Reproduction and Birth Defects: Contains material that may cause adverse reproductive effects if swallowed based on animal data. Contains material that may be harmful to the developing fetus based on animal data.

Target Organs: Contains material that causes damage to the following organ(s) if swallowed: Kidney
See Section 11 for additional information. Risk depends on duration and level of exposure.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.

Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.

Ingestion: If swallowed, get immediate medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person.

Inhalation: Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue. Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue or if any other symptoms develop.

SECTION 5 FIRE FIGHTING MEASURES

FIRE CLASSIFICATION:

OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

NFPA RATINGS: Health: 2 Flammability: 1 Reactivity: 0

FLAMMABLE PROPERTIES:

Flashpoint: Not Applicable

Autoignition: No data available

Flammability (Explosive) Limits (% by volume in air): Lower: Not Applicable Upper: Not Applicable

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames. Dry Chemical, CO₂, AFFF Foam or alcohol resistant foam.

PROTECTION OF FIRE FIGHTERS:

Fire Fighting Instructions: This material will burn although it is not easily ignited. See Section 7 for proper handling and storage. For fires involving this material, do not enter any enclosed or confined fire space

without proper protective equipment, including self-contained breathing apparatus.

Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material.

Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.

Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Do not breathe vapor or fumes. Wash thoroughly after handling.

General Handling Information: Do not taste or swallow antifreeze or solution. Keep out of the reach of children and animals.

General Storage Information: Do not store in open or unlabeled containers.

Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:

Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:

Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.

Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: Natural rubber, Neoprene, Nitrile Rubber, Polyvinyl Chloride (PVC or Vinyl).

Respiratory Protection: Determine if airborne concentrations are below the recommended occupational exposure limits for jurisdiction of use. If airborne concentrations are above the acceptable limits, wear an approved respirator that provides adequate protection from this material, such as: Air-Purifying Respirator for Organic Vapors, Dusts and Mists.

Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Ethylene Glycol	ACGIH	--	--	100 mg/m3	--

Consult local authorities for appropriate values.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Red

Physical State: Liquid

Odor: Faint or Mild

pH: 8.1 - 8.5

Vapor Pressure: 0.12 mmHg (Typical) @ 20 °C (68 °F)

Vapor Density (Air = 1): 2.1

Boiling Point: 108.9°C (228°F)

Solubility: Miscible

Freezing Point: -37°C (-34.6°F)

Specific Gravity: 1.08 @ 15.6°C (60.1°F) / 15.6°C (60.1°F)

Viscosity: No data available

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

Hazardous Decomposition Products: Ketones (Elevated temperatures), Aldehydes (Elevated temperatures)

Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS

Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.

Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.

Skin Sensitization: The skin sensitization hazard is based on evaluation of data for similar materials or product components.

Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

ADDITIONAL TOXICOLOGY INFORMATION:

This product contains ethylene glycol (EG). The toxicity of EG via inhalation or skin contact is expected to be slight at room temperature. The estimated oral lethal dose is about 100 cc (3.3 oz.) for an adult human.

Ethylene glycol is oxidized to oxalic acid which results in the deposition of calcium oxalate crystals mainly in the brain and kidneys. Early signs and symptoms of EG poisoning may resemble those of alcohol intoxication. Later, the victim may experience nausea, vomiting, weakness, abdominal and muscle pain, difficulty in breathing and decreased urine output. When EG was heated above the boiling point of water, vapors formed which reportedly caused unconsciousness, increased lymphocyte count, and a rapid, jerky movement of the eyes in persons chronically exposed. When EG was administered orally to pregnant rats and mice, there was an increase in fetal deaths and birth defects. Some of these effects occurred at doses that had no toxic effects on the mothers. We are not aware of any reports that EG causes reproductive toxicity in human beings.

2-Ethylhexanoic acid (2-EXA) caused an increase in liver size and enzyme levels when repeatedly administered to rats via the diet. When administered to pregnant rats by gavage or in drinking water, 2-EXA caused teratogenicity (birth defects) and delayed postnatal development of the pups. Additionally, 2-EXA impaired female fertility in rats. Birth defects were seen in the offspring of mice who were administered sodium 2-ethylhexanoate via intraperitoneal injection during pregnancy.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY

This material is not expected to be harmful to aquatic organisms. The ecotoxicity hazard is based on an evaluation of data for the components or a similar material.

ENVIRONMENTAL FATE

Ready Biodegradability: This material is expected to be readily biodegradable. The biodegradability of this material is based on an evaluation of data for the components or a similar material.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: PROPRIETARY ANTIFREEZE PREPARATION IN NON-BULK PACKAGING; NOT REGULATED FOR TRANSPORT UNDER 49 CFR

Additional Information: Bulk shipments containing a reportable quantity (RQ, 5000 pounds or more) of ethylene glycol in a single packaging are transported as hazardous material. The shipping description is: UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (ETHYLENE GLYCOL CONTAINS BITTERANT), 9, III, RQ (ETHYLENE GLYCOL)

IMO/IMDG Shipping Description: NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER THE IMDG CODE

ICAO/IATA Shipping Description: Anti-freeze Preparations, Proprietary; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER ICAO

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES:	1. Immediate (Acute) Health Effects:	YES
	2. Delayed (Chronic) Health Effects:	YES
	3. Fire Hazard:	NO
	4. Sudden Release of Pressure Hazard:	NO
	5. Reactivity Hazard:	NO

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

The following components of this material are found on the regulatory lists indicated.
Ethylene Glycol 03, 05, 06, 07

CHEMICAL INVENTORIES:

All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), ENCS (Japan), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States).

NEW JERSEY RTK CLASSIFICATION:

Refer to components listed in Section 2.

WHMIS CLASSIFICATION:

Class D, Division 1, Subdivision B: Toxic Material -
Acute Lethality

Class D, Division 2, Subdivision A: Very Toxic Material -
Teratogenicity and Embryotoxicity
Reproductive Toxicity

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 2 Flammability: 1 Reactivity: 0

HMIS RATINGS: Health: 2* Flammability: 1 Reactivity: 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:

Label Category : ANTIFREEZE/COOLANT 3 - AFC3

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet:
1,2,5,9,12,16

Revision Date: JULY 18, 2012

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Governmental Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.



MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Material name	D-MO GOLD
Version #	03
Issue date	10-22-2012
Revision date	11-13-2012
Supersedes date	11-13-2012
CAS #	Mixture
Product code	2882
Product use	Lubrication oil.
Synonym(s)	SAE 10W30; 15W40; Sonic D-MO Gold; SAE 10W-30; 15W-40
Manufacturer information	
Manufacturer	Consumers' Co-operative Refineries Limited
Address	P.O. Box 260; 9th Avenue North Regina, SK S4P 3A1 Canada (306) 721-5353
Telephone	
Supplier	Federated Co-operatives Limited
Address	P.O. Box 1050, 401 - 22nd Street East Saskatoon SK S7K 3M9 Canada (306) 244-3447
Telephone	
24 Hour Emergency	(613) 996-6666 - Canutec
Telephone	

2. Hazards Identification

Physical state	Liquid.
Appearance	Yellowish liquid.
Emergency overview	Low hazard for usual industrial or commercial handling by trained personnel.
OSHA regulatory status	This product is not hazardous according to OSHA 29CFR 1910.1200.
Potential health effects	
Routes of exposure	Eye contact. Skin contact. Ingestion. Inhalation.
Eyes	Direct contact with eyes may cause temporary irritation.
Skin	Prolonged skin contact may cause temporary irritation.
Inhalation	May cause respiratory tract irritation.
Ingestion	Under normal conditions of intended use, this material does not pose a risk to health.
Chronic effects	No data available.
Potential environmental effects	No special environmental precautions required.

3. Composition / Information on Ingredients

The manufacturer lists no ingredients as hazardous according to OSHA 29 CFR 1910.1200.

4. First Aid Measures

First aid procedures

Eye contact	Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 20 minutes, occasionally lifting the upper and lower eyelids. Get medical attention if symptoms occur.
Skin contact	In case of contact, flush skin with plenty of water for at least 20 minutes, while removing contaminated shoes and clothes. Wash contaminated skin with soap and water. Wash contaminated clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops and persists.
Inhalation	If fumes or combustion products are inhaled move victim to fresh air. Get medical attention if any discomfort occurs.

Ingestion	Do not induce vomiting. Never give anything by mouth to an unconscious person. Get medical attention if any discomfort occurs.
Notes to physician	Treat symptomatically.
General advice	If you feel unwell, seek medical advice (show the label where possible).

5. Fire Fighting Measures

Extinguishing media

Suitable extinguishing media	Extinguish with water spray, carbon dioxide, dry chemical or material appropriate for the surrounding fire.
Unsuitable extinguishing media	None.

Protection of firefighters

Specific hazards arising from the chemical	By heating and fire, toxic vapors/gases may be formed.

Fire fighting equipment/instructions

Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

Specific methods

Use standard firefighting procedures and consider the hazards of other involved materials.

Hazardous combustion products

Incomplete combustion may produce: Carbon oxides.

6. Accidental Release Measures

Personal precautions	In case of spills, beware of slippery floors and surfaces. Wear suitable protective clothing and gloves.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground. Prevent spreading over a wide area (e.g. by containment or oil barriers).
Methods for containment	Collect and dispose of spillage as indicated in Section 13 of the MSDS.
Methods for cleaning up	Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
Other information	Clean up in accordance with all applicable regulations.

7. Handling and Storage

Handling	Observe good industrial hygiene practices. Use appropriate Personal Protective Equipment.
Storage	Store in original tightly closed container. Keep in a cool, well-ventilated place.

8. Exposure Controls / Personal Protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Engineering controls	General ventilation is normally adequate.
Personal protective equipment	
Eye / face protection	Wear approved safety glasses or goggles.
Skin protection	Wear appropriate clothing to prevent repeated or prolonged skin contact. Wear protective gloves. Chemical resistant, impervious gloves are recommended.
Respiratory protection	No personal respiratory protective equipment normally required.
General hygiene considerations	Handle in accordance with good industrial hygiene and safety practices.

9. Physical & Chemical Properties

Appearance	Yellowish liquid.
Physical state	Liquid.
Form	Liquid.
Color	Yellowish.
Odor	Hydrocarbon.
Odor threshold	Not available.
pH	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Boiling point	Not available.

Melting point/Freezing point	Not available.
Solubility (water)	Insoluble in cold and hot water.
Specific gravity	0.90 at 15.5°C
Flash point	428 °F (220 °C) Open Cup
Flammability limits in air, upper, % by volume	Not available.
Flammability limits in air, lower, % by volume	Not available.
Auto-ignition temperature	Not available.

10. Chemical Stability & Reactivity Information

Chemical stability	Material is stable under normal conditions.
Conditions to avoid	Heat or contact with oxidizing materials will greatly increase fire and explosion hazards.
Incompatible materials	Reactive or incompatible with the following materials: Oxidizing materials. Acids.
Hazardous decomposition products	None expected under normal conditions of use.
Possibility of hazardous reactions	Will not occur.

11. Toxicological Information

Sensitization	No data available.
Acute effects	No data available.
Local effects	None known.
Chronic effects	Chronic effects are not expected when this product is used as intended.
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.
Mutagenicity	Not expected to be mutagenic.
Neurological effects	No data available.
Reproductive effects	Contains no ingredient listed as toxic to reproduction.
Teratogenicity	Not classified.

12. Ecological Information

Ecotoxicity	No data on possible environmental effects have been found.
Environmental effects	The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	No data is available on the degradability of this product.
Bioaccumulation / Accumulation	Not available.

13. Disposal Considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose in accordance with all applicable regulations.
Waste from residues / unused products	Dispose of waste and residues in accordance with local authority requirements.
Contaminated packaging	Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport Information

DOT	Not regulated as a hazardous material by DOT.
IATA	Not regulated as dangerous goods.
IMDG	Not regulated as dangerous goods.

TDG

Not regulated as dangerous goods.

15. Regulatory Information**US federal regulations**

This product is not hazardous according to OSHA 29CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

CERCLA (Superfund) reportable quantity (lbs) (40 CFR 302.4)

None

Superfund Amendments and Reauthorization Act of 1986 (SARA)**Hazard categories**

Immediate Hazard - No
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

Section 302 extremely hazardous substance (40 CFR 355, Appendix A)

No

Section 311/312 (40 CFR 370)

No

Drug Enforcement Administration (DEA) (21 CFR 1308.11-15)

Not controlled

WHMIS status

Non-controlled

Inventory status**Country(s) or region****Inventory name****On inventory (yes/no)***

Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	No

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s)

State regulations**US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance**

Not listed.

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. Pennsylvania RTK - Hazardous Substances

Not regulated.

16. Other Information

Further information

HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings

Health: 0
Flammability: 1
Physical hazard: 0

NFPA ratings

Health: 0
Flammability: 1
Instability: 0

Disclaimer

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 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

WHMIS (Pictograms)	WHMIS (Classification)	Protective Clothing
	Class D-2B: Material causing other toxic effects (TOXIC).	

Section I. Chemical Product and Company Identification

Product Name/ Trade Name	Ecopure EP61 Glass & Surface Cleaner	Code	1989
		CAS#	Not applicable.
Supplier	AVMOR LTD 950 Michelin Laval (QC) Tel : (450)-629-8074 www.avmorgreen.com	DSL	All ingredients are listed.
		CI#	Not applicable
Synonym	Not available.	In case of Emergency CANUTEC : 1-613-996-6666	
Chemical Name	Not applicable.		
Chemical Family	Mixture		
Chemical Formula	Not applicable.		
Manufacturer	AVMOR LTD 950 Michelin Laval (QC) Tel : (450)-629-8074 www.avmorgreen.com	Material Uses Glass & surface cleaner	

Section II. Composition and Information on Ingredients

			Exposure Limits	
Name	CAS #	% by Weight	TLV/PEL	LC ₅₀ /LD ₅₀
Alcohols, C9-11 ethoxylate	68439-46-3	5 - 10	Not available.	ORAL (LD50): Acute: 1400 mg/kg [Rat]. Not available.
Surfactant	N.J. Trade Secret Registry # 360116-01	1 - 5	Not available.	
Complexing agent	N.J. Trade Secret registry # 361102-02	1 - 5	Not available.	Not available.

Section III. Hazards Identification.

Potential Acute Health Effects	Irritating to eyes. Incidental skin contact is not expected to cause any significant irritation. If ingested might cause discomfort, diarrhea and nausea.
Potential Chronic Health Effects	No ingredient in this product is currently listed as carcinogens by IARC, NTP or OSHA. Prolonged contact without washing may cause skin rash or redness.

Continued on Next Page

Section IV. First Aid Measures

Eye Contact	In case of contact with eyes, rinse immediately with plenty of water. If irritation persists, get medical attention.
Skin Contact	Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. If irritation persists, seek medical attention.
Hazardous Skin Contact	Not applicable.
Inhalation	Allow to rest in a well ventilated area. If discomfort persists seek medical attention.
Hazardous Inhalation	Not applicable.
Ingestion	DO NOT induce vomiting. Have conscious person drink several glasses of water. Seek medical attention. NEVER give an unconscious person anything to ingest.
Hazardous Ingestion	Not applicable.

Section V. Fire and Explosion Data

The Product is:	Non-flammable.
Auto-Ignition Temperature	Not applicable.
Flash Points	Not applicable.
Flammable Limits	Not applicable.
Products of Combustion	Not applicable.
Fire Hazards in Presence of Various Substances	Not applicable.
Explosion Hazards in Presence of Various Substances	Risks of explosion of the product : Not explosive.
Fire Fighting Media and Instructions	Use dry chemical or CO ₂ .
Special Remarks on Fire Hazards	Not applicable.
Special Remarks on Explosion Hazards	Not applicable.

Section VI. Accidental Release Measures

Small Spill	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.
Large Spill	No additional information.

Section VII. Handling and Storage

Precautions	Avoid contact with skin and eyes. In case of contact with eyes, rinse with plenty of water. In case of contact, immediately flush skin with plenty of water.
Storage	Store in a cool, well-ventilated area away from incompatible materials.

Section VIII. Exposure Controls/Personal Protection

Engineering Controls	No special measures required for normal use conditions.
Personal Protection	Safety eyewear should be used when there is a likelihood of exposure. Gloves (impervious) are recommended for prolonged contact with bulk quantities.
Personal Protection in Case of a Large Spill	Wear suitable protective clothing, gloves and eye/face protection.
Exposure Limits	Not available.

Section IX. Physical and Chemical Properties

Physical State and Appearance	Liquid. (Clear.)	Odor	Fragrance free.
Molecular Weight	Not applicable.	Taste	Not available.
pH (1% soln/water)	11 to 12 (Conc. (% w/w): 100)	Color	Blue.
Boiling Point	The lowest known value is 100°C (212°F) (Water).		
Melting Point	May start to solidify at 0°C (32°F) based on data for: water .		
Critical Temperature	Not available.		
Specific Gravity	1.01 to 1.03 (Water = 1)		
Vapor Pressure	Not applicable.		
Vapor Density	The highest known value is >1 (Air = 1) (). Weighted average: 1 (Air = 1)		
Volatility	Not available.		
Odor Threshold	Not available.		
Evaporation rate	Not available.		
Viscosity	Not available.		
Water/Oil Dist. Coeff.	The product is much more soluble in water.		
Ionicity (in Water)	Not available.		
Dispersion Properties	See solubility in water.		
Solubility	Easily soluble in water		

Section X. Stability and Reactivity Data

Stability	The product is stable.
Instability Temperature	Not available.
Conditions of Instability	Not available.
Incompatibility with various substances	Incompatible with strong oxydizing materials.

Continued on Next Page

**Ecopure EP61
Glass & Surface Cleaner**

Page Number: 4

Corrosivity Not considered to be corrosive.

**Special Remarks on
Reactivity** No additional information.

**Special Remarks on
Corrosivity** No additional information.

Section XI. Toxicological Information

Routes of Entry Eye contact. Ingestion. Inhalation. Skin.

Toxicity to Animals See section II

**Chronic Effects on
Humans** No ingredient in this product is currently listed as carcinogens by IARC, NTP or OSHA. Prolonged contact without washing may cause skin rash or redness.

**Other Toxic Effects
on Humans** Irritating to eyes. Incidental skin contact is not expected to cause any significant irritation. If ingested might cause discomfort, diarrhea and nausea.

**Special Remarks on
Toxicity to Animals** Not available.

**Special Remarks on
Chronic Effects on
Humans** Not available.

**Special Remarks on
Other Toxic Effects on
Humans** Not available.

Section XII. Ecological Information

Ecotoxicity Not determined.

BOD5 and COD Not determined.

Products of Biodegradation All components of this product are readily biodegradable as per OECD 301E.

**Toxicity of the Products
of Biodegradation** The products of biodegradation are less toxic than the original product.

**Special Remarks on the
Products of Biodegradation** No additional information.

Section XIII. Disposal Considerations

Waste Disposal Dispose of material according to regional, provincial and federal regulations. Consult your local or regional authorities.

Section XIV. Transport Information

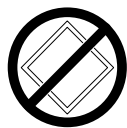
TDG Classification Not a TDG controlled material.

PIN Not applicable.

**Special Provisions for
Transport** No additional remark.

Continued on Next Page

TDG (Pictograms)



Section XV. Other Regulatory Information and Pictograms

Other Regulations OSHA: Not hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

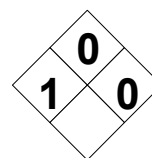
Other Classifications HCS (U.S.A.) Not determined.

DSCL (EEC) R36- Irritating to eyes.

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

Health Hazard	1
Fire Hazard	0
Reactivity	0
Personal Protection	b

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

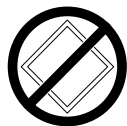


Fire Hazard

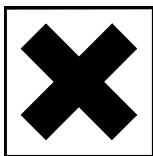
Reactivity

Specific Hazard

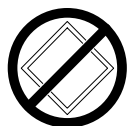
DOT (U.S.A) (Pictograms)



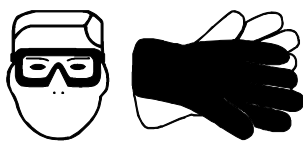
DSCL (Europe) (Pictograms)



ADR (Europe) (Pictograms)



Protective Equipment (Pictograms)



Section XVI. Other Information

References -Manufacturer's Material Safety Data Sheet. -Material safety data sheet issued by: la Commission de la Santé et de la Sécurité du Travail du Québec.

Other Special Considerations 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. Always follow label directions carefully when using this or any other chemical product. Keep MSDSs filed and organized in an area accessible to workers.

Validated by Regulatory Affairs on 16/05/2008.

Verified by Regulatory Affairs.

Printed 16/05/2008.

Information Contact If information about this product is required, please contact Avmor Ltd. at (450) 629-3800 or visit us at www.ecopure.ca.

Notice to Reader

Continued on Next Page

Ecopure EP61
Glass & Surface Cleaner

Page Number: 6

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

WHMIS (Pictograms)	WHMIS (Classification)	Protective Clothing
	Class D-2B: Material causing other toxic effects (TOXIC).	

Section I. Chemical Product and Company Identification

Product Name/ Trade Name	ECOPURE EP70 Washroom Cleaner	Code	1993
		CAS#	Not applicable.
Supplier	AVMOR LTD 950 Michelin Laval (QC) Tel : (450)-629-8074 www.avmorgreen.com	DSL	All ingredients are listed.
		CI#	Not applicable
Synonym	Not available.	In case of Emergency Emergency phone : CANUTEC : 1-613-996-6666 If information about this product is required, please contact Avmor Ltd at (450) 629-3800.	
Chemical Name	Not applicable.		
Chemical Family	Mixture		
Chemical Formula	Not applicable.		
Manufacturer	AVMOR LTD 950 Michelin Laval (QC) Tel : (450)-629-8074 www.avmorgreen.com	Material Uses washroom cleaner	

Section II. Composition and Information on Ingredients

			Exposure Limits	
Name	CAS #	% by Weight	TLV/PEL	LC ₅₀ /LD ₅₀
Ethoxylated C7-C21 alcohols	68991-48-0	10-30	Not available.	ORAL (LD50): Acute: 2000 mg/kg [Rat]. Not available.
Hydrogen peroxide	7722-84-1	1 - 5	Not available.	

Section III. Hazards Identification.

Potential Acute Health Effects	May cause severe eye irritation. Incidental skin contact is not expected to cause any significant irritation. If ingested might cause discomfort, diarrhea and nausea.
Potential Chronic Health Effects	No ingredient in this product is currently listed as carcinogens by IARC, NTP or OSHA. Prolonged contact without washing may cause skin rash or redness.

Section IV. First Aid Measures

Eye Contact	Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. If irritation persists, get medical attention.
Skin Contact	Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. If irritation persists, seek medical attention.
Hazardous Skin Contact	Not applicable.
Continued on Next Page	

**ECOPURE EP70
Washroom Cleaner****Page Number: 2**

Inhalation	Allow to rest in a well ventilated area. If discomfort persists seek medical attention.
Hazardous Inhalation	Not applicable.
Ingestion	DO NOT induce vomiting. Have conscious person drink several glasses of water. Seek medical attention. NEVER give an unconscious person anything to ingest.
Hazardous Ingestion	Not applicable.

Section V. Fire and Explosion Data

The Product is:	Non-flammable.
Auto-Ignition Temperature	Not applicable.
Flash Points	Not applicable.
Flammable Limits	Not applicable.
Products of Combustion	Not applicable.
Fire Hazards in Presence of Various Substances	Not applicable.
Explosion Hazards in Presence of Various Substances	Risks of explosion of the product : Not explosive.
Fire Fighting Media and Instructions	Use dry chemical or CO ₂ or water spray or fog.
Special Remarks on Fire Hazards	Not applicable.
Special Remarks on Explosion Hazards	Not applicable.

Section VI. Accidental Release Measures

Small Spill	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.
Large Spill	No additional information.

Section VII. Handling and Storage

Precautions	Avoid contact with skin and eyes. In case of contact with eyes, rinse with plenty of water. In case of contact, flush skin with plenty of water.
Storage	Store in a cool, well-ventilated area away from incompatible materials. Store between 10 -30 °C

Continued on Next Page

Section VIII. Exposure Controls/Personal Protection

Engineering Controls	No special measures required for normal use conditions.
Personal Protection	Safety glasses. Gloves (impervious) are recommended for prolonged contact with bulk quantities.
Personal Protection in Case of a Large Spill	Wear suitable protective clothing, gloves and eye/face protection.
Exposure Limits	US OSHA Hydrogene peroxyde : 1 ppm TWA

Section IX. Physical and Chemical Properties

Physical State and Appearance	Liquid. (Clear.)	Odor	Fragrance free.
Molecular Weight	Not applicable.	Taste	Not available.
pH (1% soln/water)	5 to 6.5 (Conc. (% w/w): 100) [Acidic.]	Color	Pinkish / Red.
Boiling Point	Weighted average: 113.43°C (236.2°F)		
Melting Point	Weighted average: 1.24°C (34.2°F)		
Critical Temperature	Not available.		
Specific Gravity	1.01 to 1.02 (Water = 1)		
Vapor Pressure	Not applicable.		
Vapor Density	Weighted average: 1.01 (Air = 1)		
Volatility	Not available.		
Odor Threshold	Not available.		
Evaporation rate	Not available.		
Viscosity	Not available.		
Water/Oil Dist. Coeff.	The product is much more soluble in water.		
Ionicity (in Water)	Not available.		
Dispersion Properties	See solubility in water.		
Solubility	Easily soluble in water		

Section X. Stability and Reactivity Data

Stability	The product is stable.
Instability Temperature	Not available.
Conditions of Instability	Not available.
Incompatibility with various substances	Incompatible with strong oxydizing materials and combustible materials
Corrosivity	Not considered to be corrosive.
Special Remarks on Reactivity	No additional information.
Special Remarks on Corrosivity	No additional information.

Continued on Next Page

Section XI. Toxicological Information

Routes of Entry	Eye contact. Ingestion. Inhalation. Skin.
Toxicity to Animals	See section II
Chronic Effects on Humans	No ingredient in this product is currently listed as carcinogens by IARC, NTP or OSHA. Prolonged contact without washing may cause skin rash or redness.
Other Toxic Effects on Humans	May cause severe eye irritation. Incidental skin contact is not expected to cause any significant irritation. If ingested might cause discomfort, diarrhea and nausea.
Special Remarks on Toxicity to Animals	Not available.
Special Remarks on Chronic Effects on Humans	Not available.
Special Remarks on Other Toxic Effects on Humans	Not available.

Section XII. Ecological Information

Ecotoxicity	Not determined.
BOD5 and COD	Not determined.
Products of Biodegradation	All surfactants of this product are readily biodegradable as per OECD 301
Toxicity of the Products of Biodegradation	The products of biodegradation are less toxic than the original product.
Special Remarks on the Products of Biodegradation	No additional information.

Section XIII. Disposal Considerations

Waste Disposal	Dispose of material according to regional, provincial and federal regulations. Consult your local or regional authorities.

Section XIV. Transport Information

TDG Classification	Not a TDG controlled material.
PIN	Not applicable.
Special Provisions for Transport	No additional remark.
TDG (Pictograms)	

Section XV. Other Regulatory Information and Pictograms

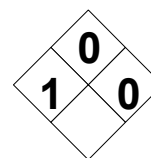
Other Regulations Not determined.

Other Classifications	HCS (U.S.A.)	Not determined.
	DSCL (EEC)	R41- Risk of serious damage to eyes.

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

Health Hazard	1
Fire Hazard	0
Reactivity	0
Personal Protection	b

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

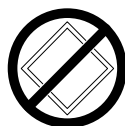


Fire Hazard

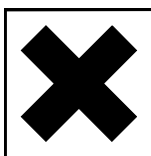
Reactivity

Specific Hazard

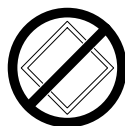
DOT (U.S.A.)
(Pictograms)



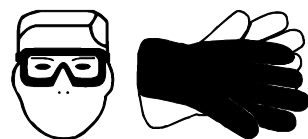
DSCL (Europe)
(Pictograms)



ADR (Europe)
(Pictograms)



Protective Equipment
(Pictograms)



Section XVI. Other Information

References -Manufacturer's Material Safety Data Sheet. -Material safety data sheet issued by: la Commission de la Santé et de la Sécurité du Travail du Québec.

Other Special Considerations 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. Always follow label directions carefully when using this or any other chemical product. Keep MSDSs filed and organized in an area accessible to workers.

Validated by Regulatory Affairs on 23/12/2008.

Verified by Regulatory Affairs.

Printed 23/12/2008.

Information Contact If information about this product is required, please contact
Avmor Ltd. at (450) 629-3800 or visit us at www.ecopure.ca.

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

Product Trade Name: EZ-MUD GOLD

Revision Date: 02-Jun-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: EZ-MUD GOLD
Synonyms: None
Chemical Family: Anionic Polymer
Application: Additive

Manufacturer/Supplier Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Contains no hazardous substances	Mixture	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and skin irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMS Ratings: Flammability 0, Reactivity 0, Health 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust. Slippery when wet.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. Slippery when wet.

Storage Information Store away from oxidizers. Store in a cool, dry location. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%) Not normally needed. But if significant exposures are possible then the following respirator is recommended:

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Granules
Color:	Off white
Odor:	Odorless
pH:	7.75 (1%)
Specific Gravity @ 20 C (Water=1):	0.8-1.0
Density @ 20 C (lbs./gallon):	6.66-8.33
Bulk Density @ 20 C (lbs/ft3):	52
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Ammonia. Oxides of nitrogen. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	None known.
Skin Contact	May cause mild skin irritation.
Eye Contact	May cause mild eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	

Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not readily biodegradable.
Bio-accumulation	Will not bio-accumulate.

Ecotoxicological Information

Acute Fish Toxicity:	TLM96: >1000 mg/l (Pimephales promelas)
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	EC50: > 500 mg/l (Selenastrum capricornutum)

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS

Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

KLEEN-FLO TUMBLER INDUSTRIES LIMITED		MATERIAL SAFETY DATA SHEET		PAGE 1
SECTION I-MATERIAL IDENTIFICATION AND USE				
Material Name/Identifier:	Anti-Seize Sealing Compound	Stock No.	810	
Manufacturer's Name:	Kleen-Flo Tumbler Industries Ltd	Street Address:	75 Advance Blvd.	
City:	Brampton	Province:	Ontario	
Postal Code:	L6T 4N1	Emergency Phone #:	CANUTEC:- 613-996-6666 (24HR)	
Chemical Name:	N. Ap (Mixture)	Chemical Family:	N/Av.	
Chemical Formula:	N. Ap (Mixture)	Trade Names & Synonyms:	None	
Material Use:	Sealer-Lubricant	Molecular Weight:	N. Ap (Mixture)	
SECTION II-HAZARDOUS INGREDIENTS OF MATERIAL				
Hazardous Ingredients	C.A.S.	Approximate Concentration	LD50 Species & Route	LC50 Species & Route
Aluminum	429-90-5	5-10%	N/Av.	N/Av.
Aluminum Stearate	637-12-7	5-10%	N/Av.	N/Av.
Copper	7440-50-8	5-10%	N/Av.	N/Av.
Graphite	7792-42-5	10-30%	N/Av.	N/Av.
Mineral Spirits	8032-32-4	15 -40%	N/Av.	3400 ppm (4hr) rat-inh.
Zinc Oxide	1314-13-2	1-5%	N/Av.	N/Av.
SECTION III-PHYSICAL DATA FOR MATERIAL				
Physical State:	Paste	Odour/Appearance:	faint, sweet odour/ copper paste	
Specific Gravity:	1.31	Odour Threshold(p.p.m.):	N/Av.	
Boiling Point:	N/Av.	Evaporation Rate (B.A.=1):	N/Av.	
Freezing Point:	N/Av.	Solubility in Water:	Negligible	
% Volatile(by volume):	N/Av.	Vapour Pressure (mm) Hg:	N/Av.	
Vapour Density(Air=1):	N/Av.	Coefficient of Water/Oil Distribut:	N/Av.	
pH	N/Av			
SECTION IV-FIRE AND EXPLOSION HAZARD OF MATERIAL				
Flammability Yes/No	No	If yes under which conditions?:	N.Ap.	
Auto Ignition Temperature:	N/Av.	Means of Extinction:	carbon dioxide, dry chemicals, foam	
Flashpoint and Method:	213°C COC	Hazardous Combustion Prod.:	carbon monoxide, carbon dioxide, oxides	
			sulfur and nitrogen, toxic fumes of metals and oxides.	
Upper Flammable limit %vol	N/Av.	Lower Flammable Limit(% by volume):	N/Av.	
Sensitivity to mechanical Impact	N/Av	Sensitivity to Static Discharge:	N.Ap.	
SECTION V-REACTIVITY DATA				
Chemical Stability Yes/No:	Yes	If NO under which conditions?	N.Ap.	
Incompatibility to Other Substances Yes/No:	Yes	If so which ones?	Strong acids, base, oxidizers, bromate, chlorate,	
			Iodates, Chlorinated hydrocarbons.	
Reactivity and under what conditions?	Open flame, fire			
Hazardous Decomposition Products:	Carbon monoxide, carbon dioxide, Oxides of Sulfur, Nitrogen, Toxic Metal fumes			
	and oxides.			
N/E: not established	N.Ap.: not applicable		N/Av.: not available	

Material Name/Identifier: Anti-Seize Sealing Compound		Stock No. 810		PAGE 2
SECTION VI-TOXICOLOGICAL PROPERTIES OF PRODUCT				
Route of Entry: ALL Routes	--SKIN CONTACT --SKIN ABSORPTION --EYE CONTACT --INHALATION --INGESTION			
Effects of Acute Exposure:	May cause eye, irritation, skin irritation, drying and cracking. Ingestion may cause irritation and burning			
	pain in mouth and stomach, thirst, nausea, vomiting, diarrhea with possible collapse if large amount ingested.			
Effects of Chronic Exposure:	Chronic exposure to aluminum is possibly connected with Alzheimer's disease. Copper contact nasal membranes			
	may cause ulceration or perforation. Some test indicates that it's reproductive toxine and feto toxin.			
LD 50 of Product:	N/Av.	LC 50 of Product:	N/Av.	
Irritancy of Product:	Eye, skin Irritant	Exposure Limits of Prod:	N/Av.	
Sensitization of Product:	Contains copper, a potential skin sensitizer	Toxicologically Synergistic Materials:	N/Av.	
--CARCINOGENICITY --REPRODUCTIVE EFFECTS --TERATOGENICITY --MUTAGENICITY			N/Av.	
SECTION VII-PREVENTIVE MEASURES				
Personal Protective Equipment to be used:				
Gloves(specify):	Chemical resistant gloves	Eye(specify):	Safety glasses	
Respiratory (specify):	Not Required in normal use	Clothing:	Not Required	
Respiratory Protection:	If mist generated by heating or spraying, wear NOISH approved organic vapour cartridge respirator suitable			
	for oil mist areas with sufficient oxygen.			
Engineering Controls:	Local or mechanical exhaust ventilation is recommended.			
Leak and Spill Procedure:	Contain spilled liquid with inert absorbant such as dry claysand, diatomaceous earth.			
	Prevent spills from entering sewers.			
Waste Disposal:	Standard methods as approved in your region by government bodies..			
Storage Requirements:	Store in cool, well ventilated place. Keep away from heat opn flame, spark and incompatible materials			
Handling Procedures and	Avoid skin or eye contact. Wash hand thoroughly after handling and before eating. Launder contaminated cloths.			
Equipment:	Keep containers closed.			
DSL listing	All components are listed.			
TDG Classification:	Not regulated			
WHMIS Classification:	Consumer Commodity			
SECTION VIII-FIRST AID MEASURES				
Eye:	Wash with water for at least 15 minutes. Seek immediate medical help if irritation persists.			
Skin:	Flush immediately and thoroughly with soap and water. Contact doctor if rash, irritation persist.			
Inhalation:	Move patient to fresh air and restore breathing if required. See doctor if discomfort persist.			
Ingestion:	DO NOT INDUCE VOMITING. Get prompt medical attention.			
SECTION IX-PREPARATION DATE OF M.S.D.S.				
Additional Info/Comments:		Source used: Supplier's data		
Phone Number:	(905) 793-4311	Prepared By: Quality Control Laboratory		
Date prepared:	January 16, 2012.	Kleen-Flo Tumbler Industries Limited		
THIS SHEET SUPERSEDES ANY OTHER M.S.D.S. PREVIOUSLY PREPARED				
N/E: not established		N.Ap.: not applicable		N/Av.: not available

SECTION I-MATERIAL IDENTIFICATION AND USE

Material Name/Identifier:	Safe -T-Brake	Stock No.	509/510/511/513
Manufacturer's Name:	Kleen-Flo Tumbler Industries Ltd	Street Address:	75 Advance Blvd.
City:	Brampton	Province:	Ontario
Postal Code:	L6T 4N1	Emergency Phone #:	CANUTEC:- 613-996-6666 (24HR)
Chemical Name:	N/Ap (mixture)	Chemical Family:	Alcohol
Chemical Formula:	N/Ap (mixture)	Trade Names & Synonyms:	Safe-T-Brake
Material Use:	Air Brake Anti-Freeze	Molecular Weight:	N/Ap.

SECTION II-HAZARDOUS INGREDIENTS OF MATERIAL

Hazardous		Approximate	LD50	LC50
Ingredients	C.A.S.	Conc. %wt.	Species & Route	Species & Route
Methanol	67-56-1	60 - 100%	5628 mg/kg rat-oral	64000 ppm (4hrs) rat-inh.

SECTION III-PHYSICAL DATA FOR MATERIAL

Physical State:	Liquid	Odour/Appearance:	Colourless with alcoholic odour.
Specific Gravity:	0.792	Odour Threshold(p.p.m.):	N/Av.
Boiling Point:	64.5°C	Evaporation Rate:	4.1
Freezing Point:	-97.8°C	Solubility in Water:	miscible
% Volatile(by volume):	100	Vapour Pressure(mm)Hg:	96 mm Hg @ 20°C
Vapour Density(Air=1):	1.105 @ 15°C	Coefficient of Water/Oil Distribut:	readily soluble in water, separates from oil.
pH	7 - 8		

SECTION IV-FIRE AND EXPLOSION HAZARD OF MATERIAL

Flammability Yes/No	Yes	If yes under which conditions:	Can be ignited under almost all normal temp. conditions.
Auto Ignition Temperature:	385°C	Means of Extinguishing:	Carbondioxide, Dry chemical media for small fire.
Flashpoint and Method:	11.5°C TCC	Water spray in a fog form, Alcohol resistant foam for large fire.	
		Hazardous Combustion Products:	Fumes, smokes, oxides of carbon & formalddhyde.
Upper Flammable limit (%vol)	36.5	Lower Flammable Limit(% by volume):	6
Explosion Data:	Sensitivity of mechanical Impact: Yes	Sensitivity to Static Discharge: Yes	Use grounded quipment.

SECTION V-REACTIVITY DATA

Chemical Stability Yes/No:	Yes	If NO under which conditions?	N.Ap.
Incompatibility to Other Substances Yes/No:	Yes	If so which ones?	strong acids, strong bases & strong oxidizers.
		May react with metallic aluminum or magnisium and generate hydrogen gas.	
Reactivity and under what conditions?	Yes, Heat, spark, open flame and in contact with incompatible substance		
Hazardous Decomposition Products:	Carbon monoxide, carbon dioxide, formaldehyde on burning.		
N/E: not established	N.Ap.: not applicable		N/Av.: not available

SECTION VI-TOXICOLOGICAL PROPERTIES OF PRODUCT

Route of Entry: All routes	--SKIN CONTACT --SKIN ABSORPTION --EYE CONTACT --INHALATION --INGESTION		
Effects of Acute Exposure:	Cause skin & eye irritation, ingestion may cause severe headache, dizziness, nausea, vomiting, and depression of the central nervous system. May cause visual disturbance or blindness.		
Effects of Chronic Exposure:	May cause visual impairment and progress to contraction of visual fields and sometimes complete blindness. The fatal internal dosage is 60 - 250 ml.		
Irritancy of Product:	Skin and eye irritant	Exposure Limits of Product:	200 ppm skin (ACGIH)
Sensitization of Product:	N/E	Toxicologically Synergistic Materials:	N/E
--CARCINOGENICITY --REPRODUCTIVE EFFECTS --TERATOGENICITY --MUTAGENICITY			none known

SECTION VII-PREVENTIVE MEASURES

Personal Protective Equipment to be used:

Gloves(specify):	Butyl Rubber, Nitrile, Chemical resistant gloves	Eye(specify):	Safety Goggles
Respiratory(specify):	Not required in normal use	Clothing:	Not required in normal use
Respiratory Protection:	If used indoors or on a continuous basis, use of NIOSH approved respirator is recommended		
Engineering Controls:	Local or mechanical ventilation required to maintain exposure limit below TLV.		
Leak and Spill Procedure:	Remove all sources of ignition. Use non sparking, explosion proof equipment. Use non reactive absorbent, Contain liquid, dispose waste material at an approved hazardous waste disposal facility in accordance with local, provincial and federal regulation.		
Waste Disposal:	Dispose off at an approved waste disposal facility.		
Storage Requirements:	Keep away from open flames or sparks. Store in a cool place where temperature below 40 °C.		
Handling Procedures and Equipment:	Keep away from children. Do not inhale or ingest. Use of spark resistant tools and equipment is recommended.		
TDG Classification:	Flammable Liquids, Toxic. Organic, n.o.s.(methanol mixture) Class 3 (6.1)UN 1992, Pkg.Gr.II #510, #511, #513 #509 Limited Quantity		
WHMIS Classification:	#509 Consumer commodity	#510, #511 & 513: B2, D1B, D2A, D2B	

SECTION VIII-FIRST AID MEASURES

Eye:	Flush with fresh water for at least 15 minutes. Seek immediate medical attention immediately.
Skin:	Wash with soap and water see doctor if irritation persist.
Inhalation:	Move patient to fresh air and restore breathing if required. Call a physician immediately if discomfort persist.
Ingestion:	DO NOT INDUCE VOMITING. If person is conscious then give a glass of water. Do not give anything by mouth to unconscious person. Vomiting should be induce under the direction of Doctor only. Call doctor immediately.

SECTION IX-PREPARATION DATE OF M.S.D.S.

Additional Info/Comments:		Sources Used: Supplier's data
Phone Number:	(905) 793-4311	Prepared By: Quality Control Laboratory
Date Prepared:	January 2, 2012	Kleen-Flo Tumbler Industries Limited



Material Safety Data Sheet

WHMIS (Pictograms)	WHMIS (Classification)	Personal protective equipment
	Class D-1B: Material causing immediate and serious toxic effects (Toxic). Class D-2B: Material causing other toxic effects (Toxic).	

Section 1. Product and Company Identification

Product name / Trade name	Brake Fluid DOT 3	Associated Product's Item Code	35-814PRES
Synonym	Not available.	CAS #	Not applicable.
Chemical family	Not available.	Validation date	Jan. 09 2012
Chemical formula		Print date	Jan. 17 2012
Manufacturer	Recochem Inc. 850 Montee de Liesse Montreal, Quebec H4T 1P4 (514) 341-3550 www.recochem.com	In case of emergency	Recochem Inc. Communications and Regulatory Affairs Department (905) 878-5544
Material uses	Consumer products: Brake Fluid.		

Section 2. Hazards identification

Emergency Overview	CONTAINS MATERIAL THAT CAN CAUSE TARGET ORGAN DAMAGE. Avoid exposure - obtain special instructions before use. Do not breathe vapor or mist. Contains material that can cause target organ damage.
Potential Acute Health Effects	See section 11 for more detailed information on health effects and symptoms. Slightly hazardous by the following route of exposure: of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, . Severe over-exposure can result in death.
Note to Physician	Not available.

Section 3. Composition, information on ingredients

Canada

Name	CAS number	%
2-(2-(2-ethoxyethoxy)ethoxy)ethanol	112-50-5	50 - 70
Poly(oxy-1,2-ethanediyl), .alpha.-hydro-.omega.-hydroxy-Ethane-1,2-diol, ethoxylated	25322-68-3	15 - 40
2,2'-oxybisethanol	111-46-6	10 - 12

There are no ingredients or 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.

Continued on next page

**Section 4. First aid measures**

Eye contact	Immediately flush eyes with plenty of water for at least 60 minutes, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.
Skin contact	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Inhalation	Move exposed person to fresh air. Keep person warm and at rest. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Ingestion	Wash out mouth with water. Remove dentures if any. Move exposed person to fresh air. Keep person warm and at rest. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Notes to physician	No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Section 5. Fire fighting measures

Products of combustion	Decomposition products may include the following materials: carbon oxides
Fire-fighting media and instructions	Use an extinguishing agent suitable for the surrounding fire.
Fire Hazards	Not considered to be flammable.
Explosion Hazards	Not considered to be a product presenting a risk of explosion.

Section 6. Accidental release measures

Small spill and leak	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 and leak	Stop leak if without risk. Move containers from spill area. Approach 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 spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 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 breathe vapor or mist. Do not ingest. 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.

Continued on next page



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 unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls, personal protection

Engineering controls	If user operations generate dust, fumes, gas, vapor 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.

Personal protection

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, gases or dusts.
Recommended: splash goggles

Body 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.

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.

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.
>8 hours (breakthrough time): nitrile rubber

Product name

Exposure limits

United States

Poly(oxy-1,2-ethanediyl), .alpha.-hydro-
.omega.-hydroxy-Ethane-1,2-diol, ethoxylated
2,2'-oxybisethanol

AIHA WEEL (United States, 1/2007).

TWA: 10 mg/m³ 8 hour(s). Form: Aerosol

AIHA WEEL (United States, 1/2007).

TWA: 10 mg/m³ 8 hour(s).

Section 9. Physical and chemical properties

Physical State and Appearance	Slightly viscous liquid.	Odour	Not available.
Molecular weight	Not applicable.	Taste	Not available.
pH	Not available.	Colour	Colorless to amber. (Light.)
Boiling/condensation point	235 to 246°C (455 to 474.8°F)	Volatility	Not available.
Melting/freezing point	Not available.	Evaporation rate	Not available.
Relative density	1.038 to 1.04	Odour Threshold	Not available.
Vapour Pressure	<0.013 kPa (<0.1 mm Hg)	Viscosity	
Vapour Density	Not available.	Solubility	Easily soluble in the following materials: cold water, hot water, methanol and diethyl ether.
VOC Content	0 (g/l).	Other Properties	Not available.
The product is:	Non-flammable.		

Continued on next page



Auto-ignition temperature	Not available.
Flash Point	Closed cup: 132°C (269.6°F)
Flammable limits	Not available.
Fire hazards in the presence of various substances	Non-flammable in the presence of the following materials or conditions: open flames, sparks and static discharge, heat and shocks and mechanical impacts.

Section 10. Stability and reactivity

Stability	The product is stable. Under normal conditions of storage and use, hazardous polymerization will not occur.
Conditions of instability	Not available.
Incompatibility with various substances	Reactive or incompatible with the following materials: oxidizing materials. Avoid contamination with oxidizing agents.
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological Information

Canada

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
2-(2-(2-ethoxyethoxy)ethoxy)ethanol	LD50 Dermal	Rabbit	8 mL/kg	-
	LD50 Oral	Rat	7750 mg/kg	-
Poly(oxy-1,2-ethanediyl), .alpha.-hydro-.omega.-hydroxy-Ethane-1,2-diol, ethoxylated	LD50 Dermal	Rabbit	20000 mg/kg	-
	LD50 Oral	Rat	43600 mg/kg	-
2,2'-oxybisethanol	LD50 Dermal	Rabbit	11890 mg/kg	-
	LD50 Dermal	Hamster	11890 mg/kg	-
	LD50 Intraperitoneal	Rat	7.7 g/kg	-
	LD50 Intravenous	Rat	6565 mg/kg	-
	LD50 Oral	Rat	12000 mg/kg	-
	LD50 Oral	Hamster	12565 mg/kg	-
	LD50 Oral	Rat	12565 mg/kg	-
	LD50 Subcutaneous	Rat	18800 mg/kg	-
	LD50 Unreported	Rat	15650 mg/kg	-
	LDLo Intramuscular	Rat	7826 mg/kg	-

Conclusion/Summary : LD50 is an expected value.

Chronic toxicity

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Mutagenicity

Continued on next page

**Conclusion/Summary** : Not available.**Teratogenicity****Conclusion/Summary** : Not available.**Reproductive toxicity****Conclusion/Summary** : Not available.**Section 12. Ecological information**

For accidental discharges into the environment, see Section 6: "Accidental Release Measures" for suggested instructions.

Environmental effects : No known significant effects or critical hazards.**Canada****Aquatic ecotoxicity**

Product/ingredient name	Test	Result	Species	Exposure
Poly(oxy-1,2-ethanediyl), .alpha.-hydro-.omega.-hydroxy-Ethane-1,2-diol, ethoxylated	-	Acute LC50 >20000000 ug/L Fresh water	Fish - Carassius carassius	96 hours
	-	Acute LC50 >20000000 ug/L Fresh water	Fish - Oncorhynchus mykiss	96 hours
	-	Acute LC50 >1000000 ug/L Fresh water	Fish - Salmo salar	96 hours
2,2'-oxybisethanol	-	Acute LC50 75200000 ug/L Fresh water	Fish - Pimephales promelas	96 hours
	-	Acute LC50 >32000000 ug/L Fresh water	Fish - Gambusia affinis	96 hours

Conclusion/Summary : Not available.**Biodegradability****Conclusion/Summary** : Not available.**Section 13. Disposal considerations**

Waste information The generation of waste should be avoided or minimized wherever possible. 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 spilled 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.*Continued on next page*



Section 14. Transport information

Canada TDG Classification

Class _____ Not a TDG-controlled material.

Subsidiary class _____

Proper Shipping Name

(Canada) TDG

UN number

Packing Group

Special provisions _____ Not applicable.

No placard (handling and hazard label) required.

IMDG Classification

Class _____ Not controlled under IMDG.

Subsidiary class _____

Proper Shipping Name

IMDG

UN number

Packing Group

Marine pollutant _____ Not a pollutant.

Special provisions _____

No placard (handling and hazard label) required.

No placard (handling and hazard label) required.

United States DOT (Classification)

Class _____ Not a DOT controlled material (United States).

Subsidiary class _____

Proper Shipping Name

(United States) DOT

UN number

Packing Group

Special provisions _____

No placard (handling and hazard label) required.

**International Air
Transport Association
(IATA)**

For air shipment classification and associated regulations, please refer to the latest edition of IATA Dangerous Goods Regulations.

Section 15. Regulatory information

**WHMIS Classification
(Canada)**

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

**Canada Domestic
Substances List (DSL)
Status**

This product and/ or all of its components are on the DSL.



**HCS Classification
(U.S.A.)**

Target organ effects

U.S.A. Regulatory Lists

This product and/ or all of its components are on the TSCA inventory list.

Continued on next page

Validated on Jan. 09 2012 Brake Fluid DOT 3 

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

Health	2
Flammability	1
Reactivity	0
Personal protection	B

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

		Flammability
	1	
Health	2	0
		Reactivity
		Specific hazard

Section 16. Other informationValidated and verified by Compliance and Technical Information Manager  ph.# Jan. 09 2012 
905-791-1788.Printed : Jan. 17 2012 **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.

MSDS are available at www.recochem.com

MATERIAL SAFETY DATA SHEET

SECTION 1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

LUBRIPLATE® Lubricants Co.
129 Lockwood St.
Newark, NJ 07105

Emergency Telephone Number:
1-800-255-3924-CHEM-TEL (24 hour)
Telephone Number for information:
1-973-589-9150

SUBSTANCE: LUBRIPLATE Low Temp

MSDS No. - 0892150172001

TRADE NAMES/SYNONYMS:

PRODUCT USE: Petroleum lubricating grease

CREATION DATE: 06/14/2007

REVISION DATE: 12/15/2011

SECTION 2 COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT: Heavy and light hydrotreated naphthenic distillates

CAS NUMBER: 64742-52-5/64742-53-6

EC NUMBER (EINECS): 265-155-0/265-156-6

PERCENTAGE: 80-85

COMPONENT: 12 hydroxy stearic acid

CAS NUMBER: 106-14-9

EC NUMBER (EINECS): 203-366-1

PERCENTAGE: 5-10

COMPONENT: Zinc oxide

CAS NUMBER: 1314-13-2

EC NUMBER (EINECS): 215-222-5

PERCENTAGE: 5-10

COMPONENT: Chlorinated alkanes

CAS NUMBER: 63449-39-8/61788-76-9

EC NUMBER (EINECS): 264-150-0/263-004-3

PERCENTAGE: 0-2

COMPONENT: Oleic acid

CAS NUMBER: 112-80-1

EC NUMBER (EINECS): 204-007-1

PERCENTAGE: 0-2

COMPONENT: Calcium hydroxide

CAS NUMBER: 1305-62-0

EC NUMBER (EINECS): 215-137-3

PERCENTAGE: 0-2

COMPONENT: Alkylated diphenylamine

CAS NUMBER: 184378-08-3

EC NUMBER (EINECS): NA

PERCENTAGE: 0-2

NOTE: The IP 346 value of the mineral oil is less than 3%

SECTION 3 HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

INHALATION:

SHORT TERM EXPOSURE: Irritation

LONG TERM EXPOSURE: Lung damage

SKIN CONTACT:

SHORT TERM EXPOSURE: Irritation

LONG TERM EXPOSURE: Irritation, skin disorders

EYE CONTACT:

SHORT TERM EXPOSURE: Irritation

LONG TERM EXPOSURE: No information available

INGESTION:

SHORT TERM EXPOSURE: Diarrhea, difficulty breathing

LONG TERM EXPOSURE: no information on significant adverse effects

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM (HMIS):

Health – 1

Flammability – 1

Reactivity – 0

Not a Controlled Product under (WHMIS) – Canada

Special Protection: See Section 8

SECTION 4 FIRST AID MEASURES

INHALATION: Vapor pressure is very low and inhalation at room temperature is not a problem. If overcome by vapor from hot product, immediately remove from exposure and call a physician.

SKIN CONTACT: Remove any contaminated clothing and wash with soap and warm water. If injected by high pressure under skin, regardless of the appearance or its size, contact a physician IMMEDIATELY. Delay may cause loss of affected part of the body.

EYE CONTACT: Flush with clear water for 15 minutes or until irritation subsides. If irritation persists, consult a physician.

INGESTION: If ingested, call a physician immediately. Do not induce vomiting.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Slight fire hazard

EXTINGUISHING MEDIA: Foam, Dry Chemical, Carbon Dioxide or Water Spray (Fog)

SPECIAL FIRE FIGHTING PROCEDURES: Cool exposed containers with water. Use air-supplied breathing equipment for enclosed or confined spaces.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Do not store or mix with strong oxidants. Empty containers retain residue. Do not cut, drill, grind, or weld, as they may explode.

SECTION 6 ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE: Scrape up grease, wash remainder with suitable petroleum solvent or add absorbent. Keep petroleum products out of sewers and water courses. Advise authorities if product has entered or may enter sewers and water courses.

SECTION 7 HANDLING AND STORAGE

STORAGE: Keep containers closed when not in use. Do not handle or store near heat, sparks, flame, or strong oxidants.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE LIMITS:

OIL MIST IN AIR (Not Encountered in Normal Usage):

5 mg/m³ UK OES TWA

10mg/m³ UK OES STEL

VENTILATION: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant (nitrile) gloves.

RESPIRATOR: Consider the need for appropriate protective equipment, such as self-contained breathing apparatus, adequate masks and filters.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: semi-solid
APPEARANCE: smooth
COLOUR: off-white
PHYSICAL FORM: grease
ODOR: mineral oil odor
BOILING POINT: >288°C
FREEZING POINT: Not available
FLASH POINT: 166°C (COC)
LOWER FLAMMABLE LIMIT: 0.9% by volume
UPPER FLAMMABLE LIMIT: 7.0% by volume
AUTO IGNITION: not available
VAPOUR PRESSURE: <0.01
VAPOR DENSITY (air=1): >5
SPECIFIC GRAVITY (water=1): 0.91
DENSITY: not available
WATER SOLUBILITY: negligible
pH: not available
VOLATILITY: not available
ODOR THRESHOLD: not available
EVAPORATION RATE (Butyl acetate = 1): <0.01
VISCOSITY: not available
COEFFICIENT OF WATER/OIL DISTRIBUTION: not available

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressures

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Avoid contact with incompatible materials.

INCOMPATIBLES: Oxidising materials, chlorine

HAZARDOUS DECOMPOSITION:

Thermal decomposition products or combustion: oxides of carbon, oxides of sulphur

POLYMERISATION: Will not polymerise.

SECTION 11 TOXICOLOGICAL INFORMATION

Heavy and light hydrotreated naphthenic distillates:

TOXICITY DATA:

Greater than 5,000 mg/kg LD50 oral-rat

12 hydroxy stearic acid:**TOXICITY DATA:**

Greater than 5 g/kg LD50 oral-rat

Zinc oxide:**TOXICITY DATA:**

No data available

Chlorinated alkanes:**TOXICITY DATA:**

Greater than 4,000 mg/kg oral-rat LD50

Oleic acid:**TOXICITY DATA:**

No data available

Calcium hydroxide:**TOXICITY DATA:**

No data available

Alkylated diphenylamine:**TOXICITY DATA:**

Greater than 2,500 mg/kg oral-rat LD50

SECTION 12 ECOLOGICAL INFORMATION

Not available

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations

SECTION 14 TRANSPORT INFORMATION

LAND TRANSPORT ADR: No classification assigned.**LAND TRANSPORT RID:** No classification assigned.**AIR TRANSPORT IATA:** No classification assigned.**AIR TRANSPORT ICAO:** No classification assigned.**MARITIME TRANSPORT IMDG:** No classification assigned.

SECTION 15 REGULATORY INFORMATION

EUROPEAN REGULATIONS:

EC CLASSIFICATION (CALCULATED): N

Risk Phrases: R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

SARA/TITLE III, Section 313 Status – Zinc Compounds <5%

SECTION 16 OTHER INFORMATION

The above information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of LUBRIPLATE Lubricants Company. The data on these sheets relates only to the specific material designated herein. LUBRIPLATE Lubricants Company assumes no legal responsibility for use or reliance upon this data.

MATERIAL SAFETY DATA SHEET

SECTION 1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

LUBRIPLATE® Lubricants Co.
129 Lockwood St.
Newark, NJ 07105

Emergency Telephone Number:
1-800-255-3924-CHEM-TEL (24 hour)
Telephone Number for information:
1-973-589-9150

SUBSTANCE: LUBRIPLATE 630-AA

MSDS No. - 0892150067001

TRADE NAMES/SYNONYMS:

PRODUCT USE: Petroleum lubricating grease

CREATION DATE: 06/18/2007

REVISION DATE: 03/23/2012

SECTION 2 COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT: Heavy hydrotreated naphthenic distillates (petroleum)

CAS NUMBER: 64742-52-5

EC NUMBER (EINECS): 265-155-0

PERCENTAGE: 85-90

COMPONENT: Inedible animal grease

CAS NUMBER: 68153-81-1

EC NUMBER (EINECS): 268-896-8

PERCENTAGE: 2-5

COMPONENT: Zinc oxide

CAS NUMBER: 1314-13-2

EC NUMBER (EINECS): 215-222-5

PERCENTAGE: 2-5

COMPONENT: Antimony diamyldithiocarbamate

CAS NUMBER: 15890-25-2

EC NUMBER (EINECS): 240-028-2

PERCENTAGE: 2-5

COMPONENT: Stearic acid

CAS NUMBER: 68440-15-3

EC NUMBER (EINECS): 270-438-7

PERCENTAGE: 0-1

COMPONENT: Lithium hydroxide monohydrate

CAS NUMBER: 1310-66-3

EC NUMBER (EINECS): NA

PERCENTAGE: 0-1

NOTE: The IP 346 value of the mineral oil is less than 3%

SECTION 3 HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

INHALATION:

SHORT TERM EXPOSURE: Irritation

LONG TERM EXPOSURE: Lung damage

SKIN CONTACT:

SHORT TERM EXPOSURE: Irritation

LONG TERM EXPOSURE: Irritation, skin disorders

EYE CONTACT:

SHORT TERM EXPOSURE: Irritation

LONG TERM EXPOSURE: No information available

INGESTION:

SHORT TERM EXPOSURE: Diarrhea, difficulty breathing

LONG TERM EXPOSURE: no information on significant adverse effects

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM (HMIS):

Health – 1

Flammability – 1

Reactivity – 0

Not a Controlled Product under (WHMIS) – Canada

Special Protection: See Section 8

SECTION 4 FIRST AID MEASURES

INHALATION: Vapor pressure is very low and inhalation at room temperature is not a problem. If overcome by vapor from hot product, immediately remove from exposure and call a physician.

SKIN CONTACT: Remove any contaminated clothing and wash with soap and warm water. If injected by high pressure under skin, regardless of the appearance or its size, contact a physician IMMEDIATELY. Delay may cause loss of affected part of the body.

EYE CONTACT: Flush with clear water for 15 minutes or until irritation subsides. If irritation persists, consult a physician.

INGESTION: If ingested, call a physician immediately. Do not induce vomiting.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Slight fire hazard

EXTINGUISHING MEDIA: Foam, Dry Chemical, Carbon Dioxide or Water Spray (Fog)

SPECIAL FIRE FIGHTING PROCEDURES: Cool exposed containers with water. Use air-supplied breathing equipment for enclosed or confined spaces.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Do not store or mix with strong oxidants. Empty containers retain residue. Do not cut, drill, grind, or weld, as they may explode.

SECTION 6 ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE: Scrape up grease, wash remainder with suitable petroleum solvent or add absorbent. Keep petroleum products out of sewers and water courses. Advise authorities if product has entered or may enter sewers and water courses.

SECTION 7 HANDLING AND STORAGE

STORAGE: Keep containers closed when not in use. Do not handle or store near heat, sparks, flame, or strong oxidants.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE LIMITS:

OIL MIST IN AIR (Not Encountered in Normal Usage):

5 mg/m³ UK OES TWA

10mg/m³ UK OES STEL

VENTILATION: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant (nitrile) gloves.

RESPIRATOR: Consider the need for appropriate protective equipment, such as self-contained breathing apparatus, adequate masks and filters.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: semi-solid

APPEARANCE: smooth

COLOUR: off-white

PHYSICAL FORM: grease

ODOR: mineral oil odor

BOILING POINT: >288 C
FREEZING POINT: Not available
FLASH POINT: 204 C (COC)
LOWER FLAMMABLE LIMIT: 0.9% by volume
UPPER FLAMMABLE LIMIT: 7.0% by volume
AUTO IGNITION: not available
VAPOUR PRESSURE: <0.01 mm Hg
VAPOR DENSITY (air=1): >5
SPECIFIC GRAVITY (water=1): 0.95
DENSITY: not available
WATER SOLUBILITY: negligible
pH: not available
VOLATILITY: not available
ODOR THRESHOLD: not available
EVAPORATION RATE (Butyl acetate = 1): <0.01
VISCOSITY: not available
COEFFICIENT OF WATER/OIL DISTRIBUTION: not available

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressures

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Avoid contact with incompatible materials.

INCOMPATIBLES: Oxidising materials, chlorine

HAZARDOUS DECOMPOSITION:

Thermal decomposition products or combustion: oxides of carbon, oxides of sulphur

POLYMERISATION: Will not polymerise.

SECTION 11 TOXICOLOGICAL INFORMATION

Heavy hydrotreated naphthenic distillates (petroleum):

TOXICITY DATA:

Low order of dermal and oral toxicity

Inedible animal grease:

TOXICITY DATA:

No data available

Zinc oxide:

TOXICITY DATA:

No data available

Antimony diamyldithiocarbamate:

TOXICITY DATA:

Greater than 5,000 mg/kg LD50 oral-rat

Stearic acid:

TOXICITY DATA:

Greater than 10,000 mg/kg LD50 oral-rat

Lithium hydroxide monohydrate:

TOXICITY DATA:

210 mg/kg LD50 oral-rat

SECTION 12 ECOLOGICAL INFORMATION

Not available

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations

SECTION 14 TRANSPORT INFORMATION

LAND TRANSPORT ADR: No classification assigned.

LAND TRANSPORT RID: No classification assigned.

AIR TRANSPORT IATA: No classification assigned.

AIR TRANSPORT ICAO: No classification assigned.

MARITIME TRANSPORT IMDG: No classification assigned.

SECTION 15 REGULATORY INFORMATION

EUROPEAN REGULATIONS:

EC CLASSIFICATION (CALCULATED): Not classified as dangerous.

SARA/TITLE III, Section 313 Status – Zinc compounds <6%, Antimony compounds <3%

SECTION 16 OTHER INFORMATION

The above information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of LUBRIPLATE Lubricants Company. The data on these sheets relates only to the specific material designated herein. LUBRIPLATE Lubricants Company assumes no legal responsibility for use or reliance upon this data.

Section 1. Chemical product and company identification

Product name	: Oxygen
Supplier	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
Product use	: Synthetic/Analytical chemistry.
Synonym	: Molecular oxygen; Oxygen molecule; Pure oxygen; O ₂ ; UN 1072; Dioxygen; Oxygen USP, Aviator's Breathing Oxygen (ABO)
MSDS #	: 001043
Date of Preparation/ Revision	: 9/24/2013.
<u>In case of emergency</u>	: 1-866-734-3438

Section 2. Hazards identification

Physical state	: Gas. [Compressed gas.]
Emergency overview	: DANGER! GAS: OXIDIZER. CONTACT WITH COMBUSTIBLE MATERIAL MAY CAUSE FIRE. CONTENTS UNDER PRESURE. Do not puncture or incinerate container. May cause severe frostbite. LIQUID: OXIDIZER. CONTACT WITH COMBUSTIBLE MATERIAL MAY CAUSE FIRE. Extremely cold liquid and gas under pressure. May cause severe frostbite. Do not puncture or incinerate container. Store in tightly-closed container. Avoid contact with combustible materials. Contact with rapidly expanding gases or liquids can cause frostbite.
Routes of entry	: Inhalation
<u>Potential acute health effects</u>	
Eyes	: May cause eye irritation. Contact with rapidly expanding gas may cause burns or frostbite. Contact with cryogenic liquid can cause frostbite and cryogenic burns.
Skin	: May cause skin irritation. Contact with rapidly expanding gas may cause burns or frostbite. Contact with cryogenic liquid can cause frostbite and cryogenic burns.
Inhalation	: Respiratory system irritation after overexposure to high oxygen concentrations.
Ingestion	: Ingestion is not a normal route of exposure for gases. Contact with cryogenic liquid can cause frostbite and cryogenic burns.
Medical conditions aggravated by over-exposure	: Acute or chronic respiratory conditions may be aggravated by overexposure to this gas.
See toxicological information (Section 11)	

Section 3. Composition, Information on Ingredients

<u>Name</u>	<u>CAS number</u>	<u>% Volume</u>	<u>Exposure limits</u>
Oxygen	7782-44-7	100	

Section 4. First aid measures

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.

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	: None expected.
Frostbite	: Try to warm up the frozen tissues and seek medical attention.
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	: As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

Flammability of the product	: Non-flammable.
Products of combustion	: No specific data.
Fire hazards in the presence of various substances	: Extremely flammable in the presence of the following materials or conditions: reducing materials, combustible materials and organic materials.
Fire-fighting media and instructions	: Use an extinguishing agent suitable for the surrounding fire. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk. Contains gas under pressure. Contact with combustible material may cause fire. This material increases the risk of fire and may aid combustion. In a fire or if heated, a pressure increase will occur and the container may burst or explode.
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.

Section 6. Accidental release measures

Personal precautions	: Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Eliminate all ignition sources if safe to do so. Do not touch or walk through spilled material. Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.
Environmental precautions	: Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
Methods for cleaning up	: Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Handling	: High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Store in tightly-closed container. Avoid contact with combustible materials. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement. Never allow any unprotected part of the body to touch uninsulated pipes or vessels that contain cryogenic liquids. Prevent entrapment of liquid in closed systems or piping without pressure relief devices. Some materials may become brittle at low temperatures

Oxygen

and will easily fracture.

- Storage** : Keep container tightly closed. Keep container in a cool, well-ventilated area. Separate from acids, alkalis, reducing agents and combustibles. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

- Engineering controls** : 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.

Personal protection

- 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.
When working with cryogenic liquids, wear a full face shield.
- 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.
- 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.
The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93
- 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.
Insulated gloves suitable for low temperatures
- Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

Product name

Oxygen

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

- Molecular weight** : 32 g/mole
- Molecular formula** : O₂
- Boiling/condensation point** : -183°C (-297.4°F)
- Melting/freezing point** : -218.4°C (-361.1°F)
- Critical temperature** : -118.15°C (-180.7°F)
- Vapor density** : 1.1 (Air = 1)
- Specific Volume (ft³/lb)** : 12.0482
- Gas Density (lb/ft³)** : 0.083

Section 10. Stability and reactivity

- Stability and reactivity** : The product is stable.
- Incompatibility with various substances** : Extremely reactive or incompatible with the following materials: oxidizing materials, reducing materials and combustible materials.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

Toxicity to the environment : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1072	OXYGEN, COMPRESSED	2.2	Not applicable (gas).		Limited quantity Yes.
	UN1073	Oxygen, refrigerated liquid				Packaging instruction Passenger aircraft Quantity limitation: 75 kg Cargo aircraft Quantity limitation: 150 kg Special provisions A52

Oxygen

TDG Classification	UN1072	OXYGEN, COMPRESSED	2.2	Not applicable (gas).		<u>Explosive Limit and Limited Quantity Index</u> 0.125
	UN1073	Oxygen, refrigerated liquid				<u>ERAP Index</u> 3000 <u>Passenger Carrying Ship Index</u> 50 <u>Passenger Carrying Road or Rail Index</u> 75 <u>Special provisions</u> 42
Mexico Classification	UN1072	OXYGEN, COMPRESSED	2.2	Not applicable (gas).		-
	UN1073	Oxygen, refrigerated liquid				

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

Section 15. Regulatory information

United States

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption:** This material is listed or exempted.
United States inventory (TSCA 8b): This material is listed or exempted.
SARA 302/304: No products were found.
SARA 311/312 Hazards identification: Fire hazard, Sudden release of pressure

State regulations : **Connecticut Carcinogen Reporting:** This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is not listed.
New York Acutely Hazardous Substances: This material is not listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.

Oxygen

Rhode Island Hazardous Substances: This material is not listed.

Canada

WHMIS (Canada)

: Class A: Compressed gas.
Class C: Oxidizing material.

CEPA Toxic substances: This material is not listed.

Canadian ARET: This material is not listed.

Canadian NPRI: This material is not listed.

Alberta Designated Substances: This material is not listed.

Ontario Designated Substances: This material is not listed.

Quebec Designated Substances: This material is not listed.

Section 16. Other information

United States

Label requirements

: GAS:
OXIDIZER.
CONTACT WITH COMBUSTIBLE MATERIAL MAY CAUSE FIRE.
CONTENTS UNDER PRESURE.
Do not puncture or incinerate container.
May cause severe frostbite.
LIQUID:
OXIDIZER.
CONTACT WITH COMBUSTIBLE MATERIAL MAY CAUSE FIRE.
Extremely cold liquid and gas under pressure.
May cause severe frostbite.

Canada

Label requirements

: Class A: Compressed gas.
Class C: Oxidizing material.

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

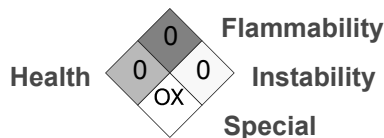
Health	0
Flammability	0
Physical hazards	0

liquid:

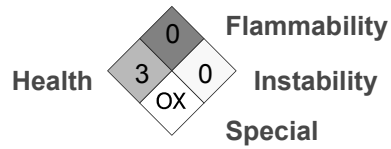
Health	3
Fire hazard	0
Reactivity	0
Personal protection	

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

:



liquid:



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 / Fiche signalétique

WESTCOAST DRILLING SUPPLIES LTD.

8069 River Way, Delta, British Columbia,
Canada V4G 1L3
Ph. (604) 940-6050 Fax (604) 940-6080

EMERGENCY 1-800-665-6645

SECTION I: IDENTIFICATION OF PRODUCT

PRODUCT NAME: **W-OB POLYMER**
PRODUCT USE: Drilling Mud Additive
CHEMICAL FAMILY: Polysaccharide Polymer
WHMIS CLASSIFICATION: Class B-3 & D-2(B)
WORK PLACE HAZARD: Combustible and Skin and Eye Irritant

TRANSPORTATION OF DANGEROUS GOODS (TDGR)

CLASSIFICATION: Not Dangerous Goods
PACKAGE GROUP: Not applicable
PRODUCT IDENTIFICATION NUMBER (PIN): Not applicable

SECTION II: HAZARDOUS INGREDIENTS

INGREDIENT	PERCENTAGE	CAS NUMBER	LD50	LC50
Light mineral distillate	10 - 20%	64742-47-8	Not determined	

SECTION III: TOXICOLOGICAL PROPERTIES

ROUTE OF ENTRY:
[XXX] Skin, [XXX] Eye Contact, [XXX] Inhalation, [XXX] Ingestion

THRESHOLD LIMIT VALUE: 5 mg/cu.M/8 hrs.
EFFECTS OF OVEREXPOSURE: No significant signs or symptoms indicative of any adverse health effects are expected to occur upon short-term exposures.

SECTION IV: FIRST AID MEASURES

SKIN CONTACT: Remove by wiping; then wash thoroughly with plenty of soap and water.
EYE CONTACT: Flush eyes with clean, low pressure water for at least fifteen (15) minutes, occasionally lifting the eyelids. If pain or redness persists after flushing, obtain medical attention.
INHALATION: Immediately remove personnel from contaminated area to fresh air. Obtain medical attention if there are signs of breathing difficulties.
INGESTION: Do not induce vomiting, since aspiration into the lungs could cause lipoid pneumonia. This material is not toxic and no significant signs or symptoms indicative of any adverse health effects are expected.

SECTION V: PHYSICAL DATA

APPEARANCE AND ODOR: Opaque, blue liquid; Odorless.
DENSITY (SPECIFIC GRAVITY): 1.03
BOILING POINT: 200° C
MELTING POINT: Not applicable
WATER SOLUBILITY: Soluble
% VOLATILE BY VOLUME: Negligible
EVAPORATION RATE: Nil
VAPOR PRESSURE: (mm Hg) < 1.0
VAPOR DENSITY: (Air = 1) > 10.0
pH: 6 - 8

**WESTCOAST DRILLING SUPPLIES LTD.**

8069 River Way, Delta, British Columbia, Canada V4G 1L3

Phone: (604) 940-6050 · Fax: (604) 940-6080

Toll Free: 1-800-665-6645

W-OB POLYMER

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SECTION VI: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 62° C
FLAMMABLE LIMIT: Auto-ignition Temp. 227° C
EXTINGUISHING MEDIA: Dry chemical, CO₂, foam and water are effective but may cause frothing.
SPECIAL FIRE FIGHTING PROCEDURES: Cool tanks and containers exposed to fire with water.
UNUSUAL FIRE AND EXPLOSION HAZARDS: To protect against hazardous effects of combustion products respiratory protective equipment when in confined spaces or down wind of fire.

SECTION VII: REACTIVITY DATA

STABLE [XXX] INSTABLE []
INCOMPATIBILITY (CONDITIONS TO AVOID): Extreme heat and open flame.
HAZARDOUS DECOMPOSITION PRODUCTS: Carbon dioxide; carbon monoxide.
HAZARDOUS POLYMERIZATION: Will not occur [XXX] May occur []

SECTION VIII: PREVENTATIVE MEASURES

SPECIAL PROTECTION INFORMATION:
RESPIRATORY PROTECTION: None required under normal conditions.
VENTILATION: Adequate ventilation to minimize oil mists below acceptable standards.
PROTECTIVE GLOVES: None required.
EYE PROTECTION: Normal safety glasses suggested.
OTHER PROTECTIVE EQUIPMENT: None required.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

Avoid ingestion. Practice reasonable caution and personal cleanliness. Avoid skin and eye contact.

STEPS TO BE TAKEN IN CASE OF SPILL OR LEAK:

(Use appropriate safety equipment). Small spills, soak up with absorbent material. Large spills, dike to contain spill to prevent water pollution. Water will cause extreme slipperiness. Recover diked material; return recovered material to plant.

WASTE DISPOSAL METHOD:

Absorb spilled material with absorbent compound, incinerate/dispose to conform with local disposal regulations.

SECTION IX: PREPARATION

The information contained herein is given in good faith, but no warranty, expressed or implied is made.

DATE ISSUED: October 29, 1993

BY: Product Safety Committee

DATE REVISED: April 1, 2000

Review date: March 31/03Authorized by: Alan Lalonde



Material Safety Data Sheet

Material Name: Ag Lime

ID: CAMAS AG
LIME

*** Section 1 - Chemical Product and Company Identification ***

Chemical Name: Mixture

Product Use: PCC Co-Product

Synonyms: Aglime

Manufacturer Information

Specialty Minerals Inc - Camas
220 NW 6th Avenue
Camas WA 98607

Phone: 360 518 6626

Emergency # +1-760-476-3962 (USA) Access Code: 333336

General Comments

*** Section 2 - Composition / Information on Ingredients ***

CAS #	Component	Percent (wt/wt)
1317-65-3	Calcium carbonate	60-100
1305-62-0	Calcium hydroxide	5-10
14808-60-7	Quartz	1-5
1305-78-8	Calcium oxide	1-5

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Silica, crystalline (general form).

Component Information

This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

*** Section 3 - Hazards Identification ***

Emergency Overview

This product is irritating to the respiratory system and skin.

Potential Health Effects: Eyes

This product is severely irritating to the eyes and may cause eye burns.

Potential Health Effects: Skin

This product may cause irritation to the skin.

Potential Health Effects: Ingestion

May cause temporary irritation of the throat, stomach, and gastrointestinal tract.

Potential Health Effects: Inhalation

WARNING: This product contains crystalline silica. Long-term overexposure to crystalline silica causes silicosis, a form of pulmonary fibrosis. Continued overexposure to silica can lead to cardiopulmonary impairment.

Crystalline silica has been reviewed by IARC. IARC found sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica in the form of quartz or cristobalite from occupational sources.

Medical Conditions Aggravated by Exposure

No information available for the product.

Potential Environmental Effects

This material is alkaline.

Material Safety Data Sheet

Material Name: Ag Lime

ID: CAMAS AG
LIME

HMIS Ratings: Health: 1* Fire: 0 Reactivity: 0 Pers. Prot.: F

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

*** Section 4 - First Aid Measures ***

First Aid: Eyes

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

First Aid: Skin

For skin contact, wash immediately with soap and water.

First Aid: Ingestion

If the material is swallowed, get immediate medical attention or advice -- Do not induce vomiting.

First Aid: Inhalation

If inhaled, immediately remove the affected person to fresh air.

First Aid: Notes to Physician

Provide general supportive measures and treat symptomatically.

*** Section 5 - Fire Fighting Measures ***

General Fire Hazards

This material will not burn.

Hazardous Combustion Products

None identified.

Extinguishing Media

Use methods for the surrounding fire.

Fire Fighting Equipment/Instructions

None necessary.

NFPA Ratings: Health: 1 Fire: 0 Reactivity: 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

*** Section 6 - Accidental Release Measures ***

Containment Procedures

Contain the discharged material.

Clean-Up Procedures

Wear appropriate protective equipment and clothing during clean-up.

Evacuation Procedures

None necessary.

Special Procedures

No additional information available.

*** Section 7 - Handling and Storage ***

Handling Procedures

Avoid contact with skin and eyes.

Storage Procedures

Room temperature - normal conditions.

*** Section 8 - Exposure Controls / Personal Protection ***

Exposure Guidelines

A: General Product Information

Protect from eye and skin contact.

Material Safety Data Sheet

Material Name: Ag Lime

ID: CAMAS AG
LIME

B: Component Exposure Limits

Calcium carbonate (1317-65-3)

OSHA: 15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
NIOSH: 10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)

Calcium hydroxide (1305-62-0)

ACGIH: 5 mg/m3 TWA
OSHA: 5 mg/m3 TWA (not in effect as a result of reconsideration)
NIOSH: 5 mg/m3 TWA

Calcium oxide (1305-78-8)

ACGIH: 2 mg/m3 TWA
OSHA: 5 mg/m3 TWA (not in effect as a result of reconsideration)
NIOSH: 2 mg/m3 TWA

Quartz (14808-60-7)

ACGIH: 0.025 mg/m3 TWA (respirable fraction)
OSHA: 0.1 mg/m3 TWA (respirable dust)
NIOSH: 0.05 mg/m3 TWA (respirable dust)

Engineering Controls

Provide adequate local exhaust ventilation to maintain worker exposure below exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear dust goggles.

Personal Protective Equipment: Skin

Use of protective coveralls and long sleeves is recommended. Use impervious gloves.

Personal Protective Equipment: Respiratory

Wear a NIOSH approved filtering facepiece (dust mask).

Personal Protective Equipment: General

Eye wash fountain and emergency showers are recommended.

*** Section 9 - Physical & Chemical Properties ***

Appearance:	Gray powder	Odor:	None
Physical State:	Solid	pH:	12.4-12.7 (USEPA Method 9045C)
Vapor Pressure:	Minimal	Vapor Density:	N/A
Boiling Point:	Unknown	Melting Point:	N/A
Solubility (H2O):	Slightly Soluble	Specific Gravity:	2.7 (dry product)

*** Section 10 - Stability & Reactivity ***

Chemical Stability

Stable under normal conditions.

Chemical Stability: Conditions to Avoid

None.

Incompatibility

None identified.

Hazardous Decomposition

None identified.

Material Safety Data Sheet

Material Name: Ag Lime

ID: CAMAS AG
LIME

Hazardous Polymerization

Will not occur.

*** Section 11 - Toxicological Information ***

Acute and Chronic Toxicity

A: General Product Information

No information available for the product.

B: Component Analysis - LD50/LC50

Calcium hydroxide (1305-62-0)

Oral LD50 Rat 7340 mg/kg

Calcium oxide (1305-78-8)

Oral LD50 Rat 500 mg/kg

Quartz (14808-60-7)

Oral LD50 Rat 500 mg/kg

Carcinogenicity

A: General Product Information

No carcinogenicity data available for this product.

B: Component Carcinogenicity

Quartz (14808-60-7)

ACGIH: A2 - Suspected Human Carcinogen

NIOSH: potential occupational carcinogen

NTP: Known Human Carcinogen (Select Carcinogen)

IARC: Monograph 100C [in preparation] (listed under Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources); Monograph 68 [1997] (Group 1 (carcinogenic to humans))

*** Section 12 - Ecological Information ***

Ecotoxicity

A: General Product Information

A 96-hour Washington State Hazardous Waste Regulation bioassay using concentrations of 10 and 100 mg/L of this material was conducted. The organisms tested were rainbow trout (*Oncorhynchus mykiss*). Results were as follows:

10 ppm - 0 dead/30 tested (does not qualify as a Washington State Extremely Hazardous Waste)

100 ppm - 2 dead/30 tested (does not qualify as a Washington State Dangerous Waste)

LC50 >100 mg/L

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Calcium hydroxide (1305-62-0)

96 Hr LC50 *Gambusia affinis*: 160 mg/L [static]

Calcium oxide (1305-78-8)

96 Hr LC50 *Cyprinus carpio*: 1070 mg/L [static]

Environmental Fate

This material shows no bioaccumulation or food chain concentration toxicity potential.

Material Safety Data Sheet

Material Name: Ag Lime

ID: CAMAS AG
LIME

*** Section 13 - Disposal Considerations ***

US EPA Waste Number & Descriptions

A: General Product Information

No components are identified as hazardous wastes.

B: Component Waste Numbers

No EPA Waste Numbers are applicable for this product's components.

Disposal Instructions

State of Washington Waste Number and Description:

This material is a special waste in the State of Washington only.

Washington State Waste Code: WSC2

*** Section 14 - Transport Information ***

US DOT Information

Shipping Name: None necessary.

Additional Info.: None.

International Transportation Regulations

This product is not regulated as a hazardous material by the United States (DOT) or Canadian (TDG) transportation regulations.

*** Section 15 - Regulatory Information ***

US Federal Regulations

A: General Product Information

Components of this product have been checked against the non-confidential TSCA inventory by CAS Registry Number. Components not identified on this non-confidential inventory are either exempt from listing (i.e. polymers, hydrates) or are listed on the confidential inventory as declared by the supplier.

B: Component Analysis

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).

Acute Health: Yes **Chronic Health:** Yes **Fire:** No **Pressure:** No **Reactive:** No

State Regulations

A: General Product Information

Other state regulations may apply. Check individual state requirements.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	FL	MA	MN	NJ	PA	MI
Calcium carbonate	1317-65-3	No	No	Yes	Yes	Yes	Yes	No
Calcium hydroxide	1305-62-0	Yes	No	Yes	Yes	Yes	Yes	No
Calcium oxide	1305-78-8	Yes	No	Yes	Yes	Yes	Yes	No
Quartz	14808-60-7	No	No	Yes	Yes	Yes	Yes	No

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

Material Safety Data Sheet

Material Name: Ag Lime

ID: CAMAS AG
LIME

Other Regulations

A: General Product Information

Canadian WHMIS Classification: Class D, Division 2, Subdivision A. Class E, Corrosive Material

B: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	NDSL	EINECS	AUST	PHIL.	MITI	KOREA	ELINCS	CHINA
Calcium carbonate	1317-65-3	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No	Yes
Calcium hydroxide	1305-62-0	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Calcium oxide	1305-78-8	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
Quartz	14808-60-7	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes

C: Component Analysis - WHMIS IDL

Component	CAS	Present
Calcium hydroxide	1305-62-0	Yes
Calcium oxide	1305-78-8	Yes
Quartz	14808-60-7	Yes

*** Section 16 - Other Information ***

Other Information

Disclaimer: Neither Minerals Technologies Inc., nor any of its affiliates ("MTI") shall be responsible for the use of information, product, method, or apparatus herein presented ("Information"), and you must make your own determination as to its suitability and completeness for your own use, for the protection of the environment, and for health and safety purposes. You assume the entire risk of relying on this information. In no event shall MTI be responsible for damages of any nature whatsoever resulting from the use of or reliance upon this information. By providing this information, MTI neither can nor intends to control the method or manner by which you use, handle, store, or transport MTI products. Nothing herein shall be construed as a recommendation or license to use any Information that conflicts with any patent, trademark or copyright. Material Safety Data Sheets providing safety precautions that should be observed in handling and storing MTI products are available upon request. You should obtain and review the available material safety information before handling any of these products.

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Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; DOT = Department of Transportation; RCRA = Resource Conservation and Recovery Act

This is the end of MSDS # LONGVIEW AG LIME

**MATERIAL SAFETY DATA SHEET****Aluminium Sulphate****Section 01 - Chemical And Product And Company Information**

Product Identifier Aluminium Sulphate, granular

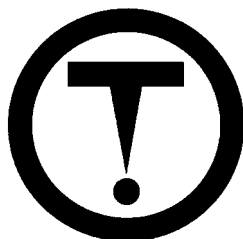
Product Use Coagulating agent in water treatment and pulp and paper, production of aluminum chemicals, general purpose food additive, fire extinguisher compounds, soaps, greases, drugs and cosmetics.

Supplier Name ClearTech Industries Inc.
2302 Hanselman Avenue
Saskatoon, SK. Canada
S7L 5Z3

Prepared By ClearTech Industries Inc. Technical Department
Phone: (306)664-2522

Preparation Date September 28, 2010

24-Hour Emergency Phone 306-664-2522

**Section 02 - Composition / Information on Ingredients**

Hazardous Ingredients Aluminium Sulphate Anhydrous 57-60% (anhydrous)

CAS Number Aluminium Sulphate Anhydrous 10043-01-3

Synonym (s) Dry alum, papermaker's alum, dialuminum trisulphate, aluminum sulphate anhydrous, aluminum sulphate octadecahydrate

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, Conventional Gasoline.
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 MAY 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 may 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.
<u>Potential acute health effects</u>	
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 may 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

<u>Name</u>	<u>CAS number</u>	<u>%</u>
Gasoline	86290-81-5	85-100
Toluene	108-88-3	15-40*
Benzene	71-43-2	0.5-1.5
Ethanol	64-17-5	0.1-0.3

*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, CO₂, 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 (NO_x), 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. 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. Remove contaminated clothing and protective equipment before entering eating areas. Avoid exposure - obtain special instructions before use. 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

7 . Handling and storage

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
Gasoline	ACGIH TLV (United States). TWA: 300 ppm 8 hour(s). STEL: 500 ppm 15 minute(s).
Toluene	ACGIH TLV (United States). TWA: 20 ppm 8 hour(s).
Benzene	ACGIH TLV (United States). Absorbed through skin. TWA: 0.5 ppm 8 hour(s). STEL: 2.5 ppm 15 minute(s).
Ethanol	ACGIH TLV (United States). STEL: 1000 ppm 15 minute(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	-
Toluene	LD50 Dermal	Rabbit	12125 mg/kg	-
	LD50 Oral	Rat	636 mg/kg	-
	LC50 Inhalation Vapour	Rat	7585 ppm	4 hours
Benzene	LD50 Dermal	Rabbit	>8240 mg/kg	-
	LD50 Oral	Rat	930 mg/kg	-
	LC50 Inhalation Vapour	Rat	13700 ppm	4 hours
Ethanol	LD50 Oral	Rat	7060 mg/kg	-
	LC50 Inhalation Vapour	Rat	>32380 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	-	-	-	-
Toluene	A4	3	D	-	-	-
Benzene	A1	1	A	+	Proven.	+
Ethanol	A3	-	-	-	-	-

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. 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. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. 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.

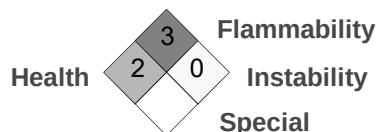
16 . Other information

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

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

Health	*	2
Flammability		3
Physical hazards		0
Personal protection		H

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



References : Available upon request.
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Date of printing : 10/10/2012.

Date of issue : 10 October 2012

Date of previous issue : 4/9/2010.

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.



Shell Canada Limited

Material Safety Data Sheet

Effective Date: 2005-08-15

Supersedes: 2002-08-14

Class B3 Combustible Class D2B Skin
Liquid Irritation

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: **SHELL* JET A-1**
SYNONYMS: Aviation Turbine Fuel (Kerosene Type)
May contain anti-icing additive (Diethylene Glycol Monomethyl Ether)
PRODUCT USE: Fuel Solvent
MSDS Number: 142-011

MANUFACTURER
Shell Canada Limited
P.O. Box 100, Station M
400-4th Ave. S.W.
Calgary, AB Canada
T2P 2H5

TELEPHONE NUMBERS
Shell Emergency Number 1-800-661-7378
CANUTEC 24 HOUR EMERGENCY NUMBER 613-996-6666
For general information: 1-800-661-1600
For MSDS information: 403-691-3982
(From 7:30 to 4:30 Mountain Time) 403-691-2220

This MSDS was prepared by the Toxicology and Product Stewardship Section of Shell Canada Limited.

*An asterisk in the product name designates a trade-mark(s) of Shell Canada Limited, used under license by Shell Canada Products.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Kerosene (Petroleum), Hydrodesulfurized	64742-81-0	60 - 100	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Liquid Bright Clear Hydrocarbon Odour

Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.

Hazards:
Combustible Liquid.
Irritating to skin.

Handling: Vapours are moderately irritating to the eyes.
Ingestion may result in vomiting. Avoid aspiration of vomitus into lungs as small quantities may result in aspiration pneumonitis.
Vapours are moderately irritating to the respiratory passages.
Eliminate all ignition sources.
Avoid prolonged exposure to vapours.
Wear suitable gloves and eye protection.
Bond and ground transfer containers and equipment to avoid static accumulation.
Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

For further information on health effects, see Section 11.

4. FIRST AID

Eyes: Flush eyes with water for at least 15 minutes while holding eyelids open. If irritation occurs and persists, obtain medical attention.

Skin: Wash contaminated skin with mild soap and water for at least 15 minutes. If irritation occurs and persists, obtain medical attention.

Ingestion: DO NOT INDUCE VOMITING! OBTAIN MEDICAL ATTENTION IMMEDIATELY. Guard against aspiration into lungs by having the individual turn on to their left side. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs.

Inhalation: Remove victim from further exposure and restore breathing, if required. Obtain medical attention.

Notes to Physician: The main hazard following accidental ingestion is aspiration of the liquid into the lungs producing chemical pneumonitis. If more than 2.0 mL/kg has been ingested, vomiting should be induced with supervision. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before vomiting, gastric lavage with a cuffed endotracheal tube should be considered.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Carbon Dioxide
Foam
Dry Chemical
Water Fog

Firefighting Instructions: Caution - Combustible. Vapour forms a flammable/explosive mixture with air between upper and lower flammable limits. Vapours may travel along ground and flashback along vapour trail may occur. Product will float and can be reignited on surface of water. Do not use a direct stream of water as it may spread fire. Containers exposed to intense heat from fires should be cooled with water to prevent vapour pressure buildup, which could result in container rupture. Container areas exposed to direct flame contact should be cooled with large quantities of water as needed to prevent weakening of container structure. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus.

Hazardous Combustion Products: A complex mixture of airborne solid, liquid, particulates and gases will evolve when this material undergoes pyrolysis or combustion. Carbon dioxide, carbon monoxide and unidentified organic compounds may be formed upon combustion.

6. ACCIDENTAL RELEASE MEASURES

Issue warning "Combustible". Eliminate all ignition sources. Isolate hazard area and restrict access. Handling equipment must be grounded. Work upwind of spill if it is safe to do so. Avoid direct contact with material. Wear appropriate breathing apparatus (if applicable) and protective clothing. Stop leak only if safe to do so. Dike and contain land spills; contain spills to water by booming. Use water fog to knock down vapours; contain runoff. Absorb residue or small spills with absorbent material and remove to non-leaking containers for disposal. Recommended materials: Clay or Sand Flush area with water to remove trace residue. Dispose of recovered material as noted under Disposal Considerations. Notify appropriate environmental agency(ies).

7. HANDLING AND STORAGE

- Handling:** Avoid excessive heat, sparks, open flames and all other sources of ignition. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Vapours are heavier than air and will settle and collect in low areas and pits, displacing breathing air. Extinguish pilot lights, cigarettes and turn off other sources of ignition prior to use and until all vapours are gone. Vapours may accumulate and travel to distant ignition sources and flashback. Do not cut, drill, grind, weld or perform similar operations on or near containers. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Do not pressurize drum containers to empty them. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities. Launder contaminated clothing prior to reuse. Use good personal hygiene. Combustible.
- Storage:** Store in a cool, dry, well ventilated area, away from heat and ignition sources. Keep container tightly closed.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

THE FOLLOWING INFORMATION, WHILE APPROPRIATE FOR THIS PRODUCT, IS GENERAL IN NATURE. THE SELECTION OF PERSONAL PROTECTIVE EQUIPMENT WILL VARY DEPENDING ON THE CONDITIONS OF USE.

OCCUPATIONAL EXPOSURE LIMITS (Current ACGIH TLV/TWA unless otherwise noted):

Kerosene/Jet fuels, as total hydrocarbon vapour (skin) : 200 mg/m³ (Application restricted to conditions in which there are negligible aerosol exposures.)

Skin Notation: Absorption through skin, eyes and mucous membranes may contribute significantly to the total exposure.

- Mechanical Ventilation:** Use explosion-proof ventilation as required to control vapour concentrations. Concentrations in air should be maintained below the occupational exposure limit if unprotected personnel are involved. Local ventilation recommended where mechanical ventilation is ineffective in controlling airborne concentrations below the recommended occupational exposure limit. Make up air should always be supplied to balance air exhausted (either generally or locally). For personnel entry into confined spaces (i.e. bulk storage tanks) a proper confined space entry procedure must be followed including ventilation and testing of tank atmosphere.

PERSONAL PROTECTIVE EQUIPMENT:

- Eye Protection:** Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes. Provide an eyewash station in the area.
- Skin Protection:** Avoid contact with skin. Use protective clothing and gloves manufactured from nitrile. Safety showers should be available for emergency use.
- Respiratory Protection:** Avoid breathing vapour or mists. If exposure has the potential to exceed occupational exposure limits, use an appropriate NIOSH-approved respirator. Use a NIOSH-approved chemical cartridge respirator with organic vapour cartridges or use a NIOSH-approved supplied-air respirator.

9. PHYSICAL DATA

Physical State:	Liquid
Appearance:	Bright Clear
Odour:	Hydrocarbon Odour
Odour Threshold:	Not available
Freezing/Pour Point:	Freeze Point < -47 °C
Boiling Point:	145 - 300 °C
Density:	775 - 840 kg/m ³ @ 15 °C
Vapour Density (Air = 1):	Not available
Vapour Pressure (absolute):	1 - 1.4 kPa @ 37.8 °C
pH:	Not available
Flash Point:	Tag Closed Cup > 43 °C
Lower Explosion Limit:	0.7 % (vol.)
Upper Explosion Limit:	5 % (vol.)
Autoignition Temperature:	210 °C
Viscosity:	< 8 cSt @ -20 °C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (log K_{ow}):	3.3 - 6
Water Solubility:	Insoluble
Other Solvents:	Hydrocarbon Solvents

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes
Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No
Sensitive to Static Discharge:	Yes
Hazardous Decomposition Products:	Thermal decomposition products are highly dependent on combustion conditions.
Incompatible Materials:	Avoid strong oxidizing agents.
Conditions of Reactivity:	Avoid excessive heat, open flames and all ignition sources.

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	Toxicological Data
Kerosene (Petroleum), Hydrodesulfurized	LD50 Dermal Rabbit > 2000 mg/kg LD50 Oral Rat > 5000 mg/kg

Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.

Irritancy:	This product is expected to be irritating to skin but is not predicted to be a skin sensitizer.
Chronic Effects:	Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged exposure to high vapour concentration can cause headache, dizziness, nausea, blurred vision and central nervous system depression.
Pre-existing Conditions:	Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.
Carcinogenicity and Mutagenicity:	The International Agency for Research on Cancer (IARC) considers that this product is not classifiable as to its carcinogenicity to humans. Middle distillates have caused skin cancers in laboratory animals when applied repeatedly and left in place between applications. This effect is believed to be caused by the continuous irritation of the skin. Good personal hygiene should be maintained to avoid this risk.

12. ECOLOGICAL INFORMATION

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities. May cause physical fouling of aquatic organisms.

Biodegradability:	Not readily biodegradable. Rapid volatilization.
Bioaccumulation:	Potential for bioaccumulation.
Partition Coefficient (log K_{ow}):	3.3 - 6

Aquatic Toxicity

Product is expected to be toxic to aquatic organisms.

Ingredient:	Toxicological Data
Kerosene (Petroleum), Hydrodesulfurized	EL50 - growth rate (WAF method) Algae (72hr) 1 - 10 mg/L. EL50 (WAF method) Daphnia Magna (48hr) 1 - 10 mg/L. LL50 (WAF method) Rainbow Trout (96hr) 1 - 10 mg/L.

Definition(s):	LL and EL are the lethal loading concentration and effective loading concentration respectively. The concentration represents the amount of substance added to the system to obtain a toxic concentration. They replace the traditional LC and EC for low solubility substances. WAF is the water accommodated fraction. A slightly soluble hydrocarbon is stirred into water and the insoluble portions are removed. The remaining solution is the water accommodated fraction.

13. DISPOSAL CONSIDERATIONS

Waste management priorities (depending on volumes and concentration of waste) are: 1. recycle (reprocess), 2. energy recovery 3. incineration, 4. disposal at a licenced waste disposal facility. Do not attempt to combust waste on-site. Incinerate at a licenced waste disposal site with approval of environmental authority.

14. TRANSPORTATION INFORMATION**Canadian Road and Rail Shipping Classification:**

UN Number	UN1863
Proper Shipping Name	FUEL, AVIATION, TURBINE ENGINE
Hazard Class	Class 3 Flammable Liquids
Packing Group	PG III
Additional Information	Not Regulated in Containers Less Than or Equal to 450 Litres.
Shipping Description	FUEL, AVIATION, TURBINE ENGINE Class 3 UN1863 PG III Not Regulated in Containers Less Than or Equal to 450 Litres.

15. REGULATORY INFORMATION

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

WHMIS Class:	Class B3 Combustible Liquid Class D2B Skin Irritation
DSL/NDL Status:	This product, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act.
Other Regulatory Status:	No Canadian federal standards.

16. ADDITIONAL INFORMATION**LABEL STATEMENTS**

Hazard Statement :	Combustible Liquid. Irritating to skin.
Handling Statement:	Eliminate all ignition sources. Avoid prolonged exposure to vapours. Wear suitable gloves and eye protection. Bond and ground transfer containers and equipment to avoid static accumulation. Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.
First Aid Statement :	Wash contaminated skin with soap and water. Flush eyes with water. If overcome by vapours remove to fresh air. Do not induce vomiting. Obtain medical attention.

Revisions:

This MSDS has been reviewed and updated.

Changes have been made to:

Section 3

Section 4

Section 5

Section 7

Section 8

Section 9

Section 12

Section 14

**Shell Canada Limitée****Fiche signalétique**FS en vigueur le : 2005-08-15
Remplace celle du : 2002-08-14Catégorie B3 Liquide
combustibleCatégorie D2B Irritation
de la peau**1. IDENTIFICATION DU PRODUIT ET DE LA SOCIÉTÉ**

NOM COMMERCIAL : **CARBUREACTEUR SHELL* A-1**
SYNONYMES : Carburant aviation pour moteurs à turbines (type kérosène)
Peut contenir un additif antigivre (éther monométhylque du diéthylèneglycol)

UTILISATION DU PRODUIT : Carburant. Solvant.
NUMÉRO DE LA FS : 142-011

NOM DU FABRICANT
Shell Canada Limitée
P.O. Box 100, Station M
400-4th Ave. S.W.
Calgary, AB Canada
T2P 2H5

NUMÉROS DE TÉLÉPHONE
Numéro d'urgence de Shell 1 800 661-7378
Numéro d'urgence de CANUTEC (24 heures) (613) 996-6666

Pour information générale 1 800 661-1600
Pour information sur la FS (403) 691-3982
(De 7 h 30 à 16 h 30, heure des Rocheuses) (403) 691-2220

Cette FS a été préparée par le groupe de toxicologie et bonne gestion des produits de Shell Canada Limitée.

* L'astérisque dans la désignation du produit signifie <<Marque déposée de Shell Canada Limitée, utilisée en vertu d'une licence par Produits Shell Canada>>.

2. COMPOSITION/INFORMATION SUR LES INGRÉDIENTS

Ingrédients	N° CAS	%	Contrôlé par SIMDUT
Kérosène (pétrole), hydrodésulfuré	64742-81-0	60 - 100	Oui

Voir la section 8 pour les directives sur l'exposition.

3. IDENTIFICATION DES RISQUES

Description physique : Liquide. Brillant Clair Odeur d'hydrocarbure.

Voies d'entrée : L'exposition à ce produit est le plus susceptible de se produire par contact avec la peau ou inhalation.

Effets potentiels sur la santé :

Liquide combustible.
Irritant pour la peau.
Les vapeurs sont modérément irritantes pour les yeux.
Il peut y avoir vomissement après ingestion du produit. Éviter d'aspirer le produit vomi dans les poumons étant donné que de petites quantités peuvent causer une pneumonie par aspiration.
Les vapeurs sont modérément irritantes pour les voies respiratoires.
Éliminer toutes les sources d'inflammation.
Éviter l'exposition prolongée aux vapeurs.
Porter des protecteurs oculaires et des gants appropriés.
Mettre à la masse et à la terre le matériel et les contenants de transfert pour éviter l'accumulation d'électricité statique.
Les contenants vides sont dangereux, car ils peuvent contenir des poussières, des vapeurs ou des résidus liquides inflammables/explosifs. Tenir loin des étincelles et de la flamme nue.

Information sur la manipulation :

Pour plus d'information sur les effets sur la santé, voir la section 11.

4. PREMIERS SOINS

Contact avec les yeux : Rincer les yeux à grande eau pendant au moins 15 minutes en gardant les paupières ouvertes. En cas d'irritation et si celle-ci persiste, obtenir des soins médicaux.

Contact avec la peau : Laver la peau contaminée à l'eau et au savon doux pendant au moins 15 minutes. En cas d'irritation et si celle-ci persiste, obtenir des soins médicaux.

Ingestion : NE PAS FAIRE VOMIR! OBTENIR IMMÉDIATEMENT DES SOINS MÉDICAUX. Empêcher le produit d'être aspiré dans les poumons en plaçant la personne incommodée sur son côté gauche. Si la personne incommodée vomit spontanément, lui faire placer la tête entre les jambes de façon à empêcher que le liquide ne soit aspiré dans les poumons.

Inhalation : Éloigner la personne incommodée de l'endroit contaminé et rétablir la respiration s'il y a lieu. Obtenir des soins médicaux.

Remarques à l'intention du médecin : Le principal danger qui puisse résulter de l'ingestion accidentelle de ce produit est son aspiration dans les poumons, ce qui causerait alors une pneumonie chimique. Si plus de 2,0 mL par kg de poids ont été avalés, faire vomir sous surveillance. Si des symptômes tels que la perte du réflexe pharyngé, des convulsions ou la perte de connaissance surviennent avant que la personne ait vomi, envisager la possibilité de procéder à un lavage gastrique avec une sonde endotrachéale à ballonnet.

5. LUTTE EN CAS D'INCENDIE

Moyens d'extinction : Gaz carbonique
Mousse
Poudre
Brouillard d'eau

Mesures spéciales de lutte en cas d'incendie :	Attention - Produit combustible. Les vapeurs forment un mélange inflammable/détonant dans l'air entre les limites inférieure et supérieure d'inflammabilité. Les vapeurs peuvent se déplacer au niveau du sol et il peut y avoir retour des flammes le long du chemin qu'elles ont emprunté. Le produit va flotter et peut se réenflammer à la surface de l'eau. Ne pas utiliser un jet d'eau direct, ce qui pourrait propager l'incendie. Les contenants exposés à la chaleur intense en cas d'incendie doivent être refroidis à l'eau afin de prévenir une hausse de la pression due aux vapeurs, ce qui pourrait les faire se rupturer. Les parties des contenants exposées au contact direct des flammes doivent être refroidies à grande eau afin de prévenir une faiblesse de paroi des contenants. Ne pas pénétrer sur les lieux d'un incendie dans un espace clos sans vêtements protecteurs appropriés et sans appareil respiratoire autonome à surpression homologué.
Produits de combustion dangereux :	Un mélange complexe de particules solides et liquides en suspension dans l'air et des gaz seront libérés lors de la pyrolyse ou de la combustion. Gaz carbonique, monoxyde de carbone et composés organiques non identifiés peuvent se former lors de la combustion.

6. MESURES EN CAS DE REJET ACCIDENTEL

Avertir que ce produit est combustible. Éliminer toutes les sources d'inflammation. Circonscrire l'endroit dangereux et en interdire l'accès. Mettre à la terre l'équipement qui sert à manipuler ce produit. Travailler dans le sens du vent par rapport au produit répandu s'il est prudent de le faire. Éviter tout contact direct avec ce produit. Utiliser un appareil respiratoire approprié (s'il y a lieu) et porter des vêtements protecteurs. N'arrêter les fuites que s'il est prudent de le faire. Endiguer et contenir les déversements terrestres; contenir les rejets accidentels dans les eaux au moyen de barrages flottants. Se servir d'eau pulvérisée pour supprimer les vapeurs; empêcher cette eau de se répandre. Absorber les résidus ou les petites quantités répandues avec une matière absorbante et mettre dans des contenants hermétiques avant de s'en débarrasser. Produits recommandés : Argile ou Sable Rincer les lieux à grande eau pour enlever toutes les traces de résidus. Se débarrasser du produit récupéré conformément aux directives d'élimination. Avertir les agences de protection de l'environnement appropriées.

7. ENTREPOSAGE ET MANUTENTION

Manutention :	Éviter la chaleur excessive, les étincelles, les flammes nues et toutes les autres sources d'inflammation. Mettre à la terre l'équipement fixe ainsi que les contenants qui servent au transvasement et le matériel de façon à prévenir l'accumulation d'électricité statique. Les vapeurs sont plus lourdes que l'air et vont s'accumuler dans les régions basses et les fosses en déplaçant l'air respirable. Éteindre les lampes pilotes, les cigarettes et fermer toutes les autres sources d'inflammation avant d'utiliser ce produit et jusqu'à ce que toutes les vapeurs se soient dissipées. Les vapeurs peuvent s'accumuler et se propager vers une source d'inflammation éloignée provoquant ainsi un retour des flammes. Ne pas effectuer d'opérations de découpage, de forage, de meulage, de soudage ou autres sur ou près des contenants. Les contenants vides sont dangereux car ils peuvent contenir des poussières, des vapeurs ou des résidus inflammables/explosifs. Ne pas utiliser de pression pour vider les fûts. Se laver à l'eau et au savon avant de manger, boire, fumer, se maquiller ou aller aux toilettes. Laver les vêtements contaminés avant de les porter de nouveau. Observer une bonne hygiène personnelle. Combustible.
Entreposage :	Entreposer dans un endroit frais, sec et bien ventilé, loin de la chaleur et des sources d'inflammation. Garder le contenant fermé hermétiquement.

8. CONTRÔLES DE L'EXPOSITION, PROTECTION PERSONNELLE

LES RENSEIGNEMENTS SUIVANTS, QUOIQU' APPROPRIÉS POUR CE PRODUIT, ONT UNE PORTÉE GÉNÉRALE. LE CHOIX DE L'ÉQUIPEMENT DE PROTECTION PERSONNELLE SERA FONCTION DES CONDITIONS D'UTILISATION.

Limites d'exposition en milieu de travail (VLE/MPT actuelle selon l'ACGIH, sauf avis contraire)

Kérosène/carburéacteurs, sous forme de vapeur d'hydrocarbures totaux (peau): 200 mg/m³ (Application limitée aux conditions où l'exposition aux aérosols est négligeable.)

Mention Peau: L'absorption par la peau, les yeux ou les muqueuses peut contribuer de façon significative à l'exposition totale.

Ventilation mécanique : Système de ventilation requis de façon à prévenir l'accumulation des vapeurs. En présence de personnel non protégé, la concentration du produit dans l'air doit être maintenue sous la limite d'exposition en milieu de travail. Ventilation locale recommandée lorsque le système de ventilation mécanique est insuffisant pour maintenir la concentration du produit dans l'air du lieu de travail sous la limite d'exposition conseillée. De l'air d'appoint doit toujours être fourni pour remplacer l'air rejeté (de façon générale ou locale). Lorsqu'il faut pénétrer dans un espace clos (par exemple, un réservoir de stockage), observer la marche à suivre appropriée, y compris en ce qui a trait à la ventilation et à la vérification de l'air du réservoir.

ÉQUIPEMENT DE PROTECTION PERSONNELLE :

Yeux et visage : Lunettes de sécurité et(ou) masque couvrant tout le visage si le produit est manipulé d'une façon où il pourrait y avoir éclaboussement dans les yeux. Prévoir un poste de lavage des yeux à proximité.

Peau (mains, bras et corps) : Éviter le contact avec la peau. Porter des vêtements et des gants protecteurs faits de nitrile. Des douches doivent être disponibles en cas d'urgence.

Voies respiratoires : Éviter de respirer les vapeurs ou le brouillard. Si l'exposition a le potentiel de dépasser les limites pour le lieu de travail, utiliser le respirateur approprié homologué par le NIOSH. Utiliser un respirateur à cartouche filtrante protégeant contre les vapeurs organiques homologué par le NIOSH ou un respirateur à adduction d'air homologué par le NIOSH.

9. PROPRIÉTÉS PHYSIQUES ET CHIMIQUES

Description physique :	Liquide.
Aspect/couleur :	Brillant Clair
Odeur :	Odeur d'hydrocarbure.
Seuil moyen de perception de l'odeur :	Non disponible
Point de congélation/point d'écoulement :	Point de congélation < -47 °C
Point d'ébullition :	145 - 300 °C
Masse volumique :	775 - 840 kg/m ³ @ 15 °C
Densité de vapeur (air = 1) :	Non disponible
Tension de vapeur (absolu) :	1 - 1,4 kPa @ 37,8 °C
pH :	Non disponible
Point d'éclair :	Vase clos Tag > 43 °C
Limite d'inflammabilité inférieure :	0,7 % (vol.)
Limite d'inflammabilité supérieure :	5 % (vol.)
Température d'autoinflammation :	210 °C
Viscosité :	< 8 cSt @ -20 °C

Vitesse d'évaporation (n-BuAc = 1) : Non disponible
Coefficient de distribution eau/huile (log K_{oc}) 3,3 - 6
Solubilité dans l'eau : Insoluble
Autre solvant : Solvants à base d'hydrocarbures

10. STABILITÉ ET RÉACTIVITÉ

Chimiquement stable : Oui
Polymérisation dangereuse : Non
Sensibilité au choc mécanique : Non
Sensibilité à l'électricité statique : Oui
Produits de décomposition dangereux : Les produits de la décomposition thermique dépendent en grande partie des conditions de la combustion.
Matériaux incompatibles : Éviter les oxydants puissants.
Conditions de réactivité : Éviter la chaleur excessive, les flammes nues et toutes les autres sources d'inflammation.

11. INFORMATION TOXICOLOGIQUE

Ingrédient (ou produit si non précisé)	Données toxicologiques
Kérosène (pétrole), hydrodésulfuré	DL50 Cutanée Lapin > 2 000 mg/kg DL50 Orale Rat > 5 000 mg/kg

Voies d'entrée : L'exposition à ce produit est le plus susceptible de se produire par contact avec la peau ou inhalation.

Irritation : Ce produit devrait causer une irritation de la peau mais il n'est pas supposé être un agent de sensibilisation de la peau.

Toxicité chronique : Le contact prolongé et répété de ce produit avec la peau peut causer un dégraissement et un dessèchement de la peau se traduisant par une irritation et une dermatite. L'exposition prolongée à des vapeurs très concentrées peut causer des maux de tête, des étourdissements, des nausées, une vision brouillée et une dépression du système nerveux central.

Conditions préexistantes : Des troubles préexistants des yeux, de la peau et des voies respiratoires peuvent être aggravés par une exposition à ce produit.

Carcinogénicité et mutagénicité : Selon le Centre international de recherche sur le cancer (CIRC), ce produit ne peut être classé en fonction de sa cancérogénicité pour les humains. Des distillats moyens ont causé des cancers de la peau chez des animaux de laboratoire lorsqu'ils ont été appliqués de façon répétée et laissés en place entre les applications. Cela serait causé par une irritation continue de la peau. Une bonne hygiène personnelle doit être observée pour prévenir ce risque.

12. RENSEIGNEMENTS ÉCOLOGIQUES

Ne pas laisser ce produit ou l'eau qui sert à combattre un incendie où ce produit est en cause pénétrer dans les égouts, les lacs, les cours d'eau ou les canalisations d'eau potable. Boucher les égouts et bloquer les fossés. Les règlements provinciaux exigent et les règlements fédéraux peuvent exiger que les agences de protection de l'environnement ou d'autres organismes soient avertis en cas de déversement. La région polluée doit être nettoyée et remise à son état original ou à la satisfaction des autorités. Peut causer une pollution des organismes aquatiques.

Biodégradabilité: N'est pas facilement biodégradable.
Volatilisation rapide.

Bioaccumulation: Possibilité d'accumulation dans les organismes vivants.

Partition Coefficient (log K_{ow}): 3,3 - 6

Toxicité en Milieu Aquatique

Le produit devrait être toxique pour les organismes aquatiques.

Ingrédient:	Données toxicologiques
Définition(s):	CL et CE sont respectivement la concentration de la charge létale et la concentration de la charge effective. La concentration représente la quantité de la substance qui est placée dans l'eau de façon à obtenir la concentration toxique. Ces concentrations remplacent les concentrations létales et effectives traditionnelles pour les substances à faible solubilité. WAF (water accomodated fraction) est la fraction adaptée à l'eau. Un hydrocarbure légèrement soluble est remué dans de l'eau, puis la partie insoluble est enlevée. La solution restante correspond à la fraction adaptée à l'eau.
Kerosène (pétrole), hydrodésulfuré	CE50 - vitesse de croissance (méthode WAF) Algues (72hr) 1 - 10 mg/L CE50 (Méthode WAF) Daphnia Magna (72hr) 1 - 10 mg/L CL50 (méthode WAF) Truite arc-en-ciel (96hr) 1 - 10 mg/L

13. ÉLIMINATION DU PRODUIT

Priorités de gestion des déchets (selon leur volume et leur concentration) : 1. Recycler (retraiter), 2. Récupérer l'énergie 3. Incinérer, 4. Remettre à une installation d'élimination des déchets autorisée. Ne pas essayer de brûler les déchets sur les lieux. Incinérer avec l'approbation des organismes de protection de l'environnement dans un endroit approuvé détenant un permis.

14. RENSEIGNEMENTS SUR LE TRANSPORT

Description d'expédition du TMD (route et rail)

Numéro de l'ONU	UN1863
Nom d'expédition approprié	CARBURÉACTEUR
Classe de danger	Class 3 Liquides inflammables
Groupe d'emballage	PG III
Renseignements additionnels	Non réglementé en contenants de 450 litres ou moins.
Description d'expédition	CARBURÉACTEUR Class 3 UN1863 PG III Non réglementé en contenants de 450 litres ou moins.

15. RENSEIGNEMENTS SUR LA RÉGLEMENTATION

Ce produit a été classifié conformément aux critères de danger du Règlement sur les produits contrôlés (RPC) du Canada et la FS contient toute l'information requise en vertu du RPC.

Catégorie SIMDUT et description : Catégorie B3 Liquide combustible
Catégorie D2B Irritation de la peau

Statut LPCE/NLPCE : Ce produit, ou tous ses composants, figurent sur la liste intérieure des substances, en vertu de la Loi canadienne sur la protection de l'environnement.

Autres règlements : Normes fédérales canadiennes inexistantes.

16. AUTRES RENSEIGNEMENTS**ÉTIQUETTE**

Mention de danger : Liquide combustible.
Irritant pour la peau.

Précautions lors de la manipulation : Éliminer toutes les sources d'inflammation.
Éviter l'exposition prolongée aux vapeurs.
Porter des protecteurs oculaires et des gants appropriés.
Mettre à la masse et à la terre le matériel et les contenants de transfert pour éviter l'accumulation d'électricité statique.
Les contenants vides sont dangereux, car ils peuvent contenir des poussières, des vapeurs ou des résidus liquides inflammables/explosifs. Tenir loin des étincelles et de la flamme nue.

Premiers soins : Laver la peau contaminée à l'eau et au savon.
Rincer les yeux à grande eau.
Si une personne est incommodée par les vapeurs, l'amener à l'air frais.
Ne pas faire vomir.
Obtenir des soins médicaux.

Révisions : Cette fiche signalétique a été révisée et mise à jour.
Des modifications ont été apportées à :
Rubrique 3
Rubrique 4
Rubrique 5
Rubrique 7
Rubrique 8
Rubrique 9
Rubrique 12
Rubrique 14



Shell Canada Limited

Material Safety Data Sheet

Effective Date: 2005-11-07

Supersedes: 2002-11-06

Class B3 Combustible Class D2B Skin
Liquid Irritation

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: **ULTRA LOW SULPHUR DIESEL CP-43**
SYNONYMS: Diesel
Automotive Gas Oil
PRODUCT USE: Fuel
MSDS Number: 320-043

SUPPLIER
Shell Canada Limited (SCL)
P.O. Box 100, Station M
400-4th Ave. S.W.
Calgary, AB Canada
T2P 2H5

TELEPHONE NUMBERS
Shell Emergency Number 1-800-661-7378
CANUTEC 24 HOUR EMERGENCY NUMBER 613-996-6666
For general information: 1-800-661-1600
For MSDS information: 403-691-3982
(From 7:30 to 4:30 Mountain Time)

This MSDS was prepared by the Toxicology and Product Stewardship Section of Shell Canada Limited.

*An asterisk in the product name designates a trade-mark(s) of Shell Canada Limited, used under license by Shell Canada Products.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Fuels, Diesel, No. 2	68476-34-6	100	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Liquid Clear To Yellow Hydrocarbon Odour

Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.

Hazards:

Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.

Combustible Liquid.

Irritating to skin.

Vapours are moderately irritating to the eyes.

Ingestion may result in vomiting. Avoid aspiration of vomitus into lungs as small quantities may result in aspiration pneumonitis.

Vapours are moderately irritating to the respiratory passages.

Handling: Eliminate all ignition sources.

Avoid prolonged exposure to vapours.

Wear suitable gloves and eye protection.

Bond and ground transfer containers and equipment to avoid static accumulation.

Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

For further information on health effects, see Section 11.

4. FIRST AID

Eyes: Flush eyes with water for at least 15 minutes while holding eyelids open. If irritation occurs and persists, obtain medical attention.

Skin: Wash contaminated skin with mild soap and water for at least 15 minutes. If irritation occurs and persists, obtain medical attention.

Ingestion: DO NOT INDUCE VOMITING! OBTAIN MEDICAL ATTENTION IMMEDIATELY. Guard against aspiration into lungs by having the individual turn on to their left side. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Do not give anything by mouth to an unconscious person.

Inhalation: Remove victim from further exposure and restore breathing, if required. Obtain medical attention.

Notes to Physician: The main hazard following accidental ingestion is aspiration of the liquid into the lungs producing chemical pneumonitis. If more than 2.0 mL/kg has been ingested, vomiting should be induced with supervision. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before vomiting, gastric lavage with a cuffed endotracheal tube should be considered.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Dry Chemical
Carbon Dioxide
Foam
Water Fog

Firefighting Instructions: Caution - Combustible. Do not use a direct stream of water as it may spread fire. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus. Vapour forms a flammable/explosive mixture with air between upper and lower flammable limits. Vapours may travel along ground and flashback along vapour trail may occur. Avoid inhalation of smoke. Product will float and can be reignited on surface of water. Delayed lung damage can be experienced after exposure to combustion products, sometimes hours after the exposure.

Hazardous Combustion Products: A complex mixture of airborne solid, liquid, particulates and gases will evolve when this material undergoes pyrolysis or combustion. Carbon dioxide, carbon monoxide and unidentified organic compounds may be formed upon combustion.

6. ACCIDENTAL RELEASE MEASURES

Issue warning "Combustible". Eliminate all ignition sources. Isolate hazard area and restrict access. Handling equipment must be grounded. Work upwind of spill if it is safe to do so. Avoid direct contact with material. Wear appropriate breathing apparatus (if applicable) and protective clothing. Stop leak only if safe to do so. Dike and contain land spills; contain spills to water by booming. Use water fog to knock down vapours; contain runoff. Absorb residue or small spills with absorbent material and remove to non-leaking containers for disposal. Recommended materials: Clay or Sand Flush area with water to remove trace residue. Dispose of recovered material as noted under Disposal Considerations. Notify appropriate environmental agency(ies).

7. HANDLING AND STORAGE

Handling: Combustible. Avoid excessive heat, sparks, open flames and all other sources of ignition. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Vapours are heavier than air and will settle and collect in low areas and pits, displacing breathing air. Extinguish pilot lights, cigarettes and turn off other sources of ignition prior to use and until all vapours are gone. Vapours may accumulate and travel to distant ignition sources and flashback. Do not cut, drill, grind, weld or perform similar operations on or near containers. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Do not pressurize drum containers to empty them. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities. Launder contaminated clothing prior to reuse. Use good personal hygiene.

Storage: Store in a cool, dry, well ventilated area, away from heat and ignition sources. Keep container tightly closed.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

THE FOLLOWING INFORMATION, WHILE APPROPRIATE FOR THIS PRODUCT, IS GENERAL IN NATURE. THE SELECTION OF PERSONAL PROTECTIVE EQUIPMENT WILL VARY DEPENDING ON THE CONDITIONS OF USE.

OCCUPATIONAL EXPOSURE LIMITS (Current ACGIH TLV/TWA unless otherwise noted):

Diesel fuel, as total hydrocarbons (skin): 100 mg/m³

Skin Notation: Absorption through skin, eyes and mucous membranes may contribute significantly to the total exposure.

Mechanical Ventilation: Concentrations in air should be maintained below the occupational exposure limit if unprotected personnel are involved. Use explosion-proof ventilation as required to control vapour concentrations. Make up air should always be supplied to balance air exhausted (either generally or locally). For personnel entry into confined spaces (i.e. bulk storage tanks) a proper confined space entry procedure must be followed including ventilation and testing of tank atmosphere. Local ventilation recommended where mechanical ventilation is ineffective in controlling airborne concentrations below the recommended occupational exposure limit.

PERSONAL PROTECTIVE EQUIPMENT:

- Eye Protection:** Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes. Provide an eyewash station in the area.
- Skin Protection:** Impervious gloves (viton, nitrile) should be worn at all times when handling this material. In confined spaces or where the risk of skin exposure is much higher, impervious clothing should be worn. Safety showers should be available for emergency use.
- Respiratory Protection:** If exposure exceeds occupational exposure limits, use an appropriate NIOSH-approved respirator. Use a NIOSH-approved chemical cartridge respirator with organic vapour cartridges or use a NIOSH-approved supplied-air respirator. For high airborne concentrations, use a NIOSH-approved supplied-air respirator, either self-contained or airline breathing apparatus, operated in positive pressure mode.

9. PHYSICAL DATA

Physical State:	Liquid
Appearance:	Clear To Yellow
Odour:	Hydrocarbon Odour
Odour Threshold:	Not available
Freezing/Pour Point:	Cloud Point-43 °C
Boiling Point:	150 - 330 °C
Density:	< 850 kg/m ³ @ 15 °C
Vapour Density (Air = 1):	Not available
Vapour Pressure (absolute):	Not available
pH:	Not available
Flash Point:	Pensky-Martens CC > 40 °C
Lower Flammable Limit:	1 % (vol.)
Upper Flammable Limit:	6 % (vol.)
Autoignition Temperature:	250 °C
Viscosity:	1.3 - 3.6 cSt @ 40 °C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (log K_{ow}):	Not available
Water Solubility:	Insoluble
Other Solvents:	Hydrocarbon Solvents

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes
Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No
Sensitive to Static Discharge:	Yes
Hazardous Decomposition Products:	Thermal decomposition products are highly dependent on combustion conditions.
Incompatible Materials:	Avoid strong oxidizing agents.
Conditions of Reactivity:	Avoid excessive heat, open flames and all ignition sources.

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	Toxicological Data
Fuels, Diesel, No. 2	LD50 Dermal Rabbit > 5000 mg/kg LD50 Oral Rat = 9000 mg/kg

Routes of Exposure:	Exposure will most likely occur through skin contact or inhalation.
Irritancy:	This product is expected to be irritating to skin but is not predicted to be a skin sensitizer.
Acute Toxicity:	Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.
Chronic Effects:	Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged exposure to high vapour concentration can cause headache, dizziness, nausea, blurred vision and central nervous system depression.
Pre-existing Conditions:	Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.
Carcinogenicity and Mutagenicity:	The International Agency for Research on Cancer (IARC) considers that this product is not classifiable as to its carcinogenicity to humans. Middle distillates have caused skin cancers in laboratory animals when applied repeatedly and left in place between applications. This effect is believed to be caused by the continuous irritation of the skin. Good personal hygiene should be maintained to avoid this risk. The American Conference of Governmental Industrial Hygienists (ACGIH) has classified this product as A3 - confirmed animal carcinogen with unknown relevance to humans.

12. ECOLOGICAL INFORMATION

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities. May cause physical fouling of aquatic organisms.

Biodegradability:	Not readily biodegradable.
Bioaccumulation:	Potential for bioaccumulation.
Partition Coefficient (log K_{ow}):	Not available

Aquatic Toxicity

May be harmful to aquatic life.

Ingredient:	Toxicological Data
Fuels, Diesel, No. 2	EL50 - growth rate Algae (72hr) 10 - 100 mg/L. EL50 Daphnia Magna (48hr) 10 - 100 mg/L. LL50 (WAF method) Rainbow Trout (96hr) 10 - 100 mg/L.

Definition(s):	LL and EL are the lethal loading concentration and effective loading concentration respectively. The concentration represents the amount of substance added to the system to obtain a toxic concentration. They replace the traditional LC and EC for low solubility substances. WAF is the water accommodated fraction. A slightly soluble hydrocarbon is stirred into water and the insoluble portions are removed. The remaining solution is the water accommodated fraction.

13. DISPOSAL CONSIDERATIONS

Waste management priorities (depending on volumes and concentration of waste) are: 1. recycle (reprocess), 2. energy recovery 3. incineration, 4. disposal at a licenced waste disposal facility. Do not attempt to combust waste on-site. Incinerate at a licenced waste disposal site with approval of environmental authority.

14. TRANSPORTATION INFORMATION**Canadian Road and Rail Shipping Classification:**

UN Number	UN1202
Proper Shipping Name	DIESEL FUEL
Hazard Class	Class 3 Flammable Liquids
Packing Group	PG III
Additional Information	Not Regulated in Containers Less Than or Equal to 450 Litres.
Shipping Description	DIESEL FUEL Class 3 UN1202 PG III
	Not Regulated in Containers Less Than or Equal to 450 Litres.

15. REGULATORY INFORMATION

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

WHMIS Class:	Class B3 Combustible Liquid Class D2B Skin Irritation
DSL/NDL Status:	This product, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act.
Other Regulatory Status:	No Canadian federal standards.

16. ADDITIONAL INFORMATION**LABEL STATEMENTS**

Hazard Statement :	Combustible Liquid. Irritating to skin.
Handling Statement:	Eliminate all ignition sources. Avoid prolonged exposure to vapours. Wear suitable gloves and eye protection. Bond and ground transfer containers and equipment to avoid static accumulation. Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

First Aid Statement : Wash contaminated skin with soap and water.
Flush eyes with water.
If overcome by vapours remove to fresh air.
Do not induce vomiting.
Obtain medical attention.

Revisions: This MSDS has been reviewed and updated.
Changes have been made to:
Section 1
Section 3
Section 5
Section 8
Section 9
Section 12

**Shell Canada Limitée****Fiche signalétique**FS en vigueur le : 2005-11-07
Remplace celle du : 2002-11-06Catégorie B3 Liquide
combustibleCatégorie D2B Irritation
de la peau**1. IDENTIFICATION DU PRODUIT ET DE LA SOCIÉTÉ**

NOM COMMERCIAL : **CARB. DIESEL A TENEUR ULTRA-FAIBLE EN SOUFRE PT-43**
SYNONYMES : Diesel
Gazole automobile
UTILISATION DU PRODUIT : Carburant.
NUMÉRO DE LA FS : 320-043

NOM DU FOURNISSEUR
Shell Canada Limitée (SCL)
P.O. Box 100, Station M
400-4th Ave. S.W.
Calgary, AB Canada
T2P 2H5

NUMÉROS DE TÉLÉPHONE
Numéro d'urgence de Shell 1 800 661-7378
Numéro d'urgence de CANUTEC (24 heures) (613) 996-6666

Pour information générale 1 800 661-1600
Pour information sur la FS (403) 691-3982
(De 7 h 30 à 16 h 30, heure des Rocheuses)

Cette FS a été préparée par le groupe de toxicologie et bonne gestion des produits de Shell Canada Limitée.

* L'astérisque dans la désignation du produit signifie <<Marque déposée de Shell Canada Limitée, utilisée en vertu d'une licence par Produits Shell Canada>>.

2. COMPOSITION/INFORMATION SUR LES INGRÉDIENTS

Ingrédients	N° CAS	%	Contrôlé par SIMDUT
Carburant, Diesel, No. 2	68476-34-6	100	Oui

Voir la section 8 pour les directives sur l'exposition.

3. IDENTIFICATION DES RISQUES

Description physique : Liquide. De clair à jaune Odeur d'hydrocarbure.

Voies d'entrée : L'exposition à ce produit est le plus susceptible de se produire par contact avec la peau ou inhalation.

Effets potentiels sur la santé :

Information sur la manipulation :

Les concentrations de vapeurs supérieures au niveau d'exposition recommandé irritent les yeux et les voies respiratoires, peuvent causer des maux de tête et des étourdissements, sont anesthésiques et peuvent avoir d'autres effets sur le système nerveux central.

Liquide combustible.

Irritant pour la peau.

Il peut y avoir vomissement après ingestion du produit. Éviter d'aspirer le produit vomi dans les poumons étant donné que de petites quantités peuvent causer une pneumonie par aspiration.

Les vapeurs sont modérément irritantes pour les yeux.

Les vapeurs sont modérément irritantes pour les voies respiratoires.

Éliminer toutes les sources d'inflammation.

Éviter l'exposition prolongée aux vapeurs.

Porter des protecteurs oculaires et des gants appropriés.

Mettre à la masse et à la terre le matériel et les contenants de transfert pour éviter l'accumulation d'électricité statique.

Les contenants vides sont dangereux, car ils peuvent contenir des poussières, des vapeurs ou des résidus liquides inflammables/explosifs. Tenir loin des étincelles et de la flamme nue.

Pour plus d'information sur les effets sur la santé, voir la section 11.

4. PREMIERS SOINS

- Contact avec les yeux :** Rincer les yeux à grande eau pendant au moins 15 minutes en gardant les paupières ouvertes. En cas d'irritation et si celle-ci persiste, obtenir des soins médicaux.
- Contact avec la peau :** Laver la peau contaminée à l'eau et au savon doux pendant au moins 15 minutes. En cas d'irritation et si celle-ci persiste, obtenir des soins médicaux.
- Ingestion :** NE PAS FAIRE VOMIR! OBTENIR IMMÉDIATEMENT DES SOINS MÉDICAUX. Empêcher le produit d'être aspiré dans les poumons en plaçant la personne incommodée sur son côté gauche. Si la personne incommodée vomit spontanément, lui faire placer la tête entre les jambes de façon à empêcher que le liquide ne soit aspiré dans les poumons. Ne rien faire prendre par la bouche à une personne qui a perdu connaissance.
- Inhalation :** Éloigner la personne incommodée de l'endroit contaminé et rétablir la respiration s'il y a lieu. Obtenir des soins médicaux.
- Remarques à l'intention du médecin :** Le principal danger qui puisse résulter de l'ingestion accidentelle de ce produit est son aspiration dans les poumons, ce qui causerait alors une pneumonie chimique. Si plus de 2,0 mL par kg de poids ont été avalés, faire vomir sous surveillance. Si des symptômes tels que la perte du réflexe pharyngé, des convulsions ou la perte de connaissance surviennent avant que la personne ait vomi, envisager la possibilité de procéder à un lavage gastrique avec une sonde endotrachéale à ballonnet.

5. LUTTE EN CAS D'INCENDIE

- Moyens d'extinction :**
- Poudre
 - Gaz carbonique
 - Mousse
 - Brouillard d'eau

Mesures spéciales de lutte en cas d'incendie :	Attention - Produit combustible. Ne pas utiliser un jet d'eau direct, ce qui pourrait propager l'incendie. Ne pas pénétrer sur les lieux d'un incendie dans un espace clos sans vêtements protecteurs appropriés et sans appareil respiratoire autonome à surpression homologué. Les vapeurs forment un mélange inflammable/détonant dans l'air entre les limites inférieure et supérieure d'inflammabilité. Les vapeurs peuvent se déplacer au niveau du sol et il peut y avoir retour des flammes le long du chemin qu'elles ont emprunté. Ne pas respirer la fumée. Le produit va flotter et peut se réenflammer à la surface de l'eau. Des dommages retardés aux poumons peuvent survenir après exposition aux produits de combustion, parfois des heures après l'exposition.
Produits de combustion dangereux :	Un mélange complexe de particules solides et liquides en suspension dans l'air et des gaz seront libérés lors de la pyrolyse ou de la combustion. Gaz carbonique, monoxyde de carbone et composés organiques non identifiés peuvent se former lors de la combustion.

6. MESURES EN CAS DE REJET ACCIDENTEL

Avertir que ce produit est combustible. Éliminer toutes les sources d'inflammation. Circonscrire l'endroit dangereux et en interdire l'accès. Mettre à la terre l'équipement qui sert à manipuler ce produit. Travailler dans le sens du vent par rapport au produit répandu s'il est prudent de le faire. Éviter tout contact direct avec ce produit. Utiliser un appareil respiratoire approprié (s'il y a lieu) et porter des vêtements protecteurs. N'arrêter les fuites que s'il est prudent de le faire. Endiguer et contenir les déversements terrestres; contenir les rejets accidentels dans les eaux au moyen de barrages flottants. Se servir d'eau pulvérisée pour supprimer les vapeurs; empêcher cette eau de se répandre. Absorber les résidus ou les petites quantités répandues avec une matière absorbante et mettre dans des contenants hermétiques avant de s'en débarrasser. Produits recommandés : Argile ou Sable Rincer les lieux à grande eau pour enlever toutes les traces de résidus. Se débarrasser du produit récupéré conformément aux directives d'élimination. Avertir les agences de protection de l'environnement appropriées.

7. ENTREPOSAGE ET MANUTENTION

Manutention :	Combustible. Éviter la chaleur excessive, les étincelles, les flammes nues et toutes les autres sources d'inflammation. Mettre à la terre l'équipement fixe ainsi que les contenants qui servent au transvasement et le matériel de façon à prévenir l'accumulation d'électricité statique. Les vapeurs sont plus lourdes que l'air et vont s'accumuler dans les régions basses et les fosses en déplaçant l'air respirable. Éteindre les lampes pilotes, les cigarettes et fermer toutes les autres sources d'inflammation avant d'utiliser ce produit et jusqu'à ce que toutes les vapeurs se soient dissipées. Les vapeurs peuvent s'accumuler et se propager vers une source d'inflammation éloignée provoquant ainsi un retour des flammes. Ne pas effectuer d'opérations de découpage, de forage, de meulage, de soudage ou autres sur ou près des contenants. Les contenants vides sont dangereux car ils peuvent contenir des poussières, des vapeurs ou des résidus inflammables/explosifs. Ne pas utiliser de pression pour vider les fûts. Se laver à l'eau et au savon avant de manger, boire, fumer, se maquiller ou aller aux toilettes. Laver les vêtements contaminés avant de les porter de nouveau. Observer une bonne hygiène personnelle.
Entreposage :	Entreposer dans un endroit frais, sec et bien ventilé, loin de la chaleur et des sources d'inflammation. Garder le contenant fermé hermétiquement.

8. CONTRÔLES DE L'EXPOSITION, PROTECTION PERSONNELLE

LES RENSEIGNEMENTS SUIVANTS, QUOIQUE APPROPRIÉS POUR CE PRODUIT, ONT UNE PORTÉE GÉNÉRALE. LE CHOIX DE L'ÉQUIPEMENT DE PROTECTION PERSONNELLE SERA FONCTION DES CONDITIONS D'UTILISATION.

Limites d'exposition en milieu de travail (VLE/MPT actuelle selon l'ACGIH, sauf avis contraire)

Carburant diesel, sous forme d'hydrocarbures totaux, vapeurs et aérosol (peau) : 100 mg/m³

Mention Peau: L'absorption par la peau, les yeux ou les muqueuses peut contribuer de façon significative à l'exposition totale.

Ventilation mécanique : En présence de personnel non protégé, la concentration du produit dans l'air doit être maintenue sous la limite d'exposition en milieu de travail. Système de ventilation requis de façon à prévenir l'accumulation des vapeurs. De l'air d'appoint doit toujours être fourni pour remplacer l'air rejeté (de façon générale ou locale). Lorsqu'il faut pénétrer dans un espace clos (par exemple, un réservoir de stockage), observer la marche à suivre appropriée, y compris en ce qui a trait à la ventilation et à la vérification de l'air du réservoir. Ventilation locale recommandée lorsque le système de ventilation mécanique est insuffisant pour maintenir la concentration du produit dans l'air du lieu de travail sous la limite d'exposition conseillée.

ÉQUIPEMENT DE PROTECTION PERSONNELLE :

Yeux et visage : Lunettes de sécurité et/ou masque couvrant tout le visage si le produit est manipulé d'une façon où il pourrait y avoir éclaboussement dans les yeux. Prévoir un poste de lavage des yeux à proximité.

Peau (mains, bras et corps) : Des gants résistants (Viton, nitrile) doivent toujours être portés lors de la manipulation de ce produit. Dans les espaces clos ou lorsque le risque d'exposition de la peau est plus élevé, porter des vêtements résistant au produit. Des douches doivent être disponibles en cas d'urgence.

Voies respiratoires : Si l'exposition dépasse les limites pour le lieu de travail, utiliser le respirateur approprié homologué par le NIOSH. Utiliser un respirateur à cartouche filtrante protégeant contre les vapeurs organiques homologué par le NIOSH ou un respirateur à adduction d'air homologué par le NIOSH. En cas de concentrations élevées dans l'air, utiliser un respirateur à adduction d'air homologué par le NIOSH, soit autonome ou à canalisation d'air fonctionnant en pression positive intermittente.

9. PROPRIÉTÉS PHYSIQUES ET CHIMIQUES

Description physique :	Liquide.
Aspect/couleur :	De clair à jaune
Odeur :	Odeur d'hydrocarbure.
Seuil moyen de perception de l'odeur :	Non disponible
Point de congélation/point d'écoulement :	Point de trouble -43 °C
Point d'ébullition :	150 - 330 °C
Masse volumique :	< 850 kg/m ³ @ 15 °C
Densité de vapeur (air = 1) :	Non disponible
Tension de vapeur (absolu) :	Non disponible
pH :	Non disponible
Point d'éclair :	V.cl. Pensky-Martens > 40 °C
Limite d'inflammabilité inférieure :	1 % (vol.)
Limite d'inflammabilité supérieure :	6 % (vol.)
Température d'autoinflammation :	250 °C
Viscosité :	1,3 - 3,6 cSt @ 40 °C

Vitesse d'évaporation (n-BuAc = 1) :	Non disponible
Coefficient de distribution (log K_{oe}) :	Non disponible
Solubilité dans l'eau :	Insoluble
Autre solvant :	Solvants à base d'hydrocarbures

10. STABILITÉ ET RÉACTIVITÉ

Chimiquement stable :	Oui
Polymérisation dangereuse :	Non
Sensibilité au choc mécanique :	Non
Sensibilité à l'électricité statique :	Oui
Produits de décomposition dangereux :	Les produits de la décomposition thermique dépendent en grande partie des conditions de la combustion.
Matériaux incompatibles :	Éviter les oxydants puissants.
Conditions de réactivité :	Éviter la chaleur excessive, les flammes nues et toutes les autres sources d'inflammation.

11. INFORMATION TOXICOLOGIQUE

Ingrédient (ou produit si non précisé)	Données toxicologiques
Carburant, Diesel, No. 2	DL50 Cutanée Lapin > 5 000 mg/kg DL50 Orale Rat = 9 000 mg/kg

Voies d'entrée :	L'exposition à ce produit est le plus susceptible de se produire par contact avec la peau ou inhalation.
Irritation :	Ce produit devrait causer une irritation de la peau mais il n'est pas supposé être un agent de sensibilisation de la peau.
Toxicité aiguë :	Les concentrations de vapeurs supérieures au niveau d'exposition recommandé irritent les yeux et les voies respiratoires, peuvent causer des maux de tête et des étourdissements, sont anesthésiques et peuvent avoir d'autres effets sur le système nerveux central.
Toxicité chronique :	Le contact prolongé et répété de ce produit avec la peau peut causer un dégraissage et un dessèchement de la peau se traduisant par une irritation et une dermatite. L'exposition prolongée à des vapeurs très concentrées peut causer des maux de tête, des étourdissements, des nausées, une vision brouillée et une dépression du système nerveux central.
Conditions préexistantes :	Des troubles préexistants des yeux, de la peau et des voies respiratoires peuvent être aggravés par une exposition à ce produit.
Carcinogénicité et mutagénicité :	Selon le Centre international de recherche sur le cancer (CIRC), ce produit ne peut être classé en fonction de sa cancérogénicité pour les humains. Des distillats moyens ont causé des cancers de la peau chez des animaux de laboratoire lorsqu'ils ont été appliqués de façon répétée et laissés en place entre les applications. Cela serait causé par une irritation continue de la peau. Une bonne hygiène personnelle doit être observée pour prévenir ce risque. L'American Conference of Governmental Industrial Hygienists (ACGIH) a classé ce produit A3 - cancérogène connu pour les animaux, sans effet connu pour les humains.

12. RENSEIGNEMENTS ÉCOLOGIQUES

Ne pas laisser ce produit ou l'eau qui sert à combattre un incendie où ce produit est en cause pénétrer dans les égouts, les lacs, les cours d'eau ou les canalisations d'eau potable. Boucher les égouts et bloquer les fossés. Les règlements provinciaux exigent et les règlements fédéraux peuvent exiger que les agences de protection de l'environnement ou d'autres organismes soient avertis en cas de déversement. La région polluée doit être nettoyée et remise à son état original ou à la satisfaction des autorités. Peut causer une pollution des organismes aquatiques.

Biodégradabilité: N'est pas facilement biodégradable.

Bioaccumulation: Possibilité d'accumulation dans les organismes vivants.

Coefficient de distribution (log K_{ow}): Non disponible

Toxicité en Milieu Aquatique

Peut être nocif pour la vie aquatique.

Ingrédient:	Données toxicologiques
Définition(s):	CL et CE sont respectivement la concentration de la charge létale et la concentration de la charge effective. La concentration représente la quantité de la substance qui est placée dans l'eau de façon à obtenir la concentration toxique. Ces concentrations remplacent les concentrations létales et effectives traditionnelles pour les substances à faible solubilité. WAF (water accomodated fraction) est la fraction adaptée à l'eau. Un hydrocarbure légèrement soluble est remué dans de l'eau, puis la partie insoluble est enlevée. La solution restante correspond à la fraction adaptée à l'eau.
Carburant, Diesel, No. 2	CE50 - vitesse de croissance Algues (72hr) 10 - 100 mg/L CE50 Daphnia Magna (72hr) 10 - 100 mg/L CL50 (méthode WAF) Truite arc-en-ciel (96hr) 10 - 100 mg/L

13. ÉLIMINATION DU PRODUIT

Priorités de gestion des déchets (selon leur volume et leur concentration) : 1. Recycler (retraiter), 2. Récupérer l'énergie 3. Incinérer, 4. Remettre à une installation d'élimination des déchets autorisée. Ne pas essayer de brûler les déchets sur les lieux. Incinérer avec l'approbation des organismes de protection de l'environnement dans un endroit approuvé détenant un permis.

14. RENSEIGNEMENTS SUR LE TRANSPORT

Description d'expédition du TMD (route et rail)

Numéro de l'ONU	UN1202
Nom d'expédition approprié	DIESEL
Classe de danger	Class 3 Liquides inflammables
Groupe d'emballage	PG III
Renseignements additionnels	Non réglementé en contenants de 450 litres ou moins.
Description d'expédition	DIESEL Class 3 UN1202 PG III Non réglementé en contenants de 450 litres ou moins.

15. RENSEIGNEMENTS SUR LA RÉGLEMENTATION

Ce produit a été classifié conformément aux critères de danger du Règlement sur les produits contrôlés (RPC) du Canada et la FS contient toute l'information requise en vertu du RPC.

Catégorie SIMDUT et description : Catégorie B3 Liquide combustible
Catégorie D2B Irritation de la peau

Statut LPCE/NLPCE : Ce produit, ou tous ses composants, figurent sur la liste intérieure des substances, en vertu de la Loi canadienne sur la protection de l'environnement.

Autres règlements : Normes fédérales canadiennes inexistantes.

16. AUTRES RENSEIGNEMENTS**ÉTIQUETTE**

Mention de danger : Liquide combustible.
Irritant pour la peau.

Précautions lors de la manipulation : Éliminer toutes les sources d'inflammation.
Éviter l'exposition prolongée aux vapeurs.
Porter des protecteurs oculaires et des gants appropriés.
Mettre à la masse et à la terre le matériel et les contenants de transfert pour éviter l'accumulation d'électricité statique.
Les contenants vides sont dangereux, car ils peuvent contenir des poussières, des vapeurs ou des résidus liquides inflammables/explosifs. Tenir loin des étincelles et de la flamme nue.

Premiers soins : Laver la peau contaminée à l'eau et au savon.
Rincer les yeux à grande eau.
Si une personne est incommodée par les vapeurs, l'amener à l'air frais.
Ne pas faire vomir.
Obtenir des soins médicaux.

Révisions : Cette fiche signalétique a été révisée et mise à jour.
Des modifications ont été apportées à :
Rubrique 1
Rubrique 3
Rubrique 5
Rubrique 8
Rubrique 9
Rubrique 12

Permatex, Inc.
10 Columbus Blvd.
Hartford, CT 06106 USA
Telephone: 1-87-Permatex
(877) 376-2839
Emergency: 800-255-3924
International Emergency: 813-348-0585

Material Safety Data Sheet

1. PRODUCT IDENTIFICATION

Product Name: FAST ORANGE PUMICE LOTION 1GAL
Item No: 25219
Product Type: Waterless hand cleaner

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	Percent	ACGIH 8 Hr. TWA:	OSHA 8 Hr. TWA:
Water 7732-18-5	75-85	Not Listed	Not Listed
PUMICE 1332-09-8	5-15	10 mg/m ³ (inhal); 3 mg/m ³ (resp)	15 mg/m ³ (total); 5 mg/m ³ (resp)
D-Limonene 5989-27-5	5-15	Not Established	Not Established
ETHOXYLATED C11-C16 ALCOHOL 127036-24-2	1-10	Not Listed	Not Listed
SILICA, QUARTZ 14808-60-7	0.1-1.0	0.1 mg/m ³ TWA respirable	0.1 mg/m ³ TWA respirable

3. HAZARDS IDENTIFICATION

Toxicity: Oral LD50 greater than 5000 mg/kg. Primary irritation tests show that this product is not a primary irritant.
Primary Routes of Entry: Eye and skin contact, ingestion, inhalation.
Signs and Symptoms of Exposure: None under normal conditions of use.

Ingredients	Percent	NTP:	ACGIH Carcinogens	IARC:
D-Limonene 5989-27-5	5-15	male rat-clear evidence; female rat-no evidence; male mice-no evidence; female mice-no evidence		
SILICA, QUARTZ 14808-60-7	0.1-1.0	Known Carcinogen	Not known	Group 1; Vol. 68; 1997

Medical Conditions Recognized as Being Aggravated by Exposure: None known

4. FIRST AID MEASURES

Ingestion: If swallowed, seek medical advice immediately and show this container or label
Inhalation: Immediate medical attention is not required.
Skin Contact: none under normal use
Eye Contact: In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice

5. FIRE FIGHTING MEASURES

Flash Point (°F/C): 193 degrees F. Method: Setaflash Closed Cup
Recommended Extinguishing Media: Carbon dioxide, chemical powder
Special Fire-Fighting Procedures: No special procedures.
Hazardous Products Formed by Fire or Thermal Decomposition: None anticipated
Unusual Fire/Explosion Hazards: None
Lower Explosive Limit: Not determined.

Upper Explosive Limit: Not determined.

6. ACCIDENTAL RELEASE MEASURES

Spill Procedures: Rinse away with water or wipe up with a towel.

7. HANDLING AND STORAGE

Storage: Hand cleaner should be stored at temperatures between 40 degrees F. and 100 degrees F.

Handling: Follow all general safety precautions.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eyes: Not required

Skin: Not required

Ventilation: Provide adequate ventilation

Respiratory Protection: not required under normal use

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: White lotion with pumice

Odor: orange

Boiling Point (°F): Not determined.

pH: 7.0

Solubility in Water: SOLUBLE

Specific Gravity: 1.03

VOC Content(Wt.%): 7 % by weight

Vapor Pressure: Not Determined

Vapor Density (Air=1): Not Determined

Evaporation Rate: Not Determined

10. STABILITY AND REACTIVITY

Chemical Stability: Stable at normal conditions

Hazardous Polymerization: WILL NOT OCCUR

Incompatabilities: None known

Conditions to Avoid: Freezing

Hazardous Products Formed by Fire or Thermal None anticipated

Decomposition:

11. TOXICOLOGICAL INFORMATION

See Section 3

12. ECOLOGICAL INFORMATION

No data available

13. DISPOSAL CONSIDERATIONS

Recommended Method of Disposal: Dispose of uncontaminated material through sewer system with permission of the authority responsible for that system.

US EPA Waste Number: NH - Not a RCRA Hazardous Waste Material

14. TRANSPORTATION INFORMATION

DOT (49CFR 172)

Domestic Ground Transport

DOT Shipping Name: Unrestricted

Hazard Class: NONE

UN/ID Number: None

Marine Pollutant: None

IATA

Proper Shipping Name: not regulated

Class or Division: None

UN/NA Number: None

IMDG

Proper Shipping: Unrestricted

Hazard Class: None
UN Number: None

15. REGULATORY INFORMATION

SARA 313 Chemicals: The following component(s) is listed as a SARA Section 313 Toxic Chemical.

SARA 313 Information
NONE

CALIFORNIA PROP 65:

No California Prop 65 chemicals are known to be present at or above the No Significant Risk Level.

TSCA Inventory Status:

Listed on Inventory: YES All components of this product are listed (or exempt) on the EPA TSCA inventory.

16. OTHER INFORMATION

Estimated NFPA Rating: HEALTH 1, FLAMMABILITY 2, REACTIVITY 0

Estimated HMIS Classification: HEALTH 1, FLAMMABILITY 2, PHYSICAL HAZARD 0

NFPA is a registered trademark of the National Fire Protection Assn.

HMIS is a registered trademark of the National Paint and Coatings Assn.

Prepared By: Denise Boyd, Health and Safety Manager
Company: Permatex. Inc. 10 Columbus Blvd. Hartford, CT USA
06106

Revision Date: 01/23/2003

Revision 1

Number:

Telephone Number: 1-87-Permatex (877) 376-2839



Material Safety Data Sheet

May be used to comply with
OSHA's Hazard Communication Standard,
29 CFR 1910.1200. This Standard must be
consulted for specific requirements.

U.S. Department of Labor

Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (<i>As Used on Label and List</i>)	Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.
PROPANE	

Section I

Manufacturer's Name Bernzomatic	Emergency Telephone Number 800-654-9011
Address (<i>Number, Street, City, State, and ZIP Code</i>)	Telephone Number for Information 800-424-9300
1 Bernzomatic Drive	Date Prepared June 11, 2011
Medina, NY 14103	Signature of Preparer (<i>optional</i>)

Section II - Hazard Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	US OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
PROPANE (CAS No. 74-98-6)	1000PPM	1000PPM	N/A	100
NFPA HAZARD RATINGS Health - 1 Flammability - 4 Reactivity - 0			HMIS RATINGS Health - 0 Flammability - 4 Reactivity - 0	

Notes: When propane fuel is burned efficiently, the normal by-products of combustion are CO₂ and H₂O.

Inefficient burning may add CO to the by-products of combustion.

Section III - Physical/Chemical Characteristics

Boiling Point:	-44° F	Specific Gravity (H ₂ O = 1):	Liquid @ 60° F .51
Vapor Pressure (mm Hg.):	@ 100° F 197psig	Melting Point:	Not Applicable
Vapor Density (AIR = 1):	@ 1 ATM @ 60° F 1.56	Evaporation Rate (Butyl Acetate = 1):	Not Applicable
Solubility in Water: Insoluble			
Appearance and Odor (At Normal Conditions): Colorless - Rotten Egg Odor.			



Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used): -156° F Closed Cup	Flammable Limits:	LEL 2.1	UEL 9.5
Extinguishing Media:			
Stop flow of gas or oxygen.			
Special Fire Fighting Procedures:			
Use water to cool tanks.			
Unusual Fire and Explosion Hazards:			
Auto ignition temp. 842° F. Heavier than air (vapor density 1.5). May travel a considerable distance to a source of ignition and flashback.			

Section V - Reactivity Data

Stability:	Unstable	NO	Conditions to Avoid:
	Stable	X	N/A
Incompatibility (Materials to Avoid): N/A			
Hazardous Decomposition or Byproducts At temperatures above the melting point metal oxide fumes may be evolved.			
Hazardous Polymerization:	May Occur	NO	Conditions to Avoid:
	Will Not Occur	X	N/A

Section VI - Health Hazard Data

Route(s) of Entry:	Inhalation? YES	Skin? YES	Ingestion? NO
Health Hazards (Acute and Chronic) Contact with liquid propane may cause frost burns.			
Carcinogenicity:	NTP? Not listed as a carcinogen	IARC Monographs? Not listed as a carcinogen	OSHA Regulated? Not listed as a carcinogen
Signs and Symptoms of Exposure: High concentrations may cause headaches and drowsiness.			
Medical Conditions Generally Aggravated by Exposure: Not Applicable			
Emergency and First Aid Procedures: Remove exposed person from contaminated area.			
Warning: This fuel and by-products of combustion of this fuel, contain chemicals known to the State of California to cause cancer, birth defects, and other reproductive harm.			



Section VII - Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled:	Remove ignition sources and ventilate area.
Waste Disposal Method:	Vent gas to atmosphere in flame free, spark free area outdoors.
Precautions to Be taken in Handling and Storing:	Store at temperatures below 120° F in well ventilated, spark free, flame free area.
Other Precautions:	None

Section VIII - Control Measures

Respiratory Protection (<i>Specify Type</i>):	Not required with normal use
Ventilation:	Local Exhaust – N/A Mechanical (General) – N/A Special – N/A Other – N/A
Protective Gloves:	Not Required
Eye Protection:	Not Required
Other Protective Clothing or Equipment:	Not Required
Work/Hygienic Practices:	N/A

Section IX – Transportation Information

WHMIS Classification:	A – Compressed Gas & B1 – Flammable Gas
Class:	2.1
Proper Shipping Name:	Petroleum Gas, Liquefied
Hazard Classification:	Flammable Gas
UN Number:	1075

Section X – Additional Information

DISCLAIMER: Judgments as to the suitability of information herein or the purchaser's purposes are necessarily the purchaser's responsibility. Reasonable care has been taken in the preparation of this material, but there are NO WARRANTIES, NO REPRESENTATIONS, AND NO RESPONSIBILITY AS TO THE ACCURACY OR THE SUITABILITY OF THIS INFORMATION FOR ANY PURCHASER'S USE OR FOR ANY CONSEQUENCE TO USE.

This Material Safety Data Sheet is offered solely for your information, consideration and investigation. Bernzomatic provides no warranties, either express or implied, and assumes no responsibilities for the accuracy or completeness of the data contained in this document. The data in this Material Safety Data Sheet relates only to this product and does not relate to use in combination with any other material or in any process.



AMC 1300

AMC

Chemwatch: 15-6632

Version No: 4.1.1.1

Safety Data Sheet according to WHMIS 2015 requirements

Chemwatch Hazard Alert Code: 1

Issue Date: 12/16/2015

Print Date: 11/06/2019

L.GHS.CAN.EN

SECTION 1 IDENTIFICATION

Product Identifier

Product name	AMC 1300
Synonyms	Not Available
Other means of identification	Not Available

Recommended use of the chemical and restrictions on use

Relevant identified uses	Flocculant.

Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

Registered company name	AMC
Address	1220 N. 2200 W. Suite# 600, Salt Lake City UT 84116 United States
Telephone	801-364-0233
Fax	801-364-0278
Website	www.amcmud.com
Email	amc@imdexlimited.com

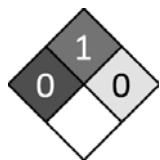
Emergency phone number

Association / Organisation	AMC	CHEMWATCH EMERGENCY RESPONSE
Emergency telephone numbers	Chemwatch - (1) 877 715 9305	+61 2 9186 1132
Other emergency telephone numbers	-	Not Available

SECTION 2 HAZARD(S) IDENTIFICATION

Classification of the substance or mixture

NFPA 704 diamond



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

CANADIAN WHMIS SYMBOLS

Classification	Not Applicable

Label elements

Hazard pictogram(s)	Not Applicable

SIGNAL WORD	NOT APPLICABLE

Hazard statement(s)

Not Applicable

Physical and Health hazard(s) not otherwise classified

Not Applicable

Precautionary statement(s) General

P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.

Precautionary statement(s) Prevention

Not Applicable

Precautionary statement(s) Response

Not Applicable

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

Not Applicable

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
Not Available		<u>mineral oil</u>

SECTION 4 FIRST-AID MEASURES

Description of first aid measures

Eye Contact	If this product comes in contact with the eyes: ▶ Wash out immediately with fresh running water. ▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▶ Seek medical attention without delay; if pain persists or recurs seek medical attention. ▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin contact occurs: ▶ Immediately remove all contaminated clothing, including footwear. ▶ Flush skin and hair with running water (and soap if available). ▶ Seek medical attention in event of irritation.
Inhalation	▶ If fumes or combustion products are inhaled remove from contaminated area. ▶ Lay patient down. Keep warm and rested. ▶ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ▶ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. ▶ Transport to hospital, or doctor.
Ingestion	▶ If swallowed do NOT induce vomiting. ▶ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▶ Observe the patient carefully. ▶ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▶ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▶ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

- ▶ Heavy and persistent skin contamination over many years may lead to dysplastic changes. Pre-existing skin disorders may be aggravated by exposure to this product.
- ▶ In general, emesis induction is unnecessary with high viscosity, low volatility products, i.e. most oils and greases.
- ▶ High pressure accidental injection through the skin should be assessed for possible incision, irrigation and/or debridement.

NOTE: Injuries may not seem serious at first, but within a few hours tissue may become swollen, discoloured and extremely painful with extensive subcutaneous

necrosis. Product may be forced through considerable distances along tissue planes.

SECTION 5 FIRE-FIGHTING MEASURES

Extinguishing media

- ▶ Water spray or fog.
- ▶ Foam.

Special hazards arising from the substrate or mixture

Fire Incompatibility	▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Special protective equipment and precautions for fire-fighters

Fire Fighting	▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ Wear breathing apparatus plus protective gloves.
Fire/Explosion Hazard	▶ Combustible. ▶ Slight fire hazard when exposed to heat or flame. Combustion products include: carbon dioxide (CO₂) nitrogen oxides (NO_x) other pyrolysis products typical of burning organic material. CARE: Water in contact with hot liquid may cause foaming and a steam explosion with wide scattering of hot oil and possible severe burns. Foaming may cause overflow of containers and may result in possible fire.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	Slippery when spilt. ▶ Remove all ignition sources. ▶ Clean up all spills immediately.
Major Spills	Slippery when spilt. Moderate hazard. ▶ Clear area of personnel and move upwind.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	▶ Avoid all personal contact, including inhalation. ▶ Wear protective clothing when risk of exposure occurs.
Other information	▶ Store in original containers. ▶ Keep containers securely sealed.

Conditions for safe storage, including any incompatibilities

Suitable container	▶ Metal can or drum ▶ Packaging as recommended by manufacturer. ▶ Check all containers are clearly labelled and free from leaks.
Storage incompatibility	Avoid contamination of water, foodstuffs, feed or seed. CARE: Water in contact with heated material may cause foaming or a steam explosion with possible severe burns from wide scattering of hot material. Resultant overflow of containers may result in fire. ▶ Avoid reaction with oxidising agents

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Source	Ingredient	Material name	TWA	STEL	Peak	Notes
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	mineral oil	Oil mist, mineral	5 mg/m3	10 mg/m3	Not Available	Not Available
Canada - Nova Scotia Occupational Exposure Limits	mineral oil	Oil mist - mineral	5 mg/m3	10 mg/m3	Not Available	TLV Basis: lung. As sampled by method that does not collect vapor.
Canada - Alberta Occupational Exposure Limits	mineral oil	Oil mist, mineral	5 mg/m3	10 mg/m3	Not Available	Not Available
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	mineral oil	Oil mist, mineral	5 mg/m3	10 mg/m3	Not Available	Not Available
Canada - Manitoba Occupational Exposure Limits	mineral oil	Not Available	5 mg/m3	Not Available	Not Available	TLV® Basis: URT irr
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	mineral oil	Mineral oil (mist)	5 mg/m3	10 mg/m3	Not Available	Not Available
Canada - Northwest Territories Occupational Exposure Limits (English)	mineral oil	Oil mist, mineral	5 mg/m3	10 mg/m3	Not Available	Not Available
Canada - British Columbia Occupational Exposure Limits	mineral oil	Oil mist - mineral, severely refined	1 mg/m3	Not Available	Not Available	Not Available
Canada - Prince Edward Island Occupational Exposure Limits	mineral oil	Mineral oil, excluding metal working fluids - Pure, highly and severely refined	5 mg/m3	Not Available	Not Available	TLV® Basis: URT irr

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
AMC 1300	Not Available	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
mineral oil	2,500 mg/m3	Not Available

MATERIAL DATA

Exposure controls

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
Personal protection	
Eye and face protection	▶ Safety glasses with side shields ▶ Chemical goggles. ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants.
Skin protection	See Hand protection below
Hands/feet protection	Wear general protective gloves, eg. light weight rubber gloves. The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
Body protection	See Other protection below

Other protection

No special equipment needed when handling small quantities.

OTHERWISE:

► Overalls.

Respiratory protection

Type A Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the "Exposure Standard" (or ES), respiratory protection is required.

Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

Required Minimum Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
up to 10 x ES	A-AUS	-	A-PAPR-AUS / Class 1
up to 50 x ES	-	A-AUS / Class 1	-
up to 100 x ES	-	A-2	A-PAPR-2 ^

^ - Full-face

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO₂), G = Agricultural chemicals, K = Ammonia(NH₃), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content.
- The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.
- Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES**Information on basic physical and chemical properties**

Appearance	Off-white opaque liquid with a hydrocarbon odour, mixes with water.		
Physical state	Liquid	Relative density (Water = 1)	1.05
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	8	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	360-900 cps @ 24C
Initial boiling point and boiling range (°C)	96	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	>93 (PMCC)	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Applicable	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water	Miscible	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	Product is considered stable and hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7

Hazardous decomposition products

See section 5

SECTION 11 TOXICOLOGICAL INFORMATION**Information on toxicological effects**

Inhaled	The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting. Inhalation hazard is increased at higher temperatures. Not normally a hazard due to non-volatile nature of product Inhalation of oil droplets/ aerosols may cause discomfort and may produce chemical pneumonitis.	
Ingestion	The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence.	
Skin Contact	The liquid may be miscible with fats or oils and may degrease the skin, producing a skin reaction described as non-allergic contact dermatitis. The material is unlikely to produce an irritant dermatitis as described in EC Directives . The material may accentuate any pre-existing dermatitis condition	
Eye	Although the liquid is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).	
Chronic	Long-term exposure to the product is not thought to produce chronic effects adverse to health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course.	
AMC 1300	TOXICITY	IRRITATION
	Oral (Rat) LD50: >5000 mg/kg ^[2]	Not Available
mineral oil	TOXICITY	IRRITATION
	Not Available	Not Available
Legend:	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

MINERAL OIL	Toxicity and Irritation data for petroleum-based mineral oils are related to chemical components and vary as does the composition and source of the original crude. A small but definite risk of occupational skin cancer occurs in workers exposed to persistent skin contamination by oils over a period of years.

Acute Toxicity	✗	Carcinogenicity	✗
Skin Irritation/Corrosion	✗	Reproductivity	✗
Serious Eye Damage/Irritation	✗	STOT - Single Exposure	✗
Respiratory or Skin sensitisation	✗	STOT - Repeated Exposure	✗
Mutagenicity	✗	Aspiration Hazard	✗

Legend: ✗ – Data either not available or does not fill the criteria for classification
✓ – Data available to make classification

SECTION 12 ECOLOGICAL INFORMATION**Toxicity**

AMC 1300	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available
mineral oil	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available
Legend:	Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5.				

ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data

1% aqueous solution of a similar product: Sheepshead Minnow (96hrs) LC50: gt;1000 mg/l Rainbow Trout (96hrs) LC50: gt;1000 mg/l Daphnia magna (48hrs) LC50: 270 mg/l

May be harmful to fauna if not disposed of according to Section 13 and legislative requirements. [AMC]

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

Bioaccumulative potential

Ingredient	Bioaccumulation
	No Data available for all ingredients

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. ▶ DO NOT allow wash water from cleaning or process equipment to enter drains. ▶ It may be necessary to collect all wash water for treatment before disposal. ▶ Recycle wherever possible or consult manufacturer for recycling options. ▶ Consult State Land Waste Authority for disposal.

SECTION 14 TRANSPORT INFORMATION

Labels Required

Marine Pollutant	NO

Land transport (TDG): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

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

MINERAL OIL IS FOUND ON THE FOLLOWING REGULATORY LISTS

Canada - Alberta Occupational Exposure Limits

Canada - British Columbia Occupational Exposure Limits

Canada - Manitoba Occupational Exposure Limits

Canada - Northwest Territories Occupational Exposure Limits

Canada - Nova Scotia Occupational Exposure Limits

Canada - Prince Edward Island Occupational Exposure Limits

Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens

Canada - Quebec Permissible Exposure Values for Airborne Contaminants

Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits

Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances

IMO Provisional Categorization of Liquid Substances - List 2: Pollutant only mixtures containing at least 99% by weight of components already assessed by IMO

IMO Provisional Categorization of Liquid Substances - List 3: (Trade-named) mixtures containing at least 99% by weight of components already assessed by IMO, presenting safety hazards

International Agency for Research on Cancer (IARC) - Agents Classified by the IARC Monographs

International FOSFA List of Banned Immediate Previous Cargoes

National Inventory Status

National Inventory	Status
Australia - AICS	Yes
Canada - DSL	Yes
Canada - NDSL	Yes
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	Yes
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	Yes
Taiwan - TCSI	Yes
Mexico - INSQ	Yes
Vietnam - NCI	Yes
Russia - ARIPS	Yes
Legend:	Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory and are not exempt from listing (see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Revision Date	12/16/2015
Initial Date	Not Available

SDS Version Summary

Version	Issue Date	Sections Updated
4.1.1.1	11/25/2013	Acute Health (inhaled), Disposal, Instability Condition, Personal Protection (Respirator), Personal Protection (hands/feet), Physical Properties

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average

PC—STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit.
IDLH: Immediately Dangerous to Life or Health Concentrations
OSF: Odour Safety Factor
NOAEL :No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index

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an **imdex** limited company

AMC AUS FLOC BLOCK

Chemwatch Material Safety Data Sheet
Aug-29-2012
X!293SP

Hazard Alert Code: NIL

CHEMWATCH 17-9801
Version No:3.1.1.1
Page 1 of 6

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

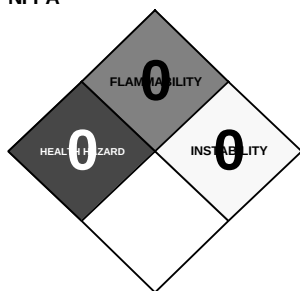
PRODUCT NAME

AMC AUS FLOC BLOCK

STATEMENT OF HAZARDOUS NATURE

Not considered a hazardous substance according to OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

Company: AMC
Address:
PO Box 1141
Osborne Park
WA, 6916
Australia
Telephone: + 61 8 9445 4000
Emergency Tel: **Australia - 1800 039 008 or +613 9573 3112**
Emergency Tel: **International - +800 24 36 22 55 or +613 9573 3112 if the Toll Free number is not supported in your country**
Fax: +61 8 9445 4040

Company: AMC
Address:
5 Pitino Court
Osborne Park
WA, 6017
Australia
Telephone: +61 8 9445 4000
Emergency Tel: Australia - 1800 039 008 or +61 3 9573 3112
Emergency Tel: International - +800 24 36 22 55 or +61 3 9573 3112 if Toll Free number is not supported in your country
Fax: +61 8 9445 4040

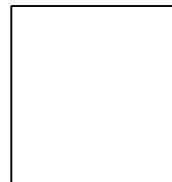
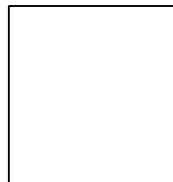
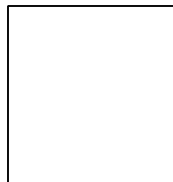
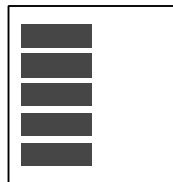
PRODUCT USE

Drilling fluid additive (flocculant).

Section 2 - HAZARDS IDENTIFICATION

HAZARD RATINGS

Flammability
Toxicity
Body Contact
Reactivity
Chronic



SCALE:

Min/Nil=0

Low=1

Moderate=2

High=3

Extreme=4

continued...

AMC AUS FLOC BLOCK

Chemwatch Material Safety Data Sheet
Aug-29-2012
X1293SP

Hazard Alert Code: NIL

CHEMWATCH 17-9801
Version No:3.1.1.1
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Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS

None

EMERGENCY OVERVIEW

RISK

* (limited evidence).

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ The material has NOT been classified as "harmful by ingestion".
This is because of the lack of corroborating animal or human evidence.

EYE

■ Although the material is not thought to be an irritant, direct contact with the eye may produce transient discomfort characterized by tearing or conjunctival redness (as with windburn).

SKIN

■ The material is not thought to produce adverse health effects or skin irritation following contact (as classified using animal models).
Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

INHALED

■ The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified using animal models).
Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

CHRONIC HEALTH EFFECTS

Long-term exposure to the product is not thought to produce chronic effects adverse to the health (as classified using animal models); nevertheless exposure by all routes should be minimized as a matter of course.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
anionic polyacrylamide flocculant		100

Section 4 - FIRST AID MEASURES

SWALLOWED

- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Center or a doctor.

EYE

- If this product comes in contact with the eyes:
- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- If pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

- If skin contact occurs:
- Immediately remove all contaminated clothing, including footwear
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

continued...

AMC AUS FLOC BLOCK

Chemwatch Material Safety Data Sheet
Aug-29-2012
X!293SP

Hazard Alert Code: NIL

CHEMWATCH 17-9801
Version No:3.1.1.1

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Section 4 - FIRST AID MEASURES

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.

NOTES TO PHYSICIAN

Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHg): Not Applicable
Upper Explosive Limit (%): Not Available
Specific Gravity (water=1): 1.0
Lower Explosive Limit (%): Not Available

EXTINGUISHING MEDIA

- There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area.

FIRE FIGHTING

- Use water delivered as a fine spray to control fire and cool adjacent area.
 - DO NOT approach containers suspected to be hot.
 - Cool fire exposed containers with water spray from a protected location.
 - If safe to do so, remove containers from path of fire.
- Slight hazard when exposed to heat, flame and oxidizers.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- Non combustible.
 - Not considered to be a significant fire risk, however containers may burn.
- Decomposes on heating and produces toxic fumes of: carbon monoxide (CO), carbon dioxide (CO₂).

FIRE INCOMPATIBILITY

- None known.

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Clean up all spills immediately.
- Secure load if safe to do so.
- Bundle/collect recoverable product.
- Collect remaining material in containers with covers for disposal.

MAJOR SPILLS

Very slippery when spilled.
Do not use water initially, shovel into suitable container for removal.
Then use large amounts of water to remove traces of the material
[AMC]

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Limit all unnecessary personal contact.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with incompatible materials.

RECOMMENDED STORAGE METHODS

24 kg box, 8 x 3 kg tablets per container

continued...

AMC AUS FLOC BLOCK

Chemwatch Material Safety Data Sheet
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X!293SP

Hazard Alert Code: NIL

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Section 7 - HANDLING AND STORAGE

STORAGE REQUIREMENTS

- Store away from incompatible materials.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

MATERIAL DATA

AMC AUS FLOC BLOCK:
Not available

PERSONAL PROTECTION



EYE

- No special equipment for minor exposure i.e. when handling small quantities.
- OTHERWISE:
 - Safety glasses with side shields.

HANDS/FEET

- Wear general protective gloves, e.g.. light weight rubber gloves.

OTHER

- No special equipment needed when handling small quantities.
- OTHERWISE:
 - Overalls.
 - Barrier cream.
 - Eyewash unit.

ENGINEERING CONTROLS

- General exhaust is adequate under normal operating conditions. If risk of overexposure exists, wear an approved respirator.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Mixes with water.

State	Manufactured	Molecular Weight	Not Applicable
Melting Range (°F)	Not Available	Viscosity	Not Applicable
Boiling Range (°F)	Not Applicable	Solubility in water (g/L)	Miscible
Flash Point (°F)	Not Applicable	pH (1% solution)	Not Available
Decomposition Temp (°F)	Not Available	pH (as supplied)	6.5
Autoignition Temp (°F)	Not Available	Vapour Pressure (mmHg)	Not Applicable
Upper Explosive Limit (%)	Not Available	Specific Gravity (water=1)	1.0
Lower Explosive Limit (%)	Not Available	Relative Vapor Density (air=1)	Not Applicable
Volatile Component (%vol)	Not Applicable	Evaporation Rate	Not Applicable

APPEARANCE

Translucent to white tablet with a slight odour; soluble in water.

continued...

AMC AUS FLOC BLOCK

Chemwatch Material Safety Data Sheet
Aug-29-2012
X!293SP

Hazard Alert Code: NIL

CHEMWATCH 17-9801
Version No:3.1.1.1
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Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

■ Product is considered stable and hazardous polymerization will not occur.
Avoid extreme temperatures. Avoid humidity.
[AMC]

STORAGE INCOMPATIBILITY

■ Avoid contamination of water, foodstuffs, feed or seed.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

AMC AUS FLOC BLOCK

TOXICITY AND IRRITATION

No data for this material.

Section 12 - ECOLOGICAL INFORMATION

No data

May be harmful to fauna if not disposed of according to Section 13 and legislative requirements. [AMC]

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
AMC AUS FLOC BLOCK	No Data Available	No Data Available	No Data Available	No Data Available

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.
- Bury residue in an authorized landfill.
- Recycle containers where possible, or dispose of in an authorized landfill.

Section 14 - TRANSPORTATION INFORMATION

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

Section 15 - REGULATORY INFORMATION

REGULATIONS

continued...

AMC AUS FLOC BLOCK

Chemwatch Material Safety Data Sheet
Aug-29-2012
X!293SP

Hazard Alert Code: NIL

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Section 15 - REGULATORY INFORMATION

No data for AMC AUS FLOC BLOCK (CW: 17-9801)

Section 16 - OTHER INFORMATION

■ Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

■ For detailed advice on Personal Protective Equipment, refer to the following U.S. Regulations and Standards:

OSHA Standards - 29 CFR:

1910.132 - Personal Protective Equipment - General requirements

1910.133 - Eye and face protection

1910.134 - Respiratory Protection

1910.136 - Occupational foot protection

1910.138 - Hand Protection

Eye and face protection - ANSI Z87.1

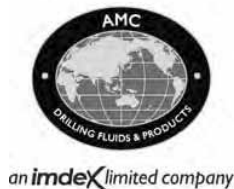
Foot protection - ANSI Z41

Respirators must be NIOSH approved.

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Issue Date: Aug-29-2012

Print Date: Mar-22-2013



AMC Ezee Pac R

AMC

Chemwatch: 4734-88
Version No: 6.1.1.1
Safety Data Sheet

Chemwatch Hazard Alert Code: 1

Issue Date: 12/16/2015
Print Date: 12/28/2015
Initial Date: Not Available
L.GHS.CAN.EN

SECTION 1 IDENTIFICATION

Product Identifier

Product name	AMC Ezee Pac R
Chemical Name	sodium carboxymethylcellulose
Other means of identification	Not Available

Recommended use of the chemical and restrictions on use

Relevant identified uses	Drilling fluids compound.

Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

Registered company name	AMC
Address	10911 72nd Street SE, Calgary T2C 3G2 AB Canada
Telephone	+1 403 259 5112
Fax	+1 403 255 7185
Website	www.amcmud.com
Email	amc@imdexlimited.com

Emergency phone number

Association / Organisation	Not Available
Emergency telephone numbers	Chemwatch - (1) 877 715 9305
Other emergency telephone numbers	-

CHEMWATCH EMERGENCY RESPONSE

Primary Number	Alternative Number 1	Alternative Number 2
(1) 877 715 9305	+612 9186 1132	Not Available

Once connected and if the message is not in your preferred language then please dial 01

Une fois connecté et si le message n'est pas dans votre langue préférée alors s'il vous plaît cadran 07

SECTION 2 HAZARD(S) IDENTIFICATION

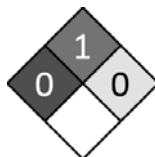
Classification of the substance or mixture

CHEMWATCH HAZARD RATINGS

AMC Ezee Pac R

	Min	Max
Flammability	1	
Toxicity	0	
Body Contact	0	
Reactivity	1	
Chronic	0	

0 = Minimum
1 = Low
2 = Moderate
3 = High
4 = Extreme



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

CANADIAN WHMIS SYMBOLS

GHS Classification	Not Applicable

Label elements

GHS label elements	Not Applicable

SIGNAL WORD	NOT APPLICABLE

Hazard statement(s)

Not Applicable

Hazard(s) not otherwise specified

Not Applicable

Precautionary statement(s) Prevention

Not Applicable

Precautionary statement(s) Response

Not Applicable

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

Not Applicable

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
9004-32-4	>99	<u>sodium carboxymethylcellulose</u>
		(polyanionic cellulose)

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

SECTION 4 FIRST-AID MEASURES

Description of first aid measures

Eye Contact	If this product comes in contact with the eyes: - Wash out immediately with fresh running water. - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. - Seek medical attention without delay; if pain persists or recurs seek medical attention. - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin or hair contact occurs: - Flush skin and hair with running water (and soap if available). - Seek medical attention in event of irritation.
Inhalation	- If dust is inhaled, remove from contaminated area. - Encourage patient to blow nose to ensure clear passage of breathing. - If irritation or discomfort persists seek medical attention.
Ingestion	- If swallowed do NOT induce vomiting. - If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

- ▶ Observe the patient carefully.
- ▶ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- ▶ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- ▶ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5 FIRE-FIGHTING MEASURES

Extinguishing media

- ▶ Water spray or fog.

Special hazards arising from the substrate or mixture

Fire Incompatibility	▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Special protective equipment and precautions for fire-fighters

Fire Fighting	▶ Alert Fire Brigade and tell them location and nature of hazard.
Fire/Explosion Hazard	▶ Solid which exhibits difficult combustion or is difficult to ignite. Combustion products include; carbon monoxide (CO) carbon dioxide (CO ₂) other pyrolysis products typical of burning organic material

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Minor Spills	▶ Clean up all spills immediately. Slippery when wet.
Major Spills	▶ Clear area of personnel and move upwind. Slippery when wet.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	▶ Limit all unnecessary personal contact. ▶ Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions) ▶ Minimise airborne dust and eliminate all ignition sources.
Other information	▶ Store in original containers.

Conditions for safe storage, including any incompatibilities

Suitable container	▶ Lined metal can, lined metal pail/ can. ▶ Glass container is suitable for laboratory quantities
Storage incompatibility	Avoid contamination of water, foodstuffs, feed or seed. Cellulose and its derivatives may react vigorously with calcium oxide, bleaching powder, perchlorates, perchloric acid, sodium chlorate, fluorine, nitric acid, sodium nitrate and sodium nitrite. ▶ Avoid reaction with oxidising agents

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3

sodium carboxymethylcellulose	Sodium carboxymethyl cellulose; (Dowex 11)	7.1 mg/m3	78 mg/m3	5300 mg/m3
Ingredient	Original IDLH	Revised IDLH		
sodium carboxymethylcellulose	Not Available	Not Available		

MATERIAL DATA

Exposure controls

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard.
Personal protection	
Eye and face protection	- Safety glasses with side shields - Chemical goggles.
Skin protection	See Hand protection below
Hands/feet protection	The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.
Body protection	See Other protection below
Other protection	No special equipment needed when handling small quantities.
Thermal hazards	Not Available

Respiratory protection

Particulate.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Lightly coloured odourless powder, soluble in water.		
Physical state	Divided Solid	Relative density (Water = 1)	1.5-1.6
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	Not Applicable	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Applicable
Initial boiling point and boiling range (°C)	Not Applicable	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Applicable	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Applicable
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Applicable	Gas group	Not Available
Solubility in water (g/L)	Miscible	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Applicable	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	Product is considered stable and hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models).
Ingestion	May produce laxative effects. High molecular weight material; on single acute exposure would be expected to pass through gastrointestinal tract with little change / absorption.
Skin Contact	The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models).
Eye	Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may cause transient discomfort characterised by tearing or conjunctival redness (as with windburn).
Chronic	Long-term exposure to the product is not thought to produce chronic effects adverse to health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course. The material contains a substantial proportion of a polymer considered to be of low concern (PLC). Studies indicate that diets containing large amounts of non-absorbable polysaccharides, such as cellulose, might decrease absorption of calcium, magnesium, zinc and phosphorus.

AMC Ezee Pac R	TOXICITY	IRRITATION
	Not Available	Not Available
sodium carboxymethylcellulose	TOXICITY	IRRITATION
	Dermal (rabbit) LD50: >2000 mg/kg ^[2]	Nil reported
	Inhalation (rat) LC50: >5.8 mg/L/4H ^[2]	
	Oral (rat) LD50: 27000 mg/kgd ^[2]	
Legend:	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

SODIUM CARBOXYMETHYLCELLULOSE	Neoplastic by RTECS criteria		
Acute Toxicity	⊘	Carcinogenicity	⊘
Skin Irritation/Corrosion	⊘	Reproductivity	⊘
Serious Eye Damage/Irritation	⊘	STOT - Single Exposure	⊘
Respiratory or Skin sensitisation	⊘	STOT - Repeated Exposure	⊘
Mutagenicity	⊘	Aspiration Hazard	⊘

Legend: ✕ – Data available but does not fill the criteria for classification
 ✓ – Data required to make classification available
 ⊘ – Data Not Available to make classification

SECTION 12 ECOLOGICAL INFORMATION

AMC Ezee Pac R

Toxicity

Ingredient	Endpoint	Test Duration (hr)	Species	Value	Source
sodium carboxymethylcellulose	LC50	96	Fish	>20000mg/L	4

Legend:

Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data

DO NOT discharge into sewer or waterways.

May be harmful to fauna if not disposed of according to Section 13 and legislative requirements. [AMC]

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

Bioaccumulative potential

Ingredient	Bioaccumulation
	No Data available for all ingredients

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	► Recycle wherever possible.

SECTION 14 TRANSPORT INFORMATION

Labels Required

Marine Pollutant	NO

Land transport (TDG): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

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.

SODIUM CARBOXYMETHYLCELLULOSE(9004-32-4) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Canada Categorization decisions for all DSL substances

Canada Domestic Substances List (DSL)

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (sodium carboxymethylcellulose)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	N (sodium carboxymethylcellulose)
Japan - ENCS	Y

AMC Ezee Pac R

Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average
 PC—STEL: Permissible Concentration-Short Term Exposure Limit
 IARC: International Agency for Research on Cancer
 ACGIH: American Conference of Governmental Industrial Hygienists
 STEL: Short Term Exposure Limit
 TEEL: Temporary Emergency Exposure Limit.
 IDLH: Immediately Dangerous to Life or Health Concentrations
 OSF: Odour Safety Factor
 NOAEL :No Observed Adverse Effect Level
 LOAEL: Lowest Observed Adverse Effect Level
 TLV: Threshold Limit Value
 LOD: Limit Of Detection
 OTV: Odour Threshold Value
 BCF: BioConcentration Factors
 BEI: Biological Exposure Index

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AMC K ION

AMC

Chemwatch: 4751-58

Version No: 4.1.1.1

Safety Data Sheet according to WHMIS 2015 requirements

Chemwatch Hazard Alert Code: 2

Issue Date: 11/08/2017

Print Date: 10/23/2019

L.GHS.CAN.EN

SECTION 1 IDENTIFICATION

Product Identifier

Product name	AMC K ION
Synonyms	Not Available
Other means of identification	Not Available

Recommended use of the chemical and restrictions on use

Relevant identified uses	Use according to manufacturer's directions. Drilling fluid additive.

Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

Registered company name	AMC
Address	1220 N. 2200 W. Suite# 600, Salt Lake City UT 84116 United States
Telephone	801-364-0233
Fax	801-364-0278
Website	www.amcmud.com
Email	amc@imdexlimited.com

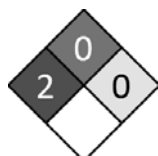
Emergency phone number

Association / Organisation	AMC	CHEMWATCH EMERGENCY RESPONSE
Emergency telephone numbers	Chemwatch - (1) 877 715 9305	+61 2 9186 1132
Other emergency telephone numbers	-	Not Available

SECTION 2 HAZARD(S) IDENTIFICATION

Classification of the substance or mixture

NFPA 704 diamond



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

CANADIAN WHMIS SYMBOLS



Classification	Skin Corrosion/Irritation Category 2, Eye Irritation Category 2A, Specific target organ toxicity - single exposure Category 3 (respiratory tract irritation), Specific target organ toxicity - repeated exposure Category 2

Label elements

Hazard pictogram(s)	

SIGNAL WORD	WARNING

Hazard statement(s)

H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H373	May cause damage to organs through prolonged or repeated exposure.

Physical and Health hazard(s) not otherwise classified

Not Applicable

Precautionary statement(s) General

P101	If medical advice is needed, have product container or label at hand.
P102	Keep out of reach of children.

Precautionary statement(s) Prevention

P260	Do not breathe mist/vapours/ spray.
P271	Use only outdoors or in a well-ventilated area.

Precautionary statement(s) Response

P321	Specific treatment (see advice on this label).
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Precautionary statement(s) Storage

P405	Store locked up.
P403+P233	Store in a well-ventilated place. Keep container tightly closed.

Precautionary statement(s) Disposal

P501	Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS**Substances**

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
Not Available	30-60	a blend of clay inhibitive polymers
127-08-2	10-<30	<u>potassium acetate</u>
Not Available	balance	nonhazardous ingredients

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

SECTION 4 FIRST-AID MEASURES**Description of first aid measures**

Eye Contact	If this product comes in contact with the eyes: ▶ Wash out immediately with fresh running water. ▶ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▶ Seek medical attention without delay; if pain persists or recurs seek medical attention. ▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact	If skin or hair contact occurs: ▶ Flush skin and hair with running water (and soap if available). ▶ Seek medical attention in event of irritation.
Inhalation	▶ If fumes, aerosols or combustion products are inhaled remove from contaminated area. ▶ Other measures are usually unnecessary.
Ingestion	▶ If swallowed do NOT induce vomiting. ▶ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▶ Observe the patient carefully. ▶ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. ▶ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. ▶ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

For potassium intoxications:

- ▶ Hyperkalaemia, in patients with abnormal renal function, results from reduced renal excretion following intoxication.
- ▶ The presence of electrocardiographic evidence of hyperkalemia or serum potassium levels exceeding 7.5 mE/L indicates a medical emergency requiring an intravenous line and constant cardiac monitoring.
- ▶ The intravenous ingestion of 5-10 ml of 10% calcium gluconate, in adults, over a 2 minute period antagonises the cardiac and neuromuscular effects. The duration of action is approximately 1 hour. [Ellenhorn and Barceloux: Medical Toxicology]

SECTION 5 FIRE-FIGHTING MEASURES

Extinguishing media

- ▶ There is no restriction on the type of extinguisher which may be used.
- ▶ Use extinguishing media suitable for surrounding area.

Special hazards arising from the substrate or mixture

Fire Incompatibility	None known

Special protective equipment and precautions for fire-fighters

Fire Fighting	▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ Wear breathing apparatus plus protective gloves in the event of a fire.
Fire/Explosion Hazard	▶ Non combustible. ▶ Not considered to be a significant fire risk. Decomposes on heating and produces toxic fumes of: carbon dioxide (CO₂) nitrogen oxides (NO_x)

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	▶ Clean up all spills immediately. ▶ Avoid breathing vapours and contact with skin and eyes.
Major Spills	Minor hazard. ▶ Clear area of personnel.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	▶ Limit all unnecessary personal contact. ▶ Wear protective clothing when risk of exposure occurs.
Other information	▶ Store in original containers. ▶ Keep containers securely sealed.

Conditions for safe storage, including any incompatibilities

Suitable container	▶ Polyethylene or polypropylene container. ▶ Packing as recommended by manufacturer. 20 L pails.
Storage incompatibility	None known

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION**Control parameters****OCCUPATIONAL EXPOSURE LIMITS (OEL)****INGREDIENT DATA**

Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
potassium acetate	Potassium acetate	9.8 mg/m3	110 mg/m3	640 mg/m3

Ingredient	Original IDLH	Revised IDLH
potassium acetate	Not Available	Not Available

OCCUPATIONAL EXPOSURE BANDING

Ingredient	Occupational Exposure Band Rating	Occupational Exposure Band Limit
potassium acetate	E	≤ 0.01 mg/m ³

Notes:

Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.

MATERIAL DATA**Exposure controls**

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
Personal protection	
Eye and face protection	▶ Safety glasses with side shields ▶ Chemical goggles. ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants.
Skin protection	See Hand protection below
Hands/feet protection	The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application. ▶ Wear chemical protective gloves, e.g. PVC. ▶ Wear safety footwear or safety gumboots, e.g. Rubber
Body protection	See Other protection below
Other protection	▶ Overalls. ▶ P.V.C.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES**Information on basic physical and chemical properties**

Appearance	Odourless liquid, mixes with water.		
Physical state	Liquid	Relative density (Water = 1)	1.09
Odour	Not Available	Partition coefficient n-octanol / water	Not Available

Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	Not Available	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	>100	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Applicable	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Applicable	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Applicable	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Applicable	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	3.1 @ 25C	Gas group	Not Available
Solubility in water	Miscible	pH as a solution (1%)	7.0-9.0
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	Product is considered stable and hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	Not normally a hazard due to non-volatile nature of product
Ingestion	Accidental ingestion of the material may be damaging to the health of the individual. Acute potassium poisonings following ingestion are rare because large doses usually induce vomiting and a healthy kidney ensures rapid excretion. Potassium poisoning disturbs the rhythm of the heart (a slow, weak pulse, heightened T waves on the ECG, arrhythmias heart block) and eventually produces a fall in blood pressure (due to weakened cardiac contractility).
Skin Contact	The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling epidermis. Open cuts, abraded or irritated skin should not be exposed to this material Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
Eye	The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.
Chronic	Long-term exposure to the product is not thought to produce chronic effects adverse to health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course.

AMC K ION	TOXICITY	IRRITATION
	Not Available	Not Available
potassium acetate	TOXICITY	IRRITATION
	Oral (rat) LD50: 3250 mg/kg ^[2]	Not Available

Legend: 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances

POTASSIUM ACETATE	Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a

	non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound.			
Acute Toxicity	✗	Carcinogenicity	✗	
Skin Irritation/Corrosion	✓	Reproductivity	✗	
Serious Eye Damage/Irritation	✓	STOT - Single Exposure	✓	
Respiratory or Skin sensitisation	✗	STOT - Repeated Exposure	✓	
Mutagenicity	✗	Aspiration Hazard	✗	

Legend: ✗ – Data either not available or does not fill the criteria for classification
 ✓ – Data available to make classification

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

AMC K ION	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	Not Available	Not Available	Not Available	Not Available	Not Available
potassium acetate	ENDPOINT	TEST DURATION (HR)	SPECIES	VALUE	SOURCE
	LC50	96	Fish	>1-mg/L	2
	EC50	48	Crustacea	>919mg/L	2
	EC50	72	Algae or other aquatic plants	>1-mg/L	2
	NOEC	72	Algae or other aquatic plants	1-mg/L	2
Legend: Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data					

DO NOT discharge into sewer or waterways.

May be harmful to fauna if not disposed of according to Section 13 and legislative requirements. [AMC]

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

Bioaccumulative potential

Ingredient	Bioaccumulation
	No Data available for all ingredients

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area.
	▶ DO NOT allow wash water from cleaning or process equipment to enter drains.
	▶ It may be necessary to collect all wash water for treatment before disposal.
	▶ Recycle wherever possible or consult manufacturer for recycling options.
	▶ Consult State Land Waste Authority for disposal.

SECTION 14 TRANSPORT INFORMATION

Labels Required

Marine Pollutant	NO

Land transport (TDG): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION**Safety, health and environmental regulations / legislation specific for the substance or mixture**

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

POTASSIUM ACETATE IS FOUND ON THE FOLLOWING REGULATORY LISTS

Canada Categorization decisions for all DSL substances

Canada Domestic Substances List (DSL)

Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS GHS (English)

National Inventory Status

National Inventory	Status
Australia - AICS	Yes
Canada - DSL	Yes
Canada - NDSL	No (potassium acetate)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	Yes
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	Yes
Taiwan - TCSI	Yes
Mexico - INSQ	Yes
Vietnam - NCI	Yes
Russia - ARIPS	Yes
Legend:	Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Revision Date	11/08/2017
Initial Date	Not Available

SDS Version Summary

Version	Issue Date	Sections Updated
3.1.1.1	12/16/2015	Appearance
4.1.1.1	11/08/2017	Name

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average

PC—STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit.

IDLH: Immediately Dangerous to Life or Health Concentrations

OSF: Odour Safety Factor

NOAEL :No Observed Adverse Effect Level

LOAEL: Lowest Observed Adverse Effect Level

TLV: Threshold Limit Value

LOD: Limit Of Detection

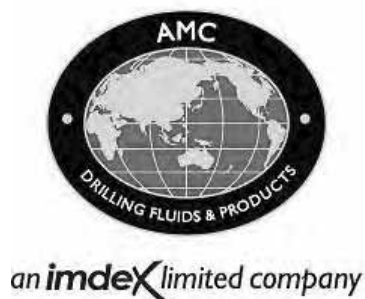
OTV: Odour Threshold Value

BCF: BioConcentration Factors

BEI: Biological Exposure Index

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AMC TORQUE GUARD

AMC

Chemwatch: 41-1072

Version No: 4.1.1.1

Safety Data Sheet

Chemwatch Hazard Alert Code: 1

Issue Date: 12/12/2016

Print Date: 03/28/2017

L.GHS.CAN.EN

SECTION 1 IDENTIFICATION

Product Identifier

Product name	AMC TORQUE GUARD
Synonyms	Not Available
Other means of identification	Not Available

Recommended use of the chemical and restrictions on use

Relevant identified uses	Drilling fluid additive.

Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party

Registered company name	AMC
Address	10911 72nd Street SE, Calgary AB T2C 3G2 Canada
Telephone	+1 403 259 5112
Fax	+1 403 255 7185
Website	www.amcmud.com
Email	amc@imdexlimited.com

Emergency phone number

Association / Organisation	Not Available
Emergency telephone numbers	Chemwatch - (1) 877 715 9305
Other emergency telephone numbers	-

CHEMWATCH EMERGENCY RESPONSE

Primary Number	Alternative Number 1	Alternative Number 2
(1) 877 715 9305	(1) 877 715 9305	+612 9186 1132

Once connected and if the message is not in your preferred language then please dial 01

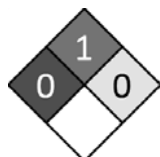
Une fois connecté et si le message n'est pas dans votre langue préférée alors s'il vous plaît cadran 07

SECTION 2 HAZARD(S) IDENTIFICATION

AMC TORQUE GUARD

Classification of the substance or mixture

NFPA 704 diamond



Note: The hazard category numbers found in GHS classification in section 2 of this SDSs are NOT to be used to fill in the NFPA 704 diamond. Blue = Health Red = Fire Yellow = Reactivity White = Special (Oxidizer or water reactive substances)

CANADIAN WHMIS SYMBOLS

Classification	Not Applicable

Label elements

GHS label elements	Not Applicable

SIGNAL WORD	NOT APPLICABLE

Hazard statement(s)

Not Applicable

Hazard(s) not otherwise specified

Not Applicable

Precautionary statement(s) Prevention

Not Applicable

Precautionary statement(s) Response

Not Applicable

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

Not Applicable

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
Not Available	100	Ingredients determined not to be hazardous

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

SECTION 4 FIRST-AID MEASURES

Description of first aid measures

Eye Contact	If this product comes in contact with eyes: ▶ Wash out immediately with water. ▶ If irritation continues, seek medical attention. ▶ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin or hair contact occurs: ▶ Flush skin and hair with running water (and soap if available). ▶ Seek medical attention in event of irritation.
Inhalation	▶ If fumes, aerosols or combustion products are inhaled remove from contaminated area. ▶ Other measures are usually unnecessary.
Ingestion	▶ Immediately give a glass of water. ▶ First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

Indication of any immediate medical attention and special treatment needed

AMC TORQUE GUARD

Treat symptomatically.

SECTION 5 FIRE-FIGHTING MEASURES

Extinguishing media

- ▶ Water spray or fog.

Special hazards arising from the substrate or mixture

Fire Incompatibility	▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Special protective equipment and precautions for fire-fighters

Fire Fighting	▶ Alert Fire Brigade and tell them location and nature of hazard.
Fire/Explosion Hazard	▶ Combustible. Combustion products include: , carbon dioxide (CO2) , other pyrolysis products typical of burning organic material.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	▶ Remove all ignition sources. Slippery when spilt.
Major Spills	Moderate hazard. Slippery when spilt.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	▶ Avoid all personal contact, including inhalation.
Other information	▶ Store in original containers.

Conditions for safe storage, including any incompatibilities

Suitable container	▶ Metal can or drum ▶ Packaging as recommended by manufacturer.
Storage incompatibility	Avoid contamination of water, foodstuffs, feed or seed. ▶ Avoid reaction with oxidising agents

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
AMC TORQUE GUARD	Not Available	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH

AMC TORQUE GUARD

Ingredients determined
not to be hazardous

Not Available

Not Available

MATERIAL DATA

Exposure controls

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard.
Personal protection	
Eye and face protection	- Safety glasses with side shields - Chemical goggles.
Skin protection	See Hand protection below
Hands/feet protection	Wear general protective gloves, eg. light weight rubber gloves. The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer.
Body protection	See Other protection below
Other protection	No special equipment needed when handling small quantities.
Thermal hazards	Not Available

Respiratory protection

Type A Filter of sufficient capacity.

Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content. The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Amber liquid with a characteristic odour; mixes with water.		
Physical state	Liquid	Relative density (Water = 1)	Not Available
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	Not Available	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Applicable	Viscosity (cSt)	Not Available
Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Applicable
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Available
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water (g/L)	Miscible	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

AMC TORQUE GUARD

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	Product is considered stable and hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models).
Ingestion	The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion".
Skin Contact	The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models).
Eye	Although the liquid is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).
Chronic	Long-term exposure to the product is not thought to produce chronic effects adverse to health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course.

AMC TORQUE GUARD	TOXICITY	IRRITATION
	Not Available	Not Available
Legend:	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

Acute Toxicity	⊘	Carcinogenicity	⊘
Skin Irritation/Corrosion	⊘	Reproductivity	⊘
Serious Eye Damage/Irritation	⊘	STOT - Single Exposure	⊘
Respiratory or Skin sensitisation	⊘	STOT - Repeated Exposure	⊘
Mutagenicity	⊘	Aspiration Hazard	⊘

Legend: ✕ – Data available but does not fill the criteria for classification
✓ – Data available to make classification
⊘ – Data Not Available to make classification

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

Ingredient	Endpoint	Test Duration (hr)	Species	Value	Source
Not Available	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Legend:	Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 (QSAR) - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data				

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

AMC TORQUE GUARD

Bioaccumulative potential

Ingredient	Bioaccumulation
	No Data available for all ingredients

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 DISPOSAL CONSIDERATIONS**Waste treatment methods**

Product / Packaging disposal	Legislation addressing waste disposal requirements may differ by country, state and/ or territory. ▶ DO NOT allow wash water from cleaning or process equipment to enter drains. ▶ Recycle wherever possible or consult manufacturer for recycling options.

SECTION 14 TRANSPORT INFORMATION**Labels Required**

Marine Pollutant	NO

Land transport (TDG): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

SECTION 15 REGULATORY INFORMATION**Safety, health and environmental regulations / legislation specific for the substance or mixture**

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.

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	Y
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	Y
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION**Other information**

AMC TORQUE GUARD

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average

PC—STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit.

IDLH: Immediately Dangerous to Life or Health Concentrations

OSF: Odour Safety Factor

NOAEL :No Observed Adverse Effect Level

LOAEL: Lowest Observed Adverse Effect Level

TLV: Threshold Limit Value

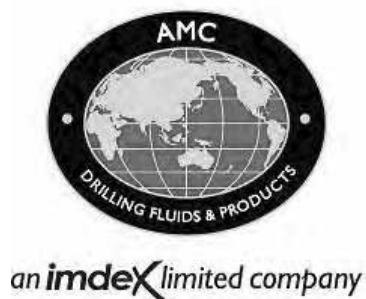
LOD: Limit Of Detection

OTV: Odour Threshold Value

BCF: BioConcentration Factors

BEI: Biological Exposure Index

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AMC Xan-Bore

AMC

Chemwatch: 7177-15

Version No: 3.1.1.1

Safety Data Sheet according to WHS and ADG requirements

Chemwatch Hazard Alert Code: 1

Issue Date: 12/16/2015

Print Date: 12/28/2015

Initial Date: Not Available

L.GHS.AUS.EN

SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

Product Identifier

Product name	AMC Xan-Bore
Chemical Name	gum xanthan
Synonyms	XCD Polymer
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Drilling fluids compound; drilling viscosifier.

Details of the supplier of the safety data sheet

Registered company name	AMC
Address	216 Balcatta Rd, Balcatta 6021 WA Australia
Telephone	+61 (8) 9445 4000, Mobile: +61 (0) 432 187 374
Fax	+61 (8) 9445 4040
Website	www.amcoilandgas.com, www.amcmud.com
Email	amc@imdexlimited.com, amcoilandgas@imdexlimited.com

Emergency telephone number

Association / Organisation	Chemwatch
Emergency telephone numbers	1800 039 008
Other emergency telephone numbers	Not Available

CHEMWATCH EMERGENCY RESPONSE

Primary Number	Alternative Number 1	Alternative Number 2
1800 039 008	+612 9186 1132	Not Available

Once connected and if the message is not in your preferred language then please dial 01

SECTION 2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

NON-HAZARDOUS CHEMICAL. NON-DANGEROUS GOODS. According to the WHS Regulations and the ADG Code.

CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability	1	
Toxicity	0	
Body Contact	0	
Reactivity	1	
Chronic	0	

0 = Minimum
1 = Low
2 = Moderate
3 = High
4 = Extreme

Poisons Schedule	Not Applicable
GHS Classification	Not Applicable

Label elements

GHS label elements	Not Applicable

SIGNAL WORD	NOT APPLICABLE

Hazard statement(s)

Not Applicable

Precautionary statement(s) Prevention

Not Applicable

Precautionary statement(s) Response

Not Applicable

Precautionary statement(s) Storage

Not Applicable

Precautionary statement(s) Disposal

Not Applicable

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
11138-66-2	100	<u>gum xanthan</u>

SECTION 4 FIRST AID MEASURES

Description of first aid measures

Eye Contact	If this product comes in contact with the eyes: - Wash out immediately with fresh running water. - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. - Seek medical attention without delay; if pain persists or recurs seek medical attention. - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin or hair contact occurs: - Flush skin and hair with running water (and soap if available). - Seek medical attention in event of irritation.
Inhalation	- If dust is inhaled, remove from contaminated area. - Encourage patient to blow nose to ensure clear passage of breathing. - If irritation or discomfort persists seek medical attention.
Ingestion	- If swallowed do NOT induce vomiting. - If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and

- ▶ prevent aspiration.
- ▶ Observe the patient carefully.
- ▶ Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- ▶ Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- ▶ Seek medical advice.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5 FIREFIGHTING MEASURES

Extinguishing media

- ▶ There is no restriction on the type of extinguisher which may be used.
- ▶ Use extinguishing media suitable for surrounding area.

Special hazards arising from the substrate or mixture

Fire Incompatibility	▶ Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Advice for firefighters

Fire Fighting	▶ Alert Fire Brigade and tell them location and nature of hazard.
Fire/Explosion Hazard	▶ Solid which exhibits difficult combustion or is difficult to ignite. Combustion products include; carbon monoxide (CO) carbon dioxide (CO ₂) other pyrolysis products typical of burning organic material

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Minor Spills	▶ Clean up all spills immediately.
Major Spills	▶ Clear area of personnel and move upwind.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Safe handling	▶ Limit all unnecessary personal contact. ▶ Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidizing medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions) ▶ Minimise airborne dust and eliminate all ignition sources.
Other information	▶ Store in original containers.

Conditions for safe storage, including any incompatibilities

Suitable container	▶ Lined metal can, lined metal pail/ can.
Storage incompatibility	Avoid contamination of water, foodstuffs, feed or seed. ▶ Avoid reaction with oxidising agents

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

OCCUPATIONAL EXPOSURE LIMITS (OEL)

INGREDIENT DATA

Not Available

EMERGENCY LIMITS

Ingredient	Material name	TEEL-1	TEEL-2	TEEL-3
AMC Xan-Bore	Not Available	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH

gum xanthan	Not Available	Not Available

MATERIAL DATA**Exposure controls**

Appropriate engineering controls	Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard.
Personal protection	
Eye and face protection	▶ Safety glasses with side shields ▶ Chemical goggles.
Skin protection	See Hand protection below
Hands/feet protection	The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.
Body protection	See Other protection below
Other protection	No special equipment needed when handling small quantities.
Thermal hazards	Not Available

Respiratory protection

Particulate.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES**Information on basic physical and chemical properties**

Appearance	Tan granular solid, partly soluble in water.		
Physical state	Divided Solid	Relative density (Water = 1)	~0.65
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Applicable
pH (as supplied)	Not Applicable	Decomposition temperature	Not Available
Melting point / freezing point (°C)	Not Available	Viscosity (cSt)	Not Applicable
Initial boiling point and boiling range (°C)	Not Applicable	Molecular weight (g/mol)	Not Available
Flash point (°C)	Not Applicable	Taste	Not Available
Evaporation rate	Not Applicable	Explosive properties	Not Available
Flammability	Not Applicable	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Applicable	Surface Tension (dyn/cm or mN/m)	Not Applicable
Lower Explosive Limit (%)	Not Applicable	Volatile Component (%vol)	Not Applicable
Vapour pressure (kPa)	Not Applicable	Gas group	Not Available
Solubility in water (g/L)	Partly miscible	pH as a solution (1%)	4.7
Vapour density (Air = 1)	Not Applicable	VOC g/L	Not Available

SECTION 10 STABILITY AND REACTIVITY

Reactivity	See section 7
Chemical stability	Product is considered stable and hazardous polymerisation will not occur.

Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 TOXICOLOGICAL INFORMATION

Information on toxicological effects

Inhaled	The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models).
Ingestion	The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion". Polysaccharides are not substantially absorbed from the gastrointestinal tract but may produce a laxative effect.
Skin Contact	The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models).
Eye	Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may cause transient discomfort characterised by tearing or conjunctival redness (as with windburn).
Chronic	Long-term exposure to the product is not thought to produce chronic effects adverse to health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course. Studies indicate that diets containing large amounts of non-absorbable polysaccharides, such as cellulose, might decrease absorption of calcium, magnesium, zinc and phosphorus. Long term exposure to high dust concentrations may cause changes in lung function (i.e. pneumoconiosis) caused by particles less than 0.5 micron penetrating and remaining in the lung.

AMC Xan-Bore	TOXICITY	IRRITATION
	Not Available	Not Available
gum xanthan	TOXICITY	IRRITATION
	Not Available	Not Available
Legend:	1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances	

GUM XANTHAN	No significant acute toxicological data identified in literature search.

Acute Toxicity	⊖	Carcinogenicity	⊖
Skin Irritation/Corrosion	⊖	Reproductivity	⊖
Serious Eye Damage/Irritation	⊖	STOT - Single Exposure	⊖
Respiratory or Skin sensitisation	⊖	STOT - Repeated Exposure	⊖
Mutagenicity	⊖	Aspiration Hazard	⊖

Legend: ✖ – Data available but does not fill the criteria for classification
✔ – Data required to make classification available
⊖ – Data Not Available to make classification

SECTION 12 ECOLOGICAL INFORMATION

Toxicity

Ingredient	Endpoint	Test Duration (hr)	Species	Value	Source
gum xanthan	LC50	96	Fish	420mg/L	4
Legend:	Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 3. EPIWIN Suite V3.12 - Aquatic Toxicity Data (Estimated) 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data				

DO NOT discharge into sewer or waterways.

[Aquatic Toxicity (based on a similar product):]Acute (rainbow trout) LC50: 320-560 ppm/96hrs][Australian Mud]

May be harmful to fauna if not disposed of according to Section 13 and legislative requirements. [AMC]

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

Bioaccumulative potential

Ingredient	Bioaccumulation
	No Data available for all ingredients

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 DISPOSAL CONSIDERATIONS

Waste treatment methods

Product / Packaging disposal	Legislation addressing waste disposal requirements may differ by country, state and/ or territory. - DO NOT allow wash water from cleaning or process equipment to enter drains. - Recycle wherever possible.

SECTION 14 TRANSPORT INFORMATION

Labels Required

Marine Pollutant	NO
HAZCHEM	Not Applicable

Land transport (ADG): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

SECTION 15 REGULATORY INFORMATION

Safety, health and environmental regulations / legislation specific for the substance or mixture

GUM XANTHAN(11138-66-2) IS FOUND ON THE FOLLOWING REGULATORY LISTS

Australia Inventory of Chemical Substances (AICS)

National Inventory	Status
Australia - AICS	Y
Canada - DSL	Y
Canada - NDSL	N (gum xanthan)
China - IECSC	Y
Europe - EINEC / ELINCS / NLP	Y
Japan - ENCS	Y
Korea - KECI	Y
New Zealand - NZIoC	Y
Philippines - PICCS	Y
USA - TSCA	Y
Legend:	Y = All ingredients are on the inventory N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

SECTION 16 OTHER INFORMATION

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment.

Definitions and abbreviations

PC—TWA: Permissible Concentration-Time Weighted Average

PC—STEL: Permissible Concentration-Short Term Exposure Limit

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

STEL: Short Term Exposure Limit

TEEL: Temporary Emergency Exposure Limit.

IDLH: Immediately Dangerous to Life or Health Concentrations

OSF: Odour Safety Factor

NOAEL :No Observed Adverse Effect Level

LOAEL: Lowest Observed Adverse Effect Level

TLV: Threshold Limit Value

LOD: Limit Of Detection

OTV: Odour Threshold Value

BCF: BioConcentration Factors

BEI: Biological Exposure Index

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Appendix G

NT-NU Spill Report

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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: MONTH – DAY – YEAR		REPORT TIME	☐ ORIGINAL SPILL REPORT, OR ☐ UPDATE # TO THE ORIGINAL SPILL REPORT	REPORT NUMBER -
	OCCURRENCE DATE: MONTH – DAY – YEAR		OCCURRENCE TIME		
C	LAND USE PERMIT NUMBER (IF APPLICABLE) IOL - Commercial Lease: Q13C301		WATER LICENCE NUMBER (IF APPLICABLE) 2BE-MRY1421 Type "B"		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM THE NAMED LOCATION Mary River Mine Site, Baffin Island, NU			REGION ☐ NWT ☒ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN	
E	LATITUDE DEGREES MINUTES SECONDS		LONGITUDE DEGREES MINUTES SECONDS		
F	RESPONSIBLE PARTY OR VESSEL NAME Baffinland Iron Mines Corp.		RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION 2275 Middle Road East, Suite 300, ON L6H 0C3		
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION			
H	PRODUCT SPILLED		QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
	SECOND PRODUCT SPILLED (IF APPLICABLE)		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 EQUIPMENT	
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

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REPORT LINE USE ONLY					
N	RECEIVED AT SPILL LINE BY	POSITION Station operator	EMPLOYER	LOCATION CALLED Yellowknife, NT	REPORT LINE NUMBER (867) 920-8130
LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC			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					

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Attachment 2

DRAFT Exploration Closure and Reclamation Plan (BAF-PH1-830-P16-0038)

	Exploration Closure and Reclamation Plan	Issue Date: ~~January 25~~ <u>March 11</u> , 2021 Revision: 2	Page 1 of 63
	Exploration	Document #: BAF-PH1-830-P16-0038	

Baffinland Iron Mines Corporation

Exploration Closure and Reclamation Plan

BAF-PH1-830-P16-0038

Revision 2

DRAFT

Prepared By: Christopher Murray
Department: Sustainable Development
Title: Environmental & Regulatory Compliance Manager
Date: ~~January 25, 2021~~ March 11, 2021
Signature:

Reviewed By: Massoud Robatian
Department: Exploration
Title: Ferrous Exploration Manager
Date: ~~January 25, 2021~~ March 11, 2021
Signature:

	Exploration Closure and Reclamation Plan	Issue Date: ~~January 25~~ March 11, 2021 Revision: 2	Page 2 of 63
	Exploration	Document #: BAF-PH1-830-P16-0038	

DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
09/27/2013	0	AG	EM	Approved for Use (H349000-1000-07-126-0016)
06/17/2014	0	JM	EM	Issued for Use (BAF-PH1-830-P16-0038)
07/02/2014	1	JM	EM	Issued for Use (BAF-PH1-830-P16-0038)
01/25/2021	2	CM	MR	Issued for Review
<u>03/11/2021</u>	<u>2</u>	<u>CM</u>	<u>MR</u>	<u>Issued for Review</u>

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1 PLAIN LANGUAGE SUMMARY

BACKGROUND AND INTRODUCTION

The Mary River Project (the Project) is an approved Project (Project Certificate No. 005) located on north Baffin Island, in the Qikiqtani Region of Nunavut. The Project is wholly owned by Baffinland Iron Mines Corporation (Baffinland). This Project represents a significant investment and therefore Baffinland will continue exploration work on its mineral leases.

Exploration activities and associated infrastructure are licenced under Type “B” Water Licence No. 2BE-MRY1421 (the Licence). The work conducted under the Licence is termed by Baffinland the “Mary River Exploration Project”. The scope of Type “B” Water Licence No. 2BE-MRY1421 “allows for the use of Waters and the deposit of Waste for a Mining undertaking, classified as per Schedule 1 of the *Regulations* at the Mary River Exploration Project” and includes the following activities:

- Land-based and on-ice mineral drilling;
- Mapping;
- Sampling;
- Drill core storage;
- Disposal of drilling mud;
- Geophysical and geochemical surveys;
- Mechanical trenching and stripping of surficial overburden;
- Activities to support of scientific and engineering studies to advance the Mary River Project including geotechnical investigation and geotechnical drilling;
- Progressive reclamation programs of drilling sites;
- Fuel storage;
- Camp operation; and
- Equipment, personnel and supply transport.

These tasks will either be supported from the facilities and infrastructure constructed at the Mary River Mine Site, Milne Port, future Steensby Port facilities (once constructed) or the existing Mid-Rail Camp, Steensby Port Camp, and potential satellite exploration camps on Baffinland’s mineral leases. The facilities at Mary River Mine Site and Milne Port are approved under Project Certificate No. 005 and Type ‘A’ Water Licence 2AM-MRY-1325, and reclamation activities for these permanent facilities are detailed in the Mary River Project Interim Mine Closure and Reclamation Plan (BAF-PH1-830-P16-0012). The remaining facilities are covered under this Plan that includes the operation of up to seven (7) satellite camps that

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may be established in support of exploration activities at locations shown in **Error! Reference source not found..** Each satellite camp will be temporary in nature and will be limited to a maximum capacity of 49 persons.

All of the activities conducted as part of the Mary River Exploration Project (Licence 2BE-MRY1421) have been permitted in the past and are common to exploration properties throughout Nunavut. Any required regulatory approvals, including modification or amendment of the Licence would be obtained before such development proceeds as needed. Closure and reclamation of any additional infrastructure required for the Mary River Exploration Project will abide by the Project commitments relating to closure and reclamation stated above and will align where appropriate with the current Mary River Project Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012). This includes ensuring facilities are designed and constructed to minimize the footprint and where possible and practical, to be temporary in nature.

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DOCUMENT ORGANIZATION

This ECRP follows the template provided in the MVLWB/AANDC Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories with some minor exceptions, and includes the following major topics of discussion:

- Section 2** Provides the purpose, scope, and goal of the ECRP, outlines the closure and reclamation planning team, details the approach for engagement, and summarizes regulatory instruments (permits, authorizations, and agreements) for closure and reclamation;
- Section 3** Provides a description of pre-disturbance (baseline) conditions for the atmospheric, physical (terrestrial), biological and socio-economic environment;
- Section 4** Provides a detailed description of the exploration area, including the location and access, project history, site geology, and high-level project summary;
- Section 5** Provides a detailed description for the permanent closure of the exploration areas, including the expected final conditions. This Section contains the bulk of available detail for how the exploration areas will be closed, and the reclamation targets Baffinland seeks to achieve (closure objectives and criteria);
- Section 6** Provides a description of planned progressive reclamation for exploration areas;
- Section 7** Discusses planning for short-term temporary closure and long-term closure and suspension of activities.
- Section 8** Provides a schedule for the planned closure activities;
- Section 9** Provides a post-closure site assessment that summarizes how the exploration areas will be assessed once the selected closure activities have been completed;
- Section 10** Discusses the estimated costs associated with closure and reclamation activities
- Section 11** Provides a tabulated summary of the ECRP's concordance with the primary regulatory instruments
- Section 12** Glossary of terms, acronyms, and abbreviations
- Section 13** References
- Appendix A** RECLAIM Model Output
- Appendix B** Cost Estimate Assumptions for RECLAIM Model
- Appendix C** Site Photos of Current Site Conditions
- Appendix D** Locations of Potential Satellite Camps

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PROJECT AND CLOSURE SUMMARY

Exploration activities are seasonal and temporary in nature (from June to September). Annually, on a seasonal basis, the exploration camps are shut down for the winter period. This seasonal shut down represents temporary closure. At the completion of the drilling season, only the exploration camp and its associated infrastructure remain as reclamation measures are implemented for each drill site after completion of drilling activity. During seasonal closure all animal attracting waste will be removed, all equipment and infrastructure will be secured and de-energized, all fuel and hazardous waste will be consolidated into engineered secondary containment structures, and periodic visual inspections will be completed during periods of inactivity. It should be noted by definition, exploration is of short duration and temporary in nature. Camps are mobile and focused on areas of high prospectively. Camps may be moved during or after the drilling the season to minimise mobilisation and travel distances for more advanced exploration activities, primarily exploration drilling.

Final closure and reclamation consists of removal of the exploration camp(s) and their associated infrastructure (sewage treatment, fuel cache) and site materials (drums, barrels, buildings and contents, docks, water pumps and lines, and material and other equipment at the specific exploration camp site). All disturbed surfaces will be prepared by ripping, grading, or scarifying the surface to conform to the natural topography. All material will be transported to the Mary River Mine Site or Milne Port for disposal in accordance with the approved Mary River Project Waste Management Plan or will be shipped off-site to an approved facility.

As progressive reclamation is being conducted throughout the life of the Mary River Exploration Project, final closure and reclamation activities are expected to last a period of no more than two (2) years. The financial cost of the Mary River Exploration Project closure and reclamation has been estimated using the Mining RECLAIM spreadsheet provided by Aboriginal Affairs and Northern Development Canada (AANDC) (formerly Department of Indian Affairs and Northern Development). The Mary River Exploration Project closure and reclamation is estimated to cost \$1,247,000.

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2 INTRODUCTION

2.1 PURPOSE AND SCOPE OF ECRP

Closure and reclamation for the Mary River Exploration Project will be regulated under Baffinland's Type 'B' Water Licence No. 2BE-MRY142. In the cases where Mary River Exploration activities occur on Inuit Owned Lands, Baffinland's IOL Commercial Lease (No. Q13C301) conditions will also apply.

The Exploration Closure and Reclamation Plan (ECRP) contains and describes the plans related to closure and reclamation of Mary River Exploration Project activities and related facilities. In accordance with Part I, Item 1, of Type 'B' Water Licence No. 2BE-MRY1421, the ECRP has been updated from a previous revision following the issuance of the renewal-amendment Type 'B' Water Licence No. 2BE-MRY1421 to better reflect the reduced scope of activities associated with the Mary River Exploration Project.

2.1.1 RELATIONSHIP TO OTHER PLANS

The ECRP has been developed in accordance with the terms and conditions of the Type 'B' Water Licence 2BE-MRY1421. In addition to this plan, the following have also been developed by Baffinland;

- The Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012) for the Mary River Project provides details on the closure and reclamation of Inuit Owned Land under the Commercial Lease Q13C301, as well as the terms and conditions of the Type 'A' Water Licence 2AM-MRY1325. Components of the Mary River Project are considered as part of this ECRP, and conversely the ECRP relies on the Interim Closure and Reclamation Plan for additional details (e.g. closure and post closure monitoring).
- The Ege Bay Closure and Reclamation Plan (BAF-PH1-400-P16-0003) for the Ege Bay Exploration Program outlines closure and reclamation under the terms and conditions of the Type 'B' Water Licence 2BE-EQE-1926. For clarity, exploration activities under the Ege Bay Exploration Program are not considered as part of this ECRP.

2.2 ECRP GOAL AND PRINCIPLES

Over the life of the Project it is expected that closure and reclamation techniques and methodologies for site reclamation will continue to evolve with changes to the exploration program, stakeholder's views, and technologies for cost effective and practical reclamation in northern conditions. Planning for exploration site reclamation will be based on the protection of human health and the environment, and remain dynamic to take into account the results of ongoing and future studies and identified best practices.

2.2.1 POLICIES AND GUIDELINES FOR FINAL CLOSURE

The ECRP has been developed in accordance with applicable requirements of:

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- The Project Certificate No. 005 conditions
- The Qikiqtani Inuit Association (QIA) Abandonment and Reclamation Policy for Inuit Owned Lands (applicable to only activities and potential future satellite camps on Inuit Owned Land)
- Aboriginal Affairs and Northern Development Canada (AANDC) Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (2013).

In addition, the ECRP abides by all commitments set forth in previous licensing conditions and commitments made during associated licensing process related to the Project. These include:

- Commitments made by Baffinland during the FEIS¹ and Type 'A' Water Licence review processes.
- Baffinland Type 'B' Water Licence No. 2BE-MRY1421 requirements.

In all cases, reclamation will be consistent with locally valued ecosystem components and regional planning objectives. All closure work will be carried out in accordance with permit requirements as stated in the Territorial Land Use Regulations.

Baffinland is committed to, and will be responsible for, carrying out the closure and rehabilitation measures in a phased, on-going (progressive) manner as reviewed and agreed with the regulatory agencies and implicated communities. Baffinland will conduct its exploration activities in a manner that minimizes disturbance to the natural environment. This will be achieved by:

1. To the extent possible, conducting and supporting exploration activities from existing infrastructure at the Mine Site, Mine Port and Steensby Port (facilities approved under Project Certificate No. 005 and subject to Type A water Licence 2AM-MRY1325).
2. Where exploration activities necessitate the construction of a satellite camp, such camp will rely on the Mary River project facilities for its material and fuel supply and solid waste disposal.
3. Systematic reclamation of drill sites will be undertaken after completion of the drilling activity.

In this context, closure and reclamation of an exploration site will consist of:

1. Removal of the exploration camp and its associated infrastructure (mainly power supply and fuel cache and accessory building(s)).
2. Removal and disposal of drill core.
3. Rehabilitation of the land (footprint of the camp, laydown areas, and, road(s)).

The main goals of this Policy and the above guidelines and regulations are to:

¹ Mary River Project Final Environmental Impact Statement and any relevant addendums, Baffinland Iron Mines, 2012

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- Apply the principles of pollution prevention and continuous improvement to minimize ecosystem impacts and facilitate biodiversity conservation.
- Use energy resources, raw materials and natural resources efficiently and effectively.
- Engage with governments, employees, local communities and the public to create a shared understanding of closure and reclamation issues and take their views into consideration in making decisions.
- Return the exploration areas to “wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and human activities” (NRCan, 1994).
- Where practicable, undertake reclamation of affected areas in an ongoing and progressive manner to reduce the environmental risk once the mine ceases operation (INAC, 2002. INAC, 2002a. Northwest Territories Water Board, 1990 and QIA, 2013).
- Provide for the reclamation of affected sites and areas to a stable and safe condition and restore altered water courses to near their original alignment and cross-section. Where practical, affected areas will be returned to a state compatible with the original undisturbed area (Territorial Land Use Regulations).
- Reduce the need for long-term monitoring and maintenance by designing for closure and instituting progressive reclamation, when possible.
- Provide for closure planning using the current available proven technologies in a manner consistent with sustainable development.

2.2.2 SITE ABANDONMENT GOAL

In accordance with the above Policy, regulations, and guidelines, the site abandonment goal is to return exploration sites and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities².

2.2.3 CLOSURE PRINCIPLES TO ACHIEVE SITE ABANDONMENT GOAL

In order to achieve the Site Abandonment Goal, closure objectives and criteria have been selected for Project components (Section 4.4.1) based on the following Closure Principles:

- Ensure the safety of the exploration areas for wildlife and human users.
- Ensure physical stability of exploration areas and remaining physical features.
- Ensure chemical stability of the exploration project areas.

² Based on alignment with Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVWLB/AANDC, 2013)

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- Incorporate considerations for future land use of exploration areas in final closure planning.
- Implement reclamation in a progressive, ongoing manner during the life of the Project and restore sites as soon as an area is no longer required for exploration to limit the need for long-term maintenance and monitoring.
- Reclaim disturbed Project areas such that no long-term active care is required.
- The objectives and criteria proposed for implementing Final Closure and achieving the stated goal and principles are discussed in Section 5.1.1 of this ECRP.

2.3 CLOSURE AND RECLAMATION PLANNING TEAM

Currently, closure planning related to the Project is the responsibility of the Sustainable Development Department at Baffinland with support consultants. Participation of local communities and other stakeholders in the consideration of alternative reclamation activities to safeguard community values is encouraged as the Project proceeds.

2.4 ENGAGEMENT

Baffinland's approach to stakeholder and Inuit community engagement emphasizes the importance of informing stakeholders, establishing effective communication strategies, and collecting feedback from them on potential issues and concerns.

In support of achieving the engagement objectives defined for the Project, Baffinland implements a variety of engagement mechanisms that are intended to ensure that a broad and comprehensive approach to the identification of stakeholders and that the creation of enhanced opportunities for dialogue and input are executed. During engagement with the North Baffin communities, the QIA and other stakeholders related to the ERP and ongoing operations, a few questions were raised about Project closure and reclamation. These were mainly concerned with who would be cleaning potential Project-related spills as proponents of past projects created fuel spills, which may have affected marine mammals. Some community members wondered what would happen to Project infrastructure and equipment post-closure and others asked about the status of the closure plans.

Refer to the Interim Closure and Reclamation Plan for the Mary River Project (BAF-PH1-830-P16-0012) for further details on engagement activities and summary of engagement to date.

2.4.1 CONSIDERATION OF INUIT QAUJIMAJATUQANGIT

An Inuit Stewardship Plan (ISP) will be developed by the QIA, that will describe how Inuit monitoring activities tie into the adaptive management system and other management, mitigation, and monitoring plans. The ISP will also describe how Inuit monitoring will relate to the protection and promotion of Inuit rights defined under the Nunavut Agreement and described under legal agreements with Baffinland related to management and stewardship of Inuit owned lands and resources. The ISP will be the

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framework for Inuit-led monitoring of impacts and changes within communities and on the land, waters and ice as a result of the Project. The ISP will embed a “boots on the ground” approach to monitoring whereby Inuit will be hired and trained as professional monitors for monitoring under the ISP. Through the ISP, Inuit will govern the use of Inuit knowledge and observations regarding the Project.

Further updates to this plan are expected as an outcome of the development of the ISP that articulates Inuit monitoring objectives, indicators, thresholds and responses (OITRs) related to the desired end land use and aesthetics of the landscape.

In the interim, Table 2.1 identifies the opportunities that Baffinland has explored to incorporate IQ into this Plan.

Table 2.1 Incorporation of IQ into this Management Plan

<u>Element</u>	<u>Description</u>
<u>Environmental sensitivities and receptors</u>	<u>Confirmation required with Inuit through QIA-Baffinland AMP Working Group; interim Inuit objectives, indicators, thresholds and responses to be identified in this Management Plan and subject to later revision through the ISP and AMP reviews on a scheduled basis</u>
<u>Indicators and thresholds</u>	<u>Confirmation required with Inuit through QIA-Baffinland AMP Working Group</u>
<u>Mitigation measures</u>	<u>Confirmation required with Inuit through QIA-Baffinland AMP Working Group</u>
<u>Monitoring</u>	<u>Confirmation required with Inuit through QIA-Baffinland AMP Working Group</u>
<u>Adaptive management</u>	<u>Confirmation required with Inuit through QIA-Baffinland AMP Working Group</u>
<u>Validation of IQ Integration</u>	<u>To be verified by Inuit Committee</u>
<u>Management review</u>	<u>To be verified by Inuit Committee</u>

An important aspect of integrating IQ is validating such integration with Inuit. For this reason, only potential opportunities for IQ integration have been identified. A more fulsome effort to incorporate IQ into this draft plan will be undertaken in the future, based on feedback from the Inuit Committee (to be established) and a standing Baffinland-QIA Adaptive Management Working Group, and consistent with the Adaptive Management Plan (Baffinland, 2020).

2.5 PRINCIPLES OF ADAPTIVE MANAGEMENT

2.5.1 DEFINING THE ADAPTIVE MANAGEMENT PROCESS

Adaptive management is a planned and systematic process for continuously improving environmental management practices by learning about their outcomes (Canadian Environmental Assessment Agency, 2016). Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project.

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Baffinland has developed a draft Adaptive Management Plan (AMP) that provides the framework by which adaptive management is to be incorporated into Project operations (Baffinland, 2020). The Project-wide adaptive management process begins with a planning phase, followed by iterative phases of implementing and monitoring the actions included in the plan(s), evaluating the effectiveness of actions included in the plans based on results of monitoring and other feedback mechanisms, and adjusting management strategies and actions and responses based on monitoring. The cycle begins anew with implementation and monitoring of a revised plan, which integrates the outcomes of the previous cycle. This cycle can occur, in real-time or over an extended period according to the nature of the situation or area of focus. In this way, a properly designed and well-implemented adaptive management process progressively diminishes uncertainty, as management strategies and processes are refined throughout a project's operational lifecycle.

Longer term review of and response to monitoring data is addressed in the annual review of plan effectiveness in Section 11, which includes annual comparison of project effects against impact predictions made in the Final Environmental Impact Statement (FEIS; Baffinland, 2012) and the addendums (Baffinland 2013, 2018). The result of the annual reviews of environmental monitoring, management, and operational plans will be incorporated into this plan as closure objectives, indicators and thresholds are set.

Implementation of the AMP will be overseen by a Baffinland-QIA Adaptive Management Working Group. Ongoing inputs from the Inuit Stewardship Plan as well as Baffinland's ongoing project monitoring will also form the basis of amendments and refinements to the objectives, indicators, thresholds, and response requirements over time.

Section 2.4 of the AMP states that with the QIA's approval of Baffinland's AMP and management plans, that implementation of pre-determined responses to effects as described in the management plan does not require additional approval by the QIA. Baffinland will communicate response actions to QIA prior to implementation unless this is not possible due to the expediency required by the circumstance. If, however, a new response not previously considered is proposed, QIA approval will be sought.

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2.5.2.6 REGULATORY INSTRUMENTS FOR CLOSURE AND RECLAMATION

Baffinland is committed to, and will be responsible for, carrying out the closure and rehabilitation measures in a phased, ongoing (progressive) manner as reviewed and agreed with the Landlord, regulatory agencies and impacted communities.

This current revision of the ECRP has been developed as per the Type “B” Water License 2BE-MRY1421, in accordance with the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVWLB/AANDC, 2013)*; and the *Abandonment and Reclamation Policy for Inuit Owned Lands* (the Qikiqtani Inuit Association-Version 3.0).

Relevant policies, guidelines, and associated regulations that Baffinland will adhere to in the development of this and future revisions to the ECRP are outlined in Table 2.2, below.

Table 2.2: Applicable Mine Closure Planning Policies, Guidelines, and Lease Requirements

Title/Year/Agency
Project Certificate No.005 (with associated amendment), 2014, NIRB
Type B Water Licence 2BE-MRY1421
Commercial Lease No.: Q13C301, 2013, QIA
AANDC Land Lease 47H/16-1-2, 2014, CIRNAC
CIRNAC Land Use Permits N2019C0009 & N2019Q0011, 2019, CIRNAC
Guidelines for the Preparation of an Environmental Impact Statement for Baffinland Iron Mines Corporation's Mary River Project (NIRB File No. 08MN053), 2009, NIRB
Abandonment and Reclamation Policy for Inuit Owned Lands, Qikiqtani Inuit Association, Version 3.0. 2013, 2013, QIA
Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories, 2013, MVWLB/AANDC
Mine Site Reclamation Policy for Nunavut, 2002, AANDC
Guidelines for Abandonment and Restoration Planning for Mines in the Northwest Territories, 1990, Northwest Territories Water Board
NWT/Nunavut Mines Health and Safety Act and Regulations, 2005, Government of Nunavut

A Glossary of Terms, Acronyms and Abbreviations used throughout this document and the applicable guidelines and regulations can be found in Section 13. Refer to Section 12 for a concordance review of applicable requirements.

2.5.12.6.1 PROJECT UPDATES AND REPORTING

Since 2013, Baffinland has provided annual reports to the Nunavut Water Board (NWB) summarizing the site work completed, and the work planned for the following year. These reports also provide a synopsis of compliance performance with explorations licences, permits, approvals and commitments, and include

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the results of monitoring activities. An update on the existing environmental conditions and progressive reclamation activities are also contained in these reports. The reports are publicly available through the NWB registry. The results of the monitoring activities have an impact and influence on the goals, objectives, criteria, or strategy of the ECRP. They are also considered in future revisions of the ECRP.

Appendix C provides site photographs of current conditions onsite.

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3 PROJECT ENVIRONMENT

A summary description of the atmospheric, bio-physical terrestrial and socio-economic environments at the Project site locations are outlined in detail in the Mary River Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012). A comprehensive description of the baseline social, physical, biological and chemical conditions at the Project Location and impact area, with supporting documentation, are presented in Volumes 4 to 8 of the Mary River Project Final Environmental Impact statement (FEIS), and the ERP (Baffinland, 2013), available through the NIRB website as follows:

- Volume 4: Human Environment
- Volume 5: Atmospheric Environment
- Volume 6: Terrestrial Environment
- Volume 7: Freshwater Environment
- Volume 8: Marine Environment

3.1 PHYSICAL ENVIRONMENT

The Project is situated in the Northern Arctic Ecozone. The climate is semi-arid and permafrost coverage is continuous to a depth of 500 metres, with an active layer of up to two (2) metres. Extremely cold temperatures, combined with the permafrost, result in a short period of runoff that typically occurs from June to September. All rivers and creeks, except for the very largest systems, freeze during winter. Due to the combination of low temperatures and low infiltration, vegetative cover is minimal and surface water is abundant. The region is dotted with thousands of small lakes and streams.

The region experiences near 24-hour darkness with less than two hours of twilight from November to January. During the winter months, the treeless topography and fine powdery snow produce blowing snow conditions, resulting in restricted visibility. Frost-free conditions occur from late June to late August. There is continuous daylight from May to August. The months of July and August usually experience the greatest precipitation. From September to November, temperature and the number of daylight hours decrease, and by mid-October the mean daily temperature is generally well below 0°C. The highest snowfall typically occurs during this period.

Topography varies considerably across the Project area. The shoreline of Milne Inlet in the northern part of the Project area is situated on a relatively broad, deep and flat sand beach. Milne Inlet itself is enclosed by steep fiord walls measuring 60–600 m above sea level (asl). Moving inland, the Milne Inlet Tote Road follows the Phillip's Creek valley that starts near sea level at Milne Inlet and rises to 188 m asl at the Mine Site. Hills or mountains on both sides confine the Phillip's Creek valley. West of the Phillip's Creek Valley is mountainous terrain with some occurrence of glaciers.

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The Project is located in a zone of continuous permafrost which can extend to depths of several hundred metres. Cryosolic soils (i.e., those affected by permafrost-related processes) predominate. The active layer through the Project area typically ranges from approximately 1 to 2 m but may be greater in areas where there is loose, sandy soil at the edges of lakes or ponds and less in areas with a substantial surface layer of wet organics. Unfrozen taliks can exist within areas of continuous permafrost below lakes, under large rivers or near the coast.

The surficial geology of the area generally consists of locally abundant Holocene glacio-lacustrine sediments, alluvial sediments (alluvial deposits), marine and glacio-marine deltaic sediments and end moraine till, with occasional outcrops of pre-Quaternary bedrock and sedimentary rock formations. Figure 6-2-2 - Surficial Geology in the Regional Study Area (RSA) in Volume 6 of the Mary River FEIS shows the surficial geology of the Project area.

The North Baffin Island region and Mary River area lie within the Committee Belt, a granite-greenstone terrane mixed with rift basin sediments and volcanic rocks. The belt lies within the Churchill Province, extending from Baker Lake to Greenland, and is divided into five main assemblages: the Archean, the Mary River Group, the Piling Group, the Bylot Supergroup, and the Turner Cliffs-Ship Formation.

Groundwater flow in the Local Study Area (LSA) consists of seepage through unconsolidated materials within the active layer, which typically ranges from 1 to 2 m (up to 3 m) below surface. This groundwater reports to local surface drainages and lakes. The long period of sub-zero temperatures results in a very short runoff season, typically occurring from June through September. Runoff may extend to late October in systems with large lake components. A Baseline Hydrology Report for the Project is found in Appendix 7A, Volume 7 of the Mary River FEIS. The key findings within the Baseline Hydrology Report pertain to four main hydrometric parameters: timing of runoff, magnitude of runoff, spatial variability of timing and magnitude of runoff, and long-term runoff estimates. Runoff in the vicinity of the Mary River Project are characterised as follows:

- Streamflow typically commences in early to mid-June as temperatures climb above 0°C, and ends in late September to late October, depending upon watershed characteristics.
- The annual hydrograph is dominated by a nival (snowmelt) freshet, which occurs between late June and the end of July, followed by a period of low baseflows driven by permafrost melt and shallow subsurface flow. Baseflows are punctuated by precipitation events through July to early September.
- Precipitation runoff events are usually quite large and flows increase rapidly as interception, infiltration, and evapotranspiration are minimal due to shallow permafrost, cool temperatures and lack of vegetative cover.

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3.2 FRESHWATER ENVIRONMENT

There are two key fish species in the freshwater environment: Arctic char (*Salvelinus alpinus*) and a minnow species named nine-spine stickleback (*Pungitius pungitius*). While both are generally abundant and widespread in distribution, ninespine stickleback are absent from the freshwater lakes and streams that were surveyed near the Milne Inlet coast. As all streams with the possible exception of large rivers freeze solid in winter, lakes provide the only overwintering habitat for both species and spawning habitat for Arctic char across the study areas. Many streams provide rearing and foraging habitat and potential protection from predators for juvenile Arctic char. Most of the drainage basins that support Arctic char either contain barriers preventing anadromous migrations and/or are distant from the coast and most populations in the five study areas are land-locked. Nearshore zones of larger lakes also provide rearing and foraging habitat and potential protection from predators for juvenile Arctic char, foraging and, in some cases, spawning habitat for adult Arctic char, and overwintering habitat for all life stages. Arctic char feed primarily on benthic invertebrates, although cannibalism occurs in a small proportion of at least some populations.

3.3 TERRESTRIAL ENVIRONMENT

Existing knowledge of the North Baffin region with respect to vegetation describes the area as having a harsh climate, high winds and shallow soils result in sparse and dwarfed plant life. Herb- and lichen-dominated communities constitute the main vegetative cover. The latter is closely associated with the rock fields and hilly upland areas. Common herbs are purple saxifrage, mountain avens, and arctic poppy, often mixed with shrubs such as arctic willow. The size of shrubs decreases rapidly as one moves north. Vegetative cover tends to be greater on wetter sites confined to coastal lowlands, sheltered valleys and moist nutrient-rich corridors along streams and rivers.

A key terrestrial wildlife species (to both humans and within the broader ecology) is the North Baffin Island caribou. They currently occur in low densities and their abundance seems to be cyclical – harvest data and Inuit Qaujimajatuqangit (IQ – Inuit Knowledge) suggests a roughly 60 to 70-year cycle of abundance. The cyclical pattern of caribou abundance is similar to patterns described on Greenland and south Baffin Island. The cause of these changes in abundance is currently unknown. The last period of caribou abundance in the regional study area (RSA) was 1980 to 2000. According to IQ, and trail orientation and abundance, movement will predominantly be east-west and will occur within the southern half of the RSA. Caribou numbers are expected to gradually increase in the Mary River Region, but might not recover to historical highs until the 2050s. There is evidence that caribou occur, and have historically occurred, throughout the entire region and, therefore, use most of the RSA as some form of habitat. The most-used habitat is in the southern and central portion of the RSA, as indicated by caribou sign (bones, antlers, tracks, and trails) and IQ. Trails observed along the proposed railway alignment suggest that some areas are better for movement. Analyses of habitat use show a greater probability of caribou occurrence for some habitats during the calving, growing, and winter seasons, but the probability of occurrence of

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caribou is relatively equal in many locations throughout the Project area. The caribou that currently occupy the RSA are not migratory. The local caribou on average move less than 4 km per day during all seasons with very few focused directional movements and all movements were at the scale of tens of kilometres — most caribou remained within the areas they were collared. Additional details on Caribou populations are summarized in Section 5 and Appendix 6F- Terrestrial Baseline Report of the Mary River FEIS.

The Terrestrial baseline report found in Appendix 6F of the Mary River FEIS is the most extensive and thorough summary of north Baffin Island caribou currently in existence. It summarizes and synthesizes the history of government surveys, local harvest, IQ, habitat use, and terrestrial wildlife surveys funded by Baffinland, and is one of the most in-depth analyses of caribou habitat selection completed in Nunavut.

Field surveys in the Project Area documented 54 bird species within the marine and terrestrial RSAs, five of them Species at Risk listed by COSEWIC (2010) or SARA (Environment Canada, SARA 2010) as identified during the time of baseline programs, including Peregrine Falcon, Short-eared Owl (documented within the terrestrial RSA but showing no signs of nesting there), and Ivory Gull, Ross's Gull and Harlequin Duck (all detected within the marine RSA, but no nesting sites were located). One additional Species at Risk, the Red Knot, has the potential to be found within the Project Area, but was not detected during baseline surveys.

Staging and breeding areas are found in the Project Area for numerous species of birds including Snow Geese, Common and King Eiders, Brant, and Long-tailed Ducks, and include a known moulting area for Snow Geese prior to fall migration. Twenty-five species were confirmed to breed throughout the marine and terrestrial study area. No large, conspicuous seabird nesting colonies were recorded during Project surveys; however, several are known to exist within and adjacent to the marine RSA, particularly on Bylot Island, in Foxe Basin, and along Hudson Strait. Marine surveys did locate a large breeding colony of Snow Geese (>5,000 individuals) on the southwestern shores of Steensby Inlet.

IQ surveys conducted in the surrounding communities indicated that the marine and terrestrial habitat contains several areas that are used seasonally by large numbers of various bird species. Community Elders indicated that most bird species in the area are migratory and typically arrive in late-April, May, and June, and start leaving in August. Breeding occurs throughout the area: most of the islands within the RSA are used as nesting grounds by various species of seabirds, gulls, terns and waterfowl, and some large colonies of seabirds and gulls are known along cliff habitats. Species such as geese, eiders, loons and ducks can be found nesting along coastlines or inland along freshwater lakes. Fall migration occurs between early August to late October depending on the species and the sex. Some birds, such as Common Raven, ptarmigan, and sometimes Snowy Owl, winter in the area, and some seabirds, such as Black Guillemot, also remain in the area year-round using the open shore leads in the winter.

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Wolves and foxes are the dominant carnivores in the RSA and exist at low densities throughout the RSA. Very little information was collected on these midsize carnivores because they were so rarely observed. Fewer than 100 wolf and fox observations were recorded during extensive baseline surveys from 2006–2010. Information in published journal articles was supplemented with anecdotal and IQ information specific to the Project area for this baseline. Carnivore populations are tied to fluctuating prey densities (e.g., caribou and lemmings). Occurrence of carnivores might increase in the area if caribou populations return in large numbers. Additional details on midsize carnivores in the Project area can be found in Section 2.3, Appendix 6F-Terrestrial Wildlife Baseline Report of the Mary River Project FEIS.

Lemming and Arctic Hare, Lemmings are a key prey species in Arctic ecosystems. Their abundance affects the behaviour, habitat use, and population dynamics of carnivores such as Arctic fox, red fox, wolf, Snowy Owls, and falcons. Lemming populations are considered Secure in Nunavut. Populations typically undergo large regular fluctuations in population size (every three to four years). Refer to Section 2.3, Appendix 6 F of the Mary River Project FEIS, February 2012 Arctic hare are a lagomorph found in treeless regions across North America and Greenland. They are restricted to mountains, tundra, and coastal barrens due to their apparent inability to use food resources in forested areas). They may occur in groups of 10–60, or up to thousands on Arctic islands. The current population status of Arctic hare in Nunavut is classified as Secure by CESSC. In northern Baffin Island, Arctic hare are locally abundant. Additional details on small prey mammals in Baffin Island can be found in Section 2.3, Appendix 6F-Terrestrial Wildlife Baseline Report of the Mary River Project FEIS.

3.4 SOCIO-ECONOMIC ENVIRONMENT

The Inuit of the North Baffin region have experienced tremendous social and cultural change over the course of a few decades. Recent changes, particularly residential schools, have affected family integrity and by implication, social cohesion. Elders are becoming more engaged in community life and in the education of youth in traditional skills. At the same time, a shift toward Western middle-class expectations appears to be taking place among Inuit youth.

The land-based economy is a major part of the livelihoods of many residents of the North Baffin. Harvesting from the land and sea is estimated to produce food worth between \$12 million and \$20 million per year in this region. The amount of work to harvest this food is estimated to be similar to 350 full-time jobs.

In addition, residents of the region earn money through sales of arts and crafts, through employment, and from various government social programs such as Income Support. The personal income reported by residents of the five North Baffin communities amounted to \$83 million per year.

Residents' demand for wage employment is very high. People want to work, even when this work requires flying to remote locations. However, job opportunities in the North Baffin are limited. Inuit employment in North Baffin is characterized by many individuals earning small levels of income, well under what full-

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time work would pay, and a small number earning full-time, year-round incomes. Most residents working in full-time jobs in Iqaluit do so year-round. In North Baffin, many more full-time workers are engaged in these jobs for only short periods. Women who work full-time jobs in North Baffin are more likely to work year-round than are men.

Nunavut relies on federal transfer payments for at least 90 % of its revenue. Government employment is a mainstay of the wage economy, with many of Nunavut's small businesses and retail outlets established to support government needs or those of public servants. The public sector accounts for a large portion of Nunavut's economic activity. Government jobs in administration, education, and health account for about half of all employment earnings in the territory. Construction has been growing as government infrastructure has been established.

These communities have a subsistence economy and have experienced dramatic population growth over the last 20 years. Over 70 % of the population is under 25. Underemployment and lack of opportunities is causing social stress. Community Elders recognize that the communities must position themselves to enter the wage economy.

For many North Baffin households, harvest of country food provides an important contribution to overall well-being. In all five communities, caribou, ringed seal, and Arctic char are of major importance. In addition, walrus is a major species of importance in Hall Beach and Igloodik, while narwhal is a key component of the harvest among households in Arctic Bay, Pond Inlet and, to a lesser degree, Clyde River.

3.4.1 NEARBY COMMUNITIES

There are five communities of north Baffin Island in the immediate vicinity of the Project, which have existing and historical socio-economic and/or ecosystemic ties to the Project area, and for which the Project has a direct effect on the traditional land use of their residents. Listed in alphabetical order, these communities (known as Category 1 communities in literature as they are closest to the Project) include Arctic Bay, Clyde River, Hall Beach, Igloodik, and Pond Inlet. The ties of these individual communities to the Project are described in more detail:

Arctic Bay is located on northern Baffin Island, 280 km northwest of the Mary River site. Harvest and land use patterns indicate that the effect of Project activities on these current patterns of Arctic Bay residents is less than what it would have been historically. Arctic Bay residents might use the Milne Inlet, Eclipse Sound, and Mary River areas for hunting on a sporadic or occasional basis but other geographic areas are more important to this community's land use.

Clyde River is located in northeastern Baffin Island, 415 km from the Project area. Historical land use information and discussions with Elders from various communities suggest that the people of the Clyde River area used to travel inland from Cambridge Fiord facing Baffin Bay, into the Raven River area east of Angajurjualuk Lake and southeast of Mary River. Harvest patterns suggest that contemporary land use

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activities are now concentrated closer to the community, however, historical ties to the Mary River area resulted in the inclusion of this community in the study area.

Hall Beach is located on the mainland just south of Igloolik, 192 km from the Steensby Port site and 288 km southwest of the Mary River site. Hall Beach harvest patterns are distinct from Igloolik despite their proximity, with a concentration of marine harvesting centred on the Hall Beach area. Some hunting occurs on Baffin Island intermixed with Igloolik hunting, including in and around Rowley and Koch islands and Steensby Inlet; thus, the Project shipping route through this area could have both land use and ecosystemic effects on the community.

Igloolik is located on the mainland but is the closest community to the Steensby Port site (155 km) and second-closest geographically to the Mary River Project site (230 km). Historically, Igloolik spent the summer hunting caribou along the western side of North and Central Baffin Island. Current harvest patterns show that while Igloolik use the Baffin coast and marine areas at the mouth of Steensby Inlet, their activities are heavily concentrated around the community on Melville Peninsula and the closest Baffin Island shoreline to the north. Igloolik still hunt around Rowley and Koch islands and even in Steensby Inlet; thus, the Project shipping route through this area could have both land use and ecosystemic effects on the community.

Pond Inlet is geographically the closest community to the Mary River mine site, located approximately 160 km northeast of Mary River. Pond Inlet relies on hunting in the marine environment of Eclipse Sound and Milne Inlet as well as caribou hunting through the Mary River area. As such, Pond Inlet has the closest land use, historical, and ecosystemic ties to the Mary River area. Details on the socioeconomic environment surrounding the Project area are described in detail in Volume 4 of the Mary River Project FEIS, February 2012.

3.4.2 TRADITIONAL LAND USE

Human habitation of the region extends back at least 4,000 years. The historic period of a region is defined as that point where human activities are documented in written record.

The historic period of the North Baffin region begins in the late 16th century with the first European whaling and exploration in areas adjacent to Baffin Bay. Two ships that over-wintered in the Igloolik in 1822 and 1823 provide the first record of Euro-Canadian exploration in the Foxe Basin area. The Hudson Bay Company, the Royal Canadian Mounted Police, and the church established themselves at different times in the vicinity of each of the existing communities, as early as 1921). The establishment of these institutions, as with the whalers before, influenced land use and settlement patterns through the mid-twentieth century. The establishment of DEW-line sites in Foxe Basin also influenced land use patterns, with Inuit settling near the DEW-line sites seeking part time employment and for trade. Traditional land use patterns changed substantially with the movement of the Inuit into permanent settlements as a result of federal policy and housing initiatives in the 1950s Contemporary Inuit land use was determined through

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consideration of the Nunavut Wildlife Harvest Study interviews and discussions with local communities, and the results of the MRIKS. Connection with the land continues to be an important aspect of Inuit life and is evident in current land use patterns. Although Inuit now live in permanent settlements, travel and camping continue to be important aspects of Inuit life. Travel routes have been identified linking all the communities of north Baffin Island (Clyde River, Pond Inlet, Arctic Bay, Igloolik, and Hall Beach). Travel is an important land use practice of the Inuit as it enables the development of connections to the land, enables individuals to meet with family and friends from other communities, and enables hunting and gathering. For additional and a through breakdown of land use areas surrounding the project information refer to Figures 3.13 – Travel Routes – North Baffin Region (workshop results) and Figure 3.14 – Travel Route – North Baffin Region (interview results) from Appendix 4C – Land Use Report, Volume 4 of the Mary River Project FEIS.

Contemporary harvesting activities on North Baffin include wildlife hunting, marine mammal hunting, freshwater and marine fishing, berry picking, egg gathering, sea resource harvesting, and land resource harvesting such as soapstone. See the following figures from Appendix 4C – Land Use Report, Volume 4 of the Mary River Project FEIS for geographical representation of identified areas where harvesting activities occur:

- Figure 3.4 - Hall Beach/Igloolik Harvest Locations (Pre-1965)
- Figure 3.5 - Hall Beach/Igloolik Harvest Locations (1965-1974)
- Figure 3.6 - Arctic Bay/Pond Inlet Harvest Patterns (pre-1959)
- Figure 3.7 - Arctic Bay/Pond Inlet Harvest Locations (1959-1964)
- Figure 3.8 - Land Use information from DIAND (1982B) (showing Inuit land use by marine and terrestrial animal activity)
- Figure 3.9 - Wildlife distribution
- Figure 3.10 - Approximate Camp Areas (1930 - 1966)
- Figure 3.19 - Berry Picking Locations - North Baffin Region (workshop results)
- Figure 3.22 - Ocean Resource Collection Areas - North Baffin Region (workshop results)
- Figure 3.31 - Reported Caribou harvest locations in North Baffin (1996 - 2001)
- Figure 3.33 - Reported marine mammal harvest locations on North Baffin (1996 - 2001)
- Figure 3.35 - Reported waterfowl and egg harvest locations in North Baffin (1996 - 2001)
- Figure 3.37 - Reported Fish Harvest Locations in North Baffin (1996 - 2001)
- Figure 4.2 - DFO Arctic Char Commercial Fishing Quotas for North Baffin Rivers

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3.4.2.1 LAND FAST ICE

Ice is an important component of land use activities, as much of the travel engaged in by residents is on land fast ice. Land fast ice is often used to reduce travel time and to access the floe edge for hunting purposes. For more information refer to Figures 3.13 – Travel Routes – North Baffin Region (Workshop Results); Figure 3.14 Travel Routes – North Baffin Region (interview results); and Figure 3.24 – Sea Ice Conditions – North Baffin from Appendix 4C – Land Use Report, Volume 4 of the Mary River Project FEIS.

Recreational Land includes several parks in the vicinity of the Project. Sirmilik National Park of Canada, established in 2001, is one of Canada’s newest national parks and covers a considerable landmass with four separate land parcels. The Bylot Island Bird Sanctuary is located within Sirmilik National Park, affording it overlapping legal protection and restrictions on land use. Tamaarvik Territorial Park, located adjacent to the community of Pond Inlet and Little Salmon River, is a relatively small park used mainly for camping. See Figure 7.1 – Parks and Conservation Areas from Appendix 4C – Land Use Report, Volume 4 of the Mary River Project FEIS for location of the parks relative to the Project.

Local outfitting resources are available in local communities for tourism activities such as kayaking, nature viewing and polar bear hunting. Cruise ships visit the North Baffin region each summer, specifically the region around Bylot Island and Sirmilik National Park.

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4 PROJECT INFORMATION

4.1 PROPONENT NAME AND ADDRESS

The proponent of the Mary River Exploration Project Closure and Reclamation Plan is:

Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3
Tel: (416) 364-8820 Fax: (416) 364-0193

4.2 PROJECT HISTORY

The Mary River iron ore deposits were originally discovered in 1962 by Murray Watts of British Ungava Explorations Limited (Brunex). Brunex staked ten claim groups in the Project area, including the Mary claims which cover the areas now known as Deposit No. 1. The private company Baffinland Iron Mines Ltd. (BIML) was established in 1963 by the financial participants and prospectors of the Brunex group to hold the Mary River claims and leases and to develop the prospects.

BIML undertook an exploration program from 1963 through 1966, with most of the field work carried out in the summers of 1964 and 1965. This work included the establishment of a 100 km tote road between Milne Inlet and the Mary River camp, and construction of gravel airstrips near the Mary River camp, at Milne Inlet, and a tundra strip at Katiktok Lake about 40 km northwest of Mary River and near Deposit No. 4. Apart from the required land surveys, some metallurgical test work, and re-examinations of project economics, no additional fieldwork was undertaken between 1965 and 2004.

In 2002, BIML interests were acquired by Baffinland, with the purpose of revitalizing the Project. The current Baffinland Iron Mines Corporation was formed in early 2004, which now holds exclusive rights to the ore deposits at Mary River. Continuous contemporary exploration work began in 2004. In 2007, a 250,000 tonne bulk sample program was approved by the Nunavut Impact Review Board, and a Memorandum of Understanding was signed with Nunavut Tunngavik Inc. to gain mineral rights over 16,695 ha surrounding Deposits No. 1, 2 and 3. In addition an agreement was signed with Fednav to develop and deliver shipping solutions for the Project and letters of intent for the future sale of iron ore were signed with 3 steel companies (Thyssen Krupp, Salzgitter and Voestalpine). A further agreement for future sale of the iron ore was signed with ROGESA Roheisengesellschaft Saar mbH ("ROGESA"), a pig iron producing company, in 2008.

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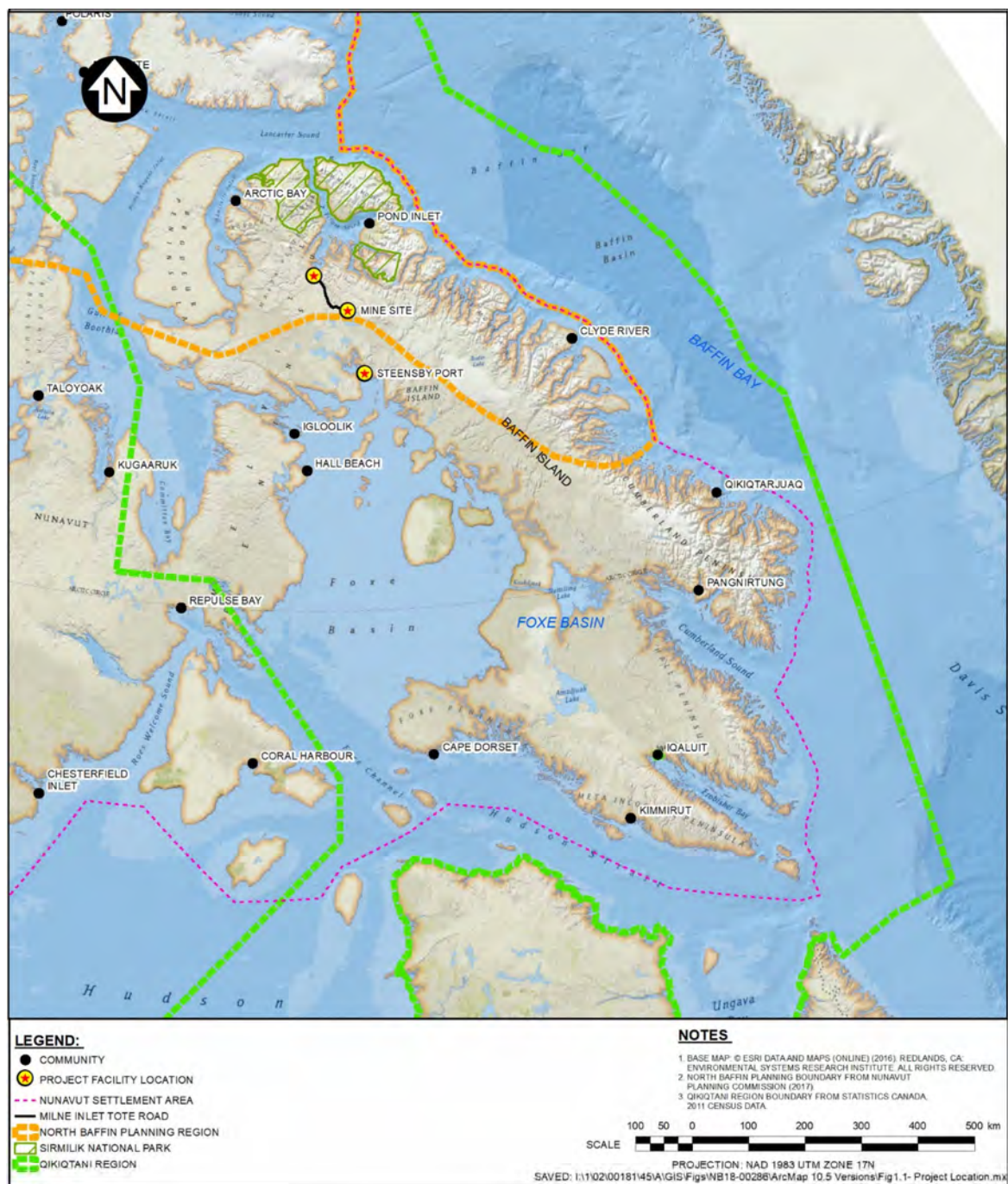


Figure 4.1 Site Location Map

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The year 2008 also saw the completion of a drill program focused on geotechnical, exploration and geomechanical work, as well as further investigations at the Milne Inlet and Steensby Port sites and along the Railway. In addition, a bulk sampling program was undertaken to extract, transport and ship ore for testing in Europe. The results were used to prepare a definitive feasibility study, which found ‘excessively robust economics’ for a Project based on 18 Mtpa of iron ore production (Baffinland press release, February 23, 2009). In March 2008, the Company submitted a Development Proposal and associated initial permit applications in order to initiate the regulatory review of a Project based on currently defined iron ore reserves. In January 2011, Baffinland submitted a Draft Environmental Impact Statement (DEIS) for stakeholder comment and review. In February 2012, Baffinland submitted the FEIS in support of the development of the Project.

The FEIS included the construction, operation, closure and post-closure activities associated with the mine and its related infrastructures, the construction of a 150 km railway to link the Mine Site to a new port facility at Steensby Inlet, and the construction of the Steensby port. On January 13, 2013, Baffinland informed the NIRB that, due to various business drivers, Baffinland was proposing to make changes to the schedule and specific activities in the initial stages of the development associated with the original Mary River Project (File No. 08MN053). Baffinland noted it understood that the request would potentially necessitate a reconsideration of the Terms and Conditions contained within Project Certificate No. 005 as issued by the NIRB on December 28, 2012 for the Mary River Project.

The changes consisted of the re-introduction of shipment of up to 4.2 Mtpa ore via Milne Port, road transport of ore from the Mine Site to Milne Port via the Tote Road, and the deferral of the full-scale development of the original Project (18 Mtpa production, with railway link to Steensby Port and the development of Steensby Port). This phase was termed ‘the Early Revenue Phase’. Baffinland received NIRB approval for the ERP amending the Project Certificate in May 2014. The amended Project Certificate allows for the future development of the 18 Mtpa railway operation, for a total combined production rate of 22.2 Mtpa. In 2015, the Type A Water Licence 2AM-MRY 1325 was successfully amended to account for activities approved for the ERP in 2014. In 2018, Baffinland sought an increase to the production volume to be shipped via Milne Inlet to 6 Mtpa, and an Amendment to the Project Certificate was issued. The Project is currently working toward the 6 Mtpa production rate via Milne Port associated with the ERP. Exploration activities have focused on continued characterization of Deposits 2 and 3 at the Mine Site, as well as survey and evaluation of other prospects in the region.

4.3 SITE GEOLOGY

4.3.1 REGIONAL GEOLOGY

The North Baffin Island region and Mary River area lie within the Committee Belt, a granite-greenstone terrane mixed with rift basin sediments and volcanic rocks. The belt lies within the Churchill Province, extending from Baker Lake to Greenland, and is divided into five main assemblages: the Archean, the Mary

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River Group, the Piling Group, the Bylot Supergroup, and the Turner Cliffs-Ship Formation (Aker Kvaerner, 2008).

The Mary River iron deposits are located within the Mary River Group, an assemblage of Late-Archean (2.76 to 2.72 Ga) metasedimentary to metavolcanic rocks that have been folded and preserved in greenstone belts (Aker Kvaerner, 2008). The Mary River Group greenstone belts are present as fragmented remnants stretching from Bylot Island south to Ege Bay, with a maximum thickness of 4,000 m. Primary sequences within the Group consist of a lower series of metavolcanic rocks and an upper series of turbidite pelitic-greywacke; the stratigraphic position of iron formation, quartzite, conglomerate, minor marble, and volcanic breccia units within the belts, which varies across the region. The Mary River Group is part of the regional Committee Belt, an Archean-aged (2.9 to 2.5 Ga) assemblage of granite-greenstone terranes, granitic migmatites gneissic granitic intrusions, and clastic and carbonate sedimentary units reworked during the Paleo-Proterozoic (2.5 to 1.6 Ga).

4.3.2 IRON ORE DEPOSIT GEOLOGY

Iron formations occur in varying thicknesses discontinuously within the Mary River Group metasedimentary units but are typically not present in economically extractable thicknesses or configurations except in the Mine Site area. The high-grade iron ore at Deposits No. 1, 2, 3 and 4 were discovered in 1962, and these initial hematite-magnetite mineralized zones were mapped within extensive belts of banded iron formation in the area over the next three years. Deposit No. 5 was discovered and surface mapped in 2009. The deposits are characterized by zones of massive layered to brecciated hematite to magnetite, variably intermixed with banded oxide to silicate facies iron formation. As typified at Deposit No. 1, the high-grade iron formations are interlayered with thin bands of chlorite-actinolite schist, staurolite-garnet-mica schist, amphibolite, and banded iron formation across their strike width, with the entire assemblage up to 400m thick.

The Mary River iron deposits are considered to belong to an Algoma-type iron formation (Aker Kvaerner, 2008) formed in a volcanic ark setting in an extensional or rift basin during the Archean. Algoma-type deposits are typically characterized by a lower series of volcanics followed by banded iron formation and/or interlayered to pure iron oxides of variable and potentially substantial thickness, in turn overlain by volcanics and volcanoclastic sediments (Gross, 1996).

4.3.3 GEOTECHNICAL OVERVIEW

4.3.3.1 MILNE PORT

The Milne Port area consists of a series of variably dipping, dissected terraces sloping towards the waters of Milne Inlet. The surficial deposits are marine and glacial marine sediments, ranging from coarse beach sediments (gravel and sand) to finer deltaic sediments (clay, silt, sand and gravel) to even finer deep water periglacial silt veneers (silt, clay and fine sand). The soils in the area are often covered by a thin layer of organics at the ground surface. The soils were noted to typically be frozen below 2 m depth and contain

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ice lenses (Mary River Project FEIS 2.1.3.1). Offshore drilling encountered loose to compact silty sand underlain by sand containing varying amount of gravel and cobbles.

4.3.3.2 TOTE ROAD

The Tote Road generally follows a glacial valley, oriented northwest-southeast to the Mine Site. The surficial deposits along this alignment generally include the following materials:

- Till deposits: veneer (up to 2 m thick) or blanket (up to 10 m thick) with drumlins and moraines (in places);
- Glaciofluvial sediments: outwash gravel and sand forming braided floodplains, terraces and fans or stratified glacial drift (gravel and sand);
- Limited bedrock exposure: especially nearer to the Mine Site/Deposit No. 1 area; and
- Mary River flows across the glacial valley to the southeast of the Mine Site, and several thaw lakes and thermokarst depressions are located along the valley floor.

4.3.3.3 MINE SITE

Deposit No. 1 is located along the top and margins of a bedrock hill on the north side of the valley, while the waste rock piles will be located along the west-facing and east-facing side slopes of the hill. Bedrock is exposed at the apex of the deposit with talus present on the upper slopes. The mid slopes on the east side of the deposit comprise up to 50 m (vertical depth) of glacial till, tapering out to near surface bedrock at the base of the slope. The till on the north and west side of deposit is shallower, in the 10 to 15 m range. The till around Deposit No. 1 is typically dominated by boulders, cobbles, gravel and trace to some organics and a moderately thick, wet organic layer is present over the majority of this upper area. The overburden materials are considered to be very ice-rich based on-site investigations, observations from bulk sample road construction and general understanding of the deposit.

Other Project-related infrastructure in the Mine Site area will be located on areas of glaciofluvial terrace along the valley floor directly south and southwest of Deposit No. 1. In addition to the glaciofluvial deposits, there appears to be some direct glacial deposition in and around the south-eastern portion of Sheardown Lake. Overburden depths over the majority of the valley floor are typically noted to be in the 10 to 20 m thickness ranges. Based on the investigations and surficial features in and around these deposits, evidence of ice-rich areas and localized massive ice bodies are present, particularly in the vicinity of the existing airstrip areas. A thin organic layer is present in some areas, over the till, in depressions and at the base of some slopes.

Underlying the glaciofluvial materials southwest of the deposit in the valley floor is weak, unconsolidated sandstone; gneissic bedrock to the south, west and north of Deposit No. 1; and amphibolite schists to the east. Often, the upper horizon of the bedrock is highly fractured and often contains ice lenses and/or infilling in the joints.

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4.4 PROJECT SUMMARY

A summary of activities associated with the Mary River Exploration Project is provided below along with a location drawing, Figure 4.2, for the primary project sites associated with the Mary River Project. In addition to these primary sites, up to seven (7) satellite camps may be established in support of exploration activities at locations shown in **Error! Reference source not found..** Each satellite camp will be temporary in nature and will be limited to a maximum capacity of 49 persons. The Mary River Exploration Project is limited to exploration-related activities and associated camp operation. Exploration-related activities specifically include the following tasks:

- Land-based and on-ice mineral drilling.
- Mapping.
- Sampling.
- Drill core storage.
- Disposal of drilling mud.
- Geophysical and geochemical surveys.
- Mechanical trenching and stripping of surficial overburden.
- Activities to support of scientific and engineering studies to advance the Mary River Project including geotechnical investigation and geotechnical drilling.
- Progressive reclamation programs.
- Fuel storage.
- Camp operation.
- Equipment, personnel and supply transport.



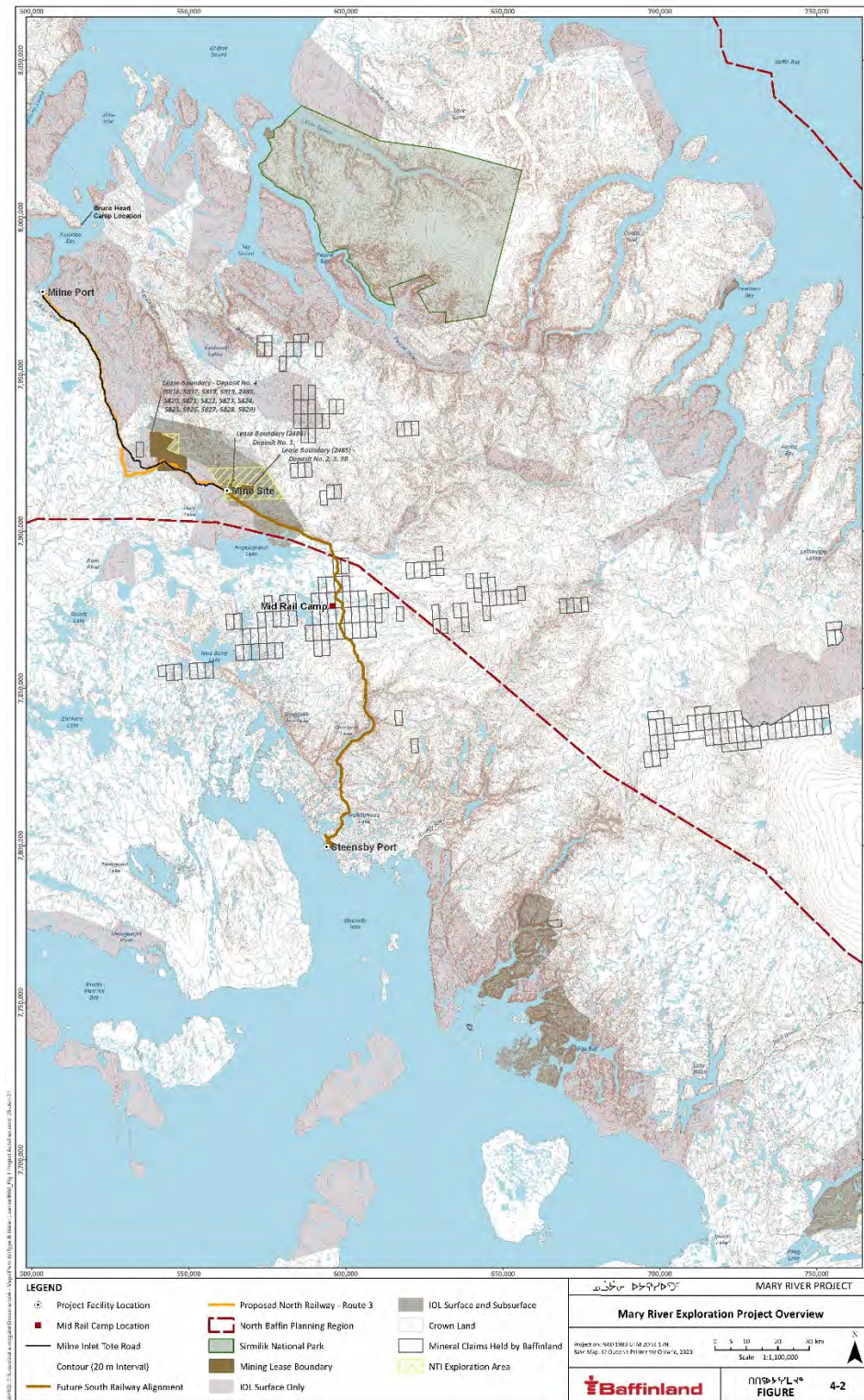
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Figure 4.2 **Relative Location of Project Areas**

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4.4.1 INUIT OWNED LANDS

The Inuit Owned Lands (IOL) surrounding the Project area are shown on Figure 4.2. The Commercial Lease, No. Q13C301, to the Project is held by Baffinland and is leased from the Qikiqtani Inuit Association (QIA). In accordance with this and any future surface leases held with the QIA, this ECRP incorporates the guidelines developed for the Qikiqtani lands entitled the Abandonment and Reclamation (A&R) Policy for Inuit Owned Lands (Version 3.0, QIA 2013). The guiding principles of the A&R Policy require that all disturbed IOL be returned to a safe and stable condition capable of supporting human and wildlife needs consistent to social and cultural needs of the Inuit for the undisturbed lands within that area.

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5 PERMANENT CLOSURE AND RECLAMATION

5.1 DEFINITION OF PERMANENT CLOSURE AND RECLAMATION

Permanent closure is defined in the MVLWB Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (MVLWB/AANDC 2013) as follows:

“Permanent closure is the final closure of a mine site with no foreseeable intent by the existing proponent to return to either active exploration or mining.”

Reclamation is defined in the MVLWB Guidelines as follows:

“The process of returning a disturbed site to its natural state or which prepares it for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety.”

Baffinland acknowledges that due to various economic drivers (commodity prices, annual exploration program planning, extended maintenance shutdown, others), Baffinland may enter into a temporary or permanent closure scenario. For planning purposes, Baffinland defines two types of temporary closure as follows:

- **Short-term Closure (described in Sections 7.1):** Cease exploration for a period of up to one (1) year while maintaining all equipment and facilities in a state of readiness to resume operation with minimal delay or have project components at the ready for use to support closure activities. Generally, this occurs on an annual basis during winter months.
- **Long-term Closure (described in Section 02):** Extension of a short-term closure to over (1) year for an indefinite period while all exploration sites are maintained in a secure condition and all facilities and equipment are de-energized and winterized until the operation resumes or the site is reclaimed as part of permanent closure.

Consideration of future land use is an important closure principle in the continuous refinement of this ECRP. To date, future land use has been considered in numerous aspects of the planning, such as:

- Adopting environmental management best practices during exploration to reduce impacts where possible;
- Various planned reclamation activities which are not required to establish physical and chemical stability, such as:
 - Scarification to promote natural revegetation
 - Removal of above-grade buildings

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Moving forward Baffinland will seek further input from communities and land owners on potential closure options that promote the desired post-closure land use. Feedback via engagement activities will be compiled and considered through the engagement on the Interim Closure and Reclamation Plan for the Mary River Project (BAF-PH1-830-P16-0012). Baffinland has committed to several closure objectives focusing on land use, which are presented in Table 5.1.

5.1.1 CLOSURE OBJECTIVES AND CRITERIA

A description of the closure criteria and applicable monitoring program that is proposed to be implemented to confirm that the objectives were met for each Project component is summarized in Table 5.1 for permanent and temporary closure. These closure objectives, criteria and monitoring outlined here are consistent with the Interim Closure and Reclamation Plan for the Mary River Project (BAF-PH1-P16-0012) and Baffinland's commitment to reclamation as a whole. Monitoring programs outlined here are discussed in more detail in the Interim Closure and Reclamation Plan.

Table 5.1: Exploration Closure Objectives, Criteria and Actions

Project Component	Closure Objectives	Closure Criteria	Actions/Measurements
Site Wide ²	Drainage pathways for surface runoff are physically stable to limit risk to humans and receiving environment ¹ .	Drainage pathways will be designed by a professional engineer for long-term stability to mitigate against erosion. No significant signs of deformation, degradation and/or erosion and sedimentation which could contribute to physically unstable conditions as visually observed during geotechnical inspections by a qualified professional engineer. Inspection criteria and schedule will be refined based on the final engineering designs for site grading and specific engineered drainage controls.	Geotechnical assessment, analysis and/or monitoring of the drainage pathways where required will occur as part of the Geotechnical/Engineering Monitoring Program (Section 9). Surface water quality monitoring will be completed post-closure at applicable drainage pathways to ensure all relevant closure objectives and criteria have been met. See closure objective relating to Site Wide Surface Water.
	Exploration areas are physically stable for use by humans and receiving environment ¹ .	No significant signs of deformation or degradation at remaining structures and/or other disturbed areas which could contribute to physically unstable conditions. This will be confirmed by visual monitoring as part of site geotechnical inspections.	Geotechnical assessment, analysis and/or monitoring of the exploration camp areas, where required, will occur as part of the Geotechnical/Engineering Monitoring Program (Section 9). Monitoring scope and duration will be informed by operational performance results where possible, and detailed in the final grading and engineering designs for remaining structures.
	Surface water runoff and seepage that is safe for humans and the receiving environment ¹ .	Closure water quality meets Type B Water Licence effluent criteria, territorial/federal guidelines, and/or site-specific risk-based criteria, as relevant to the specific exploration areas and components. Criteria will be refined based on water quality monitoring results during operations and research studies.	Monitoring activities as part of the Closure and Post-Closure Monitoring and Reporting Program. Specific testing parameters, frequencies, locations and program durations will be refined over time based on locations of exploration camp(s), findings of operational monitoring programs and research studies.
	Remaining area will be safe for humans and the receiving environment ¹ .	No buildings or equipment remain above surface grade following final closure. Areas with risk to humans, terrestrial wildlife and/or aquatic biota will be managed to reduce hazards to an acceptable level.	Geotechnical assessment, analysis and/or monitoring of the exploration camp areas will occur as part of the Geotechnical/Engineering Monitoring Program (Section 9). Final inspection by a qualified professional³ and representative of Designated Inuit Organization.
	Area facilitates the desired wildlife movement	To the extent possible, disturbed areas to be scarified to promote natural revegetation. Use of the exploration camp sites by wildlife (i.e. birds, mammals) will be consistent with FEIS, or updated predictions. Current residual effect predictions for individual wildlife and specific site areas are presented in Appendix G.	Geotechnical assessment, analysis and/or monitoring of the mine areas will occur as part of the Geotechnical/Engineering Monitoring Program (Section 9). T2 Final inspection by a qualified professional³ and representative of Designated Inuit Organization. Post closure flora and fauna monitoring (Section 9) will address selected metrics to assess wildlife presence and use in comparison with FEIS or updated impact predictions.

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Project Component	Closure Objectives	Closure Criteria	Actions/Measurements
	Natural revegetation is promoted	Grading and scarification completed to promote natural revegetation over long timelines, but specific criteria or goals for vegetation growth post-closure are not planned.	Final inspection by a qualified professional ³ and representative of Designated Inuit Organization.
	Aesthetic conditions of the project areas are similar to surrounding natural conditions	No visible buildings, equipment, or non-local materials. This excludes structures remaining at, and below grade (i.e. concrete foundations) and those which stakeholders have agreed should remain post closure. Criteria may be refined through on-going engagement.	Final inspection by a qualified professional ³ and representative of Designated Inuit Organization.
Exploration Camps Subcomponents: - Buildings and Equipment - Camp Infrastructure (e.g. pads and laydowns, secondary roads) - Fuel Storage areas - Waste Management Areas (e.g. hazardous waste containment, sumps) - Water Management Areas (water treatment systems)	Physically stable disturbed areas to limit risk of failure that would impact humans and receiving environment ¹	No significant signs of deformation or degradation at remaining engineered structures (if any) and/or other disturbed which could contribute to physically unstable conditions. This will be confirmed by visual monitoring as part of site geotechnical inspections.	Geotechnical assessment, analysis and/or monitoring of the exploration camp infrastructure and ancillary areas will occur as part of the Geotechnical/Engineering Monitoring Program (Section 9).
	Chemically stable disturbed areas to limit risk impact to humans and receiving environment ¹	Chemical contaminant sources are removed from site. Residual soils meet federal/territorial soil quality guidelines or site-specific risk based criteria as required (CCME agricultural is assumed at this time). If soil exceeds the adopted criteria, it will be removed or risk managed to the satisfaction of a qualified professional ³ to achieve protection of ecological and human health.	Post Closure Site Assessment will include an ESA component at potentially impacted areas (e.g. equipment and fuel storage areas). If required, HHERA would also be undertaken. Monitoring activities as part of the Closure and Post Closure Monitoring Program. Specific testing parameters, frequencies, locations and program durations will be refined over time based locations of exploration camps, and on findings of operational monitoring programs and research studies.

Notes:

¹Receiving Environment – includes aquatic (freshwater and marine) biota and terrestrial biota.

²Site Wide project component – Discussion under this heading includes all exploration areas.

³Qualified Professional assumes a minimum of 3 years experience in the relevant field.

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5.2 PERMANENT CLOSURE AND RECLAMATION REQUIREMENTS

The closure and reclamation approach for the Project was developed on the following basis:

- MVLWB/AANDC Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the NWT (MVLWB/AANDC, 2013); and
- QIA Abandonment and Reclamation Policy for Inuit Owned Lands (2013).

It adheres to generally-accepted rehabilitation criteria and focuses on both physical and chemical stabilization of the site. Land disturbances not needed to support active operations will be concurrently reclaimed.

The main work items for final mine closure and reclamation include:

- Demolition and removal of all buildings and ancillary camp infrastructure.
- Demobilization of equipment and materials to the Mary River Project Mine Site and/or Milne Port, where they may be transported off Site or repurposed.
- All hazardous materials and wastes will be removed from exploration areas to the Mary River Mine site and/or Milne Port and transported to licensed disposal facilities.
- All non-hazardous wastes will be removed from exploration areas to the Mary River Mine site and/or Milne Port for disposal in the on-Site landfills or transportation to off-Site disposal facilities.
- Scarification of disturbed areas of former camp and exploration infrastructure to encourage natural revegetation.

Planned closure activities will involve dismantling of camps and transport of materials and equipment via helicopter or overland by cat train during the late winter period to Mary River Site, Milne Port or Steensby Port for appropriate disposal at a licensed facility. Equipment and materials located at Mary River Exploration Project sites may have residual value for either re-sale or relocation to another exploration site. If the camp were to be relocated to another exploration site, it is possible that some or all of the equipment could be airlifted from a site directly to the new site. Materials or equipment may also be donated to local communities as appropriate.

The following summarizes the final closure activities with respect to the various components:

5.2.1 BUILDINGS AND CAMP INFRASTRUCTURE

- All tents and camp facilities (i.e., kitchens, showers, eating areas, etc.) will be dismantled and removed from site.
- Most materials related to camp facilities will have residual value for either re-sale or relocation to another exploration site. If not relocated to another exploration site, tent facilities will be transported

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overland or via helicopter to Milne Port, Mary River Mine Site or Steensby Port for shipment off-site or appropriate disposal at a licensed facility on-site.

- Wood structures like the dining hall, outhouse, dry, tent wood floors, bunk beds and table will be dismantled and wherever possible the wood will be salvaged for re-use; otherwise, it will be incinerated or open burned on-site if suitable. In the event that wood cannot be salvage or burned on-site, it will be sent to Milne Port, Mary Rive Mine Site or Steensby Port for disposal or shipment off-site.
- Fuel storage, hoses and filters associated with the diesel generator will be drained and managed as hazardous waste. The generator will be prepared for travel, transported to Milne Port or Steensby Port for disposal or shipment off-site.
- The water supply system (tank and lines) will be drained, and the water pump, intake and water lines will be removed from site.

5.2.2 EQUIPMENT

- Equipment such as the skid-steers and zoom boom will be used in closure and reclamation activities.
- Currently there is a sewage treatment system at Steensby Port that is still containerized and not in operation. In the event of final closure, this equipment will be transported off-site as per the manufacturer's specifications (as applicable) and within a manner that meets closure objectives. This sewage treatment system will be operated only under full development of the Mary River Project at Steensby Port and therefore its operation is subject to separate authorizations from the Mary River Exploration Project.

5.2.3 FUEL, FUEL STORAGE FACILITIES AND CONTAMINATED SOILS

- Drums of fuel will be consolidated, inspected and securely sealed.
- Any open drums of diesel, off-specification fuel as well as waste oil will be used in the camp incinerator (if available) or will be consolidated and transported off-site.
- Sealed fuel containers will be sold, relocated to another exploration site, provided to the Mary River Project, or provided to other users in the region, such as Pond Inlet.
- Any waste or contaminated fuel will be sent either to Milne Port or Steensby Port for disposal offsite at a licensed facility.
- Empty fuel drums and cylinders will be transported by sealift and returned to the vendor or disposed of at licensed disposal facilities.
- Fuel storage facilities consist of lined containment areas. The bedding inside the liner will be tested for petroleum hydrocarbons before being removed. Liners will be disposed of off-site at an approved facility. Soil beneath the lined areas and any other soils suspected of petroleum hydrocarbon contamination will be tested.

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- Any contaminated soils will be excavated using the skid steers and will be removed off-site in tote bags for disposal. It is expected contaminated soils will be bioremediated within the landfarm located at Milne Port or alternatively, sent via sealift to an approved facility for disposal³.

5.2.4 CHEMICALS

- Any calcium chloride on-site will be transported off-site to the calcium chloride storage area at Mary River Project sites or southern facilities for salvage or disposal.
- All other chemicals, such as lubricants and cleaning supplies, will be placed in a sea container and will be transported off-site for either re-use or disposal.

5.2.5 WASTES

- Grey water sump(s) used at remote camps will be abandoned in-place.
- Backfill and restore all sumps to the pre-existing natural contours of the land.
- Suitable wood will be open burned.
- All remaining wastes will be transported to Milne Port, the Mine Site or Steensby Port for disposal or shipment off-site.

5.2.6 RESTORATION OF OTHER DISTURBED AREAS AND DRILL HOLES

- All disturbed surfaces will be prepared by ripping, grading, or scarifying the surface to conform to the natural topography.
- No final closure and reclamation activities are required for drill holes as these are restored to natural conditions immediately upon completion of drilling.

³ Soil shall be reclaimed to meet objectives as outlined in the Government of Nunavut's Environmental Guideline for Site Remediation (2010). The use of reclaimed soils for the purpose of backfill or general site grading may be carried out only upon consultation and approval by the Government of Nunavut, Department of Environment and an Inspector.

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6 PROGRESSIVE RECLAMATION

Where practical, areas which are no longer needed to carry out exploration activities will be progressively reclaimed. As per CIRNAC Guidelines⁴, “Progressive reclamation takes place prior to permanent closure to reclaim components and/or decommission facilities that no longer serve a purpose. These activities can be completed during operations with the available resources to reduce future reclamation costs, minimize the duration of environmental exposure, and enhance environmental protection. Progressive reclamation may shorten the time for achieving closure objectives and may provide valuable experience on the effectiveness of certain measures that might be implemented during permanent closure.”

The overall intent of the proposed progressive rehabilitation measures is to assist in achieving Baffinland’s site abandonment goal to return exploration sites and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities in as minimal duration as reasonably practical. Progressive reclamation for the exploration program will involve, but is not limited to the following:

- Restoration of drill holes to natural conditions at the completion of drilling, or at the end of the field season, including capping of any holes where artesian flow was encountered;
- Backfilling of sumps to the pre-existing natural contour of the land;
- Grading and scarifying laydowns and disturbed areas to promote re-vegetation; and
- Demobilization of exploration camp(s) infrastructure, wastes and fuel storage when no longer required for future exploration works.

Further options for progressive reclamation will be identified throughout the life of the exploration project as a result of feedback from communities on desired end land use, input from land owners, and new developments in reclamation procedures and policies. Further discussion on progressive reclamation of the Mary River Project is outlined in the Interim Closure and Reclamation Plan (BAF-PH1-830-P16-0012).

⁴ MVLWB/AANDC, Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories, November 2013

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7 TEMPORARY CLOSURE

7.1 SHORT-TERM TEMPORARY MINE CLOSURE – CARE AND MAINTENANCE

As exploration drilling is a seasonal activity, on an annual basis Baffinland will make a determination which Mary River Exploration Project sites will be required for the upcoming exploration season. If a camp or area is deemed required, it will be occupied/established as appropriate. At the end of the exploration season, the camp or area are subject to temporary (seasonal) closure and care and maintenance activities.

Temporary or seasonal closure care and maintenance activities include:

7.1.1 STRUCTURES

- All tents and camp facilities (i.e., kitchens, showers, eating areas, etc.) will be thoroughly cleaned and all wastes and open food will be incinerated (if available) or taken off-site. All remaining foodstuffs will be contained in sealed in secure containers to ensure wildlife attractants are not left over winter.
- Any overflow tents (prospector or dome-style) will be taken down and packed up.
- Oil stoves and propane systems will be shut off, and supply oil drums and propane cylinders closed.
- All doors and window will be secured shut to prevent animals and snow from entering the structures.

7.1.2 WATER SUPPLY

- The water supply system (tank and lines) will be drained.
- The water pump, intake and water lines will be stored away.

7.1.3 FUEL

- Drums of fuel will remain within the engineered containment structures.
- All drums and cylinders will be inspected and securely sealed.
- Empty fuel drums and cylinders will be returned to Mary River Project sites or other appropriate facility.

7.1.4 CHEMICALS

- Any calcium chloride at the drill sites will be returned to the calcium chloride storage area at Mary River Project sites.
- All other chemicals, such as lubricants and cleaning supplies, will be stored in sealed buildings.

7.1.5 GENERATOR/MECHANICAL EQUIPMENT

- The diesel camp generator and other mechanical equipment will be shut-down and winterized according to manufacturer's procedures.
- All fuel hoses will be drained and stored away, and storage tanks will be sealed and inspected for leaks.

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7.1.6 WASTES

- Suitable wood will be disposed of by open burning. All other remaining wastes are transported to Mary River Project sites for disposal or shipment off-site.
- The greywater sump(s) will be buried and not be disturbed. Kitchen and shower water holding tanks will be drained.

No additional closure and reclamation activities are required for other disturbed areas or drill holes as these are restored to natural conditions immediately upon completion of drilling or at the end of the field season.

7.1.7 SHORT-TERM TEMPORARY CLOSURE MONITORING, MAINTENANCE, AND REPORTING

During the Temporary Closure Care and Maintenance period, all terms and conditions of Type 'B' Water Licence 2BE-MRY1421 will remain in force. "Care and Maintenance" monitoring program will include routine inspection, monitoring and reporting as required by Type 'B' Water Licence 2BE-MRY1421 and its associated management plans. Additional monitoring, maintenance and reporting for the care and maintenance of the Mary River Project is outlined in the Interim Closure and Reclamation Plan for the Mary River Project (BAF-PH1-830-P16-0012).

7.2 LONG-TERM TEMPORARY MINE CLOSURE – CARE AND MAINTENANCE

Short-term temporary closure occurs on annual basis at all active Mary River Exploration Project sites as exploration work typically occurs seasonally and camps are de-occupied at the end of the season (roughly October). In the event Baffinland deems the camp not necessary for the subsequent or up-coming season, the camp would be classified in long-term temporary closure. Long-term temporary closure activities of camp and exploration locations mirror short-term temporary closure process described above. Long-Term temporary closure is defined as the state of inactivity resulting from economic or other considerations for a period greater than one year. Additional monitoring, maintenance and reporting for the long term care and maintenance of the Mary River Project is outlined in the Interim Closure and Reclamation Plan for the Mary River Project (BAF-PH1-830-P16-0012).

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8 INTEGRATED SCHEDULE OF ACTIVITIES

As progressive reclamation is being conducted throughout the life of the Mary River Exploration Project, final closure and reclamation activities are expected to last a period of no more than two (2) years. All development areas will be subjected to a closure inspection by a company representative or contractor, and final conditions photographed. A brief A&R report or site visit by community or land owner representatives can be arranged if desired. A one-time follow-up inspection will be carried out the year following final closure, to ensure that conditions have not changed and remain stable.

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9 POST-CLOSURE SITE ASSESSMENT

Post closure monitoring for exploration areas is included in the assessment outlined in the Interim Closure and Reclamation Plan for the Mary River Project (BAF-PH1-830-P16-0012), please refer to this document for complete details and schedule of activities.

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10 FINANCIAL SECURITY

The financial cost of the Mary River Exploration Project closure and reclamation has been estimated using the Mining RECLAIM spreadsheet provided by Crown Indigenous Relations and Northern Affairs Canada (CIRNAC).

The financial cost obtained is based on the information available at the time of publishing. Several assumptions and estimations have been made and are described in Appendix B. The spreadsheet may require to be updated as the Mary River Exploration Project progresses to take into consideration additional activities that have not been considered that may have associated closure liability. To make up for uncertainties, the highest prices of the range provided by the Mining RECLAIM unit costs spreadsheet were systematically chosen.

10.1 MARY RIVER EXPLORATION PROJECT CLOSURE COST

Mining RECLAIM calculates the total capital costs required for the Project closure and reclamation. This cost has been split into Inuit Owned Lands (IOL) Lands and Crown Lands with land and water reclamation liability attributed to each. Specifically, costs relating to the infrastructure, equipment and remediation actions on these sites were attributed to the corresponding categories outlined below.

The cost associated with IOL Lands includes the following decommissioning activities:

- Full cost of decommissioning mineral exploration areas on IOL
- 50% of the cost associated with remote sites.

The cost associated with Crown Lands includes the following decommissioning activities:

- 50% of the cost associated with remote sites.
- Full cost of decommissioning Mid - Rail Camp (14 days @ six (6) man camp)
- Full cost of decommissioning Steensby Inlet Camp (14 Days @ six (6) man camp)
- Full cost of operating Mid-Rail Camp: seven (7) person camp
- Full cost of operating Steensby Inlet Camp.

Full cost for demobilization of Freight Sealift from Steensby Port to Port of Valleyfield

Note: Remote sites have been split equally between IOL and Crown lands due to uncertain nature of the location of exploration activities.

The Mary River Exploration Project closure and reclamation is estimated to cost \$1,247,000. The break down between IOL and Crown Lands and land and water liability is presented in Table 10-1.

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Table 10-1: Total Cost and Breakdown for Mary River Exploration Project Closure and Reclamation

Liability Allocation	IOL			Crown Land			PROJECT TOTAL
	Land	Water	Total	Land	Water	Total	
SUBTOTAL	\$120,311	\$14,808	\$135,119	\$886,706	\$0	\$886,706	\$1,021,825
Project Management (5%)	\$6,016	\$740	\$6,756	\$44,335	\$0	\$44,335	\$51,091
Bonding (1%)	\$1,203	\$148	\$1,351	\$8,867	\$0	\$8,867	\$10,218
Insurance (1%)	\$1,203	\$148	\$1,351	\$ 8,867	\$0	\$8,867	\$10,218
Engineering (5%)	\$ 6,016	\$740	\$6,756	\$44,335	\$0	\$44,335	\$51,091
Contingency (10%)	\$12,031	\$1,481	\$13,512	\$88,671	\$0	\$88,671	\$102,183
GRAND TOTAL - CAPITAL COSTS	\$146,779	\$18,066	\$164,845	\$1,081,781	\$0	\$1,081,781	\$1,246,627

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11 REVIEW OF PLAN EFFECTIVENESS

An important element of Baffinland's management system is reviewing the continued suitability, adequacy and effectiveness of each management plan. This will occur through an annual review process as well as scheduled updates.

11.1.1 ANNUAL REVIEW OF COMPLIANCE AND UNANTICIPATED EFFECTS

Baffinland conducts internal inspections and audits throughout the year, and immediate corrective actions are taken as appropriate to address instances of non-compliance, as well as unanticipated effects observed. Follow-up corrective actions may also be required. These immediate and follow-up corrective actions are documented in the annual report.

One follow-up corrective action may be to revise mitigation measures or monitoring programs described in the applicable management plans. During the annual reporting cycle, specifically the development of the Annual Report for Exploration and Geotechnical Drilling submitted to the QIA and NWB, Baffinland staff will review instances of non-compliance as well as unanticipated effects and determine if a review of plan effectiveness is appropriate. Should there be a significant unanticipated effect, determined by the Inuit Committee and/or community observations, a review of plan effectiveness will be completed. This process is articulated on Figure 11.1.

Part of this annual review cycle is the incorporation of IQ, which may include feedback from the Inuit Committee and/or community observations. This process may occur annually whether repeat non-compliance and/or unanticipated effects are identified (Figure 11.1).

Plan updates may be required based on feedback from the Mine Closure Working Group (MCWG), QSEMC and/or results of the annual review process. Plan updates will be recorded in the Document Revision Record located at the front of the Plan.

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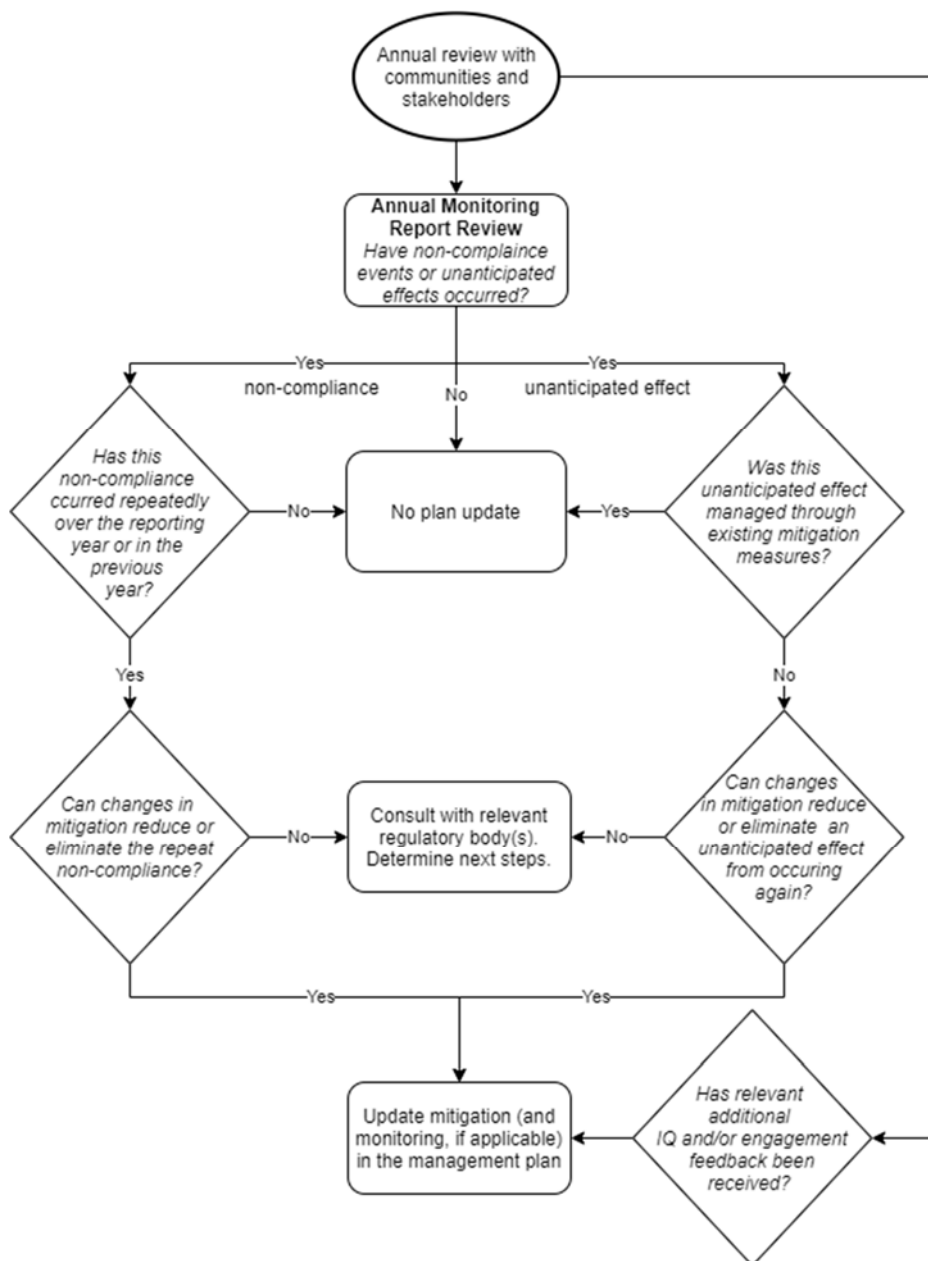


Figure 11.1 Annual Review of Plan Effectiveness

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1112 CONCORDANCE TABLES

Table 12.1 has been prepared to characterize the content of the ECRP and updated with reference to this ECRP. The concordance table is consistent with the principles of the Qikiqtani Inuit Association (QIA) Abandonment and Reclamation Policy for Inuit Owned Lands ('the Policy') and structured in accordance with Appendix C of the QIA Security Policy (v3).

Table 12.1: QIA Abandonment and Reclamation Policy for Inuit Owned Lands Concordance Table

Item	QIA Abandonment and Reclamation Policy for Inuit Owned Lands (v3)	Baffinland Response
1	Have all reports and plans including addendums and responses been submitted?	Yes
2	Are the submitted reports and plans executable standalone documents with adequate rationale and detail?	Yes
3	Do all reports and plans contain appropriate referencing (document name, author, section, and page number) to all supporting information?	Yes
4	Do the reports and plans demonstrate a firm understanding, of QIA's <i>Guiding Principles on Reclamation</i> and provide rationale on how these principles have been satisfied?	Yes
5	Has IQ and consultation with Community Land and Resources Committee(s) been applied? Has the Tenant provided detailed community consultation records?	Closure and reclamation issues discussed at hearings related to the Project Certificate. Further detail outlined in the Mary River Project ICRP.
6	Are all the components that are considered in the abandonment and reclamation plan listed?	Yes
7	Does each component of the Project have an abandonment and reclamation objectives and criteria?	Yes
8	Has an A&R plan been provided with a financial security estimate?	Yes

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Item	QIA Abandonment and Reclamation Policy for Inuit Owned Lands (v3)	Baffinland Response
9	Have Table 1, 2, 3 and 4 of Appendix B been used in completing the financial security estimate?	No. See Appendix B for description of methodology
10	Has evidence been provided to support the Policy assumptions for all reports and plans?	Yes

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Table 12.2 has been prepared to show concordance with Part J, Number 2 of the Type 'A' Water Licence, 2AM-MRY1325.

Table 12.2: Type 'A' Water Licence 2AM-MRY1325 Amendment No.1, Part J, Item 2

Baffinland Type 'B' Water Licence No. 2BE-MRY1421 Requirements Applying to Closure and Restoration or Temporary Closing (Part I)	
Type 'B' Water Licence No. 2BE-MRY1421, Part I	Mary River Exploration Project A&R Plan Section
1. The Licensee shall submit to the Board for approval within sixty (60) days following the issuance of this Licence, a revised, stand-alone, Closure and Restoration Plan prepared in accordance with applicable sections of the "Guidelines for Abandonment and Restoration Planning for Mines in the Northwest Territories (1990) and that must reflect the reduced scope of activities under this licence.	N/A
2. Licensee shall complete all restoration work prior to the expiry of this Licence.	N/A
3. The Licensee shall carry out progressive reclamation of any components of the project no longer required for the Licensee's operations.	6
4. The Licensee shall backfill and restore, to the satisfaction of an Inspector, all Sumps to the pre-existing natural contours of the land.	Error! Reference source not found. and Error! Reference source not found.
5. The Licensee shall remove from the site, all infrastructure and site materials, including but not limited to, all fuel caches, drums, barrels, buildings and contents, docks, water pumps and lines, material and equipment prior to the expiry of this Licence.	Error! Reference source not found. and Error! Reference source not found.
6. The Licensee shall, unless otherwise identified within the approved Plan under Part H, Item 1, remove all culverts and open the natural drainage channels of all water crossings associated with the Project. In carrying out this activity, measures shall be implemented to minimize erosion and sedimentation.	Error! Reference source not found.
7. In order to promote the growth of vegetation and the needed microclimate for seed deposition, all disturbed surfaces shall be prepared by ripping, grading, or scarifying the surface to conform to the natural topography.	Error! Reference source not found. and Error! Reference source not found.
8. Areas that have been contaminated by hydrocarbons from normal fuel transfer procedures shall be reclaimed to meet objectives as outlined in the Government of Nunavut's Environmental Guideline for Site Remediation (2010). The use of reclaimed soils for the purpose of backfill or general site grading may be carried out only upon consultation and approval by the Government of Nunavut, Department of Environment and an Inspector.	Error! Reference source not found. and Error! Reference source not found.
9. The Licensee shall restore all drill holes and disturbed areas to natural conditions immediately upon completion of drilling. The restoration of drill	Error! Reference source not found. and Error!

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Baffinland Type 'B' Water Licence No. 2BE-MRY1421 Requirements Applying to Closure and Restoration or Temporary Closing (Part I)	
Type 'B' Water Licence No. 2BE-MRY1421, Part I	Mary River Exploration Project A&R Plan Section
holes must include the removal of any drill casing materials and if having encountered artesian flow, the capping of holes with a permanent seal.	Reference source not found.
10. The Licensee may store drill core produced by the appurtenant undertaking in an appropriate manner and location at least thirty-one (31) metres above the ordinary High Water Mark of any adjacent Water body, where any direct flow into a Water body is not possible and no additional impacts are created.	Error! Reference source not found.
11. The Licensee shall contour and stabilize all disturbed areas to a pre-disturbed state upon completion of work.	Error! Reference source not found. and Error! Reference source not found.

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12.13 GLOSSARY OF TERMS, ACRONYMS, OR ABBREVIATIONS

12.13.1 GLOSSARY OF TERMS

Term	Meaning
Abandonment	The permanent dismantlement of a facility so it is permanently incapable of its intended use. This includes the removal of associated equipment and structures.
Active layer	The layer of ground above the permafrost which thaws and freezes annually.
Alkalinity	Measure of the capacity of a solution to neutralize a strong acid.
Backfill	Material excavated from a site and reused for filling the surface or underground void created by mining. Reinsertion of materials in extracted part(s) of the ore body. Materials used for backfilling can be waste-rock or overburden. In most cases backfill is used to refill mined-out areas in order to: - Assure ground stability. - Prevent or reduce underground and surface subsidence. - Provide roof support so that further parts of the ore body can be extracted and to increase safety. - Provide an alternative to surface disposal. And - Improve ventilation.
Background	An area near the site under evaluation not influenced by chemicals released from the site, or other impacts created by onsite activity.
Baseline	A surveyed condition and reference used for future surveys.
Benign	Having little or no detrimental effect.
Berm	A mound or wall, usually of earth, used to retain substances or to prevent substances from entering an area.
Best Management Practices	Any program, technology, process, operating method, measure, or device that controls, prevents, removes, or reduces pollution and impact on the environment.
Biodiversity	The variety of plants and animals that live in a specific area.
Bioremediation	The use of microorganisms or vegetation to reduce contaminant levels in soil or water.
Borrow Pit	A source of fill or embanking material.
Care and Maintenance	A term to describe the status of a mine when it undergoes a temporary closure.
Closure	When a mine ceases operations without the intent to resume mining activities in the future.
Closure Criteria	Detail to set precise measures of when the objective has been satisfied.
Closure Goal	The guiding statement that provides the vision and purpose of reclamation. Attainment of the closure goal happens all closure objectives have been satisfied. By its nature, the closure goal is a broad, high-level statement and not directly measurable.

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Term	Meaning
Closure Principles	A fundamental basis for the selection of closure objectives.
Closure Objectives	Statements that describe what the selected closure activities are aiming to achieve; they are guided by the closure principles.
Comminution	Size reduction of an ore by crushing and/or grinding to such a particle size that the product is a mixture of relatively clean particles of mineral and gangue. In order to produce a relatively pure concentrate, it is necessary to grind the ore fine enough to liberate the desired minerals.
Contaminant	Any physical, chemical, biological or radiological substance in the air, soil or water that has an adverse effect. Any chemical substance with a concentration that exceeds background levels or which is not naturally occurring in the environment.
Contouring	The process of shaping the land surface to fit the form of the surrounding land.
Cumulative Effects	The combined environmental impacts that accumulate over time and space as a result of a series of similar or related actions or activities.
Crushing	Comminution process that reduces the particle size of run-of-mine ore to such a level that grinding can be carried out. This is accomplished by compression of ore against rigid surfaces, or by impact against surfaces in rigidly constrained motion path.
Cryoconcentration	Concentration of solutes due to exclusion by ice.
Decommissioning	Process by which a mining operation is shut down i.e.: permanently closing a site. Removing equipment, buildings and structures. Rehabilitation and plans for future maintenance of affected land and water are also included.
Dewatering	Process of removing water from an underground mine or open pit, or from the surrounding rock or non-lithified area. The term is also commonly used for the reduction of water content in concentrates, tailings and treatment sludges.
Disposal	The relocation, containment, treatment or processing of unwanted materials or materials that are not reusable. This may involve the removal of contaminants or their conversion to less harmful forms.
Drainage	Manner in which the waters of an area exist and move, including surface streams and groundwater pathways. A collective term for all concentrated and diffuse water flow.
Drainage Chemistry	Concentrations of dissolved components in drainage, including element concentrations, chemical species and other aqueous chemical parameters.
Effluent	Treated or untreated liquid waste material that is discharged into the environment from a structure such as a settling pond or a treatment plant.
End Land Use	The allowable use of disturbed land following reclamation. Municipal zoning and/or approval may be required for specific land uses.
Environment	Interrelated physical, chemical, biological, social, spiritual and cultural components that affect the growth and development of living organisms.

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Term	Meaning
Erosion	The wearing away of rock, soil or other surface material by water, rain, waves, wind or ice, the process may be accelerated by human activities.
Evaporation	Physical process by which a liquid is changed into a gas.
Existing Operation	An installation in operation or, in accordance with legislation existing before the date on which this Directive is brought into effect, an installation authorized or in the view of the competent authority the subject of a full request for authorization, provided that that installation is put into operation no later than one year after the date on which this Directive is brought into effect.
Frost Heave	Annual ground displacements and differential ground pressures due to the freezing of water within soils.
Geochemistry	Science of the chemistry of geological materials and the interaction between geological materials with the environment.
Geology	Study of the earth, its history and the changes that have occurred or are occurring, and the rocks and non-lithified materials of which it is composed and their mode of formation and transformation.
Grade	Dimensionless proportion of any constituent in an ore, expressed often as a percentage, grams per tonne (g/t) or parts per million (ppm).
Ground Thermal Regime	Temperature conditions below the ground surface. A condition of heat losses and gains from geothermal sources and the atmosphere.
Groundwater	All subsurface water that occurs beneath the water table in rocks and geologic formations that are fully saturated. Distinct from surface water.
Humidity Cell Test	Kinetic test procedure used primarily to measure rates of acid generation and neutralization in sulphide-bearing rock.
Hydrogeology	Science of the groundwater circuit (interrelationship of geologic materials and processes with water).
Hydrology	The science that deals with water, its properties, distribution and circulation over the Earth's surface.
Inert Waste	Material having insignificant leachability and pollution content which will not require laboratory analysis.
Infiltration	Entry of water into a porous substance.
Inukshuk	A stone representation of a person, used as a milestone or directional marker by the Inuit of the Canadian Arctic.

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Term	Meaning
In Situ Treatment	A method of managing or treating contaminated soils, sludges and waters “in place” in a manner that does not require the contaminated material to be physically removed or excavated from where it originated.
Landfill	An engineered waste management facility at which waste is disposed by placing it on or in land in a manner that minimizes adverse human health and environmental effects.
Leachate	Solution obtained by leaching e.g. water that has percolated through soil containing soluble substances and that contains certain amounts of these substances in solution.
Leaching	Passage of a solvent through porous or crushed material in order to extract components from the liquid phase. For example, gold can be extracted by heap leaching of a porous ore, or pulverized tailings. Other methods are tank leaching of ore, concentrates or tailings and in-situ leaching.
Lithology	Composition of rocks, including physical and chemical characteristics such as colour, mineralogical composition, hardness and grain size.
Migration	The movement of chemicals, bacteria, and gases in flowing water or vapour.
Mineral Resource	Concentration or occurrence of natural, solid, inorganic or fossilized organic material in or on the Earth’s crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge.
Mining	Methods and techniques to extract ore from the ground, including support facilities (e.g. stockpiles, workshops, transport, ventilation) and supporting activities in the mine itself or in the vicinity.
Mining Operation	Any extraction of ore from which mineral substances are taken, where the corporate intent is to make an operating profit or build continuously toward a profitable enterprise.
Mitigation	The process of rectifying an impact by repairing, rehabilitating or restoring the affected environment, or the process of compensating for the impact by replacing or providing substitute resources or environments.
Monitoring	Observing the change in geophysical, hydrogeological or geochemical measurements over time. Process intended to assess or to determine the actual value and the variations of an emission or another parameter, based on procedures of systematic, periodic or spot surveillance, inspection, sampling and measurement or another assessment methods intended to provide information about emitted quantities and/or trends for emitted pollutants.

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Term	Meaning
Naturally Re-vegetate or Natural Re-vegetation	For the purposes of the Mary River Project natural re-vegetation will include scarification and covering with overburden as required and allowing the surrounding natural vegetation to encroach and be re-established on the disturbed area.
Objectives	Objectives describe what the reclamation activities are aiming to achieve. The goal of mine closure is to achieve the Long-term objectives that are selected for the site.
Open Pit Mining	Mining operation takes place on the surface. Mining operation and environment are in contact over an extended area.
Operator	Any natural or legal person that is responsible for the control, operation, and maintenance of the mine, mineral processing plant, tailings dam and/or related facilities including the after-closure phases.
Ore	Mineral or variety of accumulated minerals of sufficient value as to quality and quantity that it/they may be mined at a profit. Most ores are mixtures of extractable minerals and extraneous rocky material.
Orebody (mineral deposit)	Naturally occurring geological structure consisting of an accumulation of a desired mineral and waste-rock, from which the mineral can be extracted, at a profit, or with a reasonable expectation thereof.
Overburden	Layer of natural grown soil or massive rock on top of an orebody. In case of open pit mining operations it has to be removed prior to extraction of the ore
P	Phosphate
Passive Treatment	Treatment technologies that can function with little or no maintenance over long periods of time.
Permafrost	Ground that remains at or below zero degrees Celsius for a minimum of two consecutive years.
Permafrost Aggradation	A naturally or artificially caused increase in the thickness and/or area extent of permafrost.
Permeability	The ease with which gases, liquids, or plant roots penetrate or pass through soil or a layer of soil. The rate of permeability depends upon the composition of the soil.
Phreatic Surface	The term phreatic is used in Earth sciences to refer to matters relating to ground water below the water table (the word originates from the Greek phrear, phreat-meaning “well” or “spring”). The term ‘phreatic surface’ indicates the location where the pore water pressure is under atmospheric conditions (i.e. the pressure head is zero). This surface normally coincides with the water table.
Potentially Acid Generating (PAG)	Rock or overburden material that has the potential to produce acidity irrespective of its effect on the adjacent pore water or whether the material is net acid producing or neutralizing.

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Term	Meaning
Progressive Reclamation	Actions that can be taken during mining operations before permanent closure, to take advantage of cost and operating efficiencies by using the resources available from mine operations to reduce the overall reclamation costs incurred. It enhances environmental protection and shortens the timeframe for achieving the reclamation objectives and goals.
Primary Crushing	Process of reducing ore into smaller fragments to prepare it for further processing and/or so that it can be transported to the processing plant. In underground mines, the primary crusher is often located underground, or at the entrance to the processing plant.
Quarry	Whole area under the control of an operator carrying out any activity involved in the prospecting, extraction, treatment and storage of minerals, including common related infrastructures and waste management activities, being not a mine. It is distinguished from a mine because it is usually open at the top and front, and used for the extraction of building stone, such as slate, limestone, gravel and sand.
Reclamation	The process of returning a disturbed site to its natural state or one for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety.
Rehabilitation	Activities to ensure that the land will be returned to a form and productivity in conformity with a prior land use plan, including a stable ecological state that does not contribute substantially to environmental deterioration and is consistent with surrounding aesthetic values.
Remediation	The removal, reduction, or neutralization of substances, wastes or hazardous material from a site in order to prevent or minimize any adverse effects on the environment and public safety now or in the future.
Restoration	The renewing, repairing, cleaning-up, remediation or other management of soil, groundwater or sediment so that its functions and qualities are comparable to those of its original, unaltered state.
Re-vegetation	Replacing original ground cover following a disturbance to the land.
Risk Assessment	Reviewing risk analysis and options for a given site, component or condition. Risk assessments consider factors such as risk acceptability, public perception of risk, socio-economic impacts, benefits, and technical feasibility. It forms the basis for risk management.
Run-of-mine (ROM)	Run of mine. Unprocessed conveyed material (ore) from the mining operation.
Runoff	Part of precipitation and snowmelt that does not infiltrate but moves as overland flow and drains off the land into bodies of water.
Scarification	Seedbed preparation to make a site more amenable to plant growth.
Screening	Separating material into size fractions.
Security Deposit	Funds held by the Crown or designated owner of the land that can be used in the case of abandonment of an undertaking to reclaim the site, or carry out any

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Term	Meaning
	ongoing measures that may remain to be taken after the abandonment of the undertaking.
Sediment	Solid material, both mineral and organic, that has been moved by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.
Seismic	Relating to an earthquake or to other tremors of the Earth, such as those caused by large explosions.
Solubility	Quantity of solute that dissolves in a given volume and type of solvent, at given temperature and pressure, to form a saturated solution. The degree to which compounds are soluble depends on their ability, and that of the other dissolved species, to form ions and aqueous complexes in particular drainage chemistry.
Sump	An underground catch basin in a mine where water accumulates before being pumped to the surface.
Supernatant	The clear liquid that floats about the sediment or precipitate.
Surface Water	Natural water bodies such as river, streams, brooks, ponds and lakes, as well as artificial watercourses, such as irrigation, industrial and navigational canals, in direct contact with the atmosphere.
Sustainable Development	Industrial development that does not detract from the potential of the natural environment to ensure benefits for future generations.
Tailings	Material rejected from a mill after most of the recoverable valuable minerals have been extracted.
Taliks	Unfrozen zones that can exist within, below, or above permafrost layers. They are usually located below deep water bodies.
Temporary Closure	When a mine ceases operations with the intent to resume mining activities in the future. Temporary closures can last for a period of weeks, or for several years, based on economical, environmental, political, or social factors.
Thermokarst	A landscape characterized by shallow pits and depressions caused by selective thawing of ground ice, or permafrost.
Topsoil	Natural huminous layer on top of the orebody, which has to be stripped prior to start-up of ore extraction.
Traditional Knowledge	A cumulative, collective body of knowledge, experience, and values built up by a group of people through generations of living in close contact with nature. It builds upon the historic experiences of a people and adapts to social, economic, environmental, spiritual and political change.
Ultramafic	Igneous rock composed chiefly of mafic minerals, e.g. monomineralic rocks composed of hypersthene, augite, or olivine.
Waste-rock, Discard, or Spoil Material	All rock materials, except ore and tailings that are produced as a result of mining operations.
Watershed	A region or area bordered by ridges of higher ground that drains into a particular watercourse or body of water.

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Term	Meaning
Water Table	The level below where the ground is saturated with water.
Weathering	Processes by which particles, rocks and minerals are altered on exposure to surface temperature and pressure, and atmospheric agents such as air, water and biological activity.

12.213.2 ACRONYMS AND ABBREVIATIONS

The following are acronyms or abbreviations that may be used in this document:

Abbreviation	Description
General	
A&R	Abandonment and Reclamation
ARD	Acid Rock Drainage
Baffinland	Baffinland Iron Mines Corporation
CCME	Canadian Council of Ministers of the Environment
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EHS	Environmental Health and Safety
EIS	Environmental Impact Statement
EMMP	Environmental Mitigation and Monitoring Plans
ERP	Proposed Early Revenue Phase
ESA	Environmental Site Assessment
FEIS	Final Environmental Impact Statement
FOL	Federal Owned Lands
Ga	Giga-annum (billion years)
HADD	Harmful Alteration, Disruption, or Destruction
HTA/HTO	Hamlets, Hunters, and Trappers Association/Organization
HTO	Hunters and Trappers Organization
ICRP	Interim Closure and Reclamation Plan
IIBA	Inuit Impact and Benefits Agreement
IOL	Inuit Owned Lands
IQ	Inuit Qaujimajatuqangit (Inuit knowledge, or traditional knowledge)
KI	Key Indicator
LAC	Land Advisory Committee
LSA	Local Study Area
MASL	Metres above Sea Level
Mary River	Nuluujaak
MDAG	Mineral Development Advisory Group
MERA	Mineral and Energy Resource Assessment
ML	Metal Leaching
MOU	Memorandum of Understanding
Mtpa	Million Tonne-Per-Annum
NLCA	Nunavut Land Claims Agreement
NSA	Nunavut Settlement Area

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Abbreviation	Description
NWT	Northwest Territories
PAG	Potential Acid Generating
PCRPP	Preliminary Closure and Reclamation Plan
PDA	Potential Development Area
PDW	Pre-Development Works
PLA	Production Lease Area
PPR	Personal Property Registry
RA(s)	Responsible Authority(ies)
RMO	Resource Management Officer
RSA	Regional Study Area
TC-NWPP	Transport Canada Navigable Waters Protection Program
the Project	Mary River Project
TK	Traditional Knowledge
VC	Valued Component
VEC	Valued Ecosystem Component
VSEC	Valued Socio-Economic Component
Federal and Territorial Acts	
AWPPA	Arctic Waters Pollution Prevention Act
BCANU	Business Corporations Act (Nunavut)
CEAA	Canadian Environmental Assessment Act
CEPA	Canadian Environmental Protection Act, 1999
CLA	Commissioner's Land Act
CNPA	Canada National Parks Act
CWA	Canada Wildlife Act
EG&GANU	Engineers, Geologists and Geophysicists Act (Nunavut)
EMAANU	Emergency Medical Aid Act (Nunavut)
EPANU	Environmental Protection Act (Nunavut)
EUANU	Explosives Use Act (Nunavut)
EXA	Explosives Act
FA	Fisheries Act
FPANU	Fire Prevention Act (Nunavut)
LSANU	Labour Standards Act (Nunavut)
MBCA	Migratory Birds Convention Act, 1994
MH&SANU	Mine Health and Safety Act (Nunavut)
NW&NSRTA	Nunavut Waters and Nunavut Surface Rights Tribunal Act
PHANU	Public Health Act (Nunavut)
TDGA	Transportation of Dangerous Goods Act, 1992
TDGANU	Transportation of Dangerous Goods Act (Nunavut)
TLA	Territorial Lands Act
TPANU	Territorial Parks Act (Nunavut)
WANU	Wildlife Act (Nunavut)
WCANU	Workers' Compensation Act (Nunavut)
Federal and Territorial Regulations	
AWPPR	Arctic Waters Pollution Prevention Regulations

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Abbreviation	Description
CFAEAP&R	Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements
CLR	Commissioner's Land Regulations
CMR	Canada Mining Regulations
CRFR	AECB Cost Recovery Fees Regulations, 1996
CSLR	Comprehensive Study List Regulations
CSLRNU	Comprehensive Study List Regulations (Nunavut)
CSRNU	Camp Sanitation Regulations (Nunavut)
ELR	Exclusion List Regulations
EURNU	Explosives Use Regulations (Nunavut)
EXR	Explosives Regulations
FPRNU	Fire Prevention Regulations (Nunavut)
ILR	Inclusion List Regulations
LLR	Law List Regulations
MBSR	Migratory Bird Sanctuary Regulations
MH&SRNU	Mine Health and Safety Regulations (Nunavut)
MDMER	Metal and Diamond Mining Effluent Regulations
NA&PSR	Nunavut Archaeological and Palaeontological Sites Regulations
NBRLUP	North Baffin Regional Land Use Plan
NPWR	National Parks Wildlife Regulations
NWTFR	Northwest Territories Fishery Regulations
NWTWR	Northwest Territories Waters Regulations
PCSRNU	Propane Cylinder Storage Regulations (Nunavut)
SCP&RRNU	Spill Contingency Planning and Reporting Regulations (Nunavut)
TDGR	Transportation of Dangerous Goods Regulations
TDGRNU	Transportation of Dangerous Goods Regulations (Nunavut)
TDR	Territorial Dredging Regulations
TLR	Territorial Lands Regulations
TLUR	Territorial Land Use Regulations
TPRNU	Territorial Parks Regulations (Nunavut)
TQR	Territorial Quarrying Regulations
WAR	Wildlife Area Regulations
WCRNU	Workers' Compensation Regulations (Nunavut)
WSRNU	Wildlife Sanctuaries Regulations (Nunavut)
Federal Government Departments and Agencies	
AANDC	Aboriginal Affairs and Northern Development Canada
CTA	Canadian Transportation Agency
DFO	Fisheries and Oceans Canada
DOJ	Department of Justice Canada
EC	Environment Canada
CIRNAC	Crown Indigenous Relations and Northern Affairs Canada, formerly Indian and Northern Affairs Canada and prior to that Aboriginal Affairs and Northern Development Canada
NRCan	Natural Resources Canada
PCH	Parks Canada Agency (Canadian Heritage)

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Abbreviation	Description
TC	Transport Canada
<i>Territorial Government Departments and Agencies</i>	
CGSNU	Department of Community and Government Services
CLEYNU	Department of Culture, Language, Elders and Youth
DOJNU	Department of Justice
DOENU	Department of Environment
ED&TNU	Economic Development & Transportation
GN	Government of Nunavut
H&SSNU	Department of Health and Social Services
WSCC	Workers Safety and Compensation Commission of the Northwest Territories and Nunavut
<i>Institutions Of Public Government</i>	
CLARC	Community Land and Resource Committee
CLO	Community Liaison Officer
IPGs	Institutions of Public Government
MVLWB	Mackenzie Valley Land and Water Board
NIRB	Nunavut Impact Review Board
NPC	Nunavut Planning Commission
NSRT	Nunavut Surface Rights Tribunal
NWB	Nunavut Water Board
NWMB	Nunavut Wildlife Management Board
<i>Inuit Organizations</i>	
DIO	Designated Inuit Organizations
MHTO	Mittimatalik Hunters and Trappers Organization
NTI	Nunavut Tunngavik Incorporated
QIA	Qikiqtani Inuit Association
RIA	Regional Inuit Association
RWO	Regional Wildlife Organization

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Appendix A

RECLAIM Model Output

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A.1 Summary of Type B Closure Cost Estimate

SUMMARY OF COSTS				
CAPITAL COSTS				
COMPONENT TYPE	COMPONENT NAME	TOTAL COST	LAND LIABILITY	WATER LIABILITY
OPEN PIT	Mary River Mine Pit	\$0	\$0	\$0
	Bulk Sample Pit	\$0	\$0	\$0
	Mineral Exploration Areas	\$59,589	\$59,589	\$0
UNDERGROUND MINE	-	\$0	\$0	\$0
TAILINGS	-	\$0	\$0	\$0
ROCK PILE	Mary River Stockpile	\$0	\$0	\$0
BUILDINGS AND EQUIPMENT	Milne Site	\$0	\$0	\$0
	Tote Road	\$0	\$0	\$0
	Mary River Mine	\$0	\$0	\$0
	Railway	\$0	\$0	\$0
	Steensby Port	\$0	\$0	\$0
	Mineral Exploration Areas	\$9,326	\$9,326	\$0
	Remote Sites	\$102,792	\$102,792	\$0
	Mid-Rail Camp	\$136,168	\$136,168	\$0
	Steensby Inlet Camp	\$699,141	\$699,141	\$0
CHEMICALS AND SOIL MANAGEMENT		\$0	\$0	\$0
WATER MANAGEMENT		\$14,808	\$0	\$14,808
POST-CLOSURE MONITORING AND MAINTENANCE		\$0	\$0	\$0
SUBTOTAL		\$1,021,824	\$1,007,016	\$14,808
PERCENTAGES			99%	1%
MOBILIZATION/DEMOBILIZATION		\$0	0	0
PROJECT MANAGEMENT	5%	\$51,091	\$50,351	\$740
Bonding	1%	\$10,218	\$10,070	\$148
Taxes (GST on supplies) - est.	allowance	\$0	\$0	\$0
Insurance	1%	\$10,218	\$10,070	\$148
ENGINEERING	5%	\$51,091	\$50,351	\$740
CONTINGENCY	10%	\$102,182	\$100,702	\$1,481
Market Price Factor Adjustment	0%	\$0	\$0	\$0
GRAND TOTAL - CAPITAL COSTS		\$1,246,625	\$1,228,560	\$18,066

FIGURE A- 1: SUMMARY OF TYPE B CLOSURE COST ESTIMATE

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A.2 Open Pit

Open Pit Name: <u>Mineral Exploration Areas</u>						Pit # <u>3</u>			
ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	% Cost Land	Land Cost	Water Cost	Refer to Section	Refer to Table B-2, Row #
OBJECTIVE: CONTROL ACCESS									
Fence	m		#N/A	0.00	\$0		\$0	\$0	
Signs	each		#N/A	0.00	\$0		\$0	\$0	
Berm at crest	m		#N/A	0.00	\$0		\$0	\$0	
Block roads	m3		#N/A	0.00	\$0		\$0	\$0	
Other			#N/A		\$0		\$0	\$0	
OBJECTIVE: STABILIZE SLOPES									
Off-load crest, soil A	m3		#N/A	0	\$0		\$0	\$0	
Off-load crest, soil B	m3		#N/A	0	\$0		\$0	\$0	
Doze/trimoverburden at crest	m3		#N/A	0	\$0		\$0	\$0	
Drill & blast pit crest	m3		#N/A	0	\$0		\$0	\$0	
buttress slope	m3		#N/A	0	\$0		\$0	\$0	
Other			#N/A	0	\$0		\$0	\$0	
OBJECTIVE: COVER/CONTOUR SLOPES									
Dump demolition materials (pit or landfill or q)	m3		#N/A	0	\$0		\$0	\$0	
Place overburden over demolition material	m3		#N/A	0	\$0		\$0	\$0	
Rip rap	m3		#N/A	0	\$0		\$0	\$0	
Vegetate slopes	ha		#N/A	0	\$0		\$0	\$0	
Vegetate pit floor	ha		#N/A	0	\$0		\$0	\$0	
Level Pads, backfill sumps and grade to natu	\$	18000 TBUS		1	\$18,000	100%	\$18,000	\$0	Section B.3.1.1 Row #5
OBJECTIVE: SPILLWAY									
Excavate channel, soil A	m3		#N/A	0	\$0		\$0	\$0	
Excavate channel, soil B	m3		#N/A	0	\$0		\$0	\$0	
Concrete	m3		#N/A	0	\$0		\$0	\$0	
Rip rap	m3		#N/A	0	\$0		\$0	\$0	
Other	each		#N/A	0	\$0		\$0	\$0	
OBJECTIVE: FLOOD PIT									
remove stationary equipment (sump pump)	each		#N/A	0	\$0		\$0	\$0	
remove power lines	each		#N/A	0	\$0		\$0	\$0	
Embankment/dam - Soil A	m3		#N/A	0	\$0		\$0	\$0	
Embankment/dam - Soil B	m3		#N/A	0	\$0		\$0	\$0	
supply/install pump & piping system	each		#N/A	0	\$0		\$0	\$0	
operate pumps to flood pit	each		#N/A	0	\$0		\$0	\$0	
Lime addition, _____ kg/m3 of water	tonne		#N/A	0	\$0		\$0	\$0	
Lime, purchase and shipping	tonne		#N/A	0	\$0		\$0	\$0	
Other			#N/A	0	\$0		\$0	\$0	
RECLAIM QUARRIES									
Contour slopes	m3		#N/A	0	\$0		\$0	\$0	
Berm at crest	m3		#N/A	0	\$0		\$0	\$0	
Place overburden	m3		#N/A	0	\$0		\$0	\$0	
Vegetate	m3		#N/A	0	\$0		\$0	\$0	
OTHER ITEMS									
Stability inspection			#N/A	0	\$0		\$0	\$0	
Drill Holes filled and Residual Casings Cuts	\$	30376 TBUS		1	\$30,376	100%	\$30,376	\$0	Section B.3.1.2 Row #4
Inspection and final reclamation of exploration	\$	11213 TBUS		1	\$11,213	100%	\$11,213	\$0	Section B.3.1.2 Row #7
Subtotal					\$59,589	100%	\$59,589	\$0	
						Pct	Total	Water	
						Land	Total Land		

FIGURE A- 2: TYPE B OPEN PIT RECLAMATION COSTS

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A.3 Buildings and Equipments

Building / Equip Name: <i>Mineral Exploration Areas</i>					Bldg / Equip #: <i>6</i>				
ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost % Land	Land Cost	Water Cost	Refer to Section	Refer to Table B-2, Row #
OBJECTIVE: DISPOSE MOBILE EQUIPMENT									
Decontaminate and ship off-site	each		#N/A	0	\$0	\$0	\$0		
Decontaminate, dispose on-site	each		#N/A	0	\$0	\$0	\$0		
Other (sealift for equipmt)	each		#N/A	0	\$0	\$0	\$0		
OBJECTIVE: REMOVE CONTAMINATED BUILDINGS									
Decontaminate crushing plant	each		#N/A	0	\$0	\$0	\$0		
Decontaminate tanks & plumbing	each		#N/A	0	\$0	\$0	\$0		
Decontaminate thickeners	each		#N/A	0	\$0	\$0	\$0		
Decontaminate water treatment plant	each		#N/A	0	\$0	\$0	\$0		
Decontaminate maintenance shop	each		#N/A	0	\$0	\$0	\$0		
Decontaminate power plant	each		#N/A	0	\$0	\$0	\$0		
Decontaminate bulk fuel storage	each		#N/A	0	\$0	\$0	\$0		
Decontaminate ANFO plant	each		#N/A	0	\$0	\$0	\$0		
Decontaminate offices/warehouse/accom	each		#N/A	0	\$0	\$0	\$0		
Removal of asbestos siding on buildings	each		#N/A	0	\$0	\$0	\$0		
Removal of friable asbestos on equipment	each		#N/A	0	\$0	\$0	\$0		
Other			#N/A	0	\$0	\$0	\$0		
OBJECTIVE: REMOVE NON-CONTAMINATED BUILDINGS									
crushing plant	m2		#N/A	0	\$0	\$0	\$0		
conveyors & transfer towers	m2		#N/A	0	\$0	\$0	\$0		
tanks & plumbing	m2		#N/A	0	\$0	\$0	\$0		
thickeners	m2		#N/A	0	\$0	\$0	\$0		
water treatment plant	m2		#N/A	0	\$0	\$0	\$0		
maintenance shop	m2		#N/A	0	\$0	\$0	\$0		
power plant	m2		#N/A	0	\$0	\$0	\$0		
bulk fuel storage	m2		#N/A	0	\$0	\$0	\$0		
ANFO plant	m2		#N/A	0	\$0	\$0	\$0		
offices/warehouse/accom	m2		#N/A	0	\$0	\$0	\$0		
consolidate & dump boneyard debris	m3		#N/A	0	\$0	\$0	\$0		
other			#N/A	0	\$0	\$0	\$0		
OBJECTIVE: BREAK BASEMENT SLABS									
crushing plant	m2		#N/A	0	\$0	\$0	\$0		
conveyors & transfer towers	m2		#N/A	0	\$0	\$0	\$0		
tanks & plumbing	m2		#N/A	0	\$0	\$0	\$0		
thickeners	m2		#N/A	0	\$0	\$0	\$0		
water treatment plant	m2		#N/A	0	\$0	\$0	\$0		
maintenance shop	m2		#N/A	0	\$0	\$0	\$0		
power plant	m2		#N/A	0	\$0	\$0	\$0		
bulk fuel storage	m2		#N/A	0	\$0	\$0	\$0		
ANFO plant	m2		#N/A	0	\$0	\$0	\$0		
offices/warehouse/accom	m2		#N/A	0	\$0	\$0	\$0		
Other	m2		#N/A	0	\$0	\$0	\$0		
OBJECTIVE: LANDFILL FOR DEMOLITION WASTE									
Place soil cover	m3		#N/A	0	\$0	\$0	\$0		
Vegetate	ha		#N/A	0	\$0	\$0	\$0		
Landfill disposal fee	tonne		#N/A	0	\$0	\$0	\$0		
OBJECTIVE: GRADE AND CONTOUR MILL & PLANT SITE									
crushing plant	m2		#N/A	0	\$0	\$0	\$0		
conveyors & transfer towers	m2		#N/A	0	\$0	\$0	\$0		
tanks & plumbing	m2		#N/A	0	\$0	\$0	\$0		
thickeners	m2		#N/A	0	\$0	\$0	\$0		
water treatment plant	m2		#N/A	0	\$0	\$0	\$0		
maintenance shop	m2		#N/A	0	\$0	\$0	\$0		
power plant	m2		#N/A	0	\$0	\$0	\$0		
bulk fuel storage	m2		#N/A	0	\$0	\$0	\$0		
ANFO plant	m2		#N/A	0	\$0	\$0	\$0		
offices/warehouse/accom	m2		#N/A	0	\$0	\$0	\$0		
other	m2		#N/A	0	\$0	\$0	\$0		
OBJECTIVE: RECLAIM ROADS									
Remove culverts	each		#N/A	0	\$0	\$0	\$0		
Remove bridges	each		#N/A	0	\$0	\$0	\$0		
Scarify and install water breaks	ha		#N/A	0	\$0	\$0	\$0		
remove/doze down berms	m3		#N/A	0	\$0	\$0	\$0		
create wildlife passage ramps	m3		#N/A	0	\$0	\$0	\$0		
Vegetate	ha		#N/A	0	\$0	\$0	\$0		
other			#N/A	0	\$0	\$0	\$0		
SPECIALIZED ITEMS									
Prepare core for Long-term site storage	\$	1756 TBUS		1	\$1,756	100%	\$1,756	\$0	Section B.3.5.1.1 Row # 6
Salt mixing stations	\$	7570 TBUS		1	\$7,570	100%	\$7,570	\$0	Section B.3.5.1.1 Row # 8
Subtotal					\$9,326	100%	\$9,326	\$0	
					Pct Land	Total Land	Total Water		

FIGURE A- 3: TYPE B BUILDINGS AND EQUIPMENT RECLAMATION COSTS MINERAL EXPLORATION AREAS

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Building / Equip Name: <u>Remote Sites</u>					Bldg / Equip #: <u>7</u>				
ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost % Land	Land Cost	Water Cost	Refer to Section	Refer to Table B-2, Row #
OBJECTIVE: DISPOSE MOBILE EQUIPMENT									
Decontaminate and ship off-site	each		#N/A	0	\$0	\$0	\$0		
Decontaminate, dispose on-site	each		#N/A	0	\$0	\$0	\$0		
Other (sealift for equipmt)	each		#N/A	0	\$0	\$0	\$0		
OBJECTIVE: REMOVE CONTAMINATED BUILDINGS									
Decontaminate crushing plant	each		#N/A	0	\$0	\$0	\$0		
Decontaminate tanks & plumbing	each		#N/A	0	\$0	\$0	\$0		
Decontaminate thickeners	each		#N/A	0	\$0	\$0	\$0		
Decontaminate water treatment plant	each		#N/A	0	\$0	\$0	\$0		
Decontaminate maintenance shop	each		#N/A	0	\$0	\$0	\$0		
Decontaminate power plant	each		#N/A	0	\$0	\$0	\$0		
Decontaminate bulk fuel storage	each		#N/A	0	\$0	\$0	\$0		
Decontaminate ANFO plant	each		#N/A	0	\$0	\$0	\$0		
Deontaminate offices/warehouse/accom	each		#N/A	0	\$0	\$0	\$0		
Removal of asbestos siding on buildings	each		#N/A	0	\$0	\$0	\$0		
Removal of friable asbestos on equipment	each		#N/A	0	\$0	\$0	\$0		
Other			#N/A	0	\$0	\$0	\$0		
OBJECTIVE: REMOVE NON-CONTAMINATED BUILDINGS									
crushing plant	m2		#N/A	0	\$0	\$0	\$0		
conveyors & transfer towers	m2		#N/A	0	\$0	\$0	\$0		
tanks & plumbing	m2		#N/A	0	\$0	\$0	\$0		
thickeners	m2		#N/A	0	\$0	\$0	\$0		
water treatment plant	m2		#N/A	0	\$0	\$0	\$0		
maintenance shop	m2		#N/A	0	\$0	\$0	\$0		
power plant	m2		#N/A	0	\$0	\$0	\$0		
bulk fuel storage	m2		#N/A	0	\$0	\$0	\$0		
ANFO plant	m2		#N/A	0	\$0	\$0	\$0		
offices/warehouse/accom	m2		#N/A	0	\$0	\$0	\$0		
consolidate & dump boneyard debris	m3		#N/A	0	\$0	\$0	\$0		
other			#N/A	0	\$0	\$0	\$0		
OBJECTIVE: BREAK BASEMENT SLABS									
crushing plant	m2		#N/A	0	\$0	\$0	\$0		
conveyors & transfer towers	m2		#N/A	0	\$0	\$0	\$0		
tanks & plumbing	m2		#N/A	0	\$0	\$0	\$0		
thickeners	m2		#N/A	0	\$0	\$0	\$0		
water treatment plant	m2		#N/A	0	\$0	\$0	\$0		
maintenance shop	m2		#N/A	0	\$0	\$0	\$0		
power plant	m2		#N/A	0	\$0	\$0	\$0		
bulk fuel storage	m2		#N/A	0	\$0	\$0	\$0		
ANFO plant	m2		#N/A	0	\$0	\$0	\$0		
offices/warehouse/accom	m2		#N/A	0	\$0	\$0	\$0		
Other	m2		#N/A	0	\$0	\$0	\$0		
OBJECTIVE: LANDFILL FOR DEMOLITION WASTE									
Place soil cover	m3		#N/A	0	\$0	\$0	\$0		
Vegetate	ha		#N/A	0	\$0	\$0	\$0		
Landfill disposal fee	tonne		#N/A	0	\$0	\$0	\$0		
OBJECTIVE: GRADE AND CONTOUR MILL & PLANT SITE									
crushing plant	m2		#N/A	0	\$0	\$0	\$0		
conveyors & transfer towers	m2		#N/A	0	\$0	\$0	\$0		
tanks & plumbing	m2		#N/A	0	\$0	\$0	\$0		
thickeners	m2		#N/A	0	\$0	\$0	\$0		
water treatment plant	m2		#N/A	0	\$0	\$0	\$0		
maintenance shop	m2		#N/A	0	\$0	\$0	\$0		
power plant	m2		#N/A	0	\$0	\$0	\$0		
bulk fuel storage	m2		#N/A	0	\$0	\$0	\$0		
ANFO plant	m2		#N/A	0	\$0	\$0	\$0		
offices/warehouse/accom	m2		#N/A	0	\$0	\$0	\$0		
other (Construction and use of airstrips and icestrip)	m2		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.2.1	NA
OBJECTIVE: RECLAIM ROADS									
Remove culverts	each		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.2.2	NA
Remove bridges	each		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.2.2	NA
Scarify and install water breaks	ha		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.2.2	NA
remove/doze down berms	m3		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.2.2	NA
create wildlife passage ramps	m3		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.2.2	NA
Vegetate	ha		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.2.2	NA
other			#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.2.2	NA
SPECIALIZED ITEMS									
Decommission remote sites \$ 102792 TBUS 1 \$102,792 100% \$102,792 \$0 Section B.3.5.2.3 Row #9									
Subtotal					\$102,792	100%	\$102,792	\$0	
					Pct Land	Total Land	Total Water		

FIGURE A- 4: TYPE B BUILDINGS AND EQUIPMENT RECLAMATION COSTS - REMOTE SITES

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Building / Equip Name: <i>Mid-Rail Camp</i>					Bldg / Equip #: <i>8</i>				
ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost % Land	Land Cost	Water Cost	Refer to Section	Refer to Table B-2, Row #
OBJECTIVE: DISPOSE MOBILE EQUIPMENT									
Decontaminate and ship off-site	each		#N/A	0	\$0	\$0	\$0		
Decontaminate, dispose on-site	each		#N/A	0	\$0	\$0	\$0		
Other (sealift for equipmt)	each		#N/A	0	\$0	\$0	\$0		
OBJECTIVE: REMOVE CONTAMINATED BUILDINGS									
Decontaminate crushing plant	each		#N/A	0	\$0	\$0	\$0		
Decontaminate tanks & plumbing	each		#N/A	0	\$0	\$0	\$0		
Decontaminate thickeners	each		#N/A	0	\$0	\$0	\$0		
Decontaminate water treatment plant	each		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.3.1	NA
Decontaminate maintenance shop	each		#N/A	0	\$0	\$0	\$0		
Decontaminate power plant	each		#N/A	0	\$0	\$0	\$0		
Decontaminate bulk fuel storage	each		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.3.1	NA
Decontaminate ANFO plant	each		#N/A	0	\$0	\$0	\$0		
Decontaminate offices/warehouse/accom	each		#N/A	0	\$0	\$0	\$0		
Removal of asbestos siding on buildings	each		#N/A	0	\$0	\$0	\$0		
Removal of friable asbestos on equipment	each		#N/A	0	\$0	\$0	\$0		
Other			#N/A	0	\$0	\$0	\$0		
OBJECTIVE: REMOVE NON-CONTAMINATED BUILDINGS									
crushing plant	m2		#N/A	0	\$0	\$0	\$0		
conveyors & transfer towers	m2		#N/A	0	\$0	\$0	\$0		
tanks & plumbing	m2		#N/A	0	\$0	\$0	\$0		
thickeners	m2		#N/A	0	\$0	\$0	\$0		
water treatment plant	m2		#N/A	0	\$0	\$0	\$0		
maintenance shop	m2		#N/A	0	\$0	\$0	\$0		
power plant	\$	1756	TBUS	1	\$1,756	100%	\$1,756	\$0 Section B.3.5.3.2	Row# 19
bulk fuel storage	m2		#N/A	0	\$0	\$0	\$0		
ANFO plant	m2		#N/A	0	\$0	\$0	\$0		
offices/warehouse/accom	\$	15804	TBUS	1	\$15,804	100%	\$15,804	\$0 Section B.3.5.3.2	Row# 18
consolidate & dump boneyard debris	m3		#N/A	0	\$0	\$0	\$0		
Related Infrastructure	\$	3512	TBUS	1	\$3,512	100%	\$3,512	\$0 Section B.3.5.3.2	Row# 20
OBJECTIVE: BREAK BASEMENT SLABS									
crushing plant	m2		#N/A	0	\$0	\$0	\$0		
conveyors & transfer towers	m2		#N/A	0	\$0	\$0	\$0		
tanks & plumbing	m2		#N/A	0	\$0	\$0	\$0		
thickeners	m2		#N/A	0	\$0	\$0	\$0		
water treatment plant	m2		#N/A	0	\$0	\$0	\$0		
maintenance shop	m2		#N/A	0	\$0	\$0	\$0		
power plant	m2		#N/A	0	\$0	\$0	\$0		
bulk fuel storage	m2		#N/A	0	\$0	\$0	\$0		
ANFO plant	m2		#N/A	0	\$0	\$0	\$0		
offices/warehouse/accom	m2		#N/A	0	\$0	\$0	\$0		
Other	m2		#N/A	0	\$0	\$0	\$0		
OBJECTIVE: LANDFILL FOR DEMOLITION WASTE									
Place soil cover	m3		#N/A	0	\$0	\$0	\$0		
Vegetate	ha		#N/A	0	\$0	\$0	\$0		
Landfill disposal fee	tonne		#N/A	0	\$0	\$0	\$0		
OBJECTIVE: GRADE AND CONTOUR MILL & PLANT SITE									
crushing plant	m2		#N/A	0	\$0	\$0	\$0		
conveyors & transfer towers	m2		#N/A	0	\$0	\$0	\$0		
tanks & plumbing	m2		#N/A	0	\$0	\$0	\$0		
thickeners	m2		#N/A	0	\$0	\$0	\$0		
water treatment plant	m2		#N/A	0	\$0	\$0	\$0		
maintenance shop	m2		#N/A	0	\$0	\$0	\$0		
power plant	m2		#N/A	0	\$0	\$0	\$0		
bulk fuel storage	m2		#N/A	0	\$0	\$0	\$0		
ANFO plant	m2		#N/A	0	\$0	\$0	\$0		
offices/warehouse/accom	m2		#N/A	0	\$0	\$0	\$0		
other	m2		#N/A	0	\$0	\$0	\$0		
OBJECTIVE: RECLAIM ROADS									
Remove culverts	each		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.3.3	NA
Remove bridges	each		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.3.3	NA
Scarify and install water breaks	ha		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.3.3	NA
remove/doze down berms	m3		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.3.3	NA
create wildlife passage ramps	m3		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.3.3	NA
Vegetate	ha		#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.3.3	NA
other			#N/A	0	\$0	\$0	\$0	\$0 Section B.3.5.3.3	NA
SPECIALIZED ITEMS									
Decommission Decommission Laydown Areas	\$	878	TBUS	1	\$878	100%	\$878	\$0 Section B.3.5.3.4	Row# 21
General site Clean up	\$	2634	TBUS	1	\$2,634	100%	\$2,634	\$0 Section B.3.5.3.4	Row# 22
Camp Operation	\$	7404	TBUS	1	\$7,404	100%	\$7,404	\$0 Section B.3.5.3.4	Row# 35 to Row #38
Fly waste from Mid Rail Camp to Mary River Camp for landfill	\$	104180	TBUS	1	\$104,180	100%	\$104,180	\$0 Section B.3.5.3.4	Row# 23
Subtotal					\$136,168	100%	\$136,168	\$0	
					Pct Land		Total Land	Total Water	

FIGURE A- 5: TYPE B BUILDINGS AND EQUIPMENT RECLAMATION COSTS - MID-RAIL CAMP

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Building / Equip Name: <i>Steensby Inlet Camp</i>				Bldg / Equip #: <i>9</i>					
ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost % Land	Land Cost	Water Cost	Refer to Section	Refer to Table B-2, Row #
OBJECTIVE: DISPOSE MOBILE EQUIPMENT									
Decontaminate and ship off-site	\$	4218	TBUS	1	\$4,218	100%	\$4,218	\$0 Section B.3.5.4.1	Row #32
Decontaminate, dispose on-site	each		#N/A	0	\$0		\$0	\$0	
Other (sealift for equipmt)	\$	2020	TBUS	1	\$2,020	100%	\$2,020	\$0 Section B.3.5.4.1	Row #31
OBJECTIVE: REMOVE CONTAMINATED BUILDINGS									
Decontaminate crushing plant	each		#N/A	0	\$0		\$0	\$0	
Decontaminate tanks & plumbing	each		#N/A	0	\$0		\$0	\$0	
Decontaminate thickeners	each		#N/A	0	\$0		\$0	\$0	
Decontaminate water treatment plant	each		#N/A	0	\$0		\$0	\$0 Section B.3.5.4.2	NA
Decontaminate maintenance shop	each		#N/A	0	\$0		\$0	\$0	
Decontaminate power plant	each		#N/A	0	\$0		\$0	\$0	
Decontaminate bulk fuel storage	each		#N/A	0	\$0		\$0	\$0	
Decontaminate ANFO plant	each		#N/A	0	\$0		\$0	\$0	
Decontaminate offices/warehouse/accom	each		#N/A	0	\$0		\$0	\$0	
Removal of asbestos siding on buildings	each		#N/A	0	\$0		\$0	\$0	
Removal of friable asbestos on equipment	each		#N/A	0	\$0		\$0	\$0	
Other			#N/A	0	\$0		\$0	\$0	
OBJECTIVE: REMOVE NON-CONTAMINATED BUILDINGS									
crushing plant	m2		#N/A	0	\$0		\$0	\$0	
conveyors & transfer towers	m2		#N/A	0	\$0		\$0	\$0	
tanks & plumbing	m2		#N/A	0	\$0		\$0	\$0	
thickeners	m2		#N/A	0	\$0		\$0	\$0	
water treatment plant	m2		#N/A	0	\$0		\$0	\$0	
maintenance shop	m2		#N/A	0	\$0		\$0	\$0	
power plant	\$	2020	TBUS	1	\$2,020	100%	\$2,020	\$0 Section B.3.5.4.3	Row #26
bulk fuel storage	\$	1670	TBUS	1	\$1,670	100%	\$1,670	\$0 Section B.3.5.4.3	Row #29
ANFO plant	m2		#N/A	0	\$0		\$0	\$0	
offices/warehouse/accom	\$	23448	TBUS	1	\$23,448	100%	\$23,448	\$0 Section B.3.5.4.3	Row #25
consolidate & dump boneyard debris	m3		#N/A	0	\$0		\$0	\$0	
Related Infrastructure	\$	2634	TBUS	1	\$2,634	100%	\$2,634	\$0 Section B.3.5.4.3	Row #27
OBJECTIVE: BREAK BASEMENT SLABS									
crushing plant	m2		#N/A	0	\$0		\$0	\$0	
conveyors & transfer towers	m2		#N/A	0	\$0		\$0	\$0	
tanks & plumbing	m2		#N/A	0	\$0		\$0	\$0	
thickeners	m2		#N/A	0	\$0		\$0	\$0	
water treatment plant	m2		#N/A	0	\$0		\$0	\$0	
maintenance shop	m2		#N/A	0	\$0		\$0	\$0	
power plant	m2		#N/A	0	\$0		\$0	\$0	
bulk fuel storage	m2		#N/A	0	\$0		\$0	\$0	
ANFO plant	m2		#N/A	0	\$0		\$0	\$0	
offices/warehouse/accom	m2		#N/A	0	\$0		\$0	\$0	
Other	m2		#N/A	0	\$0		\$0	\$0	
OBJECTIVE: LANDFILL FOR DEMOLITION WASTE									
Place soil cover	m3		#N/A	0	\$0		\$0	\$0	
Vegetate	ha		#N/A	0	\$0		\$0	\$0	
Landfill disposal fee	tonne		#N/A	0	\$0		\$0	\$0	
OBJECTIVE: GRADE AND CONTOUR MILL & PLANT SITE									
crushing plant	m2		#N/A	0	\$0		\$0	\$0	
conveyors & transfer towers	m2		#N/A	0	\$0		\$0	\$0	
tanks & plumbing	m2		#N/A	0	\$0		\$0	\$0	
thickeners	m2		#N/A	0	\$0		\$0	\$0	
water treatment plant	m2		#N/A	0	\$0		\$0	\$0	
maintenance shop	m2		#N/A	0	\$0		\$0	\$0	
power plant	m2		#N/A	0	\$0		\$0	\$0	
bulk fuel storage	m2		#N/A	0	\$0		\$0	\$0	
ANFO plant	m2		#N/A	0	\$0		\$0	\$0	
offices/warehouse/accom	m2		#N/A	0	\$0		\$0	\$0	
other	m2		#N/A	0	\$0		\$0	\$0	
OBJECTIVE: RECLAIM ROADS									
Remove culverts	each		#N/A	0	\$0		\$0	\$0 Section B.3.5.4.4	NA
Remove bridges	each		#N/A	0	\$0		\$0	\$0 Section B.3.5.4.4	NA
Scarify and install water breaks	ha		#N/A	0	\$0		\$0	\$0 Section B.3.5.4.4	NA
remove/doze down berms	m3		#N/A	0	\$0		\$0	\$0 Section B.3.5.4.4	NA
create wildlife passage ramps	m3		#N/A	0	\$0		\$0	\$0 Section B.3.5.4.4	NA
Vegetate	ha		#N/A	0	\$0		\$0	\$0 Section B.3.5.4.4	NA
other			#N/A	0	\$0		\$0	\$0 Section B.3.5.4.4	NA
SPECIALIZED ITEMS									
Decommission Decommission Laydown Areas	\$	7644	TBUS	1	\$7,644	100%	\$7,644	\$0 Section B.3.5.4.5	Row #28
General site Clean up	\$	4218	TBUS	1	\$4,218	100%	\$4,218	\$0 Section B.3.5.4.5	Row #30
Camp Operation	\$	18304	TBUS	1	\$18,304	100%	\$18,304	\$0 Section B.3.5.4.5	Row #39
Resupply by Helicopter	\$	57239	TBUS	1	\$57,239	100%	\$57,239	\$0 Section B.3.5.4.5	Row #33
Demobilize Freight Sealift Steensby Port to Port of Valleyfield	\$	575726	TBUS	1	\$575,726	100%	\$575,726	\$0 Section B.3.5.4.5	Row #40 to Row # 42
Subtotal					\$699,141	100%	\$699,141	\$0	
					Pct Land		Total Land	Total Water	

FIGURE A- 6: TYPE B BUILDINGS AND EQUIPMENT RECLAMATION - STEENSBY INLET

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A.4 Water

1 Water Management :

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost %	Land Cost	Water Cost	Refer to Section	Refer to Table B-2, Row #
A OBJECTIVE: WATER SUPPLY EMBANKMENT									
Toe buttress, drain mat'l	m3		#N/A	0	\$0		\$0		
, fill mat'l A	m3		#N/A	0	\$0		\$0		
, fill mat'l B	m3		#N/A	0	\$0		\$0		
Rip rap	m3		#N/A	0	\$0		\$0		
Vegetate	ha		#N/A	0	\$0		\$0		
Breach dam	m3		#N/A	0	\$0		\$0		
Other			#N/A	0	\$0		\$0		
B OBJECTIVE: UPGRADE SPILLWAY									
Excavate channel, mat'l A	m3		#N/A	0	\$0		\$0		
, mat'l B	m3		#N/A	0	\$0		\$0		
Concrete	m3		#N/A	0	\$0		\$0		
Rip rap	m3		#N/A	0	\$0		\$0		
Other			#N/A	0	\$0		\$0		
E OBJECTIVE: STABILIZE &/OR UPGRADE DIVERSION DITCHES									
Excavate channel	m3		#N/A	0	\$0		\$0		
doze & spread excavated material	m3		#N/A	0	\$0		\$0		
Vegetate, spread material	ha		#N/A	0	\$0		\$0		
Rip rap in channel base	each		#N/A		\$0		\$0		
F OBJECTIVE: BREACH DITCHES									
Excavate breaches	m3		#N/A	0	\$0		\$0		
install rip rap	m3		#N/A	0	\$0		\$0		
install flow dissipation	m3		#N/A	0	\$0		\$0		
vegetate remainder of ditch	m2		#N/A	0	\$0		\$0		
G OBJECTIVE: REMOVE PIPELINES									
Remove pipes	\$	14808	TBUS	1	\$14,808		\$0	\$14,808	Section B.3.7.1 Row #3
Concrete plug deep pipes	m3		#N/A	0	\$0		\$0		
Other			#N/A	0	\$0		\$0		
H Groundwater Collection - Long-term Collection System									
excavate/install sumps	m2		#N/A	0	\$0		\$0		
install pumping wells	m3		#N/A	0	\$0		\$0		
install pumps/pipelines/power supply			#N/A	0	\$0		\$0		
I OBJECTIVE: COLLECT DRAINAGE FOR TREATMENT									
Excavate channel	m3		#N/A	0	\$0		\$0		
doze & spread excavated material	m3		#N/A	0	\$0		\$0		
Vegetate, spread material	ha		#N/A	0	\$0		\$0		
Rip rap in channel base	each		#N/A	0	\$0		\$0		
Construct contaminated water storage pond									
Excavation	m3		#N/A	0	\$0		\$0		
supply geomembrane, HDPE, ES3, GCL	m2		#N/A	0	\$0		\$0		
upper and lower bedding layers	m3		#N/A	0	\$0		\$0		
install geomembrane, HDPE, ES3, GCL	m2		#N/A	0	\$0		\$0		
erosion protection layer	m3		#N/A	0	\$0		\$0		
J OBJECTIVE: TREAT DRAINAGE (see "ONGOING TREATMENT" for operating costs)									
Build treatment plant	LS		#N/A	0	\$0		\$0		
build sludge containment facility	LS		#N/A	0	\$0		\$0		
Subtotal					\$14,808	0%	\$0	\$14,808	
						Pct	Total	Total	
						Land	Land	Water	

FIGURE A- 7: TYPE B WATER MANAGEMENT RECLAMATION COSTS

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	Exploration Closure and Reclamation Plan	Issue Date: January 25, 2021 Revision: 2	
	Exploration	Document #: BAF-PH1-830-P16-0038	

Appendix B

Cost Estimate Assumptions for RECLAIM Model

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B.1 Introduction

The costs for the Type B Closure Cost Estimate were determined using the costs presented in Baffinland Iron Mines Corporation, Mary River Project, 2013 Abandonment and Reclamation Plan For Advanced Exploration Activities, January 2013 (hereon referred to as: 2013 A&R Plan (AMEC, January 2013))³. Appendix G3, Cost Estimation Details for Closure of the 2013 A&R Plan (AMEC, January 2013) For Advanced Exploration Activities was used for detailed cost analysis. All capital costs described in 2013 A&R Plan (AMEC, January 2013) relating to the scope of work described in the renewal and amendment of Baffinland Iron Mines Corporation (BIMC) Type “B” Water Licence No. 2BE-MRY1421 are captured in the supporting RECLAIM model unless noted otherwise.

RECLAIM makes use of separate worksheets to organize the information, and calculate the closure and reclamation costs based on Unit Costs predefined for several activities (a list of the unit costs defined by RECLAIM can be found in the ‘Unit_Costs’ tab of each RECLAIM model). Components addressed include:

- Open pit.
- Waste Rock pile.
- Buildings and Equipments.
- Chemicals.
- Water.
- Mobilization.
- Post Closure.
- Ongoing water monitoring.

Several reclamation strategies (“Objectives”) are listed for each component, and broken down into lists of actions that can be priced separately. A unit cost spreadsheet (part of the generic RECLAIM model) provides a range of prices for most actions; it has been completed where possible with the most accurate available or Project specific costs.

Based on the level of information and the type of activities to be performed during Closure and Reclamation, the following percentages were applied to the indirect costs into the RECLAIM model. These percentages are calculated based on the subtotal of capital costs:

- Project Management – 5%.
- Bonding – 1%.
- Insurance – 1%.

³ This document has been distributed and made available to all relevant stakeholder and any additional evidence required to support unit costs and quantities can be found within the 2013 A&R Plan (AMEC, January 2013).

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- Engineering – 5%.
- Contingency – 10%.

The cost estimate in the 2013 A&R Plan (AMEC, January 2013) Appendix G3 was developed based on all the closure and reclamation costs unit rates and quantities defined as person day and equipment hours. The dollar value of these calculations was carried over to the RECLAIM model to account for them.

To reflect the cost presented in Appendix G3 of the 2013 A&R Plan (AMEC, January 2013) into RECLAIM a hybrid system was developed. With this system the total cost for each item (man hour cost + equipment cost) was input as the quantity assuming a Unit Cost of \$1 without contingency. For example, if the cost of the reclamation activities for a certain item was estimated as \$20,000 in the 2013 A&R Plan (AMEC, January 2013), then it was assigned 20,000 units at \$1 in the RECLAIM model.

Note: RECLAIM spreadsheet calculates Project Management fee as a percentage of the subtotal of capital costs (for the purpose of this estimate, a 5% of the subtotal of capital costs was assigned to the Project Management). Appendix G3 of 2012 A&R Plan has a breakdown for Project Management & Supervision costs (General Site Area, cells 1 to 9, Appendix G3 of 2013 A&R Plan (AMEC, January 2013)) which works out as 3% of the total capital cost. This AMEC cost was therefore excluded from the RECLAIM model to avoid double counting.

Note: All contingency values assigned in 2013 A&R Plan (AMEC, January 2013) - Appendix G3 have not been included to allow for RECLAIM's contingency methodology as a percentage of the subtotal of capital costs. For the purpose of this estimate, a 10% contingency was assigned. A 10% contingency was determined based on review of the Qikiqtani Inuit Association (QIA) Abandonment and Reclamation Policy for Inuit Owned Lands (2013) , Appendix D and BIMC experience in North Baffin Island supported by contributions from its consultants, Hatch, which have extensive Canadian and international closure experience in Arctic and other environments. Reclamation activities for the Mary River Exploration Project are predominantly an earthworks exercise with simple demolition. High allowances for contingency are not required as the construction program will be relatively simple.

In order to keep track the source of the costs and quantities and what activities drive them, a reference was inserted in each line item of RECLAIM that cross references the costing source to Appendix G3 of the 2013 A&R Plan (AMEC, January 2013). Therefore the RECLAIM Model presented and Appendix G3 of the 2013 A&R Plan (AMEC, January 2013) should be read as complementary documents. Based on calculations of the RECLAIM Model, the cost of reclamation for the scope of work described in the renewal and amendment of Baffinland Iron Mines Corporation (BIMC) Type "B" Water Licence No. 2BE-MRY1421 is as follows:

TABLE B- 1: TYPE B CLOSURE COST ESTIMATE REALLOCATION SUMMARY

Liability Allocation	IOL			CROWN			PROJECT TOTAL
	Land	Water	Total	Land	Water	Total	
DIRECT COSTS	\$120,311	\$14,808	\$135,119	\$886,706	\$0	\$886,706	\$1,021,825
Project Management (5%)	\$6,016	\$740	\$6,756	\$44,335	\$0	\$44,335	\$51,091
Bonding (1%)	\$1,203	\$148	\$1,351	\$8,867	\$0	\$8,867	\$10,218
Insurance (1%)	\$1,203	\$148	\$1,351	\$ 8,867	\$0	\$8,867	\$10,218
Engineering (5%)	\$ 6,016	\$740	\$6,756	\$44,335	\$0	\$44,335	\$51,091
Contingency (10%)	\$12,031	\$1,481	\$13,512	\$88,671	\$0	\$88,671	\$102,183
GRAND TOTAL CAPITAL COSTS	\$146,779	\$18,066	\$164,845	\$1,081,781	\$0	\$1,081,781	\$1,246,627

B.2 Type B Closure Cost Estimate

Costs under Type B Water Licence include:

- All costs associated with Steensby Camp
 - ♦ Steensby Inlet Camp operation.
 - ♦ Decommission of Steensby Inlet Camp.
 - ♦ Demobilize freight Sealift Steensby Port to Port Valleyfield.
- All cost associated with Mid-Rail and any other rail camps
 - ♦ Mid-Rail Camp operation.
 - ♦ Decommission of Remotes Sites.
 - ♦ Decommission of Mid-Rail Camp.
- All Costs associated with drilling and drill holes;
 - ♦ Mineral Exploration Areas.
- All Costs associated with additional temporary in nature Pioneer/Satellite Camps, if any.

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A summary of the Type B Closure Cost Estimate RECLAIM model is presented in FIGURE A- 1 of Appendix A. All subsequent figures FIGURE A- 3 to FIGURE A- 7 of Appendix A are screenshots from the respective tabs in the RECLAIM model that derives the summary cost table.

B.3 Assumptions

The screenshots of the RECLAIM Model presented in Figures A-2 to A-7 are based on the assumptions listed in Section B.3.1 to Section B.3.10. This assumption should be read in conjunction with TABLE B- 2, which represents the Basis for 2013 Estimate, based on AMEC, 2013. Baffinland Iron Mines Corporation, Mary River Project, 2013 Abandonment and Reclamation Plan for Advanced Exploration Activities, dated January 2013.

No cost associated with the mobilization and demobilization of fuel has been accounted for in the Type B Water License. However, cost associated with fuel related to Type B reclamation work as described in Appendix A has been accounted for in the Type 'A' Water License (\$2,900,091), including the following activities:

- Cash cost of fuel and barrel deposit (\$1,535,691);
- Hercules Aircraft mobilization from Yellowknife to Mary River (\$1,364,400).

B.3.1 Open Pit

There will be no Open Pit activities associated with the Type B Water Licence and therefore this component of RECLAIM was not considered. Geotechnical Drilling have been determined to have a negligible final reclamation cost as they are progressively reclaimed to meet to reclamation objectives during operations and this cost is captured in the drilling programs operations budget.

Mineral Exploration areas are included and accounted for in the Type B Reclamation Cost Estimate, as is presented in FIGURE A- 2. The basis of estimate is presented in TABLE B- 2 and includes the following reclamation activities:

B.3.1.1 OBJECTIVE: Cover/Contour Slopes

The activity "Level pads, backfill sumps and grade to natural contours" has been included in the Type B Reclamation Cost Estimate, as presented in FIGURE A- 2: Type B Open Pit Reclamation Costs. The Basis for 2013 Estimate, based on AMEC 2013, is presented in TABLE B- 2, Row #5.

B.3.1.2 OBJECTIVE: Other Items

The following activities have been included in the Type B Reclamation Cost Estimate, as presented in FIGURE A- 2. The basis of estimate is presented in TABLE B- 2 and includes the following items:

- Drill holes filled and residual casings cut (see TABLE B- 2, Row #4)
- Inspection and final reclamation of exploration drill hole locations (see TABLE B- 2, Row #7)

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B.3.2 Underground Mine

There will be no Underground Mine associated with the Mary River Exploration Project and therefore this component of RECLAIM was not considered.

B.3.3 Tailings

There will be no Tailings activities associated with the Type B Water Licence and therefore this component of RECLAIM was not considered.

B.3.4 Stockpile

There will be no Stockpiles associated with the Type B Water Licence and therefore this component of RECLAIM was not considered.

B.3.5 Buildings and Equipment Assumptions

B.3.5.1 Mineral Exploration Areas

Small mobile pioneer camps may be established under the authorization of Type “B” Water Licence No. 2BE-MRY1421. These camps will be temporary in nature, mobile, have a limited population (anticipated each camp would not exceed 49 persons) and only be used on a short term basis. Based on these characteristics small mobile pioneer camps have been determined to have a negligible final reclamation cost, as presented in FIGURE A- 4: Type B Buildings and Equipment Reclamation Costs Mineral Exploration Areas.

However, if larger and non-mobile pioneer camps are established under authorization of Type “B” Water Licence No. 2BE-MRY1421an amendment of security estimate cost will be required.

B.3.5.1.1 OBJECTIVE: Specialized Items

The following activities have been included in the Type B Reclamation Cost Estimate as presented in FIGURE A- 3, under the Objective Specialized Items. The basis of estimate is presented in TABLE B- 2 and includes the following items:

- Prepare core for long-term site storage (see TABLE B- 2, Row #6)
- Decommission Salt mixing stations (see TABLE B- 2, Row #8)

B.3.5.2 Remote Sites

FIGURE A- 4 presents the Reclamation Cost associated with Remote Camps. Thus the following Objectives have been considered:

- Reclaim Roads (See Section B.3.5.2.1)
- Specialized Items (See Section B.3.5.2.2)

B.3.5.2.1 OBJECTIVE: Reclaim Roads

No permanent roads for remote sites have been considered.

B.3.5.2.2 OBJECTIVE: Specialized Items

The decommission of remotes sites have been included in the Type B Reclamation Cost Estimate as specialized items for mineral exploration areas, as presented in FIGURE A- 4. The basis of estimate is presented in TABLE B- 2 and includes the following specialized items:

- Inspection and final reclamation of geotechnical drill holes and test pit location (TABLE B- 2, Row #11)
- Removal of casing/thermistors (TABLE B- 2, Row #12)
- Decommissioning of meteorological stations (3) (TABLE B- 2, Row #13)
- Decommissioning of hydrology stations (4) (TABLE B- 2, Row #14)
- Removal of current meter in Steensby Inlet (TABLE B- 2, Row #15)

B.3.5.3 *Mid-Rail Camp*

FIGURE A- 5 presents the Reclamation Cost associated with Mid-Rail Camp. Thus the following Objectives have been considered:

- Remove Contaminated Buildings (See Section B.3.5.3.1)
- Remove Non-Contaminated Buildings (See Section B.3.5.3.2)
- Reclaim Roads (See Section B.3.5.3.3)
- Specialized Items (See Section B.3.5.3.4)

B.3.5.3.1 OBJECTIVE: Remove Contaminated Buildings

Mid-Rail Camp have associated a sewage treatment facility and a fuel storage facility. In the RECLAIM model (FIGURE A- 5), the cost associated to these items (i.e. Decontaminate water treatment plant and Decontaminate bulk fuel storage) is set to nil as these items have been accounted for in the Type B Reclamation Cost Estimate under the activity "Demobilize Freight Sealift Steensby Port to Port of Valleyfield - Year 3". TABLE B- 2 row 45 to 48 present the basis for estimate for this activity.

B.3.5.3.2 OBJECTIVE: Remove Non-Contaminated Buildings

As per FIGURE A- 5, the decommission of the Mid-Rail camp considers 18 wood structure tents and assumes six (6) man crew six (6) days to completely decommission the camp. It also assumes one (1) working supervisor and five (5) labourers. The basis of estimate is presented in TABLE B- 2 and includes the following items:

- Power plant (TABLE B- 2, Decommission/package gensets and incinerator, Row #19)
- Offices/warehouse/accom (TABLE B- 2 Decommission/Package stand alone accommodation/work tent camp, Row #18)
- Related Infrastructure (TABLE B- 2 Decommission tent camp and related infrastructure (lines, piping, associated buildings), Row #20)

B.3.5.3.3 OBJECTIVE: Reclaim Roads

See section B.3.5.2.1

B.3.5.3.4 OBJECTIVE: Specialized Items

The following activities have been included in the Type B Reclamation Cost Estimate as specialized items for Mid-Rail Camp (FIGURE A- 5). The basis of estimate is presented in TABLE B- 2 and includes the following specialized items:

- Decommission Laydown Areas TABLE B- 2, Row #21)
- General site Cleanup (TABLE B- 2, Row #22)
- Camp Operation (TABLE B- 2, Row #35 to Row #38)
- Fly waste from Mid Rail Camp to Mary River Camp for landfilling (TABLE B- 2 Row #23)

In the event of any expansion to Mid-rail Camp, not including the substitution of equivalent facilities, an amendment of security estimate cost would be required.

B.3.5.4 Steensby Inlet Camp

FIGURE A- 6 presents the Reclamation Cost associated with Steensby Inlet Camp. Thus, the following Objectives have been considered:

- Dispose Mobile Equipment (See Section B.3.5.4.1)
- Remove Contaminated Buildings (See Section B.3.5.4.2)
- Remove Non-Contaminated Buildings (See Section B.3.5.4.3)
- Reclaim Roads (See Section B.3.5.4.4)
- Specialized Items (See Section B.3.5.4.5)

B.3.5.4.1 OBJECTIVE: Dispose Mobile Equipment

The following items have been included in the Type B Reclamation Cost Estimate for mobile equipment disposal at Steensby Inlet Camp, as presented in FIGURE A- 6. The basis of estimate is presented in TABLE B- 2 and includes the following items:

- Decontaminate and ship off-site (TABLE B- 2, Organize material for shipment and sealift support, Row #32)
- Other (sealift for equipment) (TABLE B- 2, Decommission remaining mobile equipment (4 pieces), Row #31)

B.3.5.4.2 OBJECTIVE: Remove Contaminated Buildings

Steensby Inlet Camp has associated a sewage treatment facility. In the RECLAIM model (FIGURE A- 6.); the cost associated to this item (i.e. Decontaminate water treatment plant) is set to nil as these items have been accounted for in the Type B Reclamation Cost Estimate under the activity “Demobilize Freight Sealift Steensby Port to Port of Valleyfield - Year 3”. TABLE B- 2, Row #45 to Row #48 presents the basis for estimate for this activity.

B.3.5.4.3 OBJECTIVE: Remove Non-Contaminated Buildings

The decommission of the Steensby Inlet camp have been included in the Type B Reclamation Cost Estimate, as presented in FIGURE A- 6. The basis of estimate is presented in TABLE B- 2 and includes the following items:

- Power Plant (TABLE B- 2, Decommission/package gensets and incinerator, Row #26)
- Bulk fuel storage (TABLE B- 2, Decommission fuel storage (200 drums of fuel), Row #29)
- Offices/warehouse/accom (TABLE B- 2, Decommission/Package stand alone accommodation/work tent camp (25 wood structure tents), Row #25)
- Related Infrastructure (TABLE B- 2, Decommission related infrastructure (lines, piping, associated buildings), Row #27)

B.3.5.4.4 OBJECTIVE: Reclaim Roads

See section B.3.5.2.1

B.3.5.4.5 SPECIALIZED ITEMS

The following activities have been included in the Type B Reclamation Cost Estimate as specialized items for Steensby Inlet Camp, as presented in FIGURE A- 6. The basis of estimate is presented TABLE B- 2 and includes the following specialized items:

- Decommission Laydown Areas TABLE B- 2, Row #28)

- General site Cleanup (TABLE B- 2, Row #30)
- Camp Operation (TABLE B- 2, Row #40 to Row #43)
- Resupply by Helicopter (TABLE B- 2 Row #33)
- Demobilize Freight Sealift Steensby Port to Port of Valleyfield (TABLE B- 2, Row # 45 to Row #48)

In the event of any expansion to Steensby Inlet Camp, not including the substitution of equivalent facilities, an amendment of security estimate cost would be required.

B.3.6 Chemicals

There will be no foreseeable chemical reclamation activities required associated with the Type B Water Licence scope of work and therefore this component of RECLAIM was not considered.

B.3.7 Water Management

B.3.7.1 Objective: Remove Pipelines

The removal of pipelines for exploration areas has been included as part of the water management tab. The basis for estimate (based on AMEC, January 2013) considers four (4) person crew (general labour) during three (3) days. The estimate also considers six (6) hours helicopter time to sling down water lines from Deposit #1. The water lines have been packaged and moved numerous times. Refer to TABLE B- 2, Row #3, for Basis for 2013 Estimate.

B.3.8 Mobilization

Mobilization costs have been accounted for in the Buildings and Equipment tab of RECLAIM. No mobilization costs were included in the Mobilization tab, and therefore this component of RECLAIM was not considered.

B.3.9 Post Closure

Post Closure activities associated with the Type B Water Licence will be conducted in conjunction with the operation of the Mary River Project and during closure as described in the Mary River Interim Mine Closure and Reclamation Plan. Therefore no cost has been considered the Type B Reclamation Cost Estimate.

B.3.10 On Going Water

On-Going Water activities associated with the Type B Water Licence will be conducted in conjunction with the operation of the Mary River Project and during closure as described in the Mary River Interim Mine Closure and Reclamation Plan. Therefore no cost has been considered the Type B Reclamation Cost Estimate.

TABLE B- 2: TYPE B ESTIMATE COST - BASIS FOR 2013 ESTIMATE⁴

Row #	Reclamation Activities	Labour				Equipment					
		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
1	Grand Total				\$19,028				\$64,695	\$83,723	
2	Decommission mineral exploration areas - Grand Total				\$19,028				\$64,695	\$83,723	
3	Remove water lines from exploration areas	Person Day	12	\$439	\$5,268	Hours	6	\$1,590	\$9,540	\$14,808	Four (4) person crew - three (3) days. Assume general labour used. Six (6) hours helicopter time to sling down water lines from Deposit #1. The water lines have been packaged and moved numerous times. Estimate based on historical productivity to package and move piping.

⁴ Source and additional supporting can be found in: AMEC, 2013. Baffinland Iron Mines Corporation, Mary River Project, 2013 Abandonment And Reclamation Plan For Advanced Exploration Activities, dated January 2013

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Row #	Reclamation Activities	Labour				Equipment					
		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
4	Drill holes filled and residual casings cut	Person Day	4	\$439	\$1,756	Hours	18	\$1,590	\$28,620	\$30,376	Geotech hole reclamation helicopter utilization in 2009 = 0.27 hours/hole with holes spread out across 130miles of railway. Assume the same drill hole reclamation productivity for exploration drills although the exploration holes are all located only kilometres from the main camp. There are 18 holes requiring reclamation at Deposit #1. Assume a very conservative (1) hour per hole, (2) man labour crew with helicopter support.
5	Level pads, backfill sumps and grade to natural contours	Person Day	5	\$996	\$4,980	Hours	60	\$217	\$13,020	\$18,000	Assume excavator used to backfill. 18 holes with sumps. Sumps are 3m x 10m x 1.5m = 45m3 each. Assume HEO and 3 hours dozer time/sump to backfill and reclaim each sump.

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Row #	Reclamation Activities	Labour				Equipment					
		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
6	Prepare core for long-term site storage adjacent to airstrip at Mary River	Person Day	4	\$439	\$1,756	Hours		\$0	\$0	\$1,756	The entire exploration core was moved in to containers for permanent storage in 2010. An allowance has been made to containerize the working inventory of core not containerized under an abandonment scenario.
7	Inspection and final reclamation of exploration drill hole locations	Person Day	2	\$439	\$878	Hours	6.5	\$1,590	\$10,335	\$11,213	Deposit 1 - 45; Deposit 2&3 - 23 holes. Although the majority of the reclamation work was completed in 2010, final inspections were not completed and the estimate reflects the full scope of work as outstanding. Scope includes final inspection by helicopter with general labour support

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Row #	Reclamation Activities	Labour				Equipment					
		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
8	Decommission salt mixing stations	Person Day	10	\$439	\$4,390	Hours	2	\$1,590	\$3,180	\$7,570	Only one helicopter lift is required. Estimate a conservative 2 hours helicopter time to remove salt station from mineral exploration area. Scope to be completed by helicopter with general labour support.
9	Remote Sites										
10	Grand Total				\$ 15,024				\$ 87,768	\$ 102,792	
11	Inspection and final reclamation of geotechnical drill holes and test pit locations	Person Day	10	\$439	\$4,390	Hours	33	\$1,590	\$52,470	\$56,860	2012 Estimate based on actual labour and helicopter hours to complete exactly half of the holes in 2009. Assume Helicopter hours = 0.27 hours/hole. 10 additional helicopter hours added to the 23 hours required to cover additional mobilization time to the south end of the rail alignment.

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Row #	Reclamation Activities	Labour				Equipment					
		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
12	Removal of casing/thermistors	Person Day	6	\$439	\$2,634	Hours	16.2	\$1,590	\$25,758	\$28,392	2012 Estimate revised based on 2009 geotech hole actual reclamation productivity and costs. Helicopter hours = 0.27 hours/hole * 60 holes = 16.2 hours. Labour 1.08 Man hrs/hole* 60 = 65 hours = six (6) man days. Scope to be completed by helicopter with general labour support.
13	Decommissioning of meteorological stations (3)	Person Day	6	\$800	\$4,800	Hours	3	\$1,590	\$4,770	\$9,570	Assume two (2) persons /day/station and 1 hour helicopter time support for each. Scope includes demolition and disposal in Landfills. Scope to be completed by helicopter with general labour support.

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Row #	Reclamation Activities	Labour				Equipment					
		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
14	Decommissioning of hydrology stations (4)	Person Day	4	\$800	\$3,200	Hours	3	\$1,590	\$4,770	\$7,970	Labour budget two (2) persons for two (2) days to remove all the hydrology stations. Helicopter hour budget revised based on detailed analysis of flying distance from MR to meters back to MR. Estimated distance is 227knots. Avg Helicopter speed is 120 k/hr. Total flying time is 227 Kn/120kn/hr = 1.9 hrs, therefore assume 3 hours of helicopter time. Scope to be completed by helicopter with general labour support.
15	Removal of current meter in Steensby Inlet	Person Day			\$0	Hours			\$0	\$0	The battery for the buoy release mechanism on both units no longer has power. The units are no longer retrievable. No cost applied to task in 2012.

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Row #	Reclamation Activities	Labour				Equipment				Total cost	Basis for 2013 Estimate
		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost		
	Mineral Exploration Areas (Dep. 1-3)										
16	Camp and Related Facilities										
17	Decommission Mid - Rail Camp (14 days @ 6 man camp)		76		\$33,364				\$95,400	\$128,764	
18	Decommission/Package stand alone accommodation/work tent camp	Person Day	36	\$439	\$15,804	Hours			\$0	\$15,804	(18 wood structure tents) Assumes 6 man crew 6 days to completely decommission the camp. Assume one (1) working supervisor and five (5) laborers. General labour & equipment rates.
19	Decommission/Package gensets and incinerator	Person Day	4	\$439	\$1,756	Hours			\$0	\$1,756	
20	Decommission tent camp and related infrastructure (lines, piping, associated buildings)	Person Day	8	\$439	\$3,512	Hours			\$0	\$3,512	
21	Decommission lay down areas	Person Day	2	\$439	\$878	Hours			\$0	\$878	
22	General site cleanup	Person Day	6	\$439	\$2,634	Hours			\$0	\$2,634	
23	Fly waste from Mid Rail Camp to Mary River Camp for landfilling	Person Day	20	\$439	\$8,780	Hours	60	\$1,590	\$95,400	\$104,180	

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Row #	Reclamation Activities	Labour				Equipment					
		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
24	Decommission Steensby Inlet Camp (14 Days @ 6 man camp)		86		\$38,500				\$66,612	\$105,112	
25	Decommission/Package stand alone accommodation/work tent camp (25 wood structure tents)	Person Day	48	\$439	\$21,072	Hours	36	\$66	\$2,376	\$23,448	Assume six (6) man operations for eight (8) days. Equipment costed at 3rd party contractor rate. Operator labour and equipment rates
26	Decommission/package gensets and incinerator	Person Day	4	\$439	\$1,756	Hours	4	\$66	\$264	\$2,020	Assume four (4) persons one (1) day, general labour and equipment cost. Equipment costed at 3rd party contractor rate. General labour and equipment rates.
27	Decommission related infrastructure (lines, piping, associated buildings)	Person Day	6	\$439	\$2,634	Hours	0	\$66	\$0	\$2,634	Assume three (3) persons for two (2) days. Equipment costed at 3rd party contractor rate. General labour and equipment rates.

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Row #	Reclamation Activities	Labour				Equipment					
		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
28	Decommission lay down areas	Person Day	12	\$439	\$5,268	Hours	36	\$66	\$2,376	\$7,644	Assume four (4) persons for three (3) days to clean up camp to decommission camp lay down area. Sealift lay down area requires no decommissioning - Material ready to ship. Equipment costed at 3rd party contractor rate. General labour and equipment rates.
29	Decommission fuel storage (200 drums of fuel)	Person Day	2	\$439	\$878	Hours	12	\$66	\$792	\$1,670	Only 180 drums remain at the camp. Assume two (2) man days' labour, and equipment to re-strap partial pallets Equipment costed at 3rd party contractor rate. Operator labour and equipment rates.
30	General site cleanup	Person Day	6	\$439	\$2,634	Hours	24	\$66	\$1,584	\$4,218	Assume three (3) persons two (2) days. Equipment costed at 3rd party contractor rate. Operator labour and equipment rates.

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Row #	Reclamation Activities	Labour				Equipment					
		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
31	Decommission remaining mobile equipment (4 pieces)	Person Day	2	\$812	\$1,624	Hours	6	\$66	\$396	\$2,020	Assume one (1) mechanic and one operator for one (1) day to drain fuel tanks - This is the only requirement for sealift. Equipment costed at 3rd party contractor rate. Operator labour and equipment rates.
32	Organize material for shipment and sealift support	Person Day	6	\$439	\$2,634	Hours	24	\$66	\$1,584	\$4,218	Assume two (2) person for sealift support for three (3) days. Assume Labour and equipment cost. Equipment costed at 3rd party contractor rate. Operator labour and equipment rates.
33	Steensby Port resupply by Helicopter	Person Day	0	\$0	\$0	Hours	36	\$1,590	\$57,240	\$57,240	Hours are for removal of the floating dock and water line (12) + 12 hours/week *2 week demob+sealift support.
34	Camp Operations										
35	MidRail Operate 7 person camp				\$7,204				\$200	\$7,404	

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Row #	Reclamation Activities	Labour				Equipment					
		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
36	6 person camp operation (Support Labour)	Person Day	9	\$621	\$5,589	Hours			\$0	\$5,589	2012 estimate basis - nine (9) days living at site requires one (1) cook. Last five (5) days are fly in.
37	Camp Operating Overhead	Person Day	0	\$0	\$0	Monthly Lot	1	\$200	\$200	\$200	2012 estimate basis (Monthly costs): - Telephone & communications = one (1) satellite phone (\$100) = \$100 - Office Supplies \$100/month - Total monthly lot cost = \$200
38	Food	Person Day	85	\$19	\$1,615				\$0	\$1,615	2012 estimated contains revised person days based on Mid-Rail reclamation work and camp operations support.
39	Steensby Inlet Camp Operation				\$18,104				\$200	\$18,304	

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Row #	Reclamation Activities	Labour				Equipment					
		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
40	6 person camp operation - Decommissioning	Person Day	24	\$530	\$12,720	Hours			\$0	\$12,720	Requires one (1) cook and a bear monitor/laborer. Last two days the camp is supported from Mary River by helicopter. See labour rates.
41	2 person camp operation - Sealift	Person Day	6	\$530	\$3,180	Hours			\$0	\$3,180	Estimate for three (3) day sealift. Three (3) Day temporary tent operation for sea lift support - Requires one (1) cook and one (1) bear monitors. Sealift labour budgeted at two (2) since all the material is packaged and the sealift company has the equipment. Additional labour as support only.

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		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
42	Camp Operating Overhead	Person Day	0	\$0	\$0	Monthly Lot	1	\$200	\$200	\$200	Estimate based on (Monthly costs): - Telephone and communications = one (1) satellite phone (\$100) = \$100 - Office Supplies \$100/month - Total monthly lot cost = \$200
43	Food	Person Day	116	\$19	\$2,204				\$0	\$2,204	Estimate based on Total Steensby Man days @ \$19/person day food. See food estimate based on 2010 actual costs.
44	Sealift Materials										
45	Demobilize Freight Sealift Steensby Port to Port of Valleyfield -Year 3				\$0				\$575,726	\$575,726	
46	Shipment, loading and off loading	Person Day	0	\$600	\$0	Hours	0		\$0	\$0	

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		Units	#Units	Unit Rate	Cost	Units	#Units	Unit Rate	Cost	Total cost	Basis for 2013 Estimate
	Mineral Exploration Areas (Dep. 1-3)										
47	Vessel Costs Steensby - 1 freight backhaul sealift in Year 3	Person Day		\$0	\$0	Rev Tonne	1965	\$198	\$389,070	\$389,070	Sealift volumes (m3). = 4912 cubes/2.5 = 1966 Revenue Tonnes. Rate is based Sealift vendor quote =\$198/rev Tonne.
48	Land Freight				\$0	Cubes	4912	\$38	\$186,656	\$186,656	Land freight based on quotes provide for hauling Nuna heavy equipment backhaul to Edmonton, Alberta. The exact demob location is not known. Assume a land freight rate at the high end of the scale. 4912 cubes backhauled at \$38/cubes. Land freight rate provided by vendor quote.

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	Exploration Closure and Reclamation Plan	Issue Date: January 25, 2021 Revision: 2	
	Exploration	Document #: BAF-PH1-830-P16-0038	

Appendix C

Site Photos of Current Site Conditions

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	Exploration	Document #: BAF-PH1-830-P16-0038	



Figure C-1: Steensby Camp Aerial Photo #1



Figure C-2: Steensby Camp Aerial Photo #2

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	Exploration	Document #: BAF-PH1-830-P16-0038	



Figure C-3: Steensby Camp Photo #3



Figure C-4: Mid-Rail Camp Photo #1

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	Exploration	Document #: BAF-PH1-830-P16-0038	



Figure C-5: Mid-Rail Camp Photo #2

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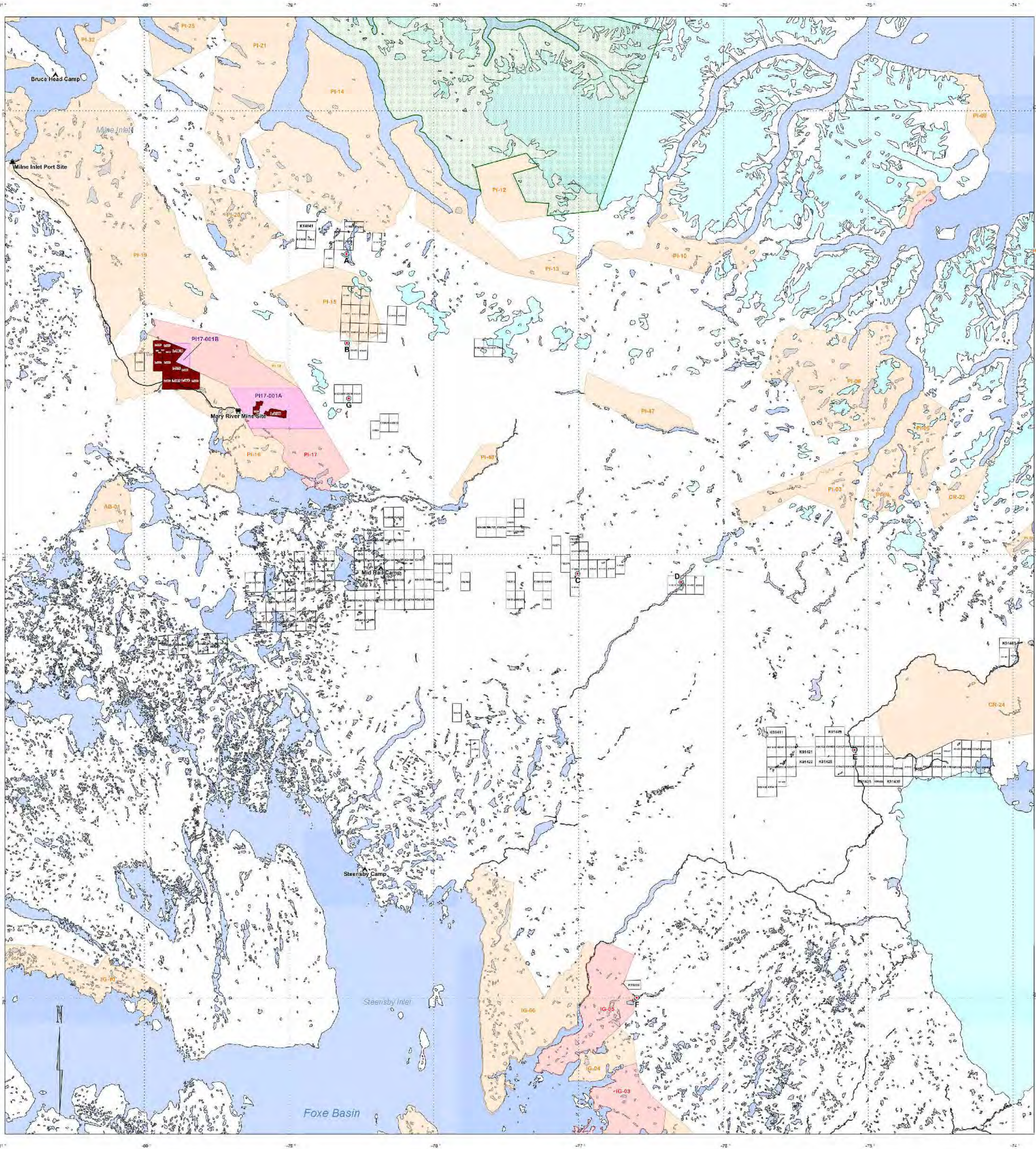
	Exploration Closure and Reclamation Plan	Issue Date: January 25, 2021 Revision: 2	
	Exploration	Document #: BAF-PH1-830-P16-0038	

Appendix D

Locations of Potential Satellite Camps

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Current Land Tenure

Date: 2020-10-28
Author: Jon Hey, P. Geo
Office: Exploration
Drawing: 1
Scale: 1:440,300
Projection: Longitude / Latitude (WGS 84)

0

30.02

kilometers

- LEGEND**

BIM Infrastructure

 - Tote Road
 - Potential Camp (location not exact)

Baffinland Land Tenure

 - Mineral Claim
 - Mining Lease
 - NTI-BIM Exploration Agreement
- Inuit Owned Land**

 - Type 1 - Surface Rights Only
 - Type 2 - Surface and Subsurface Rights Including Minerals

Federal Land

 - National Park

Geographic Features

 - Permanent Snow & Ice
 - Waterbody