Revision 6 Environmental Management Plans: Erosion and Sediment Control Plan, Hazardous Materials Management Plan, Waste Management Plan, Wildlife Management Plan, Spill Contingency Plan, Fisheries Management Plan, Permafrost Monitoring Plan, and Closure and Reclamation Plan

Construction of Concrete Arch Bridge along Inuvik to Tuktoyaktuk Highway (ITH) at km 131.2 over Gunghi Creek

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Table 1. EMP Revision Summary Table

Version #	Date	EMP Section	Description of Change
1	November 18, 2019		
2	December 6, 2019	3.0	Updated Erosion and Sediment Control Plan
2	December 6, 2019	5.0	Updated Waste Management Plan
2	December 6, 2019	6.0	Updated Wildlife Management Plan
2	December 6, 2019	7.0	Updated Spill Contingency Plan
2	December 6, 2019	8.0	Updated Aquatic Effects Monitoring Plan
2	December 6, 2019	10.0	Updated Site Closure and Reclamation Plan
3	November 20, 2020	Document Title, 1.0, 2.1, 9.0, 9.1	Aquatic Effects Monitoring Plan has been changed to Fisheries Management Plan
3	November 20, 2020	-	All table numbers updated throughout the document.
3	November 20, 2020	2.2	Updated monitoring and reporting procedures
3	November 20, 2020	3.3	Updated erosion and sediment control procedures
3	November 20, 2020	3.3.3 and 7.3	Updated work schedule
3	November 20, 2020	4.1	Additional measures for refueling, drip pans, and fuel storage vessels
3	November 20, 2020	4.2	Additional measures for drip pans, and storage vessels
3	November 20, 2020	7.7.5	Added requirements for follow-up reporting of spills
3	November 20, 2020	8.0	Title changed from Aquatic Effects Monitoring to Fisheries Management at the request of DFO to provide clarification that this encompasses all fisheries related management and monitoring, including water quality monitoring.
3	November 20, 2020	8.1	Paragraph 2 has been changed and paragraph 3 was added
3	November 20, 2020	8.1.1	Reference to instream worksite isolation was removed; Reference to Fish and Fish Habitat Protection Measures and Environmental Protection Measures changed to Mitigation Measures;
3	November 20, 2020	8.2	Proponent contact updated

Version #	Date	EMP Section	Description of Change
3	November 20, 2020	8.4	Title changed from Fish and Fish Habitat Protection Measures to Mitigation Measures; Entire section has been updated and includes additional mitigation measures; Instream isolation measures removed (project has been approved by DFO with understanding that water will not be present in a liquid state at the watercourse crossing during construction and therefore instream isolation during construction will not be required)
3	November 20, 2020	-	Version 2, Section 8.5 Surveillance Network Program has been removed (addressed under separate Fisheries Management and Monitoring Plan and QAQC Plan documents); Version 2, Section 8.5.1 Total Suspended Solids/Turbidity Monitoring Plan has been removed (project has been approved by DFO with understanding that water will not be present in a liquid state at the watercourse crossing during construction and therefore water quality monitoring during construction will not be required)
3	November 20, 2020	8.5	Previously Section 8.5.2 in version 2
4	November 27, 2020	3.3.3	March 30, 2020 updated to March 30, 2021
4	November 27, 2020	8.1.1	Reference to section 9.4 mitigation measures updated to section 8.4
4	November 27, 2020	3.2, 5.2, 6.2, 7.2, 7.7.6, and 10.2	Proponent contact information updated.
4	November 27, 2020	10.3	July 2020 updated to July 2021
5	February 19, 2021	3.3.2	Addition of effects and mitigation measures associated with construction and reclamation of a diversion channel.
5	February 19, 2021	3.3.4	Addition of clearly defined monitoring and reporting requirements for erosion and sediment control measures.
6	March 23, 2021	3.3.3, 6.1.1, 8.4.2	Updated construction completion date.
6	March 23, 2021	8.4.3	Added section outlining mitigation measures for construction during the restricted activity timing window.

1.0 Introduction

The Gunghi Creek crossing is located along the Inuvik to Tuktoyaktuk Highway (ITH) at km 131.2. The project consists of replacing the existing 2000 mm in diameter Corrugated Steel Pipe (CSP) with an invert length of 38 m that has major sagging in the center. The proposed replacement structure is a 7518 mm span by 3200 mm rise precast concrete arch bridge. The new bridge will have a 38.96 m length and be installed on a 40° left hand forward (LHF) skew. The project is scheduled for construction during the 2020/2021 winter when environmental impacts such as dust, erosion and silt contamination can be minimized. The following provides information on environmental management of erosion and sediment control, hazardous materials, waste management, wildlife management, spill contingency, fisheries management, permafrost monitoring, site closure and reclamation, and emergency response.

2.0 Environmental Management Plan Implementation

2.1 Training and Communication

The Contractor will ensure all workers are aware of applicable environmental legislation and project specific requirements before construction starts. Environmental Management Plans (EMP) will be communicated to all staff by means of Site Orientation and through regular on-site Safety Meetings and daily Tailgate meetings. Potential topics will include:

- Environmental Management Plan Contents and Onsite location;
- Environmental Management Plan Team Roles and Responsibilities;
- Location of Environmentally Sensitive Areas;
- Permit Requirements Best Management Practices and Mitigation Measures;
- Erosion and Sediment Control Measures;
- Hazardous Material and Waste Management;
- Wildlife Encounter Management;
- Spill Contingency Plans and Location of Spill Kits;
- Emergency Response Procedures;
- Fisheries Management;
- Permafrost Monitoring;
- Monitoring & Reporting Procedures;
- Environmental Emergency Response;
- Site Closure and Reclamation; and
- Contact Information.

Following an environmental impact event, the site superintendent will hold an onsite tailgate meeting to inform crew, discuss the event, receive feedback, assess the response, determine how effective the EMP was in dealing with the event, discuss changes to be made and concerns of workers, supervisors and/or the Contract Authority. Updates will made to the EMP's, as required and implemented immediately following the meeting. This meeting will be held as soon as reasonably practical after the event.

2.2 Monitoring & Reporting

The Contractor will incorporate EMP monitoring and inspections into established corporate safety site inspections. Regular (daily and/or weekly) inspections will be conducted as outlined in the individual EMP's herein. Inspection checklists and reports will be prepared and maintained onsite. Any changes to EMP's, monitoring, or reporting requirement will be communicated during project meetings.

During construction, an environmental monitor will be on site to ensure mitigation measures are being implemented correctly and to respond to any issues that may arise. Monitoring is also intended to support a feedback mechanism so that mitigation measures can be implemented or revised where and when necessary.

A separate Fisheries Management and Monitoring Plan[1] has been developed to outline short-term (construction phase) and medium and long-term (post-construction) monitoring and reporting.

2.3 Documentation

The Contractor will identify a location in the Site Office (trailer) for all applicable EMP documentation including:

- Current Environmental Management Plan's;
- Regulatory permits, approvals, authorizations, and/or notifications;
- Relevant training and meeting (tailgate, meeting minutes) records;
- Current erosion and sediment control plan and drawings;
- Hazardous/non-hazardous material inventory;
- Records of environmental incidents (spill reports);
- Completed environmental inspection checklists, reports, and resolutions;
- Completed environmental monitoring reports (inspections); and
- Site orientation, safety meeting, tailgate meeting and project progress minutes.

3.0 Erosion and Sediment Control Plan

3.1 Purpose and Scope

The Erosion and Sediment Control Plan (ESCP) was a commitment of the Contractor. The plan describes the objectives and mitigation measures related to erosion and sediment control to be used in the construction and operation of the Gunghi Creek crossing including the watercourse crossing, temporary detour, and right-of-way construction. The plan will be complementary to terms and conditions contained in all relevant permits and Authorizations. The ESCP is a "living" plan and will be updated as new information is brought forward. Once the crossing is operational, the ESCP will be reviewed every five years or as required to provide the best guidance in preventing sedimentation and erosion of watercourses and waterbodies.

1 Wood Environment & Infrastructure Solutions. 2020. Fisheries Management and Monitoring Plan, Gunghi Creek Crossing Replacement. Prepared for Government of the Northwest Territories, Department of Infrastructure, Yellowknife, Northwest Territories. Prepared by Wood Environment & Infrastructure Solutions, Edmonton, Alberta.

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3.3 Procedures of Erosion and Sediment Control Measures

As construction activities under this contract are being carried out in the winter, the potential for erosion was considered to be very low. The Contractor will continually monitor the site for signs of erosion and will implement Erosion and Sediment Control (ESC) measures as necessary, as per the contract. The Contractor will install silt fencing along areas of disturbance soils/stockpiles where required to reduce the chance of erosion and/or silt contaminating the waterbodies once the thaw occurs. All ESC measures will be inspected regularly to ensure that they are functioning properly and are maintained, cleaned and/or upgraded as required until complete revegetation of all disturbed areas is achieved. All disturbed areas will be stabilized, vegetated and/or seeded as soon as possible after construction.

The Project has been approved and Fisheries Management and Monitoring Plan developed with the understanding that water will not be present in a liquid state at the watercourse crossing during construction and therefore instream worksite isolation facilities will not be required.

3.3.1 Project Footprint

The crossing replacement footprint including the temporary detour occurring below the ordinary highwater mark will be 368 m^2.

3.3.2 Effects and Mitigation

A list of activities, potential effects and proposed mitigation measures are provided in Table 2.

Table 2. Activities, Potential Effects, and Proposed Mitigation Measures

Activities	Potential Effects	Proposed Mitigation Measures
Detour Construction	• Sediment entering the watercourse	• An ice bridge will be built across the watercourse. • Grading of the stream banks for the detour road approaches will not occur. • Clean snow & imported water will be used. • V notch will be created at the creek crossing on completion. • Removal of the vegetation will be limited to the width of the right-of-way. • All disturbed areas will be stabilized, vegetated and/or seeded as soon as possible after construction. • Silt fence will be maintained until re-vegetation of disturbed areas is achieved.
Existing Roadway Excavation	• Sediment entering the watercourse	• Existing material will be removed from site.
Stockpiling	• Sediment entering the watercourse	• Spoil and sediment-laden snow will be removed and disposed away from the site.
Removal of existing culvert	• Sediment entering the watercourse	• The work area will be isolated from flowing water, if any.
Diversion Channel/Sump Construction and Reclamation	• Sediment entering the watercourse	• Disturbance of the natural banks and streambed will be kept to a minimum by conducting all work from the existing roadway or above the streambanks, where possible. • Machinery will be operated in a manner that minimizes disturbance to the banks of the stream. • Banks will be restored to original condition if any disturbance occurs. • All debris from construction will be removed from the site and properly disposed of above the high water mark such that they do not enter any water body. • Diversion channel/sump will be backfilled with granular material and the newly constructed channel armoured with rock riprap, as per design. Riprap will be free of silt and other debris. • Any frozen surface water will be removed from the channel/sump and disposed of onsite in a well vegetated area well above the channel banks, intended to allow any sediments in the frozen surface water to filter out during spring melt before re-entering the creek. • Additional measures are outlined in Section 8.4.
Pile Drilling & Installation	• Sediment entering the watercourse	• Load & haul existing material offsite. • Contain cuttings to pile location.

Activities	Potential Effects	Proposed Mitigation Measures
Rock Riprap Installation	• Sediment entering the watercourse • Erosion of the watercourse banks • Scour of the watercourse bed	• The work area will be isolated from flowing water, if any. • Disturbance of the natural banks and streambed will be kept to a minimum. • Rock riprap will be placed upstream, downstream and along the bottom of the proposed arch bridge which will be free of silt and other debris. • Machinery will be operated in a manner that minimizes disturbance to the banks of the stream. • Banks will be restored to original condition if any disturbance occurs.
BEBO ARCH & Beam installation	• Sediment entering the watercourse	• Installation to be done with equipment on land.
Backfill over Arch	• Sediment entering the watercourse	• Place carefully granular material at the upstream and downstream edge of the arch bridge to avoid material falling in creek. • Granular material will be placed around the arch bridge.
Work Site Cleanup	• Sediment entering the watercourse	• All disturbed areas will be stabilized, vegetated and/or seeded as soon as possible after construction. • Sediment fences (see Appendix A) will be placed around all disturbed areas after construction and maintained until re-vegetation of disturbed areas is achieved.

3.3.3 Work Schedule

The Project is tentatively scheduled for December 1, 2020 - April 30, 2021, where works are expected to be completed during frozen surface water/no flow conditions. Instream works are planned to be completed by April 15, 2021, prior to the spring freshet and within the restricted activity timing window for instream work of April 1 to July 15. Details of the proposed schedule are available in Appendix B.

3.3.4 Monitoring and Reporting

An inspection program conducted by the Contractor will include daily and weekly inspections of all erosion and sediment control measures. In the event that temperatures rise prior to construction completion additional inspections will be conducted after a heavy precipitation event (e.g., greater than 15 mm recorded over a 24-hour period, a short duration storm that generates visible sheet flow). Pursuant to ESC industry best practices, standard follow-up inspections will be completed to observe existing control measures during a runoff event. Additional supplemental measures may be required if prescribed erosion and sediment control measures are found to be insufficient.

Inspection checklists and reports will be prepared and maintained onsite. Any changes to monitoring or reporting requirements will be communicated during project meetings.

During construction, an environmental monitor will be on site to ensure mitigation measures are being implemented correctly and to respond to any issues that may arise. Monitoring is also intended to support a feedback mechanism so that mitigation measures can be implemented or revised where and when necessary.

4.0 Hazardous Materials Management Plan

4.1 Fuel

No fuel will be stored onsite. However, a double wall fuel tank as part of the light tower/power source will be onsite. All reasonable precautions will be taken to ensure no contamination is caused due to spills. Industry best practices will be followed including the use of spill containment (trays) and spill kits, fire extinguishers, and barriers (e.g., spill mats, drip pans, trays) to protect workers and the environment during onsite refueling of stationary and mobile equipment. A dedicated area will be used for refueling equipment. Refuelling of equipment with limited mobility will be refuelled above the ordinary high-water mark and refueling activities will conducted as follows:

- The fuel transfer will be visually and continually monitored;
- A containment tray will be placed below the vehicle's refueling portal;
- Fuel transfer nozzles will be operated manually and will not be locked in the open position;
- Spill kits, including absorbent pads, will be positioned in close proximity to the stationary equipment during refueling operations;
- Fuel transfers will be conducted with an operator at each end of the transfer hose;
- Fuel transfers will be conducted when there is adequate visibility; and
- Fuel transfer equipment components such as pumps, hoses and nozzles will be visually checked for leaks or damage prior to each refueling operation.

Spill mats and/or drip pans / trays will be placed under all mobile fueling containers and under equipment when not in use. Drip pans will be free of ice and snow prior to and during use to ensure appropriate containment volumes. Any fuel storage vessels left for extended periods of time (including overnight in vehicles), should be stationed in an area that contains sufficient secondary containment (i.e., drip pans, lined with bermed area, double walled enviro-tanks etc.).

An emergency spill response kit will be kept onsite in case of leaks or spills from machinery. Regular inspection and maintenance of all vehicles/machinery will be conducted. Washing, refueling, servicing and staging of machinery and equipment will be conducted at least 100 m from a water body to prevent the release of any deleterious substances to the water body.

4.2 Lubricating and Hydraulic Oil

The Contractor will make every effort to ensure the area remains free of oil products, including secondary containment for the storage of oil products, and the use of drip trays under parked machinery and when oil servicing. Drip pans will be free of ice and snow prior to and during use to ensure appropriate containment volumes. In the unlikely event of a spill (ex. broken hydraulic hose), the Contractor will use industry best practices, to minimize the spill, contain, and clean-up in a safe and timely way. Any storage vessels left for extended periods of time (including overnight in vehicles), should be stationed in an area that contains sufficient secondary containment (i.e., drip pans, lined with bermed area, double walled enviro-tanks etc.). Biodegradable oils and lubricants (e.g., white lithium greases and vegetable oil

hydraulic fluid) will be used in any equipment that will be working in the watercourse. The Contractor will keep emergency spill kits onsite in case of fluid leaks or spills from machinery as a contingency for such an occurrence. Contingency plans, mitigation and emergency response will be implemented to prevent and address equipment leaks and spills.

5.0 Waste Management Plan

5.1 Purpose and Scope

Allen Services & Contracting Ltd. has prepared the following Waste Management Plan for all wastes associated with pre- construction and construction activities of the Gunghi Creek Culvert Replacement along the Inuvik to Tuktoyaktuk Highway at km 131.2. The WMP will apply to the Developer and all associated Project contractors involved in the generation, treatment, transferring, receiving, and disposing of waste materials for the project. This plan will be effective immediately and throughout the pre-construction and construction phases of the project.

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5.3 Storage Methods

No on-site camp is proposed for the work. One porta potty will be on site. When required, sewage waste will be transported to the closest municipal waste facility. Solid waste will be stored in covered metal bins and disposed at a solid waste facility as required. Sewage and solid waste will be disposed of according to the Hamlet of Tuktoyaktuk or Town of Inuvik regulation.

5.4 Letter(s) of Agreement

Allen Services & Contracting Ltd will store, transport and dispose of each waste type. They are a general contractor and do this on a regular basis. They have established and maintained accounts with Municipal landfills and sewage waste in Inuvik and Tuktoyaktuk including tipping fees for this purpose. They have disposal arrangements through KBL environmental for disposal of contaminants in the Yukon and Alberta. They are also licensed with the GNWT as a hazardous waste carrier.

5.5 Construction Material Waste

The Contractor expects to generate waste construction material onsite including, packaging from deliverables, steel banding, plastic bag material, cut-offs from Styrofoam board, wooden dunnage and culvert demolition waste. All of this waste will be stored on site in a refuse bin and transported to the landfill in Inuvik or Tuktoyaktuk as required.

5.6 Waste Generated by the Contractor

Waste potentially generated during the project includes: sediment, sewage, solid, and hazardous waste (e.g., fuels, oils, batteries and lubricants), as outlined in Table 3. All waste generated onsite by the Contractor, including empty oil containers, oil and fuel filters, spill clean-up material, will be stored in designated spill resistant containers and transported to proper disposal facility in Inuvik. Table 4 outlines disposal methods for potential waste generated by the project. The project area will be inspected daily for waste and any waste will be collected and properly disposed.

Hazardous materials and wastes (e.g., fuels, oils, batteries and lubricants) will be stored in a clearly marked area (e.g. signs and/or flagging) more than 100 m from the high-water mark of any water body. Hazardous wastes will be transported to an approved facility for treatment / disposal.

If other contaminated materials require disposal (i.e., spill pads), these will be disposed of through a licensed facility.

Table 3. Gunghi Creek Crossing Replacement Potential Waste Types

Waste Type	Description
Solid Waste	Food waste, wrappings, waste paper, non-recyclables and empty containers.
Sewage	sewage waste from onsite (1 Porta Potty only)
Recyclable Waste	Beverage containers
Hazardous Waste	Empty oil containers, oil and fuel filters, and spill cleanup material (Sorbent pads, booms, free liquids and solids).
Scrap Culvert	Excavated culvert will be compacted & transported to local municipal landfill in Inuvik.

Table 4. Gunghi Creek Crossing Replacement Waste Type, Volume and Disposal Methods

Waste Type	Hazardous or Non-hazardous	Estimated Volume (m^3)	Disposal Method
Solid Waste	Non-hazardous	10 m^3	Transported to an approved solid waste facility as required.
Sewage	Non-hazardous	1 m^3	Transported to a sewage lagoon facility for disposal or treatment as required.
Recyclable Waste	Non-hazardous	1 m^3	Transport to recycling facility as required.
Hazardous Waste	Hazardous	0 m^3	Transported to an approved facility for disposal or treatment as required.
Scrap Culvert	Non-hazardous	1 m^3	Transported to local municipal landfill in Inuvik after the existing culvert is removed.

6.0 Wildlife Management Plan

6.1 Purpose and Scope

This section provides the Wildlife Management Plan (WMP) for the Gunghi Creek crossing replacement Project. The WMP was developed to ensure compliance with federal and territorial regulations including Aboriginal Affairs and Northern Development Canada (AANDC) and Environment Canada (*Migratory Birds Convention Act* and *Species at Risk Act)*.

The WMP identifies potential issues and concerns for expected wildlife species and species of conservation concern, and provides effects and mitigation measures to address these potential issues.

6.1.1 Issues and Concerns

Potential direct or indirect construction-related effects to the wildlife are expected to be limited and include the following:

- Temporary increase in equipment noise during the installation program and equipment transport. Sensory disturbance associated with habitat clearing and construction activities and may discourage species from using habitat adjacent to the Project.
- Potential temporary wildlife avoidance of the area during the crossing replacement program. However, following construction, species are expected to return to adjacent habitats.
- Movement patterns of animals may be temporarily disrupted by construction activities.
- Direct mortality of wildlife may occur if clearing is required, however nesting activities are not expected during the proposed winter construction, and any minor clearing involved is anticipated to be localized. As the proposed works are scheduled for completion April 30 and only minor clearing will be required, the vegetation clearing timing constraint of May 20 to August 17 will be adhered to.

Proposed monitoring and mitigation plans are provided below in Section 6.5 to avoid or minimize adverse impacts to wildlife and wildlife habitat.

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6.3 Expected Wildlife Species

There are 25 mammals potentially occurring in the LSA, as outlined in Table 5. Kiggiak-EBA Consulting Ltd. reported approximately 137 bird species in the region of the ITH including songbirds, upland birds, waterfowl, raptors and owls[2]. Only 17 of these bird species are year-round residents, while the remaining 120 are migratory species with the majority only occupying the region in the summer[3]. The RSA does not overlap any amphibian ranges of species known to occur in the NWT[4].

[2] Kiggiak-EBA Consulting Ltd. 2010. Project Description Report for Construction of the Inuvik to Tuktoyaktuk Highway, Northwest Territories. EISC Application. Kiggiak-EBA Consulting Ltd. Inuvik, NT.

[3] Kiggiak-EBA Consulting Ltd. 2010. Project Description Report for Construction of the Inuvik to Tuktoyaktuk Highway, Northwest Territories. EISC Application. Kiggiak-EBA Consulting Ltd. Inuvik, NT.

[4] Conference of Management Authorities. 2017. Management Plan for Amphibians in the Northwest Territories. Species at Risk (NWT) Act Management Plan and Recovery Strategy Series. Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT. 73 + iii pp.

Table 5. Mammals Potentially Occurring Within the LSA of the Gunghi Creek Crossing[1]

Common Name	Scientific Name
Barren-ground shrew	*Sorex ugyunak*
Tundra shrew	*Sorex tundrensis*
Masked shrew	*Sorex cinereus*
Northern red-backed vole	*Clethrionomys rutilus*
Tundra vole	*Microtus oeconomus*
Brown lemming	*Lemmus sibiricus*
Collared lemmings	*Dicrostonyx groenlandicus, D. kilangmiutak, D. richardsoni*
Arctic hare	*Lepus arcticus*
Snowshoe hare	*Lepus americanus*
Arctic Ground Squirrel	*Spermophilus parryii*
Beaver	*Castor canadensis*
Muskox	*Ovibos moschatus*
Barren-ground caribou (Tuktoyaktuk Peninsula, Cape Bathurst, and Bluenose-West herds)	*Rangifer tarandus groenlandicus*
Polar bear	*Ursus maritimus*
Moose	*Alces americanus*
Grizzly bear	*Ursus arctos*
Tundra wolf	*Canis lupus*
Red fox	*Vulpes vulpes*
Arctic fox	*Vulpes lagopus*
Lynx	*Lynx canadensis*
Wolverine	*Gulo gulo*
Ermine	*Mustela ermine*
Porcupine	*Erethizon dorsata*
Least weasel	*Mustela nivalis*
River otter	*Lontra canadensis*

Notes 1: Government of Canada. 2019; Kiggiak-EBA Consulting Ltd. 2010.

6.4 Species of Conservation Concern

Of the 25 terrestrial mammals and 137 bird species that potentially occur in the LSA, 18 are federally listed as outlined in Table 6[5].

5] Government of Canada. 2019. Species at Risk Public Registry. Available at: http://www.sararegistry.gc.ca/sar/index/default_e.cfm

Table 6. Status of Federal and Territorial Listed Species Potentially Occurring in the LSA

Common Name	Scientific Name	Federal Status[1]		NWT Status		
		COSEWIC	SARA	NWT Species at Risk Listing[2]	Species at Risk Committee Assessment[2]	General Status[3]
Barren-ground Caribou	*Rangifer tarandus groenlandicus*	Threatened	No Status	Threatened	Threatened	At Risk
Grizzly bear	*Ursus arctos*	Special Concern	Special Concern	No Status	Special Concern	Sensitive
Polar Bear	*Ursus maritimus*	Special Concern	Special Concern	Special Concern	Special Concern	Sensitive
Wolverine	Gulo gulo	Special Concern	Special Concern	No Status	Not At Risk	Sensitive
Eskimo Curlew	*Numenius borealis*	Endangered	Endangered	Not Applicable	Not Applicable	At Risk
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Special Concern	No Status	Not Assessed	Sensitive
Peregrine Falcon	*Falco peregrinus*	Not At Risk	Special Concern	No Status	Not Assessed	Sensitive
Short-eared Owl	*Asio flammeus*	Special Concern	Special Concern	No Status	Not Assessed	Sensitive
Bank Swallow	*Riparia riparia*	Threatened	Threatened	Not Applicable	Not Applicable	At Risk
Barn Swallow	*Hirundo rustica*	Threatened	Threatened	Not Applicable	Not Applicable	At Risk
Buff-breasted Sandpiper	*Calidris subruficollis*	Special Concern	Special Concern	Not Applicable	Not Applicable	Sensitive
Harris's Sparrow	*Zonotrichia querula*	Special Concern	No Status	Not Applicable	Not Applicable	Undetermined
Horned Grebe	*Podiceps auratus*	Special Concern	Special Concern	Not Applicable	Not Applicable	Sensitive
Red Knot	*Calidris canutus islandica*	Special Concern	Special Concern	Not Applicable	Not Applicable	At Risk
Red Knot (Rufa subspecies)	*Calidris canutus rufa*	Endangered	Endangered	Not Applicable	Not Applicable	At Risk
Red-necked Phalarope	*Phalaropus lobatus*	Special Concern	Special Concern	Not Applicable	Not Applicable	Sensitive

Notes 1. **COSEWIC** – Committee on the Status of Endangered Wildlife in Canada[6]; **SARA** – *Species at Risk Act*; **Threatened** - A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction; **Special Concern** – A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats; **Endangered** – A wildlife species facing imminent extirpation or extinction; **Not At Risk** – A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances [7];
2. **Threatened** – a species likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction; **Special Concern** – a species that may become threatened or endangered because of a combination of biological characteristics and identified threats; **No Status** – species was assessed and found to be not at risk of extinction given the current circumstances; **Not Assessed** – species has not been assessed; **Not Applicable** – Species at Risk (NWT) Act does not apply to this species;
3: WGNWT 2016. **At Risk -** species for which a detailed assessment has recently been completed and determined that the species is at high risk of extinction or extirpation.; **Sensitive** – species that are not at high risk of extinction or extirpation but may require some special attention or protection to prevent them from becoming at risk; **Undetermined** - . species for which insufficient information, knowledge, or data is available to reliably evaluate their general status rank[8].

[6] Government of Canada. 2016. COSEWIC Wildlife Species Status Categories and Definitions. Available online at: https://www.canada.ca/en/environment-climate-change/services/committee-status-endangered-wildlife/wildlife-species-status-categories-definition.html
[7] Government of Canada. 2019. Species at Risk Public Registry. Available online at: http://www.sararegistry.gc.ca/sar/index/default_e.cfm
[8] Government of Northwest Territories, Department of Environment and Natural Resources. 2018. Species at Risk in the Northwest Territories 2018. ISBN 978-0-7708-0261-5.

6.5 Mitigation Measures

Wildlife in the area may include terrestrial and aquatic mammals, including muskrats and waterfowl. As construction activities will be conducted in the winter months, when the region is not expected to support migratory birds, the *Migratory Birds Convention Act* and its regulation will not be an issue. If for any reason work is carried out over into the spring, this plan will be updated.

An onsite Wildlife Monitor will be aware of the potential species of concern in the area and conduct monitoring of construction activities as they relate to wildlife and wildlife habitat protections and the mitigation measures outlined in the EMP. Monitoring activities will provide a means of measuring the effectiveness of mitigation measures in avoiding or minimizing potential effects on wildlife.

The following mitigation measures will be implemented to ensure protection of wildlife and wildlife habitat:

- Prior to construction a survey will be conducted to ensure no active grizzly/ black bear, wolverine or lynx dens occur within 250 m of the project site. Where dens are identified the appropriate management agency will be identified to determine appropriate mitigation.
- All wildlife sightings will be documented and reported to the appropriate management agency.
- Daily and weekly reporting will be completed by the Wildlife Monitor and include, location (UTM coordinates or latitude / longitude), date, species, number, sex/age if known, wildlife behavior, and any wildlife -vehicle / human interactions.
- Workers will not feed, harass, or approach wildlife.
- Firearms or hunting, trapping and fishing by workers will not be allowed.
- When possible, wildlife will be given the right-of-way and will be left alone, unless there is a human safety issue.
- All project personnel will undergo a wildlife awareness program, which will include prevention measures for wildlife mortality and reporting procedures for wildlife-related incidents.
- Waste will be stored, handled, and transported in accordance with the Waste Management Plan, including storage of all solid waste in sealed, bear-proof containers.
- The project area will be inspected daily for waste. Any waste will be collected and properly disposed.
- The GNWT Bear Encounter Response Guidelines will following in the event of a bear encounter
- Where caribou approach the construction site or active ungulate mineral/salt licks are observed a temporary suspension of construction may be required to adhere to recommended setback distances outlined in Table 7. Where caribou or active mineral/salt licks are observed appropriate the environmental management agencies should be contacted to determine appropriate mitigation.

Table 7. Recommended Wildlife Setback Distances [9]

Wildlife	Feature or Habitat	Setback Distance
Caribou	N/A	500 m
Ungulates (general)	Mineral/salt lick	1 km

9 Aboriginal Affairs and Northern Development Canada, Fisheries and Oceans, Environment Canada – Canadian Wildlife Service and GNWT – Department of Environment and Natural Resources (AANDC). 2012. Northern Land Use Guidelines – Volume 9a: Northwest Territories Seismic Operations.

7.0 Spill Contingency Plan

7.1 Purpose and Scope

The purpose of this Spill Contingency Management Plan is to outline response actions and mitigation procedures for potential spills of any size and to address commitments made by the Allen Services & Contracting Ltd. This plan will identify key response personnel and their roles and responsibilities in the event of a spill as well as the equipment and other resources available to respond to a spill. It details spill response procedures that will minimize potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to a spill.

7.2 Company Name, Site Name, Site Location and Mailing Address

The project is the Gunghi Creek Culvert Replacement located at km 131.2 along ITH (#10), 14 km south of Tuktoyaktuk as shown on Figure 1.

Figure 1. Gunghi Creek Crossing at km 131.2 along the ITH (#10)

Contact information for this Project are as follow.

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7.3 Effective Date of Spill Contingency Plans

The Spill Contingency Plan will be effective as of January 1, 2020 prior to the proposed construction start date of December 1, 2020.

7.4 Distribution of the Plan

Table 8 outlines a list of individuals/organizations that will receive a copy of the Spill Contingency Plan. Additional copies of the Spill Contingency Plan can be obtained from Dean S. Smith of Allen Services & Contracting Ltd. and will be kept on-site in the project trailer.

Table 8. Distribution List for Spill Contingency Plan

Name	Title	Company
Dean S. Smith	Project Manager	Allen Services & Contracting Ltd.
Brian McCarthy	General Manager	Allen Services & Contracting Ltd.

7.5 Company Environmental Policy

Allen Services & Contracting Ltd. takes its environmental responsibilities seriously and is committed to following sound environmental management practices and executing their business activities so that the environment is not adversely affected.

It is the policy of Allen Services & Contracting Ltd. to thus ensure that all reasonable measures are taken to identify and control conditions that may cause adverse environment impact and to respond

immediately and effectively to any incidents that may occur so that worker and public safety is maintained, and property and environmental damage minimized.

Proactive planning with respect to the potential impact of construction activities on the environment is a critical component of effective environmental protection. Accordingly, all Allen Services & Contracting Ltd. construction sites and facilities are required to develop and have in place an Environmental Plan prior to commencement of activities.

Where environment controls are found to have been compromised, remediation activities will be undertaken immediately.

7.6 Hazardous Materials On-Site

Table 9 outlines details of hazardous materials normally stored on-site. MSDS's for each hazardous material is provided in Appendix C. Appendix D provides a site map showing the construction site. The Gunghi Creek flow direction is from west to east. The emergency response and spill equipment will be in the job shack. Storage location of hazardous material will be 100 m away from Gunghi Creek.

Table 9. Type and Amount of Hazardous Materials Normally Stored On-Site

Material Type	Amount	Storage Capacity	No. of Storage Containers
Diesel Fuel	3-drums	55 gallon each	3-drums
Gasoline	3-drums	55 gallon each	3-drums
Propane	3-cylinder	20 lbs each	3-cylinders
Biodegradable Oils	1-container	5 gallon	1-container
Biodegradable Lubricants	1-container	5 gallon	1-container

Appendix D provides a site map showing the construction site. The Gunghi Creek flow direction is from west to east. The emergency response and spill equipment will be in the job shack. Storage location of hazardous material will be 100 m away from Gunghi Creek.

7.7 Process for Staff Response to Media and Public Enquiries

Depending on the severity of an emergency, the media may attempt to contact company representatives in person at the incident site or in close proximity to the site. These representatives include rovers, roadblock personnel, onsite personnel or other people the media deem credible to represent the company.

If you are approached by the media:

- Be Polite.
- Never use the phrase "No comment".
- If a more senior person is immediately available at your location, redirect the inquiry to that person.
- If you are the most senior person at your location, advise the media that you are not the Corporate Spokesperson.
- Gather the information on the Media Inquiry Form, if possible.
- Advise the media that the Corporate Spokesperson will be in contact with them.

- An example of the script you may use is:

> **My name is (your name).**
> **I am not the Corporate Spokesperson. However, (name of Corporate Spokesperson) could help you with your questions. May I have your name and the name of your organization? I will have (Spokesperson) call you back as soon as possible.**

- Forward the Media Inquiry Form or any call back commitments to your supervisor as soon as possible.
- The media will be working to a deadline.
- The supervisor will pass the Media Inquiry Form or call back commitments to the Corporate Spokesperson for response.
- Be careful not to deny information or facts. Again, simply state that you are not the Corporate Spokesperson.
- Although a press release may indicate information about the number of people injured, NEVER disclose any information about the names of those injured or extent of their injuries. Next-of-kin notification must be completed before this information is released.

In cases where it is not possible to pass along the information to a more senior company representative, the follow statement may be released: Media Statement
"We are in the early stages of gathering information on this situation to determine our involvement and response. Of utmost priority is the safety and protection of the public and all responders. Company information will be available to you when we know more. Feel free to leave your contact number with me or call our corporate office in Inuvik at 867-777-4000 for information.

7.7.1 Response Organization

The following sections provides the preventative measures, initial spill response actions, flowchart of response organization and control and containment.

7.7.1.1 Preventative Measures

The Contractor will take every precaution to avoid any type of environmental impact. The following preventative measures will be put in place:

- Verify last maintenance records for all mobile/heavy equipment and ensure good condition before starting the equipment;
- Complete the pre-use inspection on all mobile/heavy equipment;
- Pay special attention to lines, fuel tanks, hydraulics, etc.;
- Complete a worksite inspection and note all locations which could be contaminated;
- Review SDS for hazardous products such as oil and fuel;
- Prepare required PPE such as gloves, goggles, etc.;
- Use spill donuts to create a barricade between the creek and equipment, where reasonably practicable;
- Have fully stocked spill kits nearby; and
- Ensure phone numbers are available on-site for NWT Spill Report Line.

7.7.1.2 Initial Spill Response Actions

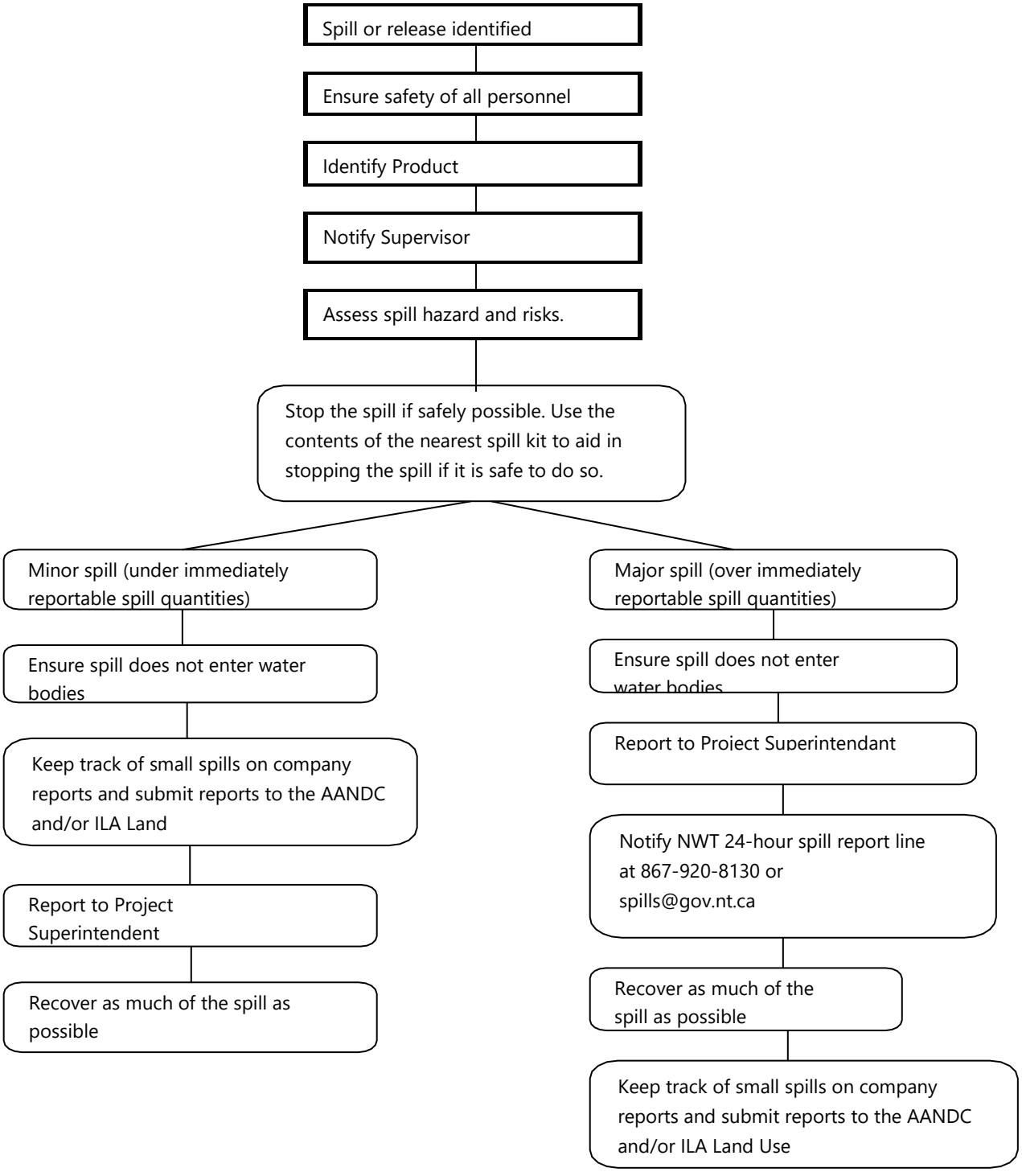
Procedures for Initial Actions:

- Ensure safety of all personnel.
- Assess spill hazards and risks.
- Remove all sources of ignition.
- Stop the spill if safely possible (e.g., shut off pump, replace cap, tip drum upwards, patch leaking hole). Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so.
- No matter what the volume is, notify camp manager.
- Contain the spill - use contents of spill kits to place sorbent materials on the spill or use shovel to dig to contain spill. Methods may vary depending on the nature of the spill.
- Relay information to internal company contacts, government agencies.

Size up considerations for a spill site:

- Are there any nearby public (workers, traffic, residents) that would need to be evacuated or diverted from the spill area?
- Is there a fire or explosion hazard? What is the ignition source?
- Are concentrations safe or is additional PPE needed?
- Are the areas deemed hazardous? (mark with flags)
- What are the ground and weather conditions? (Snow, gravel, sand, etc.)
- Where is the location of the leak? The type of release and the volume released? Is it reportable? Has it been reported to the regulator?
- How long has the spill been taking place?
- Are air monitoring trailers required?
- Is the spill into a watercourse or a water body?
- Is the spill contained or migrating? Which direction? How far can it go?
- If the spill is not contained, determine and prioritize the containment points and methods to be used.
- What lands or water bodies may be affected?
- How is it going to be contained and cleaned up?
- How to access the spill site, the source of the spill and recovery points, what equipment is required? Is oil spill equipment (oil spill co-op) required?
- Where can spill responders park so as not to interfere with spill equipment? (Minimize vehicular traffic as much as possible at the spill site.)
- Are there and residences in the area?
- Should the spill site be cordoned off to prevent wildlife from entering?
- Will a media response be required?

7.7.1.3 Flowchart of Response Actions



7.7.1.4 Control and Containment

- If possible, immediately shut off the source of the spill ensuring your own safety.
- Determine what will be affected by the spill.
- Assess speed and direction of the spill and cause of movement (water, wind and slope)
- Prioritize and set up containment points.
- Where possible, prevent a spill from entering a watercourse.
- Have a contingency plan ready in case spill worsens beyond control or if the weather or topography impedes containment.
- Use safest and simplest method to get job done within resource and safety capabilities.
- Plug and patch (e.g., fix faulty valve or hole in drum).
- Absorb or adsorb (e.g., applying absorbent pads to oil spill).
- Transfer (e.g., removing product to waste truck or new container).
- Containerize (e.g., put leaking drum into over-packed drum).
- Reposition (e.g., upright or roll and chock leaking container).
- Others (e.g., hot-tap, vent and burn, flaring).
- Contain the spill - containment is a priority for limiting environmental damage.
- Contain as close to source as safe and practical.
- Avoid excessive walking or driving on the spill area.
- Consider ground disturbances guidelines.
- Determine where bell holes or trenches would be most effective.
- Keep trenches as shallow and narrow as possible, to prevent additional clean-up and minimize groundwater impact. Supplement with berms where possible.
- Use practical containment tools and equipment including shovels, dump trucks, sand bags, plastic bags, heavy earth moving equipment, "Plug and Patch", foam, salvage covers, adsorbents, booms, hose, redwood plugs, etc.
- If weirs are installed, they should be able to handle large flow rates and surges.
- Surface run off may have to be diverted from the spill site if wet conditions are present.
- Ensure the health and safety of the persons responding to the spill
- Once containment has been achieved, recovery and clean-up operations begin immediately.
- Recover as much product and saturated debris as possible.
- Keep environmental disturbance to a minimum.

7.7.2 Response Personnel, Duties, and Communication

All personal hired to work on the Project will be familiar with on-site spill prevention, response and clean-up measures. Available communication equipment will be two-way radios and satellite phones.

7.7.3 Potential Spill Sizes and Sources

Table 10 provides a list of the hazardous materials, their potential discharge events with worst case discharge volume and direction of potential discharge.

Table 10. Potential Spill Sizes, Sources and Discharge Direction for each Hazardous Materials

Material (Sources)	Potential Discharge Events	Discharge Volume (Worst Case)	Direction of Potential Discharge
Diesel Fuel	Leak from equipment/containers and spill while refuelling equipment	165 gallons (625 liters)	Towards Gunghi Creek
Gasoline	Leak from vehicles/containers and spill while refuelling vehicles	165 gallons (625 liters)	Towards Gunghi Creek
Propane	Puncture of cylinder	14 gallons (53 liters)	In air
Biodegradable Oils	Leak from equipment/container and spill while pouring oil in equipment	5 gallons (19 liters)	Towards Gunghi Creek
Biodegradable Lubricants	Leak from equipment/container and spill while lubricating equipment	5 gallons (19 liters)	Towards Gunghi Creek

Large Spills

1. A command and control center may be needed.
2. Temporary access roads may be needed.
3. Establish Zones may be needed. [i.e.: Hot Zone (downwind first)].

	Minor Leak	Small Leak	Large Leak
Liquid Spill:	100ft (30m)	400ft (125m)	1,200ft (375m)

- Record names and functions of all personnel on site.
- Establish an evacuation area.
- Implement a safety indoctrination procedure for spill site.
- Establish a communication system.
- Set up 24-hour supervision of site.

Note: For Fuel or hydraulic spills the threshold limit is 100 liters. When reporting a spill of 100 liters or more to the NWT Spills Hotline, the person reporting the spill shall provide the following:

1. Date and time of spill.
2. Direction spill is moving (or if it has stopped).
3. Name and phone number of persons close to the location of the spill.
4. Type of released product and quantity spilled.
5. Cause of spill.
6. Whether the spill is continuing or has stopped.
7. Description of the existing containment.
8. Actions taken to recover, clean-up and dispose of spilled product.
9. Name, address and phone number of person reporting the spill.
10. Name of the person in charge of management or control at the time of the spill.

7.7.4 Potential environmental impacts of spill

This section of the plan describes the types of materials that could be spilled, the potential environmental impacts, and the worst-case scenario associated with that type of spill.

7.7.4.1 Potential Environmental Impacts of Spill

Overall for hazardous materials discussed below, impacts are lower during winter as snow is a natural sorbent and ice forms a barrier limiting or eliminating soil or water contamination, thus a spill can be more readily recovered when identified and reported.

1. ***Gasoline***
   - **Environmental impacts:** Gasoline may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Gasoline is quick to volatize. Runoff into water bodies must be avoided.
   - **Worst case scenario:** All tanks or drums were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

2. ***Diesel Fuel***
   - **Environmental impacts:** Diesel may be harmful to wildlife and aquatic life. It is not readily **biodegradable** and has the potential for bioaccumulation in the environment. Diesel burns slowly and thus risk to the environment is reduced during recovery as burn can be more readily contained compared to volatile fuels. Runoff into bodies of water must be avoided.
   - **Worst case scenario:** All fuel tanks and drums were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

3. ***Propane***
- **Environmental impacts:** Propane may be harmful to wildlife and surrounding environment. It has the potential to accumulate in the environment. Propane is extremely volatile and is the most flammable material stored on site, thus immediate impacts to the surrounding environment are a concern.
- **Worst case scenario:** All cylinders were punctured or failed simultaneously, and contents leaked into the surrounding environment and ignited leading to an explosion. This could cause serious environmental impacts in the immediate surroundings. Safety during emergency response to a propane spill is the utmost concern.

4. ***Sewage***
- **Environmental Impacts:** When sewage is discharged into river bodies without proper treatment, organic matters present in sewage causes depletion of dissolved oxygen which in turn affect aquatic ecosystem existing in the water bodies. Some gases like methane, carbon-di-oxide, sulphur dioxide, etc. are formed in sewage and escape into atmosphere causing air pollution and accelerating global warming by greenhouse gases.
- **Worst case scenario:** Portable toilet (i.e., Porta Potty) on site leaks onto the ground causing an unsanitary situation at site, and potentially having environmental and health related issues at the location.

5. ***Biodegradable* Oils and Lubricants (e.g., white lithium greases and vegetable oil hydraulic fluid)**
- **Environmental Impacts:** Biodegradable oils and lubricants will be used when working in the watercourse, which have a lower aquatic toxicity than traditional products. Biodegradable oils and lubricants break down when subjected to sunlight, water and microbial activity, however, biodegradability may be reduced in the winter.
- **Worst case scenario:** All fuel tanks and storage containers were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This may result in illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

7.7.5 Action Plan

Spills that are a potential environmental or human health hazard, including oil or fuel spills may occur on-site. A spill that meets criteria for a reportable spill defined as a substance that is likely to be an imminent environmental or human health hazard or meets or exceeds the volumes of "reportable quantities for spills in the NWT" as outlined in Appendix E will be reported to the Spill Report Line at **(867) 920-8130** and a Spill Report Form will be completed and submitted by fax **(867) 873-6924**) or email (**spills@gov.nt.ca**).

NT/NU SPILL REPORT LINE / 24-hour Spill Report Line:
Phone: (867) 920-8130
Email: spills@gov.nt.ca
Fax: (867) 873-6924

A detailed report on each occurrence will be submitted to the inspector not later than thirty (30) days after initially reporting the event.

All staff will be trained in spill response prior to working onsite. All Spill Report documents will be available in the site office. Local Fire, Ambulance, and Police contacts are included in Contractors Site Emergency Response Plan. The Contractor Emergency Contact Numbers will be posted in Site Office and are included in the Emergency Response Plan. The following spill response materials will be maintained on-site:

- Spill Kits in equipment and vehicles, which will contain sorbent material, a disposable container, safety gloves and goggles, and a shovel.
- Extra spill kits and materials will be available to contain larger spills and be stored at in the on-site trailer.
- Sorbent material to be carried in vehicles and equipment vehicles: **10 pads and 2 socks**.
- Fuel and service trucks: **200 pads and 12 socks**.

7.7.6 Technical Assistance Contacts

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7.7.7 Notification Procedure to Alert Public

Travelers along ITH who drives by the construction site will be notified if a significant spill occurs. If required, the spill area will be barricaded and supervised to protect the public.

7.7.8 Procedures for Containing and Cleaning up the Spill on Land, Water, and Snow/Ice

7.7.8.1 Spill Assessment (Land)

Following the initial hazard assessment and development of a site safety plan, gather detailed information on the location and effects on the spill on the land base. Identify and document the spill boundary with the appropriate equipment, including:

- PPE;
- Gas detection monitors;
- Compass;
- Measuring device (i.e., GPS);
- Shovel;
- Quantabs or conductivity meter for produced water or emulsion spills;
- Hoe, drill or sampling equipment of sub-surface contamination is suspected; and
- Camera.

First ensure that there are no flammable vapours in the area. Produce a sketch of the spill and take appropriate photographs. Next, identify land uses in areas affected by the spill. Look at whether the spill affects private land owners, public land (green areas, parks), dispositions (pipelines, utilities, roads, facilities, trappers, etc.), or sensitive areas (protected areas, wildlife habitat, archaeological resources etc.). Based on the land use in the spilled area, determine the possible public that could be directly impacted; evaluate site for wildlife, and determine the approval requirements for accessing the spill site. It is important to note the terrain, soil types, characteristics and conditions, as well as the vegetation types on site. Surface run-off patterns, erosion potential, moisture levels and movement of the water table can all impact the severity of the spill and the way in which it can be contained so it is imperative to take note of all these things before proceeding with cleanup. When the previous considerations have been addressed, the next course of action is to determine the equipment resources that are required to control the spill. The initial assessment will impact what equipment will be used, how it will be transported to the spill site and how it will improve or create access to the spill.

Land spills will spread outward from the initial spill point toward lower-lying areas. Penetration downward into the soil will also occur at a rate that is dependent on the soil type and the nature of the product spilled. During spills in winter petroleum will spread under the snow making definition of the extent of the spill area difficult.

The Project Superintendent should:

- Attempt to restrict spills on land to as small an area as possible based on site conditions; and
- Prevent the spill from entering water bodies or watercourses or flowing into culverts, within the bounds of safety and practicality.

The method chosen for land containment and recovery is dependent on site conditions and the equipment available. A summary of common options is presented in the Table 11.

Table 11. Land Containment Options

Containment Method	Technique Description	Comments
Earth or Sand Dike (All Seasons)	Earth or sand at or near the site is used to contain spilled material on flat or sloped surfaces. Sandbags filled with soil or sand are used to contain spill. Augment with poly-sheeting if available.	Sufficient dry earth, gravel or sand needs to be available to contain spill. Earth may be frozen. Surface disturbance to remove earth or sand may result in erosion, especially on steep slopes. Work crews and/or earth-moving equipment are required to build dike.
Snow or Ice Dike (Winter Only)	Snow or ice at or near the site is used to contain spilled material on flat or sloped surfaces. Augment with poly-sheeting if available.	Sufficient snow or water needs to be available to contain spill. Snow or ice dike will melt quickly in warm weather. Contaminated snow or ice may need to be removed or stored for treatment. Work crews and/or earth-moving equipment are required to build snow dike. Water spraying equipment may be required to construct ice dike.
Sorbent Dike (All Seasons)	Sorbent material is used to contain spill.	Useful only in small spills, as purchase of large quantities of sorbent is expensive and impractical. Contaminated sorbent may need to be replaced or squeezed out during incident. Contaminated sorbents need to be disposed in compliance with government legislation. Sufficient sorbent or sorbent boom, work crews and storage containers or a lined storage area for contaminated sorbents need to be available to build sorbent dike.
Trench or Sump (All Seasons)	A trench or sump is excavated downslope on sloping terrain to limit surface or subsurface spill movement. Work crews and/or earthmoving equipment are required to build trench or sump, as well as plastic or other impermeable sheeting for a trench liner.	It is recommended that the trench be dug to the bedrock or permafrost, which will then provide containment layer for the spilled fuel. Clean topsoil should be removed before trench construction. Frozen soil, bedrock close to the surface or soil type (e.g. sand) may result in erosion or further penetration in sandy soil. Ensure no other pipelines or underground utilities are in the excavation area.

Containment Method	Technique Description	Comments
Vacuum Truck	A vacuum truck is used to recover spilled material from a dike or trench in areas accessible by trucks or heavy equipment.	The method depends on site access. Surface disturbance and soil damage may result from movement of the vacuum truck to and from the site. Topsoil may need to be stripped from the site before starting recovery activities.
Pumping Spilled Material into Storage	A pump is used to recover spilled material from a dike or trench in areas not accessible by vacuum trucks	Pumps need to be safe for use at the spill site and compatible with the product to be pumped. Surface disturbance and soil damage may result from movement of the pump and storage equipment to the site. Skid tanks, tanker trucks, port-a-tanks, fuel bladders, permanent tanks, or a lined excavated area need to be available to provide storage for the recovered material. A work crew and power supply for the pump needs to also be available.

7.7.8.2 Spill Assessment (Watercourse)

Begin by assessing the characteristics of the affected watercourse including width, depth and velocity. Shoreline characteristics and sensitivities also need to be taken into consideration. The degree of oil impact, degree of sensitivity (ecological, cultural, human use, etc.) and the physical limitations can all affect the way in which a spill will be contained.

Petroleum products will spread outward from the origin of the spill eventually achieving a stable thickness on the water. Spills on rivers, creeks or streams will flow downstream, contaminating riverbanks and vegetation, affecting wildlife, fish and water users in the area of the spill.

The rate of the spill movement will depend on the current speed of the water and the time of year. Current may flow faster in the deepest channels in the river and slower in the shallower areas, due to varying volumes of water. Flow in a watercourse will also be faster in the spring because of snowmelt entering from the surrounding area. River currents in summer and fall will be generally slower than in the spring.

Spill velocity on a watercourse may be estimated quickly by using a current velocity meter or by timing the movement of a floating object on the watercourse over a set distance.

Table 12 is used for estimating spill velocity based on a 30 metres (100 foot) distance:

Table 12. Spill Velocity based on 30 metres (100 foot) Distance

Time Required For Object to Travel 30 metres (100 feet)	Surface Current Speed			Boom Angle
Seconds	Km/h	m/s	Miles/hour	Degrees
216	0.5	0.14	0.3	60
108	1.0	0.28	0.6	60
72	1.5	0.42	0.9	60
54	2.0	0.56	1.2	45
43	2.5	0.69	1.5	45
36	3.0	0.83	1.9	45
31	3.5	0.97	2.1	15
27	4.0	1.11	2.5	15
24	4.5	1.25	2.8	15
22	5.0	1.39	3.1	15
18	6.0	1.67	3.7	15

Note: In currents faster than 6.0 km/h (3.7 mph), or in excessively turbulent waters, the use of containment booms may be impractical and other containment or protection methods such as the use of diversion or exclusion booms may be required.

The velocity calculated will be an approximation only, as the watercourse velocity varies at different points across the river, due to changes in river depth and at various points upstream and downstream on the river. In the initial stages of spill on a watercourse, lighter-end materials will tend to evaporate, especially in warm weather. Other processes that might affect spill behaviour include dispersion of the petroleum into the water, formation of stable oil/water emulsions and stranding or oil along the shoreline.

Containment of a spill on a watercourse should be completed as quickly as possible as the spilled material has the potential to travel a much greater distance and contaminate a larger area than spills on land. The Project Superintendent will implement appropriate containment actions based on the size of the watercourse and current velocity.

Containment methods for watercourse recovery options are provided in Table 13.

Table 13. Watercourse Recovery Options

Containment Method	Technique Description	Comments
Vacuum Truck	A vacuum truck is used to recover free petroleum form water in areas accessible by trucks or heavy equipment.	A vacuum truck and operator are required. Use of this method is subject to site access. Surface disturbance and soil damage may result from the site. Topsoil may need to be stripped from the site before conducting recovery activities.
Pumping of Spilled Material into Storage	A pump is used to recover free oil from the watercourse in areas not accessible by vacuum trucks.	Pumps need to be safe for use at the spill site and be compatible with the product to be pumped. Surface disturbance and soil damage may result from movement of the pump and storage equipment to the site. Technique will generate large volumes of contaminated water that will require storage. Skid tanks, tankers, port-a-tanks, fuel bladders, permanent tanks, or a lined excavated area need to be available to provide storage for the recovered material. A work crew and power supply for the pump need to also be available.

7.7.8.3 Spill Assessment (Ice Covered Water)

The first step in an ice covered water assessment is to identify the On-Site Supervisor and Safety Supervisor and appoint an Ice Assessment Team. The applicable equipment will then be identified to ensure that all resources necessary are available to contain the spill. Before beginning an assessment, ensure workers are protected against exposure to cold, warm-up facilities and food have been provided, and designated a rest area off the ice.

An Ice assessment team will proceed from the shore and drill one test hole in the ice to determine ice thickness, current velocity, water depth below ice and current direction of water flow. If the ice is safe to continue, the ice assessment team can proceed across the watercourse. As the assessment team moves away from the shore, it may be necessary to reposition anchors from shore to on-ice with the use of ice anchors.

Following the initial assessment of the ice across the watercourse, the team may move downstream (approximately 9 metres) and drill test holes across the watercourse. At this point, it is important to stagger the holes in order to obtain a more accurate assessment. The On-Site Safety Supervisor will then declare whether or not the weight bearing capacity is sufficient to continue work without the use of safety lines or anchors.

7.7.8.3.1 Spills on Ice

Spills on ice will tend to spread out from the spill source toward lower-lying areas. Surface depressions, cracks and pockets in the ice will cause the spilled material to pool. A significant volume of some oils can be absorbed into the ice.

The presence of oil on or in ice increases solar heating and the rate of melting. Subsequent freezing and melting may eventually cause the oil to migrate through the surface of the ice. Opening in the ice may allow the spilled material to migrate into open water or allow the spill to be swept under ice, making response operations more difficult.

The information presented should be used as a guideline only in determining typical load-bearing capacity of ice. The Project Supervisor needs to determine whether it is safe to work on ice based on actual site conditions.

The ability for ice on a river, stream or lake to support the weight of workers and equipment is determined by effective ice thickness which is based on the thickness of clear ice and presence of white ice.

Clear ice (sometimes called blue ice) is translucent and well compressed with few air pockets. This ice is very strong and has a high load bearing capacity.

White ice (or snow ice) is very porous, with many air pockets and is much weaker. White ice has approximately half the load bearing capacity of clear ice. White ice is formed by constant melting and freezing of the top layer of ice due to solar heating or mild temperatures and is normally found on top of clear ice.

Holes should be drilled in the ice at the work site, before starting any on ice operations, to determine the average thickness of white and clear ice.

Effective ice thickness then can be calculated using the formula in Table 14.

Table 14. Effective Ice Thickness Calculation

Effective Ice Thickness = clear ice thickness + 1/2 white ice thickness
Example: The spill site has 20 inches of clear ice and 10 inches of white ice 20 inches clear ice + 1/2 x 10 inches white ice = 25 Effective Ice Thickness
Note: If water lies between layers, use the depth of only the top layer of white ice.

Based on the effective ice thickness, a determination can be made as to the stationary and moving loads that may be supported by the ice. Normally less ice required for continuous movement on the ice than for stationary loads as less pressure is exerted on any one point on the ice during movement.

Tables 15 and 16 will assist the Project Supervisor and Safety Supervisor to determine the permissible loads on ice based on the effective ice thickness:

Table 15. Load Bearing Capacity of Ice Thickness for Continuous Travel

Permissible Load	Effective Ice Thickness – Inches (Centimeters)	
	Lake	River
One person on foot	2.0 (5.0)	2.5 (6.3)
Group, in single file	3.2 (8.0)	3.5 (8.8)
Passenger car, 4400 lbs (2000kg)	7.1 (17.8)	8.3 (20.8)
Light truck 5500 lbs (2500kg)	7.9 (19.8)	9.1 (22.8)
Medium Truck 7700 lbs (3500kg)	10.2 (25.5)	11.8 (29.5)
Heavy Truck 17,500 lbs (8000kg)	13.8 (34.5)	16.1 (22.8)
20,000 lbs (9000kg)	15.0 (37.5)	17.3 (43.3)
50,000 lbs (23,000kg)	24.8 (62.0)	28.7 (71.8)
99,000 lbs (45,000kg)	31.5 (78.8)	36.2 (90.5)
150,000 lbs (68,000kg)	39.4 (98.5)	45.3 (113.3)
240,000 lbs (109,000kg)	49.2 (123.0)	56.7 (141.8)

Table 16. Weight Bearing Capacity for Stationary Loads and Working on Ice

Permissible Load	Effective Ice Thickness – Inches (Centimeters)	
	Lake	River
2200 lbs (1000kg)	8.0 (20.0)	9.1 (22.8)
4400 lbs (2000kg)	12.0 (30.0)	14.0 (35.0)
8800 lbs (4000kg)	18.0 (45.0)	21.0 (52.5)
17,600 lbs (8000kg)	24.0 (60.0)	27.0 (67.5)
50,000 lbs (23,000kg)	44.0 (110.0)	50.0 (125.0)
99,000 lbs (45,000kg)	59.0 (147.5)	68.0 (170.0)
150,000 lbs (68,000kg)	71.0 (177.5)	82.90 (205.0)
240,000 lbs (109,000kg)	91.0 (227.5)	105.0 (262.5)

Temperature may affect the load-bearing capacity of ice on a water body. Air temperatures need to remain below the freezing point of water (0°C) for a sufficient period to allow the ice to adequately support a stationary or moving load. Temperature effects are dependent on ice thickness, as follows:

- Less than 50 centimetres (20 inches) of ice: temperature needs to be constant for 3 days;
- Between 50 and 100 centimetres (20 and 40 inches) of ice: temperature needs to be constant for (4) days; and
- Over 100 centimetres (40 inches) of ice: temperature need to be constant for 5 days.

Sudden drops or increases in temperature can also cause thermal stressing or cracking of ice requiring temporary load restrictions for 3 to 5 days following the change. Thawing due to warm temperatures may also significantly affect ice conditions. On-site personnel should take extreme care when evaluating ice conditions during a thaw and limit work on or near ice under these conditions.

Containment and cleanup options for spills on ice are similar to those on land and are summarized in Tables 17 and 18.

Table 17. On Ice Containment Options

Containment Method	Technique Description	Comments
Earth or Sand Dike (All Seasons)	Earth or sand at or near the site is used to contain spilled material on flat or sloped surfaces. Sand bags filled with earth or sand are used to contain the spill. Augment with impermeable or poly-sheeting if available.	Effective ice thickness needs to be sufficient to support the weight of manpower and equipment required to build the dike. Sufficient dry earth, gravel or sand needs to be available to contain spill. Earth may be frozen. Surface disturbance to remove earth or sand may result in erosion, especially on steep slopes. Earth or sand placed on ice needs to be removed before spring break up. Work crews and/or earth moving equipment are required to build dike.
Snow or Ice Dike (Winter Only)	Snow or ice at or near the site is used to contain spilled material on flat or sloped surfaces. Augment with impermeable or poly-sheeting if available.	Effective ice thickness needs to be sufficient to support the weight of manpower and equipment required to build the dike. Sufficient snow or water needs to be available to contain the spill. Snow or ice dike may melt quickly in warm weather. Contaminated snow or ice may need to be removed or stored for treatment. Work crew and/or earth moving equipment are required to build snow dike. Water spraying equipment may be required to construct and maintain an ice dike.
Sorbent Dike (All Seasons)	Sorbent material is used to contain spill.	Useful only in small spills, as purchase of large quantities of sorbent is expensive and impractical. Contaminated sorbent may need to be replaced or squeezed out during incident. Contaminated sorbents needs to be disposed of properly to comply with government regulations. Sufficient sorbent or sorbent boom, work crews and storage containers or lined storage area for contaminate sorbents needs to be available to build sorbent dike.

Table 18. On Ice Clean Up Options

Clean Up Method	Technique Description	Comments
Manual Removal by Work Crew and/or Equipment (Winter)	A work crew or earth moving equipment are used to remove thick oil or contaminated snow and ice.	Effective ice thickness needs to be sufficient to support the weight of manpower and equipment required. All necessary safety precautions should be undertaken for personnel who work near any open water. Manual removal may be a difficult and time consuming process. A work crew with hand tools or earth moving equipment and operators, as well as ice cutting equipment, may be required. Lined storage area or storage drums are required to store contaminate material before treatment or disposal. Oil present in snow may be skimmed off during spring thaw.
Steaming of Ice Surface	Steam is used to melt ice surface to aid in spill cleanup. The technique may be used in association with other clean up and recovery techniques.	Effective ice thickness needs to be sufficient to support the weight of manpower and equipment required. All necessary safety precautions should be undertaken for personnel who work near any open water. A work crew with steaming equipment is required to undertake this method.
Sorbents (Spring to Fall)	The method is used in isolated areas to clean up small amounts of oil.	Clean up is labour intensive and time consuming. Limited access to site may make this method difficult or impossible. Sorbents are not very effective on weathered oil in cold weather. Sorbents may freeze to the surface. Sorbents needs to be disposed of properly to comply with government regulations. Sufficient sorbent, work crews and storage containers or a lined storage area for contaminated sorbents needs to be available.

Clean Up Method	Technique Description	Comments
Snow or Ice Melting	Snow or ice is removed from the cleanup site and melted in heated tanks to allow spilled material to be skimmed off the surface of the melted water. The technique may be used in association with other clean up and recovery techniques.	Contaminated snow or ice needs to be removed from cleanup site and placed in melting tanks. The method may be labour intensive and time consuming, as melting is not very efficient for cleanup of large volumes of petroleum contaminated ice. In very cold temperatures, sufficient heat may not be available in the tanks to melt ice. A work crew, heating tanks, skimming equipment, transfer vehicles and operators are required. A lined storage facility for storage of contaminated ice or snow before melting may also be required, as well as storage tanks for storing recovered petroleum.

7.7.8.3.2 Spills Under Ice

Spills of petroleum under ice will spread and will travel under the ice at a velocity that is less than the current speed of the watercourse. The spill will tend to follow the path of the main current flow. The spill product may become trapped in crevices, cracks, pockets, and other irregularities under the ice and may freeze from the underside of the ice anywhere downstream or outward from the original spill. This will make recovery and cleanup operations extremely difficult.

Before conducting any response operations to contain, remove and clean up oil under ice, the Project Supervisor should ensure that the Safety Supervisor and Ice Assessment Team have calculated the effective ice thickness to ensure it will support the weight of personnel and equipment.

For spills under ice, the Project Supervisor should attempt to determine the location of the spilled material and bring the spill to the surface of the water for containment and recovery. Spill movement under the ice is normally located by drilling holes through the ice using an ice auger downstream of the spill source on a flowing watercourse or outward from the spill source on a non-flowing water body. Alternately, aerial reconnaissance may be used to attempt to locate spilled material in cracks at the surface or under thin ice. Once the spill has been located, containment operations can be conducted to bring the spilled product to the surface.

Containment operations are normally accomplished by constructing slots in the ice. Ice slots allow petroleum products trapped under the ice to rise to the surface for recovery.

The slot is normally constructed at an angle in relation to the shore depends on the current velocity, similar to a containment boom placed in a flowing river. For higher currents in the river, a shallower angle is used for the ice slot, while a larger angle may be used for lower current flows.

If a slot is constructed at too great an angle to the current, turbulence may occur, sweeping the spilled material under the ice or downstream. Plywood or other types of sheeting may be placed on the downstream side of the slot and frozen in place to facilitate containment of the spilled material. The ice slot should be 0.5 to 1.0 metre (1.6 to 3.3 feet) wide, to aid in containment. Ice blocks may be cut using a

ditch witch or backhoe if the effective ice thickness is sufficient to allow stationary equipment on the ice. [If ice is too thin for equipment but safe for personnel, crews equipped with chainsaws and proper safety gear can cut the ice.] Ice blocks can be removed to clear the slot or pushed under the ice downstream of the slot if sufficient water depth is available.

Ice blocks are extremely heavy (one cubic foot of ice weighs 24 kilograms (53 pounds). Blocks should be cut to a size that will allow the crews or equipment to remove them easily. To aid in block removal, the ones nearest the shore should be removed first and remaining blocks should be floated toward shore for removal. Plywood or other sheeting can be used upstream of the slot to divert oil into the slot for recovery. Narrow slots may be cut into the ice with a chainsaw and sheeting may be wedged into the slots to channel the main current toward the ice slot in a manner similar to a diversion boom in open water.

Table 19. Under Ice Containment Options

Containment Method	Technique Description	Comments
Ice Slotting	Ice slots are cut into ice on rivers to collect oil moving under the ice. The technique is best used for rivers with current, as oil will be moved toward slot by current.	Effective ice thickness needs to be sufficient to support the weight of manpower and equipment required to build slot. All personnel working near any open water need to take safety precautions. The location of the spill needs to be confirmed by drilling holes downstream of the spill source before constructing the ice slot. Total containment of spilled petroleum in an ice slot is unlikely, due to material trapped under ice. Snowmobiles, communications gear, and ice augers may be required to determine the location of the spill. Work crews, chainsaws and/or a backhoe or ditch witch are required to construct an ice slot. A recovery device such as a heat-traced ice skimmer is required to recover spilled material. Storage tanks or a lined excavated storage area may be required to store recovered oil/water mixture.

7.7.8.3.3 Spills in Broken Ice

The risk to life safety of the personnel attempting spill response in broken ice conditions using existing technology is extreme. Emergency operations in broken ice conditions during spring thaw or winter freeze up are extremely difficult. When oil is mixed with floating ice or covered by a very thin ice cover, ice interferes with the collection of the oil and could damage containment and recovery equipment. The presence of ice also makes the use of boats difficult.

Before authorizing any spill response operations in broken ice conditions, the Project Supervisor along with the appropriate regulatory agencies, will evaluate whether it is safe or feasible to undertake containment and recovery operations and what methods should be used.

Containment options for spills during freeze up or break up are similar to those for spills on a river and on ice. If containment operations are determined to be feasible based on site conditions, the Project Supervisor will attempt to deflect ice away from the containment site.

Deflection of ice may be achieved using log booms or ice dams. A log boom consists of logs cabled together with chain, anchored upstream of a conventional containment boom. An ice dam is constructed upstream of the oil spill site and containment site, to attempt to divert upstream ice away from a containment site.

Log booms are deployed at an angle away from the containment site. Logs are spaced to allow spilled materials and water to move directly toward the containment site, while diverting the ice towards the opposite shore, allowing the ice to pass around the containment site.

7.7.8.4 Snow Spills

Snow is a natural sorbent, thus as with spills on soil, spilled fuel can be more easily recovered. Generally, small spills on snow can be easily cleaned up by raking and shovelling the contaminated snow into plastic bags or empty barrels, and storing these at an approved location.

Dikes can be used to contain fuel spills on snow. By compacting snow down slope from the spill and mounding it to for a dike, a barrier or berm is created thus helping contain the spill. If the quantity of spill fairly large, a plastic tarp can be placed over the kike such that the spill pools at the base of the dike. The collected fuel/snow mixture can then be shovelled into barrels or bags, or collected with sorbent materials.

7.7.9 Procedures for transferring, storing and managing spill-related wastes

Contaminated materials will be stored in a secure container for disposal. Allen Services & Contracting Ltd have disposal arrangements through KBL environmental for disposal of contaminants in the Yukon and Alberta. They are also licensed with the GNWT as a hazardous waste carrier.

7.7.10 Procedures for Restoring Affected Areas

Site remediation options are outside the scope of this Spill Contingency Plan. Site restoration will be determined by consultation among the Project Supervisor, Allen Services & Contracting Ltd. staff, environmental protection agency personnel and any external environmental consultants that are contracted by the company.

7.7.11 Resource Inventory

7.7.11.1 On-Site Resources

7.7.11.1.1 Personnel

All personnel hired to work on the Project will be familiar with on-site in spill prevention, response and clean-up measures (see Section 7.7.11).

7.7.11.1.2 Equipment, Spill Kits and Sorbent Materials

- 1-spill kit located in job shack as described in Section 7.7.11.1.3;
- 10 pads and 2 socks of sorbent material in each vehicles and equipment vehicles;
- Disposable container, safety gloves, goggles and shovel in each vehicles and equipment vehicles;
- 1-49 Ton Hydraulic Excavator;
- 1-30 Ton Hydraulic Excavator;
- 1-D9N Cat Bulldozer c/w Ripper;
- 1-50 T Crane;
- 2- Vibratory Compactor;
- 1-Tracked Skid Steer;
- 1- Loader c/w Bucket & Forks;
- 1-JOB/EMERGENCY SHACK;
- 2-LIGHT TOWER (s);
- 1-2000 l -Double Walled Fuel Cube; and
- 2- Pick Up truck.

7.7.11.1.3 Spill Kit Contents

The following outlines the recommended minimum requirements for contents of the spill kit to be used during the Project; the Contractor is responsible to supply the spill kit. Each spill kit will be regularly inspected to ensure it always contains the following, at a minimum (in part from INAC 2007[10]):

- 1 – 205 L open top steel drum with lid, bolting ring and gasket (spill kit container);
- 10 disposable large 5 mil polyethylene bags (dimensions 65 cm x 100 cm) with ties;
- 4 – 12.5 cm x 3 m (5 in. X 10 ft.) sorbent booms;
- 10 kg bag of sorbent particulate;
- 100 sheets (1 bail) of 50 cm x 50 cm sorbent sheets;
- 2 large (5 m x 5 m) plastic tarps;
- 1 roll duct tape;
- 1 utility knife;
- 1 field notebook and pencil;
- 1 rake;
- 1 pickaxe;
- 3 spark-proof shovels;
- 4 Tyvex® splash suits;
- 4 pairs chemical resistant gloves;
- 4 pairs of splash protective goggles; and
- Instruction binder, including Spill Contingency Plan.

10 Indian and Northern Affairs Canada (INAC). 2007. Guidelines for Spill Contingency Planning. Water Resources Division, INAC, Yellowknife, NT Available online: https://www.enr.gov.nt.ca/sites/enr/files/guidelines_for_spill_contingency_planning_2007.pdf

The entire spill kit contents, with the exception of the spark-proof shovels, can be stored within the 205 L steel drum. The drum will be sealed securely to protect the spill kit contents, though should always be accessible without the use of tools (i.e., finger tight bolt ring). The drum's bolt ring should be inspected regularly during inspections to ensure it turns freely and is lubricated.

Extra spill response materials should also be available for use, in addition to the spill kit contents. The spill kit will be located in the job shack as shown Appendix D.

7.7.11.2 Off-Site Resources

If required, additional resources will be provided from Inuvik or Tuktoyaktuk. Access to Inuvik from the Project site is approximately 2 hours by vehicle and 10 minutes to Tuktoyaktuk.

7.7.12 Training Program

Allen Services & Contracting Ltd. is committed to ensure all personnel involved in an emergency response fully understand their roles and the roles of others whom they may interact with during an incident. To meet this commitment and to ensure personnel respond effectively, training activities will include:

Orientation

- Provide employees and contractor management with an orientation to Allen Services & Contracting Ltd.'s Emergency Response Plan and its applicable elements.
- Ensure all employees are familiar with and trained in the safe work procedures related to the handling of petroleum products and fueling equipment (see Appendix F).
- Discuss and clarify bridging between contractors' emergency response procedures and this Allen Services & Contracting Ltd. ERP where applicable.
- Utilize summary wall charts outlining key responsibilities and lines of communication for quick reference purposes.
- Devote a portion of scheduled safety and/or staff meetings to discussion of emergency response issues on and on-going basis.
- Keep on site record of the training provided, when it was provided and who attended.

Specialized Emergency Response Training

- Make available (through the Allen Services & Contracting Ltd. Safety Advisor) all required training.
- Ensure employees and contractor personnel comply with Allen Services & Contracting Ltd.'s safety training requirements (e.g., First Aid/CPR, WHMIS, Transportation of Dangerous Goods, Firefighting, etc.).

Emergency Drills

- Employees and contractors will conduct drills on an on-going basis to ensure readiness, including, but not restricted to:
  - Firefighting;
  - Spill response;
  - First aid;
  - Confined space entry; and
  - Man down.

External Orientation

- As appropriate, brief and familiarize all external groups or agencies having a role in this Emergency Response Plan with the overall plan and their specific responsibilities under the plan.

7.8 Discovery of Historic Contamination

Immediately stop work. Contact site superintendent, and contract authority. Contain the immediate area to ensure contamination doesn't spread. Site superintendent and contract authority will determine the proper steps to proceed with clean-up and/or inspection from another authority.

8.0 Fisheries Management Plan

8.1 Purpose and Scope

This section provides the Fisheries Management Plan (FMP) for the Gunghi Creek crossing replacement Project. The FMP was developed to ensure compliance with the *Fisheries Act*, federal and territorial regulations including Aboriginal Affairs and Northern Development Canada (AANDC), Fisheries and Oceans Canada (DFO), and the Fisheries Joint Management Committee (FJMC).

The FMP identifies potential issues and concerns related to fisheries resources during construction and provides mitigation measures to address these potential issues. During construction an environmental monitor will be on site to ensure mitigation measures are being followed correctly and to respond to any issues that may arise.

The Project has been approved[11] and Fisheries Management Plan developed with the understanding that water will not be present in a liquid state at the watercourse crossing during construction and therefore instream worksite isolation facilities, fish rescue/salvage from instream construction worksite, and water quality monitoring will not be required. during the construction phase.

A separate Fisheries Management and Monitoring Plan[12] has been developed to outline short-term (construction phase) and medium and long-term (post-construction) monitoring and reporting.

8.1.1 Issues and Concerns

Potential direct or indirect construction-related effects to the fisheries resources of Gunghi Creek are largely related to the accidental release of a deleterious substance and include the following:

- During instream construction projects, sediment has the potential to be released or mobilized through the erosion of exposed soils, constriction or diversion of channel flows, and by disturbances to the channel bed or banks. Erosion and sedimentation at/or near the water crossing may impact water quality, fish habitat and fish health.

11 Audet-Lecouffe, José . FFHPP Biologist. Department of Fisheries and Oceans. Telephone and Email communication 2020, with Jessica Parker, Environmental Biologist, Wood Environment & Infrastructure Solution Communication. RE: Gunghi Creek - Fisheries Management and Monitoring Plan.

12 Wood Environment & Infrastructure Solutions. 2020. Fisheris Management and Monitoring Plan, Gunghi Creek Crossing Replacement. Prepared for Government of the Northwest Territories, Department of Infrastructure, Yellowknife, Northwest Territories. Prepared by Wood Environment & Infrastructure Solutions, Edmonton, Alberta.

- Accidental releases of wastes and fuels (i.e., sewage wastes, solid wastes [i.e., household and construction garbage], and hazardous wastes [hydrocarbons, hydraulic fluids]) at/or near the water crossing have the potential to impact water quality and fish health.
- Temporary access roads and/or snow fills at water crossing have the potential to result fish passage blockage during spring break-up.
- Accumulated debris (logs from clearing, boulders, garbage, ice-build-up etc.) can prevent efficient passage of water and fish at water crossing and may impact fish movement and water flows.

These potential effects can be mitigated by avoiding instream construction to the extent possible (e.g., operating machinery from outside of the watercourse), implementation of appropriate erosion and sediment control measures, proper storage and handling of hazardous materials, and removal of introduced snow fills or debris from the channel as described in the Mitigation Measures (Section 8.4).

It is expected the monitoring will support the implementation of mitigation measures to minimize impacts of construction and to provide a feedback mechanism so that mitigation measures can be adjusted where and when necessary.

8.2 Primary Contacts

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8.3 Project Footprint

The crossing replacement footprint including the temporary detour occurring below the ordinary high water mark[13] will be 368 m^2.

13 Ordinary high water level, approximately 1:2 year flow depth

8.4 Mitigation Measures

All Project activities will adhere to design specifications, conditions of project approvals (provided Appendix A), relevant guidance documents (Section 3.0), the PDRs and EMP, and will be performed in accordance with the established BMP's and/or mitigation measures outlined below. The Project has been approved (pers. comm. Audet-Lecouffe) and Fisheries Management and Monitoring Plan developed with the understanding that water will not be present in a liquid state at the watercourse crossing during construction and therefore instream worksite isolation facilities, water quality monitoring and fish rescue/salvage from instream construction worksite will not be required.

8.4.1 General

- Replace/restore any disturbed habitat features and remediate any areas impacted by the Projects works before spring thaw.
- Avoid fording the watercourse and conduct works from above the streambanks, wherever possible. Where instream access is required by construction machinery access should be restricted to one location within the instream work area and traffic should be limited. The access site must be chosen with care, where banks are low, and will be limited to the instream worksite.
- The construction limits will be conspicuously marked with flagging tape to ensure that construction personnel know the disturbance must remain within the proposed footprint and right-of-way.
- Any excavated areas of the channel bed will be backfilled with material that is the same (or better) quality and gradation that was removed.
- Only clean rock, appropriately sized and free of deleterious substances will be used for riprap. These materials will be obtained off site and will not be taken from below the ordinary high-water mark (OHM)[14] of any watercourse.
- Construction will be halted during periods of heavy precipitation (e.g., greater than 15 mm recorded over a 24-hour period, a short duration storm that generates visible sheet flow).
- All spoil materials and debris will be removed from the site and properly disposed of above the OHM so that they do not enter any water body.
- Disturbed areas will be stabilized, vegetated and/or seeded as soon as possible after construction.
- The Contractor will adhere to environmental management outlined in *Revision 6 – Environmental Management Plans: Erosion and Sediment Control Plans Hazardous Materials Management Plan, Waste Management Plan, Wildlife Management Plan, Spill Contingency Plan, Monitoring Plan, Permafrost Monitoring Plan, and Closure and Reclamation Plan.*

8.4.2 Construction Timing and Duration

The Project is tentatively scheduled for December 1, 2020 - April 30, 2021, where instream works are expected to be completed by April 15, 2021, during the restricted activity timing window for instream work of April 1 to July 15. Instream works are expected to be completed during frozen surface water/no flow conditions, prior to the spring freshet. Frozen surface water/no flow conditions are conducive to safe working conditions in the creek channel and may assist in reducing sediment transport capacity. Further, the Project has been approved and FMMP developed with the understanding that water will not be present in a liquid state at the watercourse crossing during construction. All efforts will be made by the Contractor to minimize the duration of instream activities and complete the works as expediently as

14 The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. This refers to the "active channel/bankfull level", which is often the 1:2 year flood flow return level.

possible. Clean-up of construction at the crossing location will commence immediately following the instream works.

8.4.3 Construction During the Restricted Activity Timing Window

Instream works are expected to be completed by April 15, 2021, during the restricted activity timing window for instream work of April 1 to July 15. In addition to other mitigation measures outlined in Section 8.4 of this EMP, the following will be implemented for construction during the restricted activity timing window.

- All efforts will be made by the contractor to minimize the duration of instream activities and complete the works as expediently as possible.
- Ongoing monitoring will be conducted to identify areas of erosion and sedimentation concern. Effective ESC measures will be in installed to prevent erosion and sediment from entering the watercourse. All ESC measures will be inspected regularly to ensure that they are functioning properly and are maintained, cleaned and/or upgraded as required until complete revegetation of all disturbed areas is achieved.
- Where flowing water is observed in the creek the following measures will be implemented:
    - Construction will be temporarily suspended, and the Department of Fisheries and Oceans immediately contacted (contact information provided in Section 8.2) to determine where additional measures may be required.
    - Implementation of water diversion and instream isolation measures outlined in Sections 3.0 - 3.1 of the Water Management Plan.
    - Water quality (total suspended solids, pH, and total petroleum hydrocarbons) monitoring will be conducted as outlined in Part D, Item 9 of the Water Licence N5L1-1843.
    - Where flowing water enters the instream work area at the time of construction, a fish rescue program will be completed prior to the start of instream work to ensure all fish are protected.
    - Any fish will be rescued from the isolated area prior to construction and be relocated, unharmed, into an area containing sufficient flow and cover. Fish rescue may require a territorial research licence. Rescue operations employing effective methods (e.g. electrofishing, seine netting, minnow trapping) carried out as stipulated in the research license.

8.4.4 Riparian Area Protection

The following measures will be implemented for the protection and/or re-establishment of riparian vegetation.

- Limit impacts on riparian vegetation to those approved for the Project works.
- All work will be conducted from above the streambanks, wherever possible, to avoid disturbance to riparian vegetation. Disturbed areas will be stabilized, vegetated and/or seeded as soon as possible after construction.
- Maintain an undisturbed vegetated buffer zone between areas of on-land activity and the OHM of any water body, where possible.
- Minimize clearing of riparian vegetation (where possible, prune or top vegetation rather than uprooting/grubbing) and use existing roads, cut lines or trails when accessing the work area to minimize further disturbance within the riparian area (e.g., soil compaction, clearing).
- Use methods to prevent soil compaction such as swamp/rig mats or pads.
- Prompt implementation of ESC measures of all disturbed areas.

- Implementing measures to reduce the introduction and spread of weeds and invasive plant species, such as washing and inspecting vehicles/equipment prior to its arrival onsite to ensure that they have been cleaned and are free of dirt, mud, weeds and invasive species; utilizing weed-free seed mixtures; and monitoring to identify potential locations for control measures; is recommended.
- Weed control methods will be implemented during the construction in areas where weed problems are identified. The use of herbicides is not recommended within the Project site due to potential runoff into Gunghi Creek.

8.4.5 Construction Machinery, Staging and Access

Construction staging areas and creek access will be located in areas that minimize disturbance to the creek, riparian and floodplain areas. Construction staging and access will be established to ensure that:

- Staging and creek access areas will be identified by the contractor and construction area boundaries will be marked with conspicuous flagging tape to ensure that construction personnel know limits and boundaries of the allowable work area.
- General preparation of the staging areas will be completed prior to the commencement of instream works.
- Avoid fording the watercourse and conduct works from above the streambanks, wherever possible. Where instream access is required by construction machinery access should be restricted to one location within the instream work area and traffic should be limited. The access site must be chosen with care, where banks are low, and will be limited to the instream worksite.
- All equipment and machinery will be assembled, cleaned and checked for proper mechanical operation prior to entering the work site. Regular inspections will be completed to ensure that hydraulic, fuel, and lubrication systems are in good condition and equipment is free of leaks.
- Washing, refueling, servicing and staging of machinery and equipment will be conducted at least 100 m from a water body to prevent the entry of any deleterious substances.
- All equipment that is to be used will be free of weed species and aquatic invasive species.
- Equipment travel and operation will be suspended or modified (i.e., swamp mats) in areas where rutting problems on wet ground are jeopardizing topsoil structure and integrity at the work site.

8.4.6 Instream Work

The following measures will be implemented for the protection of aquatic resources.

- Instream activities are to be completed during frozen surface water/no flow conditions.
- Instream works will be confined to the approved area.
- Minimize removal of any instream natural structures (e.g., woody debris, boulders; if removed, return to its original location).
- Any excavated areas of the channel bed will be backfilled with material that is the same or better quality and gradation that was removed.
- Only clean rock, appropriately sized and free of deleterious substances will be used for riprap. These materials will be obtained off site and will not be taken from below the average high-water level of any watercourse.
- All spoil materials and debris will be removed from the site and properly disposed of above the high-water mark so that they do not enter any water body.

- Should the need for dewatering arise (e.g., groundwater seepage), water will be released into a well vegetated area or settling basin and not directly into any water body. Water returning to the watercourse will be of equal or better quality than the water in the watercourse.

8.4.6.1 Instream Equipment

All equipment and machinery that will be working within the creek will be assembled, cleaned and checked for proper mechanical operation prior to entering the watercourse. Regular inspections will be completed to ensure that hydraulic, fuel, and lubrication systems are in good condition and equipment is free of leaks. Any equipment that arrives in a dirty condition, as determined by the Environmental monitor will not be allowed on the RoW or facilities site until it has been cleaned.

Biodegradable oils and lubricants (e.g., white lithium greases and vegetable oil hydraulic fluid) will be used in equipment that will be working within the watercourse. Used oil, filter and grease cartridges, lubrication containers, and other products of equipment maintenance will be contained and disposed of at the nearest industrial waste facility.

8.4.7 Erosion and Sediment Control

Erosion and sediment control (ESC) measures will be implemented as outlined in Section 3.0. Effective ESC measures will be in place prior to disturbance, during and after construction to prevent sediment from entering a water body. All ESC measures will be inspected regularly to ensure they are functioning properly and are maintained, cleaned and/or upgraded as required until complete revegetation of all disturbed areas is achieved.

8.4.8 Spill Management

Spill management measures will be implemented as outlined in Section 7.0.

8.4.9 Temporary Access Road – Snow Fill

The following measures will be implemented for the construction, operation and removal of the onsite detour.

- It is understood that construction of the temporary access will not require pumping of any water from any nearby water body.
- Construction/operation of the temporary access/crossing will be during frozen ground conditions and with an adequate layer of snow to prevent damage to the ground by vehicles.
- Construct approaches or access road crossings perpendicular to the watercourse where possible.
- Construct approaches using clean (ambient), compacted snow and ice to a sufficient depth to protect the stream banks or shoreline.
- The banks of the watercourse should be protected using suitable erosion control measures to the satisfaction of the inspector.
- Where logs are used to stabilize the approach, the logs are to be clean and securely cabled together. No logs and woody debris are to be left in the river or on the banks or shoreline.
- Any material placed below the Ordinary High Water mark[15] shall be free of any contaminants, debris, or fine material.
- Any temporary modification of the watercourse bank shall be returned to the original state. All materials shall be removed upon project completion.
- Any debris on the surface of the crossing will be removed immediately following construction completion.
- The snow bridge should be V-notched once construction is completed to allow it to melt from the center.
- Remove compacted snow from snow fills prior to the spring freshet.

8.5 Hazardous Waste Monitoring Plan

Based on the Project works, the most likely contaminant of potential concern for the Project is petroleum hydrocarbons associated with construction equipment (found in hydraulic fluids, diesel fuel and gasoline). The Contractor emergency spill response plan and contingency measures are provided in Section 7.0. In the unlikely event of a spill incident on site, the contractor will immediately implement the appropriate spill notification, response and mitigation measures as specified in the Spill Contingency Plan (Section 7.0). After clean-up the spill area will be reviewed for any sign of further contamination.

In large spills, or in the case a spill is released into the watercourse, this may require the input from an environmental specialist to verify the clean-up of the site is satisfactory. The Contractor will have a qualified environmental specialist on standby with appropriate training and qualifications to complete confirmatory water quality sampling and testing (i.e. sampling for hydrocarbons). The sampling will be conducted at the release site and/or containment area to confirm spill clean-up. Confirmatory samples will be sent to an approved laboratory for analysis. Criteria for confirmatory samples will follow Canadian Environmental Quality Guidelines, where appropriate. Standard lab testing criteria and quality assurance and quality control (QA/QC) plans will be established upon selection of a qualified analytical laboratory. Emergency Spill Response Reporting be conducted in as outlined in Section 7.0.

15 OHW = ordinary high water level, approximately 1:2 year flow depth

9.0 Permafrost Monitoring Plan

As the proposed development occurs within an area that has been previously disturbed by the exiting highway and watercourse crossing potential negative effects to permafrost (permafrost melt) are expected to be fully mitigated with the implementation of the following mitigation measures and permafrost monitoring is not expected to be required:

- Timing of Construction. To avoid rutting and erosion in permafrost terrain, construction and overland travel will only take place during the winter when the active layer is well-frozen.
- In areas of ice-rich permafrost, cross drains will be stacked on top of each other to maintain drainage in the event that the lower cross drain freezes, where required.
- Prior to the spring melt/freshet, the disturbed soil will be stabilized using effective erosion and sediment measures, vegetated and/or seeded. In areas with permafrost, care will be exercised to ensure these measures do not cause thawing or frost heave;
- At least 2 m of spoil material or other suitable material will be placed on any exposed ice surfaces to provide insulation.

10.0 Site Closure and Reclamation Plan

10.1 Purpose and Scope

The purpose of this Site Closure and Reclamation Plan is to outline when the Project will be completed and list the reclamations that will be carried out at the end of construction.

10.2 Primary Contacts

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10.3 Demobilization and Reclamation Details

The project is scheduled for construction during winter 2020/2021 when environmental impacts such as dust, erosion and silt contamination can be minimized. Seasonal deficiencies and final cleanup will occur in July 2021. Details of the Project schedule is provided in Appendix B.

At the end of the construction, all equipment will be driven where possible via ITH from site to the Inuvik head office. Tracked equipment, light towers, fuel cube, Porta Potty, and job site Trailer to be loaded and hauled by tractor trailer from site to Inuvik. Reclamation of banks and beds of the watercourse impacted due to construction activities and the temporary detour will be reinstated. Reclamation of impacted vegetation due to temporary detour and construction activities will be revisited post freshet and further reclamation and reseeding completed at that time. Additional details related to the temporary detour are as follows:

- No water withdrawal from nearby water bodies will be required for the temporary detour. Any water required for the project will be transported to site from the Hamlet of Tuktoyaktuk and will not be locally sourced.
- The temporary detour will only be operational when the ground is sufficiently frozen and there is an adequate layer of snow to prevent damage to the ground by vehicles.
- The snow bridge will be V-notched once construction is completed to allow it to melt from the center.
- Compacted snow from snow fills will be removed prior to the spring freshet.
- Winter ice roads will be allowed to deteriorate naturally at the end of winter, following the construction period.

11.0 Emergency Response Plan

The Contractor has prepared Emergency Response Procedures, provided in Appendix F. The document includes emergency contact numbers and reposnse procedures in the event of a personnal injury, incident or emergency, leak or spill, bomb threat, explosion, severe weather, or natural disaster.

Appendix A

GNWT Erosion and Sediment Control Best Management Practices #1 (Sediment Fences)

Sediment Fence Sediment Control	B.M.P. #1

- Useable life of approximately one year dependent on regular maintenance

Construction

- Two methods of installation are commonly used
  - Trench method (common method)
  - Mechanical (slicing) installation method (e.g. Tommy Silt Fence Machine or equivalent) (used in areas where soil depth is not a concern, therefore has not been included in this manual)
- Trench Method
  - Select location of sediment fence (fence must be level - along contours)
  - Excavate a trench approximately 0.15 m deep by 0.15 m wide for entire length of fence along upstream side of posts;
  - With fabric on the upstream or upslope side toward the flow, drive support posts a minimum of 0.3 m into ground, spaced a maximum of 2 m apart;
  - Extend the loose flap of filter fabric the bottom to cover the base of trench (see figure);
  - Backfill and compact soil in trench, being careful not to damage fence or dislodge posts;
  - Where extra support is required, attach the wire mesh or snow fencing, as reinforcement, to upstream side of posts with staples or other type of ties. If using fencing material which is not stapled to the posts, place the w ire mesh or snow fencing first and then line the upslope side with the fabric. Secure all tightly to the posts.

Construction Considerations

- Site Selection
  - Size of drainage area upslope of the sediment fence should be no greate r than 0.1 ha for each 30 m length of sediment fence;
  - Maximum slope length above sediment fence should be no greater than 30 m;
  - Maximum slope gradient above the sediment fence should be no greater than 2H:1V;
- Fence should be placed on contour (level) to produce proper water detention;

Sediment Fence Sediment Control	B.M.P. #1

- Fence should be placed far enough away from toe of slope to provide adequate retention area (minimum of 1.8 m away from toe of slope is recommended) which will also permit access by equipment to conduct maintenance;
- Fence should not be installed immediately adjacent to a stream. The fence should be as far from the stream edge as possible and at a minimum far enough (>1.0 m is recommended) from the stream bank to allow room for a second fence to be installed, should the first one fail or become damaged; Ends of fence should be angled upslope (smile) to collect runoff;
- Fence fabric should not extend more than 0.7 m above grade when installed correctly;
- Fence fabric (and wire mesh or snow fence, if used) should be dug into a trench at least 0.15 m deep (six inches) and lay across the bottom of the trench 0.15 m to prevent undercutting of fence by runoff; Fence stakes can be wood or metal material dependent on design and ground conditions;
- Stakes are to be placed on downstream side of fence, fabric on the same side as the material to be contained;
- Posts should not be spaced greater than 2 m apart;
- Wire mesh or standard snow fencing may be placed on the upslope side of the fencing to provide additional strength and support reinforcement;
- Fence material should be cut from a continuous roll to avoid joints. If joints are necessary, the wrapping of fabric around the fence post with a minimum overlap of 0.2 m and staples should be used to attach the fabric to the post);
- Fence material (and wire mesh or snow fence, if used) should be attached to posts with heavy duty staples, tie wires, or hog rings;
- Trench backfill should be compacted.
- Long sections of silt fence are more prone to failure than short sections.
  - Maximum length of each section of silt fence should be 40 m.
  - Sediment fence should be installed in 'J' hook or 'smile' configuration, with maximum length of 40 m, along contours (level). The J pattern allows for an escape path for detained water (minimizes pushing over or overtopping of the fence structure).

Inspection and Maintenance

- Inspection frequency should be in accordance with the PESC and TESC Plans. Sediment fences should be inspected daily but at a minimum of once every 7 days, as well as after significant storm events and spring melt.

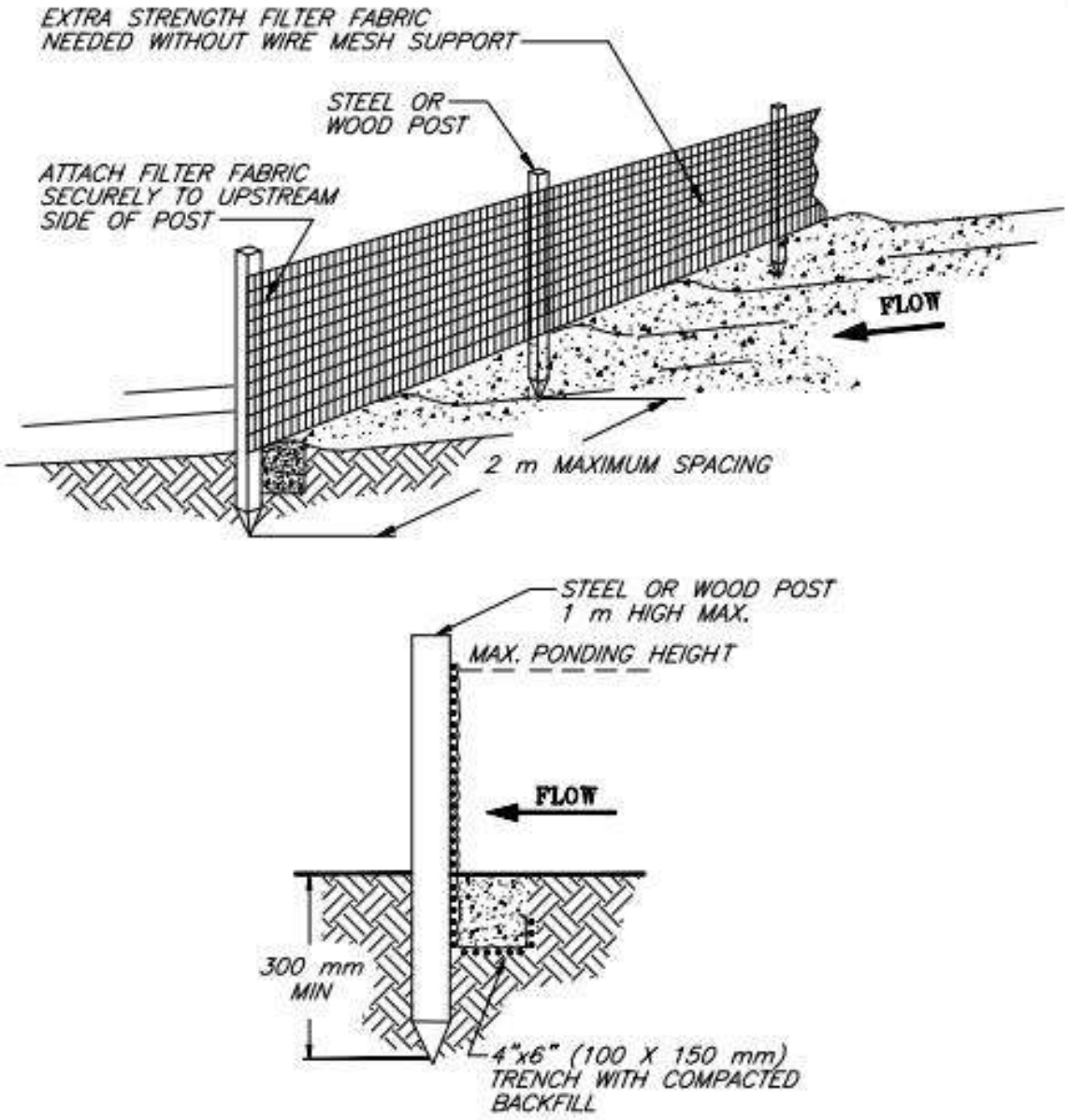
- Repair undercut fences. This is a sign that the fence was incorrectly installed or overloaded. Repair or replace damaged fencing (split, torn, loose or weathered) fabric immediately.
- Sediment build up should be removed once it accumulates to a depth of 0.3 m (one foot).
- Sediment should be removed and stored at a suitable stockpile location with no surface flow;
- Remove fence after vegetation is established;
- Deactivate fabric by cutting the fencing material between the stakes and pulling to remove; bottom trenched-in portion of fence fabric should be removed from the ground to avoid groundwater interception and potential for wildlife entanglement.

Similar Measures

- Straw Bales
- Rock Barrier
- Permeable/Synthetic Barriers

Design Considerations

- For sediment fence to work as a system, the following factors should be considered:
  a) quantity – adequate number, location, and spacing of fences for efficient detention and sedimentation
  b) installation – must be done correctly and on contour
  c) compaction – backfill and trenching of fabric
  d) support – posts adequately embedded, appropriate selection of post material and spacing
  e) attachment – secure fabric to post
- Install sediment fence in a 'J' hook or 'smile' configuration, so that the ends are higher than the fenceline to contain the water and sediment



TRENCH METHOD DETAIL

NOTES:

1. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
2. INSPECT AND REPAIR FENCE DAILY AND AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN ACCUMULATED SILT REACHES 200 mm.
3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA WILL NOT CONTRIBUTE SEDIMENT OFF-SITE.
4. THIS FIGURE IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE SPECIFIC DESIGN IS REQUIRED FROM DESIGNER/ENGINEER.

NOT TO SCALE

Sediment Fence (Trench Method)

From: Soils-Applied Earthcare - EROSION DRAW 3.0

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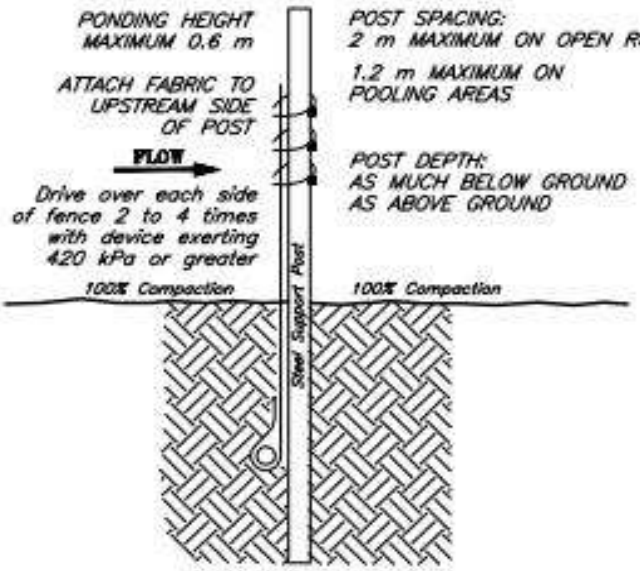
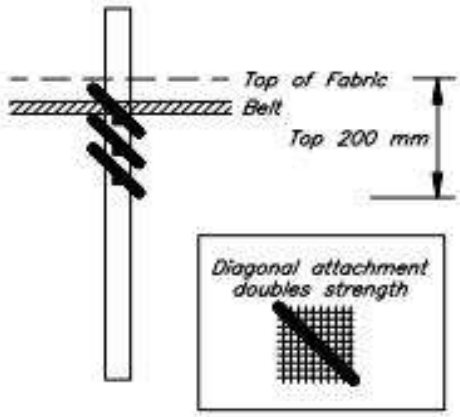
Government of the Northwest Territories – Transportation

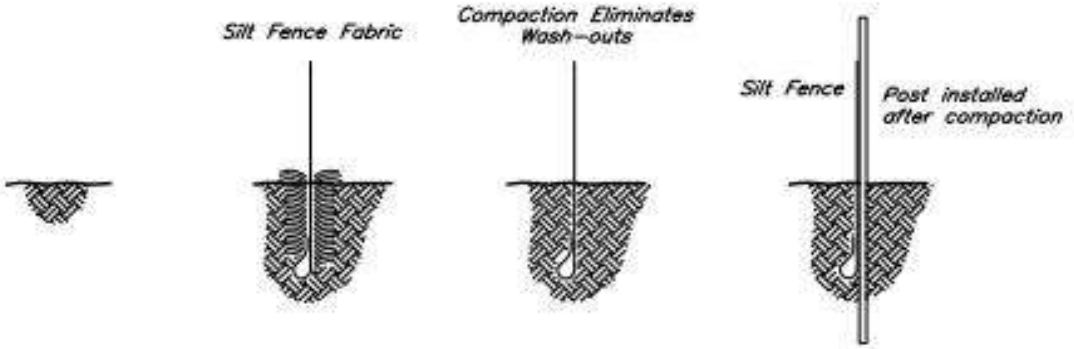




ATTACHMENT DETAILS:

- Gather fabric at posts, if needed.
- Utilize three ties per post, all within top 200 mm of fabric.
- Position each tie diagonally, puncturing holes vertically a minimum of 25 mm apart.
- Hang each tie on a post nipple and tighten securely.
- Use cable ties (50 lbs) or soft wire.

MECHANICAL (SLICING) METHOD



MECHANICAL (SLICING) METHOD INSTALLATION SEQUENCE

NOTES:

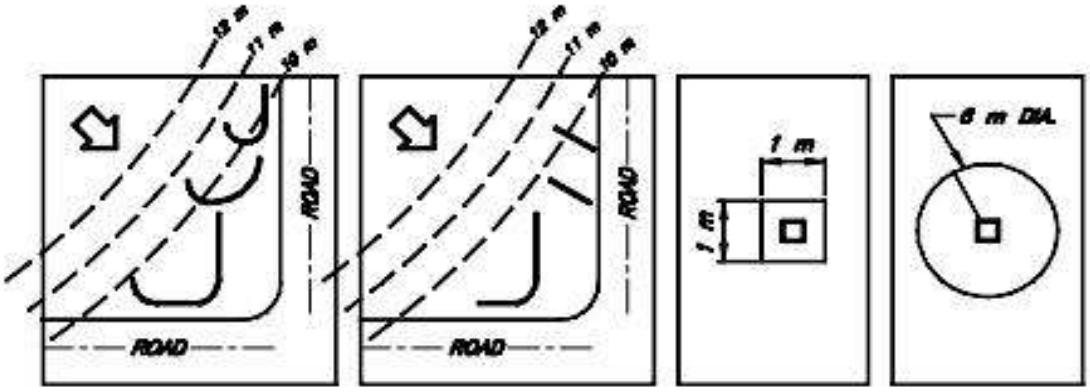
1. INSTALLATION MACHINE MUST ALLOW CONTINUOUS SLICING AND EMBEDMENT OF GEOTEXTILE INTO GROUND WITH MINOR GROUND DISTURBANCE.
2. INSTALLATION MACHINE TYPES WILL VARY WITH MANUFACTURER.
3. THIS FIGURE IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE SPECIFIC DESIGN IS REQUIRED FROM DESIGNER/ENGINEER.

NOT TO SCALE

SOURCE: CARPENTER T. 2000

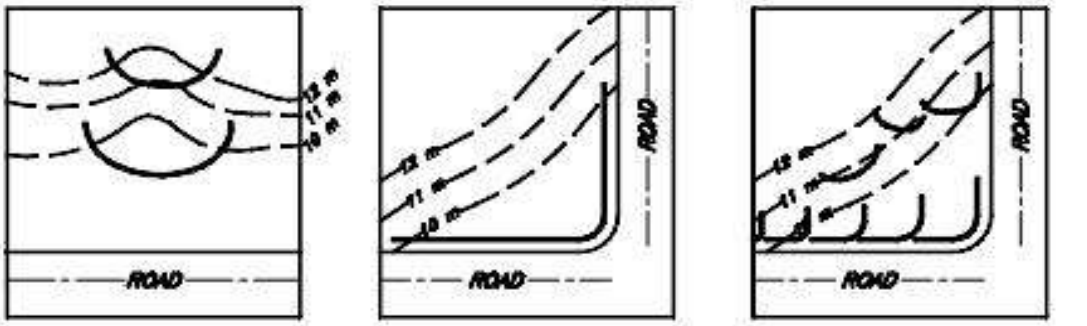
Sediment Fence (Mechanical Method)

Government of the Northwest Territories - Transportation



"J" CONFIGURATION

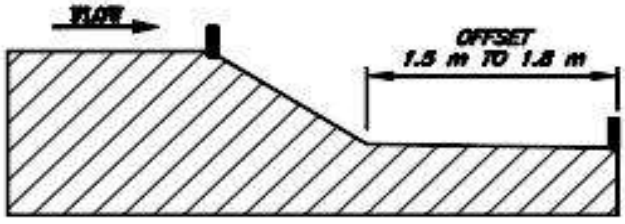
SILT FENCE BARRIER AT STORM INLET



"SMILE" CONFIGURATION

AVOID LONG INSTALLATION

COMBINATION OF "SMILE" AND "J" CONFIGURATIONS



LOCATION AT TOP AND BOTTOM OF SLOPE

NOT TO SCALE

NOTE:

1. THIS FIGURE IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE SPECIFIC DESIGN IS REQUIRED FROM DESIGNER/ENGINEER.

SOURCE: CARPENTER T. 2000

Sediment Fence (Configuration Plan)

Appendix B

Project Schedule

GUNGHI CREEK BRIDGE REPLACEMENT PROJECT
CONSTRUCTION SCHEDULE 2020 - 2021

TASK	START DATE	END DATE	TOTAL DAYS	ASCL PEOPLE ON SITE	WOOD PEOPLE ON SITE	TUNDRA PEOPLE ON SITE	PEOPLE IN CAMP	NOTES
DETOUR CONSTRUCTION	DEC 9/20	JAN 7/21	9	6	0		0	
MOBELIZE TO SITE	JAN 7/21	JAN 9/21	2	6	0		0	
SURVEY and LAYOUT	JAN 7/21	JAN 11/21	4	2	1		3	
EXCAVATION	JAN 10/21	JAN 24/21	14	7	0		7	
LAYOUT PILINGS	JAN 24/21	JAN 25/21	2	2	1		3	
PILING OPERATIONS	JAN 25/21	FEB 9/21	16	4	1	4	9	
PILING FREEZEBACK	FEB 9/21	FEB 16/21	7	2	1		3	
SURVEY PILING ELEVATIONS	FEB 15/21	FEB 16/21	2	2	1		3	
PILE CAP INSTALL & WELDING	FEB 16/21	FEB 22/21	7	6	1		7	
INSTALL ARCH SECTIONS	FEB 22/21	MAR 1/21	7	6	1		7	
BACKFILL OPERATIONS	MAR 22/21	MAR 28/21	7	6	1		7	
PLACE RIP-RAP & GUARDRAIL	MAR 28/21	MAR 30/21	6	6	1		7	
AS BUILT SURVEY	MAR 28/21	MAR 30/21	3	2	2		4	
FINAL CLEANUP & OPEN TO TRAFFIC	MAR 30/21	MAR 31/21	2	6	2		8	
REMOVE DETOUR & DEMOBE	MAR 31/21	APR 2/21	3	6	1		7	

Appendix C

Material Safety Data Sheets (MSDS)

Material Safety Data Sheet

DIESEL FUEL

1 . Product and company identification

Product name : DIESEL FUEL

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

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

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

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

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

2 . Hazards identification

Physical state : Bright oily liquid.

Odour : Mild petroleum oil like.

WHMIS (Canada) :

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

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

Emergency overview : WARNING!

COMBUSTIBLE LIQUID AND VAPOUR. CAUSES EYE AND SKIN IRRITATION.

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

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

Potential acute health effects

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

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

Skin : Severely irritating to the skin.

Eyes : Irritating to eyes.

Potential chronic health effects

Chronic effects : No known significant effects or critical hazards.

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

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

2 . Hazards identification

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

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

See toxicological information (section 11)

3 . Composition/information on ingredients

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

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

4 . First-aid measures

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

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

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

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

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

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

5 . Fire-fighting measures

Flammability of the product : Combustible liquid

Extinguishing media

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

Not suitable : Do not use water jet.

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

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

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

5 . Fire-fighting measures

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

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

6 . Accidental release measures

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

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

Methods for cleaning up

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

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

7 . Handling and storage

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

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

8 . Exposure controls/personal protection

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

Consult local authorities for acceptable exposure limits.

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

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

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

Personal protection

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

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

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

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

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

9 . Physical and chemical properties

Physical state : Bright oily liquid.

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

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

Flammable limits : Lower: 0.7%
Upper: 6%

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

Odour : Mild petroleum oil like.

Odour threshold : Not available.

pH : Not available.

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

Melting/freezing point : Not available.

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

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

Vapour density : 4.5 [Air = 1]

Volatility : Semivolatile to volatile.

Evaporation rate : Not available.

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

Pour point : Not available.

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

10 . Stability and reactivity

Chemical stability : The product is stable.

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

Materials to avoid : Reactive with oxidising agents and acids.

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

11 . Toxicological information

Acute toxicity

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

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

Conclusion/Summary : Not available.

Carcinogenicity

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

11 . Toxicological information

Classification

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

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

13 . Disposal considerations

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

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

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

14 . Transport information

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

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Combustible liquid
Irritating material

Canada

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

15 . Regulatory information

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

International regulations

Canada inventory : All components are listed or exempted.

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

Europe inventory : All components are listed or exempted.

16 . Other information

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

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

Health	2
Flammability	2
Physical hazards	0
Personal protection	H

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

References : Available upon request.
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Date of printing : **7/6/2010.**

Date of issue : 6 July 2010

Date of previous issue : 7/3/2009.

Responsible name : **Product Safety - JDW**

Indicates information that has changed from previously issued version.

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

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

For Product Safety Information: (905) 804-4752

Notice to reader

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

Material Safety Data Sheet

GASOLINE - ETHANOL

1 . Product and company identification

Product name : GASOLINE - ETHANOL

Synonym : SuperClean, SuperClean 94 (Montreal), GASOHOL, Regular, Mid-Grade, Plus, WinterGas, RegularClean, PlusClean, marked or dyed gasoline, Super Premium (94 RO), E-10, Ultra 94, Ethanol blended gasoline

Code : GASOHOL

Material uses : Gasoline-Ethanol is used in spark ignition engines including motor vehicles, farm vehicles, inboard and outboard boat engines, small engines 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.

Potential acute health effects

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

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

Skin : Irritating to skin.

Eyes : Irritating to eyes.

2 . Hazards identification

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

Name	CAS number	%
Gasoline	86290-81-5	90 - 97
Toluene	108-88-3	10 - 20
Ethanol	64-17-5	5 - 10
Benzene	71-43-2	0.5 - 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.

Extinguishing media

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

Not suitable : Do not use water jet.

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

Products of combustion : Carbon oxides (CO, CO2), nitrogen oxides (NOx), lead, aldehydes, ketones, phenols, polynuclear aromatic hydrocarbons, 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, and heat. This product can accumulate static charge and ignite. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back.

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. Runoff to sewer may create fire or explosion hazard.

6 . Accidental release measures

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

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

Methods for cleaning up

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

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

7 . Handling and storage

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

7 . Handling and storage

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. Ground all equipment containing material.

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).
Ethanol	**ACGIH TLV (United States).** STEL: 1000 ppm 15 minute(s).
Benzene	**ACGIH TLV (United States). Absorbed through skin.** TWA: 0.5 ppm 8 hour(s). STEL: 2.5 ppm 15 minute(s).

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 : -43°C (-45.4°F) (NFPA)

Auto-ignition temperature : Not available.

Flammable limits : Lower: 1.4% (NFPA)
Upper: 7.6% (NFPA)

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

Odour : Gasoline

Odour threshold : Not available.

pH : Not available.

Boiling/condensation point : 26 to 200°C (78.8 to 392°F)

Melting/freezing point : Not available.

Relative density : 0.7 to 0.78 kg/L @ 15°C (59°F)

Vapour pressure : 41 to 107 kPa (307 to 802 mm Hg) @ 15°C (59°F)

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

Volatility : Not available.

Evaporation rate : Not available.

Viscosity : 0.6 cSt @ 40ºC (104ºF)

Pour point : Not available.

Solubility : Hydrocarbon components virtually insoluble in water. Ethyl alcohol is completely soluble in water.

10 . Stability and reactivity

Chemical stability : The product is stable.

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

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

Hazardous decomposition products : May release COx, NOx, aldehydes, ketones, phenols, polynuclear aromatic hydrocarbons, 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
Ethanol	LC50 Inhalation Vapour	Rat	>32380 ppm	4 hours
Benzene	LD50 Dermal	Rabbit	>8240 mg/kg	-
	LD50 Oral	Rat	930 mg/kg	-
	LC50 Inhalation Vapour	Rat	13700 mg/kg	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	-	-	-
Ethanol	A3	-	-	-	-	-
Benzene	A1	1	A	+	Proven.	+

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	3
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 : **10/24/2012.**

Date of issue : 24 October 2012

Date of previous issue : 4/22/2010.

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.

SECTION 1. IDENTIFICATION

Product name	:	PROPANE
Synonyms	:	Propane HD-5, Propane commercial, Liquified Petroleum Gas (LPG), C3H8, CGSB Propane Grade 1, CGSB Propane Grade 2, odorized propane, stenched propane, automotive propane.
Product code	:	100139
Manufacturer or supplier's details		Petro-Canada P.O. Box 2844, 150 - 6th Avenue South-West Calgary Alberta T2P 3E3 Canada
Emergency telephone number		Suncor Energy: +1 403-296-3000; Canutec Transportation: 1-888-226-8832 (toll-free) or 613-996-6666; Poison Control Centre: Consult local telephone directory for emergency number(s).

Recommended use of the chemical and restrictions on use

Recommended use	:	Propane is used as a fuel gas, refrigerant and as a raw material for organic synthesis. It is also used as a laboratory gas. The grade determines the propane content. It is supplied as pressurized liquid in tanks.
Prepared by	:	Product Safety: +1 905-804-4752

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Appearance	Gas at room temperature; liquid when stored under pressure., Liquefied compressed gas.
Colour	colourless
Odour	Propane is an odourless gas. Odourized propane will contain up to 30 g Ethyl Mercaptan per 1000 L of propane.

GHS Classification

Flammable gases	:	Category 1
Gases under pressure	:	Liquefied gas
Simple Asphyxiant	:	Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Extremely flammable gas.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary statements : **Prevention:**
Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Response:
Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
In case of leakage, eliminate all ignition sources.
Storage:
Protect from sunlight. Store in a well-ventilated place.

Potential Health Effects

Primary Routes of Entry : Eye contact
Inhalation
Skin contact

Inhalation : Inhalation may cause central nervous system effects.
May cause respiratory tract irritation.
Inhalation of vapours may cause drowsiness, headache, dizziness and disorientation.

Skin : Contact with rapidly expanding gas may cause burns or frostbite.

Eyes : Contact with rapidly expanding gas may cause burns or frostbite.

Ingestion : Exposure by this route unlikely.

Aggravated Medical Condition : Overexposure may lead to cardiac sensitization.

Other hazards

None known.

IARC No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

Chemical name	CAS-No.	Concentration
propane	74-98-6	90 - 100 %
propylene	115-07-1	1 - 5 %
butane	106-97-8	1 - 2.5 %
ethane	74-84-0	1 - 1.5 %
methane	74-82-8	0.1 - 0.2 %

SECTION 4. FIRST AID MEASURES

If inhaled : Move to fresh air.
Artificial respiration and/or oxygen may be necessary.
Seek medical advice.

In case of 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 recognized skin cleanser.
Wash contaminated clothing before reuse.
Seek medical advice.

In case of eye contact : Remove contact lenses.
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
Obtain medical attention.

If swallowed : Not a significant route of exposure.

Most important symptoms and effects, both acute and delayed : First aider needs to protect himself.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media : No information available.

Specific hazards during fire-fighting : If the product release cannot be shut off safely, allow the product to burn itself out.
Cool closed containers exposed to fire with water spray.

Hazardous combustion products	:	Carbon oxides (CO, CO2), smoke and irritating vapours as products of incomplete combustion.
Further information	:	Prevent fire extinguishing water from contaminating surface water or the ground water system.
Special protective equipment for firefighters	:	Wear self-contained breathing apparatus and full protective wear. Wear a positive-pressure supplied-air respirator with full face-piece.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. In case of inadequate ventilation wear respiratory protection. Remove all sources of ignition.
Environmental precautions	:	If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up	:	Prevent further leakage or spillage if safe to do so. Ensure adequate ventilation. Use explosion-proof ventilation equipment. Non-sparking tools should be used. Contact the proper local authorities.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling	:	For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. In case of insufficient ventilation, wear suitable respiratory equipment. Avoid contact with skin, eyes and clothing. Avoid breathing gas. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity. Use only with adequate ventilation. Keep away from heat and sources of ignition. Keep container closed when not in use. Do not use sparking tools. Do not enter areas where used or stored until adequately ventilated.
Conditions for safe storage	:	Store in original container. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Keep in a dry, cool and well-ventilated place. Keep in properly labelled containers. To maintain product quality, do not store in heat or direct sunlight.

Keep away from sources of ignition - No smoking.
Ensure the storage containers are grounded/bonded.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
propane	74-98-6	TWA	1,000 ppm	CA AB OEL
		TWA	1,000 ppm	CA BC OEL
		TWAEV	1,000 ppm 1,800 mg/m3	CA QC OEL
propylene	115-07-1	TWA	500 ppm 860 mg/m3	CA AB OEL
		TWA	500 ppm	CA BC OEL
		TWA	500 ppm	ACGIH
butane	106-97-8	TWA	1,000 ppm	CA AB OEL
		TWA	600 ppm	CA BC OEL
		STEL	750 ppm	CA BC OEL
		TWAEV	800 ppm 1,900 mg/m3	CA QC OEL
ethane	74-84-0	TWA	1,000 ppm	CA AB OEL
		TWA	1,000 ppm	CA BC OEL

Engineering measures : Use only in well-ventilated areas.
Use explosion-proof ventilation equipment.
Adequate ventilation to ensure that Occupational Exposure Limits are not exceeded.

Personal protective equipment

Respiratory protection : 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.

Filter type : Always wear NIOSH-approved self-contained breathing apparatus when handling this material.

Hand protection
Material : Wear insulated gloves to prevent frostbite.

Remarks : 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.

Eye protection : Wear face-shield and protective suit for abnormal processing problems.

Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the spe-

cific work-place.

Protective measures	:	Wash contaminated clothing before re-use. Wear suitable protective equipment.
Hygiene measures	:	Remove and wash contaminated clothing and gloves, including the inside, before re-use. Wash face, hands and any exposed skin thoroughly after handling.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Gas at room temperature; liquid when stored under pressure., Liquefied compressed gas.
Colour	:	colourless
Odour	:	Propane is an odourless gas. Odourized propane will contain up to 30 g Ethyl Mercaptan per 1000 L of propane.
Odour Threshold	:	No data available
pH	:	No data available
Pour point	:	No data available
Boiling point/boiling range	:	-42 °C (-44 °F)
Flash point	:	-104 °C (-155 °F) Method: closed cup
Fire Point	:	No data available
Auto-Ignition Temperature	:	450 °C (842 °F)
Evaporation rate	:	No data available
Flammability	:	Extremely flammable in presence of open flames, sparks, and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. Rapid escape of vapour may generate static charge causing ignition. May accumulate in confined spaces.
Upper explosion limit	:	9.5 %(V)
Lower explosion limit	:	2.1 %(V)
Vapour pressure	:	10,763 mmHg (38 °C / 100 °F)
Relative vapour density	:	1.56
Relative density	:	No data available
Density	:	No data available

Solubility(ies)		
Water solubility	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Viscosity		
Viscosity, kinematic	:	No data available
Explosive properties	:	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. Vapour explosion hazard indoors, outdoors or in sewers. Propane may form explosive mixtures with air.

SECTION 10. STABILITY AND REACTIVITY

Possibility of hazardous reactions	:	Hazardous polymerisation does not occur. Stable under normal conditions.
Conditions to avoid	:	Heat, flames and sparks.
Incompatible materials	:	Reactive with oxidising agents and halogenated compounds.
Hazardous decomposition products	:	May release COx, smoke and irritating vapours when heated to decomposition.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Eye contact
Inhalation
Skin contact

Acute toxicity

Product:

Acute oral toxicity	:	Remarks: No data available
Acute inhalation toxicity	:	Remarks: No data available
Acute dermal toxicity	:	Remarks: No data available

Components:

butane:

Acute inhalation toxicity	:	LC50 (Rat): 658 mg/l Exposure time: 4 h Test atmosphere: gas

Skin corrosion/irritation

Product:

Remarks: No data available

Serious eye damage/eye irritation

Product:

Remarks: No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

No data available

Reproductive toxicity

No data available

STOT - single exposure

No data available

STOT - repeated exposure

No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Product:

Toxicity to fish	:	Remarks: No data available
Toxicity to daphnia and other aquatic invertebrates	:	Remarks: No data available
Toxicity to algae	:	Remarks: No data available
Toxicity to bacteria	:	Remarks: No data available

Persistence and degradability

Product:

Biodegradability	:	Remarks: No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	The product should not be allowed to enter drains, water courses or the soil. Offer surplus and non-recyclable solutions to a licensed disposal company. Waste must be classified and labelled prior to recycling or disposal. Send to a licensed waste management company. Dispose of as hazardous waste in compliance with local and national regulations. Dispose of product residue in accordance with the instructions of the person responsible for waste disposal.

SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR

UN/ID No.	:	UN 1978
Proper shipping name	:	Propane
Class	:	2.1
Packing group	:	Not assigned by regulation
Labels	:	Class 2 - Gases: Flammable (Division 2.1)
Packing instruction (cargo aircraft)	:	200

IMDG-Code

UN number	:	UN 1978
Proper shipping name	:	PROPANE
Class	:	2.1
Packing group	:	Not assigned by regulation
Labels	:	2.1
EmS Code	:	F-D, S-U
Marine pollutant	:	no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

National Regulations

TDG

UN number	:	UN 1978
Proper shipping name	:	PROPANE

Class	:	2.1
Packing group	:	Not assigned by regulation
Labels	:	2.1
ERG Code	:	115
Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

This product has been classified according to the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all of the information required by the HPR.

The components of this product are reported in the following inventories:

DSL	On the inventory, or in compliance with the inventory
TSCA	All chemical substances in this product are either listed on the TSCA Inventory or are in compliance with a TSCA Inventory exemption.
EINECS	On the inventory, or in compliance with the inventory

SECTION 16. OTHER INFORMATION

For Copy of SDS	:	Internet: www.petro-canada.ca/msds Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228 For Product Safety Information: 1 905-804-4752
Prepared by	:	Product Safety: +1 905-804-4752
Revision Date	:	2018/06/07

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT

Product Name: **MOBIL EAL 224H**
Product Description: Plant/Vegetable Oil
Product Code: 201560105010, 601831-00
Intended Use: Hydraulic fluid

COMPANY IDENTIFICATION

Supplier: **East Coast Lubes Pty Ltd (Queensland and Northern Territory)**
A.B.N. 37 117 203 611
Cnr North and Mort Streets
Toowoomba, Queensland 4350 Australia

24 Hour Emergency Telephone 1300 131 001
Supplier General Contact 1800 069 019

Supplier: **Southern Cross Lubes (Victoria and Tasmania, New South Wales and Australian Capital Territory)**
58-66 Ajax Road
Altona, Victoria 3018, Australia

24 Hour Emergency Telephone 1300 131 001
Product Technical Information
Supplier General Contact 1300 466 245
1300 552 861

Supplier: **Perkal Pty Ltd Trading as Statewide Oil (Western Australia)**
A.B.N. 43 009 283 363
14 Beete Street
Welshpool, Western Australia 6106 Australia

24 Hour Emergency Telephone (8:00am to 4:30pm Mon to Fri) 1300 919 904
Product Technical Information
Supplier General Contact (08) 9350 6777
(08) 9350 6777

Supplier: **Perkal Pty Ltd Trading as Statewide Oil (South Australia)**
A.B.N. 43 009 283 363
6-10 Streiff Rd
Wingfield, South Australia 5013 Australia

24 Hour Emergency Telephone (8:00am to 4:30pm Mon to Fri) 1300 919 904
Product Technical Information
Supplier General Contact (08) 8359 8995
(08) 8359 8995

SECTION 2 HAZARDS IDENTIFICATION

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

Other hazard information:

Physical / Chemical Hazards:
No significant hazards.

Health Hazards:
High-pressure injection under skin may cause serious damage. Mildly irritating to skin. May be irritating to the eyes, nose, throat, and lungs.

Environmental Hazards:
No significant hazards.

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 3 COMPOSITION / INFORMATION ON INGREDIENTS

This material is defined as a mixture.

No Reportable Hazardous Substance(s) or Complex Substance(s).

Name	CAS#	Concentration*	GHS Hazard Codes
2,6-DI-TERT-BUTYLPHENOL	128-39-2	1 - < 2.5%	H315, H400(M factor 1), H410(M factor 1)

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume. Other ingredients determined not to be hazardous up to 100%.

SECTION 4 FIRST AID MEASURES

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. Remove contaminated clothing. Launder contaminated clothing before reuse. 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.

NOTE TO PHYSICIAN

None

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 run-off from fire control or dilution from entering streams, sewers or drinking water supply. Fire-fighters 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.

Unusual Fire Hazards: Pressurised mists may form a flammable mixture.

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

FLAMMABILITY PROPERTIES

Flash Point [Method]: >221°C (430°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
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.

PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required, due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

SPILL MANAGEMENT

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

Water Spill: Stop leak if you can do so 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: Dyke 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 skin. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or earthing procedures. However, bonding and earthing may not eliminate the hazard from static accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Static Accumulator: This material is a static accumulator.

STORAGE

The type of container used to store the material may affect static accumulation and dissipation. Do not store in open or unlabelled containers.

Material is defined under the National Standard [NOHSC:1015] Storage and Handling of Workplace Dangerous Goods.

SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

Biological limits

No biological limits allocated.

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

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:
Particulate
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/vapour 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:
Nitrile,Viton
Chemical resistant gloves are recommended.

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:
Chemical/oil resistant clothing is recommended.

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. Practise good housekeeping.

ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Note: Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

GENERAL INFORMATION

Physical State: Liquid

Colour: Pale Yellow
Odour: Characteristic
Odour Threshold: N/D

IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION

Relative Density (at 15 °C): 0.921
Flammability (Solid, Gas): N/A
Flash Point [Method]: >221°C (430°F) [ASTM D-92]
Flammable Limits (Approximate volume % in air): LEL: N/D UEL: N/D
Autoignition Temperature: N/D
Boiling Point / Range: N/D
Decomposition Temperature: N/D
Vapour Density (Air = 1): N/D
Vapour Pressure: [N/D at 20ºC]
Evaporation Rate (n-butyl acetate = 1): N/D
pH: N/A
Log Pow (n-Octanol/Water Partition Coefficient): N/D
Solubility in Water: Negligible
Viscosity: 36.8 cSt (36.8 mm2/sec) at 40 ºC | 8.3 cSt (8.3 mm2/sec) at 100°C
Oxidizing Properties: See Hazards Identification Section.

OTHER INFORMATION

Freezing Point: N/D
Melting Point: N/A
Pour Point: -34°C (-29°F)

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Material is stable under normal conditions.

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

INCOMPATIBLE MATERIALS: Strong oxidisers

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

POSSIBILITY OF HAZARDOUS REACTIONS: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

INFORMATION ON TOXICOLOGICAL EFFECTS

Hazard Class	Conclusion / Remarks
Inhalation	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Negligible hazard at ambient/normal handling temperatures.
Ingestion	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin	

Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin Corrosion/Irritation: No end point data for material.	Mildly irritating to skin with prolonged exposure. Based on assessment of the components.
Eye	
Serious Eye Damage/Irritation: No end point data for material.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.
Sensitisation	
Respiratory Sensitization: No end point data for material.	Not expected to be a respiratory sensitizer.
Skin Sensitization: No end point data for material.	Not expected to be a skin sensitizer. Based on assessment of the components.
Aspiration: Data available.	Not expected to be an aspiration hazard. Based on physico-chemical properties of the material.
Germ Cell Mutagenicity: No end point data for material.	Not expected to be a germ cell mutagen. Based on assessment of the components.
Carcinogenicity: No end point data for material.	Not expected to cause cancer. Based on assessment of the components.
Reproductive Toxicity: No end point data for material.	Not expected to be a reproductive toxicant. Based on assessment of the components.
Lactation:	Not expected to cause harm to breast-fed children.
Specific Target Organ Toxicity (STOT)	
Single Exposure: No end point data for material.	Not expected to cause organ damage from a single exposure.
Repeated Exposure: No end point data for material.	Not expected to cause organ damage from prolonged or repeated exposure. Based on assessment of the components.

OTHER INFORMATION

For the product itself:

Repeated and/or prolonged exposure may cause irritation to the skin, eyes, or respiratory tract.

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

--REGULATORY LISTS SEARCHED--

1 = IARC 1 2 = IARC 2A 3 = IARC 2B

SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data for the material, components of the material, or for similar materials, through the application of bridging principals.

ECOTOXICITY

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

PERSISTENCE AND DEGRADABILITY
Biodegradation:
Majority of components -- Expected to be readily biodegradable.

ECOLOGICAL DATA

Ecotoxicity

Test	Duration	Organism Type	Test Results
Aquatic - Acute Toxicity	96 hour(s)	Americamysis bahia	LC50 >5000 mg/l
Aquatic - Acute Toxicity	96 hour(s)	Oncorhynchus mykiss	LC50 >5000 mg/l
Aquatic - Chronic Toxicity	7 day(s)	Ceriodaphnia dubia	NOELR >5000 mg/l
Aquatic - Chronic Toxicity	7 day(s)	Pimephales promelas	NOELR >5000 mg/l

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. Even though this product is readily biodegradable, it must not be indiscriminately discarded into the environment. Protect the environment. Dispose of used oil at designated sites. Minimize skin contact. Do not mix used oils with solvents, brake fluids or coolants.

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 (ADG) : Not Regulated for Land Transport

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

Marine Pollutant: No

AIR (IATA): Not Regulated for Air Transport

SECTION 15 REGULATORY INFORMATION

This material is not considered hazardous according to Australia Model Work Health and Safety Regulations.

Product is not regulated according to Australian Dangerous Goods Code.

No Poison Schedule number allocated by the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) established under the Therapeutic Goods Act.

AS1940 COMBUSTIBLE CLASS: C2

REGULATORY STATUS AND APPLICABLE LAWS AND REGULATIONS

Listed or exempt from listing/notification on the following chemical inventories (May contain substance(s) subject to notification to the EPA Active TSCA inventory prior to import to USA): AICS, DSL, ENCS, IECSC, ISHL, KECI, PICCS, TCSI, TSCA

SECTION 16 OTHER INFORMATION

KEY TO ABBREVIATIONS AND ACRONYMS:

N/D = Not determined, N/A = Not applicable, STEL = Short-Term Exposure Limit, TWA = Time-Weighted Average

KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):
H315: Causes skin irritation; Skin Corr/Irritation, Cat 2
H400: Very toxic to aquatic life; Acute Env Tox, Cat 1
H410: Very toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 1

THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:
Composition: No components information was modified.
Section 08: Environmental Control - Note information was modified.
Section 09: Viscosity information was modified.
Section 11: Dermal Lethality Test Comment information was added.
Section 15: National Chemical Inventory Listing information was modified.

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affiliates in which they directly of indirectly hold any interest.

DGN: 2007539DAU (554219)

Prepared by: Exxon Mobil Corporation
EMBSI, Clinton NJ USA
Contact Point: See Section 1 for Local Contact number

End of (M)SDS

SAFETY DATA SHEET

1. Identification

Product identifier **White Lithium Grease**

Other means of identification

Product Code No. 03080 (Item# 1003341)

Recommended use Lubricating grease

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Manufactured or sold by:

Company name CRC Industries, Inc.

Address 885 Louis Dr.
Warminster, PA 18974 US

Telephone

General Information 215-674-4300

Technical Assistance 800-521-3168

Customer Service 800-272-4620

24-Hour Emergency 800-424-9300 (US)

(CHEMTREC) 703-527-3887 (International)

Website www.crcindustries.com

2. Hazard(s) identification

Physical hazards	Flammable aerosols	Category 1
	Gases under pressure	Liquefied gas
Health hazards	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2B
	Reproductive toxicity (fertility)	Category 2
	Specific target organ toxicity, single exposure	Category 3 narcotic effects
	Aspiration hazard	Category 1
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 2
	Hazardous to the aquatic environment, long-term hazard	Category 2

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement Extremely flammable aerosol. Contains gas under pressure; may explode if heated. May be fatal if swallowed and enters airways. Causes skin irritation. Causes eye irritation. May cause drowsiness or dizziness. Suspected of damaging fertility. Toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Do not spray on an open flame or other ignition source. Pressurized container: Do not pierce or burn, even after use. Do not apply while equipment is energized. Extinguish all flames, pilot lights and heaters. Vapors will accumulate readily and may ignite. Use only with adequate ventilation; maintain ventilation during use and until all vapors are gone. Open doors and windows or use other means to ensure a fresh air supply during use and while product is drying. If you experience any symptoms listed on this label, increase ventilation or leave the area. Avoid breathing mist or vapor. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. Avoid release to the environment.
Response	If swallowed: Immediately call a poison center/doctor. Do NOT induce vomiting. If on skin: Wash with plenty of water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center/doctor if you feel unwell. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If exposed or concerned: Get medical advice/attention. Collect spillage.
Storage	Store in a well-ventilated place. Store locked up. Protect from sunlight. Do not expose to temperatures exceeding 50°C/122°F. Exposure to high temperature may cause can to burst.
Disposal	Dispose of contents/container in accordance with local/regional/national regulations.
Hazard(s) not otherwise classified (HNOC)	Static accumulating flammable liquid can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite liquid and vapor. May cause flash fire or explosion.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
liquefied petroleum gas		68476-86-8	30 - 40
2-methylpentane		107-83-5	20 - 30
distillates (petroleum), hydrotreated heavy naphthenic		64742-52-5	10 - 20
naphtha (petroleum), hydrotreated light		64742-49-0	10 - 20
n-hexane		110-54-3	3 - 5
zinc oxide		1314-13-2	< 1
2,2-dimethylbutane		75-83-2	< 0.3
2,3-dimethylbutane		79-29-8	< 0.3
3-methylpentane		96-14-0	< 0.3
calcium bis(dinonylnaphthalenesulphonate)		57855-77-3	< 0.3

Specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation	Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.
Skin contact	Remove contaminated clothing. Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
Ingestion	Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.
Most important symptoms/effects, acute and delayed	Aspiration may cause pulmonary edema and pneumonitis. May cause drowsiness and dizziness. Headache. Nausea, vomiting. Irritation of eyes. Exposed individuals may experience eye tearing, redness, and discomfort. Skin irritation. May cause redness and pain.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
General information	IF exposed or concerned: Get medical advice/attention. 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.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Carbon dioxide (CO2). Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	Contents under pressure. Pressurized container may rupture when exposed to heat or flame. This product is a poor conductor of electricity and can become electrostatically charged. If sufficient charge is accumulated, ignition of flammable mixtures can occur. Static electricity accumulation may be significantly increased by the presence of small quantities of water or other contaminants. Material will float and may ignite on surface of water. During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.
Fire-fighting equipment/instructions	In case of fire: Stop leak if safe to do so. Move containers from fire area if you can do so without risk. Containers should be cooled with water to prevent vapor pressure build up.
General fire hazards	Extremely flammable aerosol. Contents under pressure. Pressurized container may rupture when exposed to heat or flame.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Remove all possible sources of ignition in the surrounding area. Keep out of low areas. Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). Wear appropriate protective equipment and clothing during clean-up. Avoid breathing mist or vapor. Emergency personnel need self-contained breathing equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Use appropriate containment to avoid environmental contamination. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material. The product is immiscible with water and will spread on the water surface. Prevent product from entering drains. Stop the flow of material, if this is without risk. Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground. Use appropriate containment to avoid environmental contamination.

7. Handling and storage

Precautions for safe handling	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Minimize fire risks from flammable and combustible materials (including combustible dust and static accumulating liquids) or dangerous reactions with incompatible materials. Pressurized container: Do not pierce or burn, even after use. Do not use if spray button is missing or defective. Do not spray on a naked flame or any other incandescent material. Do not smoke while using or until sprayed surface is thoroughly dry. Do not cut, weld, solder, drill, grind, or expose containers to heat, flame, sparks, or other sources of ignition. Use caution around energized equipment. The metal container will conduct electricity if it contacts a live source. This may result in injury to the user from electrical shock and/or flash fire. Protect containers from physical damage; do not drag, roll, slide, or drop. When moving containers, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport containers. Avoid breathing mist or vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Pregnant or breastfeeding women must not handle this product. Should be handled in closed systems, if possible. Use only in well-ventilated areas. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices. For product usage instructions, see the product label.
Conditions for safe storage, including any incompatibilities	Level 3 Aerosol. Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50°C/122 °F. Do not puncture, incinerate or crush. Do not handle or store near an open flame, heat or other sources of ignition. This material can accumulate static charge which may cause spark and become an ignition source. Avoid spark promoters. These alone may be insufficient to remove static electricity. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time, the other constituents have no known exposure limits.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
distillates (petroleum), hydrotreated heavy naphthenic (CAS 64742-52-5)	PEL	5 mg/m3	Mist.
		2000 mg/m3	
		500 ppm	
naphtha (petroleum), hydrotreated light (CAS 64742-49-0)	PEL	400 mg/m3	
		100 ppm	
n-hexane (CAS 110-54-3)	PEL	1800 mg/m3	
		500 ppm	
zinc oxide (CAS 1314-13-2)	PEL	5 mg/m3	Respirable fraction.
		5 mg/m3	Fume.
		15 mg/m3	Total dust.

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
2,2-dimethylbutane (CAS 75-83-2)	STEL	1000 ppm	
	TWA	500 ppm	
2,3-dimethylbutane (CAS 79-29-8)	STEL	1000 ppm	
	TWA	500 ppm	
2-methylpentane (CAS 107-83-5)	STEL	1000 ppm	
	TWA	500 ppm	
3-methylpentane (CAS 96-14-0)	STEL	1000 ppm	
	TWA	500 ppm	
distillates (petroleum), hydrotreated heavy naphthenic (CAS 64742-52-5)	TWA	5 mg/m3	Inhalable fraction.
n-hexane (CAS 110-54-3)	TWA	50 ppm	
zinc oxide (CAS 1314-13-2)	STEL	10 mg/m3	Respirable fraction.
	TWA	2 mg/m3	Respirable fraction.

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value	Form
2,2-dimethylbutane (CAS 75-83-2)	Ceiling	1800 mg/m3	
		510 ppm	
	TWA	350 mg/m3	
		100 ppm	
2,3-dimethylbutane (CAS 79-29-8)	Ceiling	1800 mg/m3	
		510 ppm	
	TWA	350 mg/m3	
		100 ppm	
2-methylpentane (CAS 107-83-5)	Ceiling	1800 mg/m3	
		510 ppm	
	TWA	350 mg/m3	
		100 ppm	

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value	Form
3-methylpentane (CAS 96-14-0)	Ceiling	1800 mg/m3	
		510 ppm	
	TWA	350 mg/m3	
		100 ppm	
distillates (petroleum), hydrotreated heavy naphthenic (CAS 64742-52-5)	Ceiling	1800 mg/m3	
	STEL	10 mg/m3	Mist.
	TWA	5 mg/m3	Mist.
naphtha (petroleum), hydrotreated light (CAS 64742-49-0)	TWA	400 mg/m3	
		100 ppm	
n-hexane (CAS 110-54-3)	TWA	180 mg/m3	
		50 ppm	
zinc oxide (CAS 1314-13-2)	Ceiling	15 mg/m3	Dust.
	STEL	10 mg/m3	Fume.
	TWA	5 mg/m3	Fume.
		5 mg/m3	Dust.

Biological limit values

ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling Time
n-hexane (CAS 110-54-3)	0.4 mg/l	2,5-Hexanedion, without hydrolysis	Urine	*

* - For sampling details, please see the source document.

Exposure guidelines

US - California OELs: Skin designation

n-hexane (CAS 110-54-3) Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

n-hexane (CAS 110-54-3) Can be absorbed through the skin.

Appropriate engineering controls Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide eyewash station. Eye wash fountain and emergency showers are recommended.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection Wear protective gloves such as: Nitrile. Polyvinyl chloride (PVC). Viton/butyl.

Other Wear appropriate chemical resistant clothing.

Respiratory protection If engineering controls are not feasible or if exposure exceeds the applicable exposure limits, use a NIOSH-approved cartridge respirator with an organic vapor cartridge. Use a self-contained breathing apparatus in confined spaces and for emergencies. Air monitoring is needed to determine actual employee exposure levels.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Observe any medical surveillance requirements. When using do not smoke. 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.

9. Physical and chemical properties

Appearance

Physical state Liquid.

Form	Aerosol. Grease.
Color	Off-white.
Odor	Solvent.
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	-244.7 °F (-153.7 °C) estimated
Initial boiling point and boiling range	118.4 °F (48 °C) estimated
Flash point	< 0 °F (< -17.8 °C) Tag Closed Cup
Evaporation rate	Fast.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	1 % estimated
Flammability limit - upper (%)	8 % estimated
Vapor pressure	2377.8 hPa estimated
Vapor density	> 1 (air = 1)
Relative density	0.64 estimated
Solubility (water)	Insoluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	437 °F (225 °C) estimated
Decomposition temperature	Not available.
Viscosity (kinematic)	Not available.
Percent volatile	98.4 % estimated

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Heat, flames and sparks. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May cause drowsiness and dizziness. Headache. Nausea, vomiting. Prolonged inhalation may be harmful.
Skin contact	Causes skin irritation.
Eye contact	Causes eye irritation.
Ingestion	Droplets of the product aspirated into the lungs through ingestion or vomiting may cause a serious chemical pneumonia.
Symptoms related to the physical, chemical and toxicological characteristics	Aspiration may cause pulmonary edema and pneumonitis. May cause drowsiness and dizziness. Headache. Nausea, vomiting. Irritation of eyes. Exposed individuals may experience eye tearing, redness, and discomfort. Skin irritation. May cause redness and pain.

Information on toxicological effects

Acute toxicity	May be fatal if swallowed and enters airways.

Components	Species	Test Results
calcium bis(dinonylnaphthalenesulphonate) (CAS 57855-77-3)		
Acute		
Dermal		
LD50	Rabbit	> 20 g/kg
Oral		
LD50	Rat	> 5000 mg/kg
distillates (petroleum), hydrotreated heavy naphthenic (CAS 64742-52-5)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg
Oral		
LD50	Rat	> 5000 mg/kg
naphtha (petroleum), hydrotreated light (CAS 64742-49-0)		
Acute		
Dermal		
LD50	Rabbit	> 2000 mg/kg
n-hexane (CAS 110-54-3)		
Acute		
Dermal		
LD50	Rabbit	> 1300 mg/kg
Oral		
LD50	Rat	15840 mg/kg
zinc oxide (CAS 1314-13-2)		
Acute		
Oral		
LD50	Rat	> 5000 mg/kg

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Causes eye irritation.

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

US. National Toxicology Program (NTP) Report on Carcinogens

Not listed.

Reproductive toxicity Suspected of damaging fertility.

Specific target organ toxicity - single exposure May cause drowsiness and dizziness.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard May be fatal if swallowed and enters airways. If aspirated into lungs during swallowing or vomiting, may cause chemical pneumonia, pulmonary injury or death.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity Toxic to aquatic life with long lasting effects.

Components		Species	Test Results
2-methylpentane (CAS 107-83-5)			
Aquatic			
Acute			
Crustacea	EC50	Daphnia	1 - 10 mg/l, 48 hours
Fish	LC50	Fish	1 - 10 mg/l, 96 hours
distillates (petroleum), hydrotreated heavy naphthenic (CAS 64742-52-5)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	1000 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	5000 mg/l, 96 hours
naphtha (petroleum), hydrotreated light (CAS 64742-49-0)			
Aquatic			
Acute			
Crustacea	EC50	Daphnia	1 - 10 mg/l, 48 hours
Fish	LC50	Fish	1 - 10 mg/l, 96 hours
n-hexane (CAS 110-54-3)			
Aquatic			
Fish	LC50	Fathead minnow (Pimephales promelas)	2.101 - 2.981 mg/l, 96 hours
zinc oxide (CAS 1314-13-2)			
Aquatic			
Acute			
Crustacea	EC50	Water flea (Daphnia magna)	0.098 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	1.1 mg/l, 96 hours

* Estimates for product may be based on additional component data not shown.

Persistence and degradability

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)	
2,2-dimethylbutane	3.82
2,3-dimethylbutane	3.42
2-methylpentane	3.74
3-methylpentane	3.6
n-hexane	3.9
Bioconcentration factor (BCF)	
naphtha (petroleum), hydrotreated light	10 - 25000
zinc oxide	60690

Mobility in soil No data available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal of waste from residues / unused products If discarded, this product is considered a RCRA ignitable waste, D001. Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Contents under pressure. Do not puncture, incinerate or crush. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose in accordance with all applicable regulations.

Hazardous waste code D001: Waste Flammable material with a flash point <140 F

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number	UN1950
UN proper shipping name	Aerosols, flammable, Limited Quantity
Transport hazard class(es)	
Class	2.1
Subsidiary risk	-
Label(s)	2.1
Packing group	Not applicable.
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	N82
Packaging exceptions	306
Packaging non bulk	None
Packaging bulk	None

IATA

UN number	UN1950
UN proper shipping name	Aerosols, flammable, Limited Quantity
Transport hazard class(es)	
Class	2.1
Subsidiary risk	-
Packing group	Not applicable.
ERG Code	10L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Other information	
Passenger and cargo aircraft	Allowed with restrictions.
Cargo aircraft only	Allowed with restrictions.

IMDG

UN number	UN1950
UN proper shipping name	AEROSOLS, LIMITED QUANTITY
Transport hazard class(es)	
Class	2
Subsidiary risk	-
Packing group	Not applicable.
Environmental hazards	
Marine pollutant	No.
EmS	Not available.
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

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

Not regulated.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

US EPCRA (SARA Title III) Section 313 - Toxic Chemical: Listed substance

n-hexane (CAS 110-54-3)
zinc oxide (CAS 1314-13-2)

CERCLA Hazardous Substance List (40 CFR 302.4)

n-hexane (CAS 110-54-3)	Listed.
zinc oxide (CAS 1314-13-2)	Listed.

CERCLA Hazardous Substances: Reportable quantity

n-hexane (CAS 110-54-3)	5000 LBS

Spills or releases resulting in the loss of any ingredient at or above its RQ require immediate notification to the National Response Center (800-424-8802) and to your Local Emergency Planning Committee.

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

n-hexane (CAS 110-54-3)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Food and Drug Administration (FDA) Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 311/312 Hazard categories Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - Yes
Pressure Hazard - Yes
Reactivity Hazard - No

SARA 302 Extremely hazardous substance No

US state regulations

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

distillates (petroleum), hydrotreated heavy naphthenic (CAS 64742-52-5)
liquefied petroleum gas (CAS 68476-86-8)
naphtha (petroleum), hydrotreated light (CAS 64742-49-0)
n-hexane (CAS 110-54-3)

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

2,2-dimethylbutane (CAS 75-83-2)
2,3-dimethylbutane (CAS 79-29-8)
2-methylpentane (CAS 107-83-5)
naphtha (petroleum), hydrotreated light (CAS 64742-49-0)
n-hexane (CAS 110-54-3)
zinc oxide (CAS 1314-13-2)

US. Massachusetts RTK - Substance List

2,2-dimethylbutane (CAS 75-83-2)
2,3-dimethylbutane (CAS 79-29-8)
2-methylpentane (CAS 107-83-5)
3-methylpentane (CAS 96-14-0)
naphtha (petroleum), hydrotreated light (CAS 64742-49-0)
n-hexane (CAS 110-54-3)
zinc oxide (CAS 1314-13-2)

US. Pennsylvania Worker and Community Right-to-Know Law

2,2-dimethylbutane (CAS 75-83-2)
2,3-dimethylbutane (CAS 79-29-8)
2-methylpentane (CAS 107-83-5)
3-methylpentane (CAS 96-14-0)
naphtha (petroleum), hydrotreated light (CAS 64742-49-0)
n-hexane (CAS 110-54-3)
zinc oxide (CAS 1314-13-2)

US. Rhode Island RTK

distillates (petroleum), hydrotreated heavy naphthenic (CAS 64742-52-5)
naphtha (petroleum), hydrotreated light (CAS 64742-49-0)
n-hexane (CAS 110-54-3)

US. California Proposition 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

US - California Proposition 65 - CRT: Listed date/Carcinogenic substance

titanium dioxide (CAS 13463-67-7) Listed: September 2, 2011

Volatile organic compounds (VOC) regulations

EPA

VOC content (40 CFR 51.100(s)) 100 %

Consumer products (40 CFR 59, Subpt. C) Not regulated

State

Consumer products Not regulated (semi-solid lubricant)

VOC content (CA) 84.7 %

VOC content (OTC) 84.7 %

International Inventories

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)	Yes
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)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 01-16-2015

Revision date 10-06-2017

Prepared by Allison Yoon

Version # 03

Further information CRC # 568F-G/1002591-1002592

HMIS® ratings
Health: 2*
Flammability: 4
Physical hazard: 0
Personal protection: B

NFPA ratings
Health: 2
Flammability: 4
Instability: 0

NFPA ratings

Disclaimer The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. This information is accurate to the best of CRC's knowledge or obtained from sources believed by CRC to be accurate. Before using any product, read all warnings and directions on the label. For further clarification of any information contained on this (M)SDS consult your supervisor, a health & safety professional, or CRC Industries, Inc..

Revision Information
Product and Company Identification: Product Codes
Physical & Chemical Properties: Multiple Properties
Transport Information: Agency Name, Packaging Type, and Transport Mode Selection
Other information, including date of preparation or last revision: Further information

Appendix D

Site Map

EMERGENCY RESPONSE PLAN

Project: Gunghi Creek Culvert Replacement (CT2346)
Location: Inuvik - Tuktoyaktuk Highway, Marker 131.2, 14 km south of Tuktoyaktuk

Approximate Work Location

N

- First Aid Kit and other Emergency Equipment
- Fire Extinguisher
- Spill Kit
- Eyewash Station
- Air Horn
- Muster Point
- Job Shack

* All equipment may be transported to location 2

Appendix E

Reportable Quantities for Spills in the Northwest Territories

Table E1. Reportable Quantities for Spills in the Northwest Territories

Substance	Reportable Quantity
Explosives Compressed gas (toxic/corrosive) Infectious substances Sewage and Wastewater (unless otherwise authorized) Radioactive materials Unknown substance	Any amount
Compressed gas (Flammable) Compressed gas (Non-corrosive, non-flammable)	Any amount of gas from containers with a capacity greater than 100L
Flammable liquid	≥100 L
Flammable solid Substances liable to spontaneous combustion Water reactant substances	≥ 25 kg
Oxidizing substances	≥ 50 L or 50 kg
Organic peroxides Environmentally hazardous substances intended for disposal	≥1 L or 1 kg
Toxic substances	≥ 5 L or 5 kg
Corrosive substances Miscellaneous products, substances or organisms	≥ 5 L or 5 kg
PCB mixtures of 5 or more ppm	≥ 0.5 L or 0.5 kg
Other contaminants--for example, crude oil, drilling fluid, produced water, waste or spent chemicals, used or waste oil, vehicle fluids, wastewater.	≥ 100 L or 100 kg
Sour natural gas (i.e., contains H_2S) Sweet natural gas	Uncontrolled release or sustained flow of 10 minutes or more
Flammable liquid Vehicle fluid	≥ 20 L When released on a frozen water body that is being used as a working surface
Reported releases or potential releases of any size that: are near or in an open water body; are near or in a designated sensitive environment or habitat; Pose an imminent threat to human health or safety; or Pose an imminent threat to a listed species at risk or its critical habitat	Any amount

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

Government of Northwest Territories | Nunavut | Canada | Inuvialuit Land Administration

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

REPORT LINE USE ONLY

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

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

REPORT LINE USE ONLY

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

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

Significance: ☐ Minor ☐ Major ☐ Unknown

File Status: ☐ Open ☐ Closed

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

Appendix F

Allen Services and Contracting Emergency Response Procedures

PROJECT SAFETY PLAN

GUNGHI CREEK CULVERT REPLACEMENT

ALLEN SERVICES & CONTRACTING LTD.

70 KING ROAD
PO BOX 3190
INUVIK, NT
X0E 0T0

PHONE: (867) 777-4000
FAX: (867) 777-4077

www.arcticallens.ca






Prepared for
GOVERNMENT OF THE NORTHWEST TERRITORIES

Prepared by
ALLEN SERVICES & CONTRACTING LTD.

Prepared on
October 31, 2019

Project Name:……Gunghi Creek Culvert Replacement
AS&C Project #:……n/a
Event ID:……CT2346
Estimated Construction Start:……TBA
Estimated Construction End:……TBA
Project Location:……Inuvik - Tuktoyaktuk Highway, Marker 131.2, 14 km south of Tuktoyaktuk

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1.0 Introduction

Allen Services & Contracting (AS&C) Ltd.'s policy and mission are to perform its work in the safest manner as reasonably practicable, consistent with good construction practices and industry standards, and with regard to the health, safety and environmental welfare of people, assets, operation and the environment. The management of Allen Services & Contracting Ltd. strongly believes that work performed safely yields the highest quality at the lowest cost possible.

To meet this policy and mission, Allen Services & Contracting Ltd. has implemented a comprehensive Health and Safety Management System, develops Project Safety Plans (PSPs), Pre-Job Hazard Analyses (PJHAs), Emergency Response Plans (ERPs) and ensures these plans and Occupational Health & Safety Regulations, Act and Code are followed on all our work sites. Allen Services & Contracting Ltd. strives to continually improve health and safety in the workplace and to prevent all injuries, illnesses and any incidents which could cause harm to property or the environment. Allen Services & Contracting Ltd.'s copy of the Health and Safety Management System is available online under the following link:

https://www.dropbox.com/s/dk7frdqg8vofgp6/H%26S%20Management%20System%20V1.0.pdf?dl=0

1.1 Introduction

The purpose of this Project Safety Plan (PSP) is to provide the Client, Allen Services & Contracting Ltd. employees and subcontractors a reference of health & safety rules, procedures and the work being completed at the Gunghi Creek Culvert Replacement project.

The Project Safety Plan is designed to assist personnel working at the Gunghi Creek Culvert Replacement project and to provide an overview of Allen Services & Contracting Ltd.'s health and safety practices, procedures, rules, reporting requirements, guidelines for identifying, assessing and controlling hazards and environmental aspects associated with the work. The Pre-Job-Hazard-Analysis (PJHA) is a vital part of pre-project preparation and is enclosed with this Project Safety Plan.

This Project Safety Plan will commensurate with work until demobilization date and will be in conformance with the specific requirements of the Client's HSE requirements and in conformance with the Northwest Territories Occupational

Health & Safety Act and Regulations as well as with Allen Services & Contracting Ltd.'s policies, rules and procedures.

1.2 Scope of Work

Allen Services & Contracting Ltd. and its subcontractors will replace the existing culvert located on Inuvik – Tuktoyaktuk Highway, at approximately km marker 131.2, 14 km south of Tuktoyaktuk, NT with a new engineered open bottom concrete arch bridge. Work will include but will not be limited to off-site manufacturing of the arches, transportation to site, building of ice road to detour traffic, excavating for the new structure, augering for piles and setting piles, installation of concrete beam on piles, welding of beam onto pile, lifting and hoisting of arches into place and backfilling of excavation.

2.0 Project Contacts

2.1 Allen Services & Contracting Ltd. Project Key Contacts

Role/Position	Name	Cell/Phone	Email
Site Supervisor - Owner/President	Brian McCarthy Sr.	(780) 271-5666	bmccarthy@arcticallens.ca
Site Supervisor	Lee McMann	(780) 999-0177	lmcmann@arcticallens.ca
Site Safety Representative	Barry Setzer	(867) 678-5078	
General Manager (Project Management)	Dean Smith	(780) 914-9300	dsmith@arcticallens.ca
Logistics Manager	Lee McMann	(780) 999-0177	lmcmann@arcticallens.ca
Safety Consultant	Lena Stotko	(780) 266-7676	lena@verussafety.ca

2.2 Client Key Contacts

Role/Position	Name	Cell/Phone	Email
Manager Structures – Bridges, GNWT	Ann Kulmatycki	(867) 767-9086 ext. 31127	ann_kulmatycki@gov.nt.ca
Project Manager, Structures Section/Bridges	David MacDonald	(867) 446-2227	david_bmacdonald@gov.nt.ca
Structural Engineer, Dillon Consulting	David Amorim	(204) 229-8441	damorim@dillon.ca

3.0 RESPONSIBILITIES

3.1 Principal (Prime) Contractor

Allen Services & Contracting Ltd. assumes the role of the Principal (Prime) Contractor for this project and is responsible for the overall health and safety of all personnel involved in work including AS&C Ltd. employees and subcontractors, the protection of any persons including other contractors, visitors and the general public who may be affected by conduct of this work and the environment that may affected by conduct of this work. AS&C Ltd. will fulfill its role as the Principal (Prime) Contractor as outlined in the NT Health and Safety Act and Regulations.

3.2 Site Supervisors

AS&C Ltd.'s Site Supervisors will comply with and enforce the compliance by all personnel on site with applicable federal and territorial health and safety regulations, this Project Safety Plan and AS&C Ltd.'s policies, rules and procedures. Site Supervisors will ensure all personnel are aware of all hazards on site and control measures to be implemented. Site Supervisors will be responsible for all aspects of work under the contract and for ensuring workers' health and safety on the work site.

3.3 Site Safety Representatives

Site Safety Representatives are responsible for the overall health & safety of personnel on site, the preparation and holding of toolbox/safety meetings, ensuring FLHAs are completed as required, ensuring hazards are identified and either eliminated or reduced to an acceptable level, preparation and holding of Joint OHS Committee meetings, incident investigations and reporting to appropriate authorities and AS&C Ltd. management, providing orientations on site, monitoring of compliance with Health and Safety legislation by all workers and health & safety documentation organization and retention.

3.4 Safety Consultant

The Safety Consultant is responsible for the development of this PSP, PJHA, Emergency Response Plans and the preparation of project related documentation before project start.

3.5 Employees and Subcontractors (Workers)

Employees and subcontractors will follow and comply with all rules, regulations, policies, practices and procedures set out by the NWT Safety Act, Regulations, AS&C Ltd.'s Health and Safety Management System and this PSP.

3.6 Project Management

Project Managers are responsible for the management of this project, ensuring all contract requirements, deadlines and specifications are followed, to communicate with the Client on all project and health & safety matters and to support the Site Supervisors and Site Safety Representatives in all their initiatives to fulfil project and health & safety requirements.

3.7 Visitors

Visitors are considered all persons not involved in work activities who request access to the site to review the progress of the project or persons such as inspectors, estimators, engineers, etc. All visitors to site will receive a visitor orientation that will cover hazards on site, controls to be used, emergency procedures and PPE requirements. All visitors must follow the Site Supervisor's instructions, hazard controls, site procedures and PPE requirements.

All visitors must report to the Site Supervisor upon arrival on site and must be escorted around the worksite at all times to ensure their own and others' health & safety at the work site.

4.0 SITE-SPECIFIC HEALTH AND SAFETY ORIENTATION

All personnel on site will receive a site-specific health and safety orientation. The orientation will include all site-specific rules, PPE requirements, reporting procedures for incidents and hazards, toolbox/safety meetings, use of equipment, and tools, site-specific hazards and emergency response procedures including muster points and emergency phone numbers.

5.0 COMMUNICATION

5.1 Emergency Communication

AS&C Ltd. will ensure all required project contact phone numbers and emergency phone numbers are available and/or posted on site. At a minimum, Site Supervisors will carry a two-way radio with them to contact emergency services and a functioning cell phone with booster, if applicable.

In case of an emergency on site, AS&C Ltd. will provide an air horn to communicate the emergency to personnel on site. In the event of an emergency, work on site will stop and the Site Supervisor and Site Safety Representative will assess the scene and take appropriate measures to reduce farther effects of the emergency, to tend to injured personnel and to reduce environmental damages.

To ensure all persons are accounted for in the event of an emergency, all employees and subcontractors must sign in when arriving on site and sign out when leaving the site on AS&C Ltd.'s sign-in/sign-out protocol. For further information on Emergency response, please refer to the Environmental management Plan, section

5.2 Project Meetings

Project meetings will be held on an as-and-when needed basis, will be directed by the Manager, Structures and attended by AS&C Ltd. key personnel.

5.3 Daily Toolbox Talks

The Site Safety Representative in collaboration with the Site Supervisor will prepare and hold daily toolbox talks with all personnel on site to communicate changes and updates to health and safety and operations on site. The minutes of the toolbox talks will be kept on site for reference and will be provided to the Client upon request.

5.4 Weekly Safety Meetings

The Site Safety Representative in collaboration with the Site Supervisor will hold weekly safety meetings with all personnel on site. The attendance of the safety meetings is mandatory for all personnel working on this project.

The weekly safety meetings shall not be longer than 30 minutes in duration, record the topics discussed, corrective actions, accountabilities and names of attendees. The meeting minutes will be kept on site for reference and will be provided to the Client on a weekly basis, if applicable.

5.5 WSCC Communication & Documentation

AS&C Ltd.'s Site safety Representative will communicate all incidents to AS&C Ltd.'s management. Management will report all dangerous occurrences and reportable incidents to the Chief OHS Officer as per Safety Act and Regulations and will provide copies of all documentation and communication between the Principal (Prime) Contractor and WSCC to the Client.

6.0 HAZARD ASSESSMENT AND CONTROL

6.1 Pre-Job Hazard Analysis

AS&C Ltd. will develop a Pre-Job-Hazard-Analysis based on the work environment (location) and jobs/tasks performed, identify the hazards associated with the environment, jobs/tasks and will develop recommendations for control measures for those hazards. All hazards will be assessed for risk based on frequency and severity. All personnel on site must use the recommended control measures when controlling hazards. Control measures put in place must eliminate or reduce risk levels to an acceptable level. The PJHA is a vital part of this PSP and will be provided to the Client for review before project start.

6.2 Field Level Hazard Assessment (FLHAs)

All workers are required to complete/review and sign Field Level Hazard Assessments every day before beginning work. FLHAs will cover all major tasks completed during the day including but not limited to the use of tools, materials and equipment, the work environment and activities throughout the day. All identified hazards must be assessed and controls must be assigned within the ongoing work site hazard assessment (FLHA) for that specific hazard.

6.3 Hazard Reporting

Hazard Reporting is a useful tool to ensure hazards, which have not yet been identified, are addressed as the project progresses. During the progression of the project all employees are required to:

- Identify potentially hazardous conditions and acts and notify the Site Supervisor of the hazards.
- Correct hazardous conditions and acts when there is no danger to the worker or others.
- Report all situations in which imminent danger is present and refuse work.
- Participate in the investigation of imminent danger situations or hazardous conditions.

7.0 WORKER TRAINING AND COMPETENCY

7.1 Worker Training

AS&C Ltd. will ensure all personnel on site will have the required safety training and certification to perform their work in a safe manner.

Training will include but will not be limited to:

- Site-Specific Health & Safety Orientation
- WHMIS 2015/GHS
- Fall Protection
- Environmental Awareness
- Emergency Preparedness
- Aerial Work Platform
- Hours of Service
- Mobile Equipment
- Ground Disturbance
- First Aid
- Environmental and Wildlife Awareness
- Personal Protective Equipment
- Hazard Awareness
- OH&S Supervisor Safety Training

7.2 Worker Competency

All workers will be trained in safe work practices and safe job procedures for the equipment they are required to operate. Equipment includes “things” used to equip workers at a worksite and includes tools, supplies, machinery, etc.

A worker who is not competent to perform work that may endanger the worker or others will not perform the work unless under direct supervision of a worker who is competent to perform the work.

A worker must immediately report to the Site Supervisor any equipment that is in a condition that will compromise the safety of the worker using it, will not perform the function for which it is needed, is not strong enough for its purpose or has an obvious defect. AS&C Ltd.’s Site Supervisor will ensure all workers who enter any AS&C Ltd. worksite are competent to perform their work.

8.0 PERSONAL PROTECTIVE EQUIPMENT

8.1 Basic PPE

Basic PPE must be worn at all times and will include:

- CSA approved Type II Class E hard hat
- CSA approved steel or composite toe safety boots with 6” ankle support

- CSA z94 or ANSI z87 approved safety glasses with side shields

8.2 Specialized PPE

Specialized PPE such as respirators, face shields, hearing protection and fall protection will be worn by all workers as per specific task requirement and/or site condition. All specialized PPE will be inspected visually before each use by all workers and as per manufacturer's specifications. At start-up of project, all specialized PPE will be inspected using a written form.

Specialized PPE and RPE on this project will include:

- Gloves - Jobs with potential of injury to hands will require workers to wear task specific gloves (i.e. Kevlar gloves, impact resistant gloves, etc.)
- Hi-vis vest or coveralls with hi-vis stripes
- Hearing protection (ear muffs during cutting of concrete)
- Face shields
- Welding helmets
- Half-face respirators with P100 cartridges during welding operations

9.0 WHMIS AND SDS

AS&C Ltd.'s Site Supervisor is responsible to ensure all required Safety Data Sheets (SDS) for hazardous products being used on-site are readily available to workers throughout the duration of the project.

The Site Supervisor will ensure that all products have labels as per WHMIS 2015/GHS requirement and that all workers have current WHMIS training.

10.0 INSPECTIONS

10.1 Worksite Inspections

The Site Safety Representative in collaboration with the Supervisor will conduct daily informal (walk around) inspections and weekly formal (recorded and planned) inspections using a pre-written inspection form to identify and prevent unhealthy and unsafe conditions. Findings will be communicated to all employees during the daily toolbox talk, weekly safety meeting, or more often and as required.

10.2 Tool Inspections

All workers will inspect their tools visually every day before use. Tools without required guards/modified tools or defective tools must be tagged out and taken out of service immediately. Tools which are tagged out will not be used until defects are corrected.

Tool inspections will be completed on a monthly basis using the pre-written inspection form.

10.3 Mobile/Heavy Equipment Inspections

All workers using mobile/heavy equipment will inspect their equipment daily prior use on a written form. Equipment pre-use inspections will be completed by the operators. The daily equipment pre-sue inspection will be available on site for review. All equipment will be maintained within manufacturer specifications and will be in good condition.

10.4 PPE Inspections

All workers will inspect their PPE visually every day prior use. All PPE will be clean, in good condition and appropriate for the task. PPE inspection items will be checked off on the daily FLHA form.

11.0 INCIDENT INVESTIGATION AND REPORTING

All incidents and accidents (including near misses) must be immediately reported to the Site Supervisor and Site Safety Representative. The Site Supervisor will notify management immediately of any incidents on site. Management will report incident to the Client and follow Northwest Territories' legislated incident reporting procedures (see section 10. "Incident/Accident Investigation & Reporting" of AS&C Ltd.'s Health & Safety Management System).

If an injured person requires immediate medical assistance, the Site Supervisor or Site Safety Representative will contact Medical Assistance and inform of the injury, will discuss first aid measures and transportation options. All incidents/accidents and near misses will be investigated using the procedure as set out in the Allen Services & Contracting Ltd. Health & safety Management System.

The purpose of incident investigations will focus on root cause determination and the prevention of recurrence. Incident Investigations should take place as soon as possible. Written incident reports must be completed no later than 48 hours after the incident and incident investigation reports no later than 72 hours after

the incident. All incidents, accidents and near misses will be reported and reports will be made available to the Client by project management.

12.0 VIOLENCE AND HARASSMENT

AS&C Ltd. has developed a Violence and Harassment policy and program and expects all employees, subcontractors and visitors to follow this policy. AS&C Ltd. is committed to providing and promotes a work environment free of violence and harassment. Any act of violence or harassment committed by or against any worker, visitor or member of the public is unacceptable conduct and will not be tolerated. Violations of this policy will be handled in an objective but firm manner.

13.0 SUBSTANCE ABUSE

AS&C Ltd. is committed to a ZERO Tolerance Policy with respect to inappropriate use and possession of drugs and alcohol in the workplace. The possession, distribution or use of mood-altering substances at the workplace, or coming to work under the influence of such substances is a violation of our rules and will be subject to disciplinary action, including a possible dismissal.

The President and project management have the authority to immediately dismiss personnel from the worksite who are under the influence or are in possession of substances and to request a D&A test under reasonable grounds or post incident.

A person found under the influence or in possession will be reprimanded by senior management and disciplinary actions will be taken as per AS&C Ltd.'s disciplinary action chart.

14.0 ENVIRONMENT

Allen Services & Contracting Ltd. takes its environmental responsibilities seriously and is committed to following sound environmental management practices and executing our business activities so that the environment is not adversely affected. Where environmental controls are found to have been compromised, remediation activities will be undertaken immediately.

AS&C Ltd.'s Site Supervisor is responsible for overseeing and controlling activities on site, the prevention of harm to the environment, appropriate waste disposal and any measure taken to prevent environmental damages.

Environmental Management Plans have been developed and are included in

this project safety package. For further information on environmental protection measures, such as spill contingency, waste management, sediment and erosion control, wildlife protection, aquatic life protection, etc., please refer to the Environmental Management Plan.

15.0 SITE-SPECIFIC EMERGENCY RESPONSE PLAN

A site-specific emergency response plan (ERP) has been developed for this project and will be implemented on site upon project start. The ERP will be discussed with all personnel during site-specific orientation and relayed to any visitors that may require access to the worksite. The ERP will include procedures for possible emergency situations, emergency phone numbers, a map of the work site including Muster Point, a map to the closest health facility and emergency response procedures. The site-specific emergency response plan will be made available to all employees at the work site.

16.0 TRAFFIC ACCOMMODATION PLAN

Due to the nature of the project and location of work, traffic will need to be diverted. AS&C Ltd. will build an ice road to divert the traffic during the period of construction work. A Traffic Accommodation Plan will be developed and provided to the Client for review. The Traffic Accommodation Plan will outline activities, procedures, locations and signage for the diversion of traffic during construction activities.

17.0 WORKING ALONE

AS&C Ltd. will not allow any worker to work alone throughout the duration of this project. All employees and subcontractors must work with at least one other worker at all times and have the possibility to either be seen at all times or be able to verbally communicate at all times. A 2-way radio must be available on site at all times to summon emergency services, if required.

18.0 FIRE PROTECTION

AS&C Ltd. is responsible to provide all fire extinguishers on this project. Fire extinguishers on mobile equipment will me a minimum of 2 A 10 B.C. and all other areas will be equipped with fire extinguishers with a minimum rating of 2 A 40 B. C. All fire extinguishers will be maintained as required and monthly inspections will be completed.

19.0 HOT WORK

A Hot Work Permit is required for all operations involving open flame or producing heat and/or sparks. This includes brazing, grinding, cutting, soldering, thawing pipe, torch-applied roofing, and welding. All personnel performing this type of work will request a hot work permit from the Site Supervisor. The Site Supervisor will coordinate hot work activities will all personnel. Hot work will have fire/spark watch, welding blankets and the area will be continuously monitored, a fire watch including a final fire inspection will be completed.

Hot work will be required during the welding of beams onto the piles. A shelter will be built around the welding activities to reduce environmental affects and to assure quality of welds and safety of workers.

20.0 FIRST AID

AS&C Ltd. will provide first aid services, first aid attendants, supplies and equipment in accordance with the applicable requirements of part 5, section 53 through 66 of the Occupational Health and Safety Regulations.

EMERGENCY RESPONSE PROCEDURES

GUNGHI CREEK CULVERT REPLACEMENT PROJECT

Project Location:
Inuvik - Tuktoyaktuk Highway, Marker 131.2, 14 km south of Tuktoyaktu

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1.0 Emergency Phone Numbers

Tuktoyaktuk Health Services

Main Phone 8:30 – 17:00……..(867) 977 - 2321
Satellite Phone……..01-8816-326-17088
After Hours Emergency/Nurse……..(867) 977 - 2321

Tuktoyaktuk Fire Department……(867) 977 - 2222
Tuktoyaktuk Police (RCMP)……...(867) 977 - 1111

Regulatory Contacts

NWT Spill Hotline……..24 hrs……(867) 920 - 8130
Poison Centre……24 hrs……(800) 332 - 1414
WSCC Reporting Line……..24 hrs……(800) 661 - 0792
WSCC Information……..(867) 678 - 2301
NWT Chief Safety Officer……(800) 661 - 0792

Utilities

Natural Gas……..Inuvik Gas……(800) 511 - 3447
Electrical……NWT Power Corp……...(800) 668 - 5506

Allen Services & Contracting Ltd.

Brian McCarthy Sr……Supervisor…….....(780) 271- 5666
Barry Setzer.....Site Safety Rep.....(867) 678 - 5078
Lee McMann …….Supervisor.....(780) 999 - 0177
Allen Services Office……..…….....(867) 777 - 4000

Other Phone Numbers

Roger Gruben – camp location Tuktoyaktuk.....(867) 977 - 2230

1.1 General Information for Emergency Response on Active Work Sites

1. In the event that the Media arrives on site – please DO NOT answer any questions;

   **REFER ALL MEDIA QUESTIONS TO AS&C Media Spokespersons ONLY:

   - **Brian McCarthy (Northwest Territories)**
   - **Dean Smith (Alberta)**

2. Do not smoke in emergency situations!
3. Wardens:

   On work sites, the Site Supervisor is always the 1st Chief Warden. The 1st Chief Warden will appoint a 2nd Chief Warden for the events that the 1st Chief Warden is absent.

- If 1st Chief Warden is absent, the 2nd Chief Warden becomes the 1st Chief Warden.
- A Warden must be always present at an active work site – plan ahead!
- If working in remote locations – establish contact with medical emergency facilities and fire department. Provide details of potential emergencies and of your location. Sending a map of the location ahead of time can save valuable time during an emergency and will aid the responders in finding the location faster.
- If working in remote location – remember that a simple first aid kit may not be sufficient. Ensure to have a stretcher, blankets, splints, designated first aid room, etc. in place.
- Ensure the vehicle for transportation of injured or ill is large enough to accommodate a stretcher.
- Familiarize yourself with the routes to medical services, if ambulance services are not available.

2.0 Fire Response Procedure

1. If you are the first one to discover the fire **sound the alarm with 3 short blasts on the air horn, short pause, then 3 short blasts on the air horn again.**
2. Attempt to extinguish the fire only if it is safe to do so. As a rule of the thumb, **if you can't put the fire out within 5 seconds, abandon your efforts.** Remember these steps:

   P – Pull the pin
   A – Aim low at the base of the fire
   S – Squeeze the handle
   S – Sweep from side to side

3. Report the fire to your Chief Warden, the Chief Warden will notify the Fire Department of the fire from a safe location by two-way radio or mobile phone. Fire Department should be called ONLY by the Chief Warden. Provide the address and or description of the location.
4. Shut down your tools and/or equipment, if it is safe to do so.
5. **CALMLY** evacuate the area on a direct and safe way, don't run.
6. Assist others, if it is safe to do so.
7. Assembly at Muster Point for a head count.
8. Report any information about the fire to your Warden.
9. Remain at the Muster Point until cleared to go back ONLY by your Warden or Fire Department authority.
10. Do not smoke in emergency situations!

If You Are On Fire

- **STOP** where you are
- **DROP** to the floor or ground and
- **ROLL** your body to smother the fire.

3.0 Medical Emergency Response Procedure (General)

1. Assess the scene and take charge of the situation, if it is safe to do so.
2. If there are others around you, call them to assist you. Call for the Chief Warden.
3. If the scene is unsafe, proceed with evacuation procedure.
4. Attempt to rescue the victim only if it does not endanger yourself and others.
5. If the scene is safe, check the victim for vital signs as instructed in First Aid Training. If you do not have First Aid Training call someone who has completed the training as listed on the First Aid Attendant list. Do not move the injured unless absolutely necessary.
6. If there are life-threatening injuries or the victim is unresponsive call for medical assistance immediately or instruct someone to call and to report back to you.
7. In case of rendering assistance to personnel exposed to hazardous materials, consult the Safety Data Sheet (SDS) and wear the **appropriate personal protective equipment.**
8. Continue to assist the victim until help arrives or until ready for transportation
9. Do not smoke in emergency situations!

3.1 First Aid Procedure

Administer immediate first aid to injured or exposed personnel using the following steps:

1. Move injured personnel only if necessary to prevent their exposure to further harm.
2. For spills affecting small portions of skin, immediately flush with flowing water for at least 15 minutes. If no visible burn exists, wash with warm water and soap, removing any jewelry to facilitate proper decontamination.
3. For spills on clothes or large areas of skin, quickly initiate showering while removing all contaminated clothing, shoes and jewelry. It may be necessary to cut the clothes off in some instances to prevent contamination of the eyes.
4. Contaminated clothes should be laundered when possible (at work, separate from other clothing, or use a contracted laundering service), decontaminated or discarded. Never take contaminated clothing home.
5. Do not use creams, lotions or salves, except to neutralize the spilled material (e.g., calcium gluconate gel for hydrofluoric acid exposure and polyethylene glycol [PEG 300] for phenol exposure).
6. For splashes into the eyes, immediately irrigate the eyes at an eyewash station for at least 15 minutes. Hold the eyelids away from the eyeball, moving eye in all directions to wash thoroughly behind the eyelids.
7. If necessary administer artificial respiration, but only if CPR trained.

In all cases, the exposed or injured person must seek medical attention:

1. Call emergency services.
2. Relevant safety information such as an SDS should accompany the person.
3. Notify the injured person's supervisor as soon as possible.
4. For non-life threatening/non-critical injuries or illnesses, see Reporting Accidents & Injuries, section 10, of the safety manual.

3.2 Amputation Injuries and Emergencies

If you witness an amputation:

- Call emergency services.
- Stop the bleeding. A complete amputation may not bleed very much. The cut blood vessels may spasm, pull back into the injured part, and shrink. This slows or stops the bleeding. If there is bleeding, do the following:
    - If available, wash your hands with soap and water and put on disposable gloves. If gloves are not available, use many layers of clean cloth, plastic bags, or the cleanest material available between your hands and the wound.
    - Have the injured person lie down and elevate the site that is bleeding.
    - Remove any visible objects in the wound that are easy to remove and remove or cut clothing from around the wound.
    - Apply steady direct pressure for a full 15 minutes. If blood soaks through the cloth, apply another one without lifting the first. If there is an object in the wound, apply pressure around the object, not directly over it.
    - If moderate to severe bleeding has not slowed or stopped, continue direct pressure while getting help. Do all you can to keep the wound clean and avoid further injury to the area.
    - Mild bleeding usually stops on its own or slows to an ooze or trickle after 15 minutes of pressure. It may ooze or trickle for up to 45 minutes. Use the Check Your Symptoms section to determine your next steps.
- Check and treat for shock. The trauma of the accident or severe blood loss can cause the person to go into physiologic shock. Signs of physiologic shock include:
    - Passing out (losing consciousness).
    - Feeling very dizzy or light-headed, like the person may pass out.
    - Feeling very weak or having trouble standing up.
    - Being less alert. The person may suddenly be unable to respond to questions, or he or she may be confused, restless, or fearful.
- Emotional stress from the event may cause symptoms such as light-headedness or fainting. This is sometimes called "emotional shock." Light-headedness and fainting from emotional stress may be confused with physiologic shock.

3.3 Care for an Amputated Body Part

- Recover the amputated body part, if possible, and transport it to the hospital with the injured person. If the part can't be found right away, transport the injured person to the hospital and bring the amputated part to the hospital when it is found.
- Gently rinse off dirt and debris with clean water, if possible. Do not scrub.
- Wrap the amputated part in a dry, sterile gauze or clean cloth.
- Put the wrapped part in a plastic bag or waterproof container.
- Place the plastic bag or waterproof container on ice. The goal is to keep the amputated part cool but not to cause more damage from the cold ice. Do not cover the part with ice or put it directly into ice water.

3.4 Care for the Part of the Body Where the Amputation Occurred

- Stop the bleeding.
- Elevate the injured area.
- Wrap or cover the injured area with a sterile dressing or clean cloth until medical treatment is received.

3.5 Care for a Partially Amputated Body Part

- Elevate the injured area.
- Wrap or cover the injured area with a sterile dressing or clean cloth. Apply pressure if the injured area is bleeding. This will slow the bleeding until the person receives medical care. You don't want to cut off the blood flow to the partially amputated part, so pressure needs to be light—just enough to slow blood loss.
- Gently splint the injured area to prevent movement or further damage.

3.6 Heart Attack First Aid

If you believe you are having a heart attack:

- Call emergency authorities. Don't ignore or attempt to tough out the symptoms of a heart attack. If you don't have access to emergency medical services, have a co-worker drive you to the nearest hospital.
- Do not drive yourself to the hospital.
- Chew and swallow an aspirin, unless you are allergic to aspirin or have been told by your doctor never to take aspirin.
- Take nitroglycerin, if prescribed. If you think you're having a heart attack and your doctor has previously prescribed nitroglycerin for you, take it as directed. Don't take anyone else's nitroglycerin, because that could put you in more danger.

If someone else is having a heart attack:

- Call 9-1-1 immediately.
- Begin CPR if the person is unconscious. If you are with a person who is unconscious, tell the 9-1-1 dispatcher or another emergency medical specialist. You may be advised to begin cardiopulmonary resuscitation (CPR).
- If you haven't received CPR training, doctors recommend performing only chest compressions (about 100 to 120 compressions a minute). The dispatcher can instruct you in the proper procedures until help arrives.
- If an Automated External Defibrillator (AED) is immediately available and the person is unconscious, follow the device instructions for using it.
- If the person is conscious, ask if they have medication for their condition.
- Find/get the medication for them and hand it to them. Do not administer the medication, let the person administer the medication themselves.
- Call 9-1-1 and/or transport the person to the Hospital.

4.0 Emergencies in Individuals With Diabetes

Patients with diabetes may develop complications of the disease, which may present as a medical emergency. Two emergencies that the OFA attendant will most commonly encounter are:

1. **Hypoglycemia** — low blood sugar
2. **Hyperglycemia** — high blood sugar

When managing a patient with diabetes and a decreased level of consciousness, the OFA attendant can often find it difficult to determine if the patient is suffering from hypoglycemia or hyperglycemia.

Hypoglycemia Signs and Symptoms

The OFA attendant must suspect hypoglycemia whenever a patient with diabetes becomes confused or behaves irrationally. Because of the brain's dependence on adequate levels of glucose, failure to quickly recognize and treat hypoglycemia will result in progressive deterioration of the patient's condition and possibly death.

The earliest signs of hypoglycemia are:

- hunger
- pale, clammy skin
- dizziness, trembling, weakness
- confusion, restlessness, irrational behaviour

As hypoglycemia progresses, the patient may develop slurred speech or collapse, or become unresponsive. Seizures and profound sweating are also quite common. The patient's respiration and pulse may increase somewhat but, they often remain normal despite the changes to the patient's level of consciousness.

Hypoglycemia Management

1. The basic principle of treatment is to provide glucose in any form.
2. If the patient is conscious, any sugar-containing substance will suffice — honey, syrup, sugar and water, fruit juice, soft drinks, (not diet drinks), glucose tablets, or candy.
3. The OFA attendant should not be concerned about giving too much sugar. Sips of juice or small amounts of candy are insufficient. A full glass of juice with sugar added or a whole candy bar is usually required.
4. All individuals, even if they regain their normal status, should be referred for medical assessment. All patients with diabetes and a decreased level of consciousness are in the Rapid Transport Category.
5. If the patient has a decreased level of consciousness and is thus not able to take anything by mouth, the OFA attendant has limited options. For hypoglycemic patients in a remote workplace or where medical resources are not readily accessible, it is recommended that a small amount of sugar be placed under the lateral or ¾-prone patient's tongue.
6. Concentrated glucose jelly or glucose tablets are commercially available.

7. Care must be taken when administering sugar because such patients are at very high risk of choking or of aspirating liquid, even if the patients are placed 3⁄4-prone or suction equipment is available. The most effective way to give glucose to these patients is intravenously.
8. After conducting the primary survey and managing any life-threatening conditions, the OFA attendant should position the patient in the lateral or 3⁄4-prone position.
9. With the patient in the lateral or 3⁄4-prone position, the OFA attendant completes the secondary survey. If medical assistance (ambulance) is delayed, the attendant should attempt to place a teaspoon of sugar or concentrated sugar solution — e.g., honey or syrup - under the patient's tongue and the area between the inside of the cheek and the teeth and gums while awaiting transport or en-route.
10. The OFA attendant must take care not to place the sugar at the back of the throat because it may cause the patient to choke. Special attention must be devoted to maintaining the airway of the comatose patient.

Hyperglycemia

When the blood sugar of a person with diabetes rises to high levels, a chain of events is triggered in the body's metabolism. In the absence of adequate amounts of insulin, the body's cells are unable to use glucose and they begin to malfunction. High levels of blood glucose cause excessive urination, which in turn causes severe dehydration and thirst. The changes to the body's metabolism result in acidic waste products accumulating in the blood. This causes a loss of appetite, nausea, vomiting, and deep, rapid breathing. The breath has a characteristic fruity, sweet odour, caused by the accumulation of these acid waste products.

This sequence of events develops gradually, usually over the course of a few days. However, it can progress to coma and, ultimately, death if not adequately treated. At this extreme, hyperglycemia becomes a true emergency.

Hyperglycemia Signs and Symptoms

The earliest signs of hyperglycemia are:

- thirst
- excessive urination
- loss of appetite
- weakness, dizziness

As the hyperglycemia progresses and the body's metabolism alters in other ways, the following signs and symptoms develop:

- nausea, vomiting
- deep, rapid breathing
- dry mouth
- breath has a characteristic fruity sweet odour • weak, rapid pulses
- warm, dry skin
- decreased level of consciousness, coma

Hyperglycemia Management

The OFA attendant can do little to treat hyperglycemia. These patients require prompt treatment in hospital with intravenous fluids and insulin. The OFA attendant must manage the patient's ABCs and complete the primary survey. The patient with a decreased level of consciousness requires special attention to the airway.

5.0 Burn Emergencies

5.1 Major Burn Wound Management

1. Cooling may limit the depth of the burn for some first- and second-degree burns — e.g., from a propane flash or scald. Cooling is soothing and provides some pain relief for all types of burns. Cooling should start within 5 minutes of the burn and be applied for a maximum of 20 minutes.
   A helper can continue the cooling during RTC packaging or the secondary survey. Cooling should be limited to 20% of the body surface. Cooling of a greater portion of the body surface can cause hypothermia. Never apply ice. Any available source of water may be used — e.g., tap water from a kitchen sink or a garden hose. Sterile water or saline solution is neither superior to tap water nor necessary.

2. If water is used to put out the fire, the patient's entire body may have to be covered. This is done to put out the fire but should not be prolonged. In these circumstances, once the fire is out, wet and burned clothing should be removed. Do not cool more than 20% of the body surface except to extinguish flames.

3. Remove burned clothing to ensure all smouldering or melting fabric is no longer in contact with the skin.

4. Remove rings, wrist watches, and footwear, if possible.

5. Elevate burned extremities, if possible. This may decrease fluid loss and tissue swelling. Do not splint burned limbs unless there is an obvious fracture or dislocation.

6. Do not break blisters.

7. Do not apply creams, ointments, or topical anaesthetics to burns.

8. Apply wet dressings on burns to less than 20% of the body surface. Any burn in excess of 20% can be covered with dry dressings or clean sheets. Do not apply tight, encircling dressings.

9. After the burns are dressed, keep the patient comfortable and cover him or her with blankets if necessary.

10. Monitor the patient's ABCs frequently en-route to the hospital.

5.2 Minor Burn Care First - Degree Burns

- Unless a first-degree burn has involved a very large area — e.g., 40% to 50% — of the body surface, a patient with a first-degree burn usually does not require hospitalization. The principal problem in first-degree burns is pain, which can be relieved by cold water compresses. These should be applied only to a maximum 20% of the body surface at any one time. Cold towels are usually effective for burns of the trunk or face. Stop the cooling if the patient starts to shiver.

5.3 Partial-Thickness Second-Degree Burns

- The principal problems with second-degree burns are infection, pain, and shock caused by loss of fluid into blisters. Treatment is similar to that of a first-degree burn. Cooling applied within 5 minutes of burn may limit the depth of this type of burn and reduce pain.
- Do not deliberately break blisters because this may lead to secondary infection.
- If blisters do spontaneously rupture, allow the fluid to drain and treat the burn as outlined previously.

5.4 Third-Degree Burns and Full-Thickness Second-Degree Burns

- All full-thickness burns, regardless of size, should be referred to medical attention as soon as possible.

5.5 Chemical Burns

Chemical burns result from contact with corrosive or caustic substances, usually strong acids or alkalis. A chemical will continue to burn as long as the substance remains in contact with the skin. Early removal of the chemical is of great importance.

The type of tissue injury varies with the chemical properties of the substance involved. The OFA attendant should be familiar with the substances used in his or her particular workplace.

Three primary factors determine the severity of an injury:

1. properties of the chemical
2. concentration of the chemical
3. length of exposure to the chemical

Management of Chemical Burns

The management of chemical burns follows the Priority Action Approach with special emphasis on the following considerations. Throughout the management, the OFA attendant must be careful not to come into contact with the substance.

1. Immediately dilute and remove the chemical
   by copious flushing with water (see Figure 37- 5). Speed is essential. Dry powder chemicals should be brushed from the skin before flushing is started, unless large

quantities of water are immediately available (see Figure 37-6). For the specific management of hydrofluoric acid see Hydrofluoric Acid.

2. Begin flushing immediately, preferably with a hose or shower (see Figure 37-7) and flush vigorously with water for 30 consecutive minutes — by the clock. When the chemical is known not to be water soluble or the substance causing the burn is unknown and not dissolving in the water irrigation, mineral oil should be liberally applied to the burn site for 1 minute. Immediately following the mineral oil application, continue to flush with water for 30 minutes.

3. The use of buffer-irrigating solutions has been considered as an alternative to flushing with water for years. The purpose of the buffer or neutralizing agent is to neutralize the substance rendering chemicals harmless through chelation and encapsulation, eliminating or reducing the severity of the burn. The idea is logical, but impractical. Neutralizing agents are rarely as available as water and some create heat during the neutralizing process, harming the patient. Water irrigation is safe and practical. Immediate access to a flushing system is key in affecting outcomes.

4. Remove any of the patient's clothing that is soiled with the chemical. Continue flushing until the burning sensation stops.

5. Estimate the degree and extent of the burn using the Rule of Nines, as with a heat burn.

6. Continue flushing or use saline-soaked dressings, reapplied every 30 minutes, when possible.

7. Transport to medical aid, constantly monitoring and recording the patient's condition. It may be necessary to continue flushing the area during transportation.

6.0 Gas Leaks and Spills

6.1 Gas Leaks

1. Upon smelling or noticing a gas leak or strong unusual vapors, evaluate the situation. If you believe it to be of dangerous nature, sound the alarm with **3 short blasts on the air horn, short pause, then 3 short blasts on the air horn again.**
2. Shut down your tools and equipment, if it is safe to do so.
3. **CALMLY** evacuate the building on a direct and safe way through the nearest exit, don't run.
4. Assist others on your way out and shut all doors, if it is safe to do so.
5. Assembly at Muster Point for a head count.
6. Report any information about leak/smell to your Warden. The Warden will contact emergency authorities.
7. Remain at the Muster Point until cleared to go back ONLY by your Warden or Emergency Authority (i.e. Police, Fire Department).
8. Do not smoke in emergency situations!

6.2 Chemical and Reportable Spills

1. Evaluate the spill situation: determine if the spill is hazardous or non-hazardous material, quantities of material, areas of concern, potential chemical reactions.
2. Evaluate the need for Personal Protective Equipment.
3. Block any drains if you are inside or in an area where storm sewers are present.
4. Confine the spill area: use absorbent socks or absorbent booms to confine the spill area.
5. Absorb the confined area: use absorbent mats and pads or granular absorbent to absorb the spill.
6. Contact the Chief Warden and report the spill.
7. Package and dispose of contaminated material: any materials used to absorb the spill and contaminated soil should be stored in an approved container and disposed of in an appropriate facility.
8. Reporting: Complete any required health and safety and environmental reports as required by the type and quantity of materials spilled in coordination with the Chief Warden and/or Safety representative.
9. Do not smoke in emergency situations!

6.3 Non-Hazardous Spills

- Will be contained using the spill kits available in at the facility/job site.
- Will be reported based on volume and type of material.
- Contaminated soil will be removed and bagged for safe disposal.
- Contaminated soil will only be disposed of at an approved facility.

6.4 Hazardous Spills

- Allen Service & Contracting Ltd. employees are not trained to respond to hazardous material spills and should contact specially trained crews to control the spill.

7.0 Bomb Threats and Explosions

7.1 Bomb Threats

1. If a threat is received by phone, mail or other means, get as much information as possible.
2. If the threat is received by phone, try to keep the person on the line for as long as possible. Do not hang up the phone, even after the call has been terminated.
3. If a threat is received in person, try to get as much information as possible.
4. Contact your Chief Warden immediately when possible and if it is safe to do so.
5. If a suspicious device is identified, sound the alarm with **3 short blasts on the air horn, short pause, then 3 short blasts on the air horn again.**
6. Shut down your equipment or tools, if it is safe to do so.
7. Evacuate the immediate area and notify your Chief Warden to notify local Emergency Authorities (i.e. Police).
8. **CALMLY** evacuate the building on a direct and safe way through the nearest exit, don't run.
9. Assembly at Muster Point for a head count, if the Muster Point area is safe. If it is not safe, assembly in an area close to the Muster Point where you are visible.
10. Report any information about the bomb threat to your Warden.
11. Remain at the Muster Point until cleared to go back ONLY by your Warden or Emergency Authorities (i.e. Police, Fire Department).
12. Do not smoke in emergency situations!

7.2 Explosions

1. Get down on the floor, take shelter under tables or desks, and protect your face and head against flying glass and debris.
2. **Once it is safe to do so, CALMLY** evacuate the building on a direct and safe way through the nearest exit, don't run.
3. Assist others on your way out, if it is safe to do so.
4. Assembly at Muster Point for a head count, if the Muster Point area is safe. If it is not safe, assembly in an area close to the Muster Point where you are visible.
5. If applicable, assist injured persons and provide first aid.
6. Report any information about the explosion to your Warden.
7. Remain at the Muster Point until cleared to go back ONLY by your Warden or Emergency Authority (i.e. Police, Fire Department).
8. Do not smoke in emergency situations!

8.0 Severe Weather and Natural Disasters

8.1 Tornado

1. When you notice severe weather, seek inside shelter.
2. Seek shelter under desks or tables, if possible.
3. Heavy items that may cause injury should be moved to the floor.
4. Stay away from outside walls and windows
5. Use arms to protect head and neck
6. Remain sheltered until the tornado threat is announced to be over.

8.2 Blizzard

1. Stay calm and await instructions from your Warden.
2. Stay indoors!
3. If there is no heat:
    i. Close off unneeded rooms or areas
    ii. Stuff towels or rags in cracks under doors
    iii. Cover windows at night
4. Eat and drink. Food provides the body with energy and heat. Fluids prevent dehydration.
5. Wear layers of loose-fitting, light-weight, warm clothing, if available.

9.0 Workplace Violence

1. Notify your Chief Warden immediately by phone or other means and report the occurrence. If not possible, contact or let someone contact emergency authorities.
2. Do NOT attempt to physically intervene. Protect yourself first.
3. **STAY CALM**, stay out of way and wait for authorities to arrive.
4. Report all information to your Chief Warden and emergency authorities (i.e. Police).

10.0 Trucker's and Driver's Emergencies

Hi-way trucks are equipped with GEO-TRAC and two-way radio for tracking, monitoring and communication.

Before beginning a trip, all hi-way truck drivers must:

- Inspect their truck and trailer, if applicable
- Ensure fire extinguisher and first aid kit are available
- Check if GEO-TRAC is functioning
- Check if two-way radio is functioning
- Ensure they have a functioning and charged cell phone with them and a charger
- Trips should be planned as to avoid night driving or driving after 10pm

Before beginning a trip, all pick-up drivers must:

- Inspect their vehicle and trailer, if applicable
- Ensure fire extinguisher and first aid kit and reflective triangles are available
- Ensure they have a functioning and charged cell phone with them and a charger
- Trips should be planned as to avoid night driving or driving after 10pm

In case of a break down or accident not involving other vehicles/traffic and physical injuries:

- Put on your hi-vis vest or clothing with hi-vis stripes
- Turn on your hazard lights
- Before Exiting the vehicle ensure there is not traffic or that you step onto traffic
- Secure the scene/vehicle by placing reflecting triangles 100 meters behind the truck/vehicle
- Investigate the problem
- Call your trip supervisor, report and follow instructions

In case of physical injuries:

- If you are or another person are injured, try to administer first aid, if possible
- Call 9-1-1 for medical aid
- Call your trip supervisor immediately
- Report the injury and severity of injury
- Wait for help to arrive, if applicable

What to do if there is no cell service:

- Try calling other truckers with the two-way radio
- Communicate your problem and ask to make a call for you
- If other truckers don't have service, ask for other truckers to help you
- Try waving other traffic down – follow procedure for break down or accident

If you are stranded in remote area:

- Try contacting other truckers with two-way radio
- If the two-way radio is broken, try contacting your supervisor with your cell phone
- If there is no cell service, push the distress/panic button on GEO-Track

EMERGENCY RESPONSE PLAN

Project: Gunghi Creek Culvert Replacement (CT2346)
Location: Inuvik - Tuktoyaktuk Highway, Marker 131.2, 14 km south of Tuktoyaktuk

Approximate Work Location

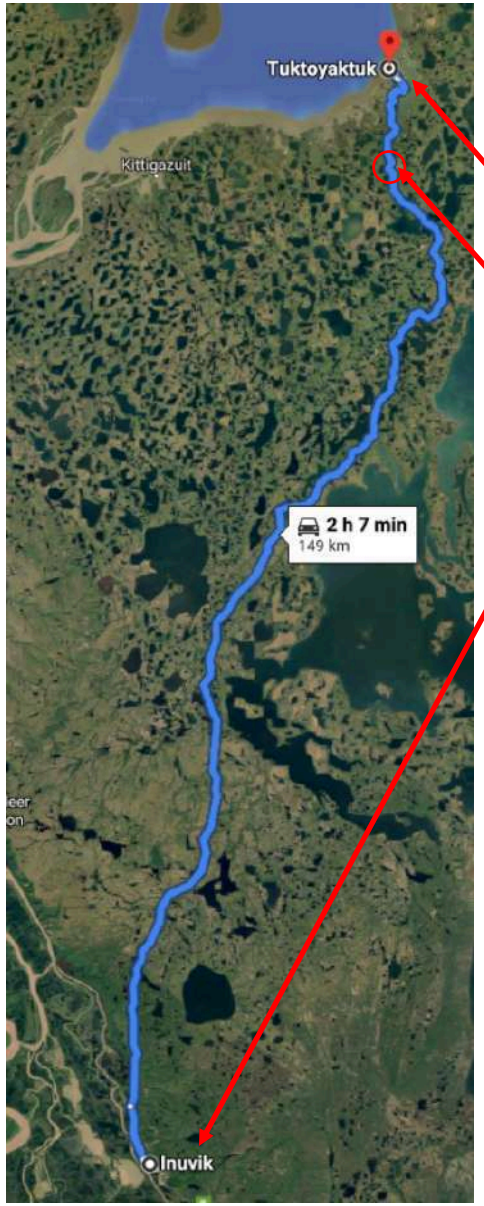
N

- First Aid Kit and other Emergency Equipment
- Fire Extinguisher
- Spill Kit
- Eyewash Station
- Air Horn
- Muster Point
- Job Shack

* All equipment may be transported to location 2

EMERGENCY RESPONSE PLAN

Project: Gunghi Creek Culvert Replacement (CT2346)
Location: Inuvik - Tuktoyaktuk Highway, Marker 131.2, 14 km south of Tuktoyaktuk



Tuktoyaktuk

Work Area (approx.)

Inuvik

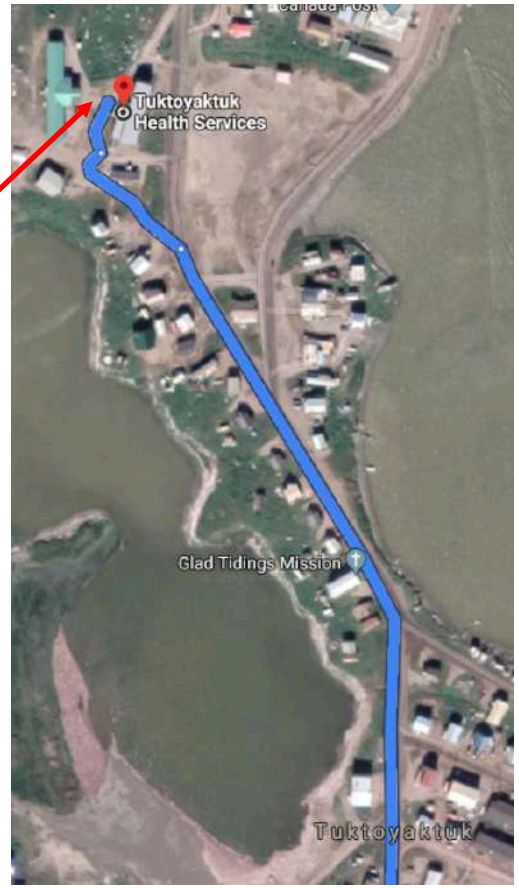
Directions from work area to Tuktoyaktuk Health Services

Distance: ca. 14.8 km and ca. 20 min (across frozen river)

1. Head east on Dempster Hwy/NT-8 N for ca. 14 km

2. Turn left onto Tetlit Gwich'In Rd and keep driving for ca. 1 km

Area Overview and Medical Aid



Tuktoyaktuk Health Services

Address:
Bag Service 1000
Tuktoyaktuk, NT X0E 1C0

Main phone: 867-977-2321
Satellite phone: 01-8816-326-17088

After Hours Emergency: 867-977-2321

Hours of Operation:
Monday to Friday: 08:30-17:00

EMERGENCY RESPONSE PLAN

Project: Gunghi Creek Culvert Replacement (CT2346)
Location: Inuvik - Tuktoyaktuk Highway, Marker 131.2, 14 km south of Tuktoyaktuk

Basic Emergency Response Procedure

- Do not panic, stay calm
- Shut down your equipment, if it is safe to do so
- Assess the scene
- Sound the alarm – 3 short blasts on the air horn, short pause, then again 3 short blasts or shout: HELP-HELP-HELP

- If a person is injured, ensure first aid is provided
- Assess the injury - If severe injury, call Health Services for assistance/guide and to announce arrival with injured

- If fire, use the fire extinguisher and try to extinguish the fire
- If the fire is too big, leave the area immediately
- Call the Fire Department

- Assemble at Muster Point, if not assisting
- Remain at Muster Point until given clear by Site Supervisor

- For all other emergencies, follow the specific Emergency Response Procedures for type of emergency

Remember: DO NOT DISTURB the scene
DO NOT SMOKE in emergency situations
Do not talk to media

EMERGENCY RESPONSE PLAN

Project: Gunghi Creek Culvert Replacement (CT2346)
Location: Inuvik - Tuktoyaktuk Highway, Marker 131.2, 14 km south of Tuktoyaktuk

Emergency Phone Numbers

First Aiders on site marked with 

Tuktoyaktuk Health Services
Main Phone 8:30 – 17:00……..(867) 977 - 2321
Satellite Phone……..……...01-8816-326-17088
After Hours Emergency/Nurse……..……....(867) 977 - 2321

Tuktoyaktuk Fire Department……(867) 977 - 2222
Tuktoyaktuk Police (RCMP)……....(867) 977 - 1111

Regulatory Contacts
NWT Spill Hotline……..24 hrs……..….(867) 920 - 8130
Poison Centre……24 hrs……..….(800) 332 - 1414
WSCC Reporting Line……..24 hrs……..….(800) 661 - 0792
WSCC Information…….....(867) 678 - 2301
NWT Chief Safety Officer……(800) 661 - 0792

Utilities
Natural Gas……..Inuvik Gas……..….(800) 511 - 3447
Electrical……..……NWT Power Corp……...(800) 668 - 5506

Allen Services & Contracting Ltd.

Brian McCarthy Sr……Supervisor…….(780) 271- 5666
Barry Setzer.....Site Safety Rep....(867) 678 - 5078
Lee McMann ……Supervisor..... (780) 999 - 0177

Allen Services Office……..……..….(867) 777 - 4000

Other Phone Numbers

Roger Gruben – camp location Tuktoyaktuk.....(867) 977 - 2230

Water Management Plan

Construction of Concrete Arch Bridge along Inuvik to Tuktoyaktuk Highway (ITH) at km 131.2 over Gunghi Creek

Prepared for:

Allen Services & Contracting

Prepared by:

Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited
5681 – 70 Street
Edmonton, AB T6B 3P6
Canada
T: 780-436-21525 March 2021

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Third-party disclaimer

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1.0 Introduction

The Gunghi Creek crossing is located along the Inuvik to Tuktoyaktuk Highway (ITH) at km 131.2. The project consists of replacing the existing 2000 mm in diameter Corrugated Steel Pipe (CSP) with an invert length of 38 m that has major sagging in the center. The proposed replacement structure is a 7518 mm span by 3200 mm rise precast concrete arch bridge. The new bridge will have a 38.96 m length and be installed on a 40° left hand forward (LHF) skew. The project construction was scheduled during the 2020/2021 winter when environmental impacts such as dust, erosion and silt contamination can be minimized.

The following sections provide information on hydrology and the water management plan for this project to be implemented during the construction stage.

2.0 Hydrology

Gunghi Creek flows from west to east within the ITH crossing area. The drainage area upstream of the Gunghi Creek crossing consists of tundra with several lakes. Near the crossing, a lake is located approximately 200 m upstream and several pools have been documented (Bonhomme, 2018). Figure 2-1 shows characteristic of the Gunghi Creek at the crossing.

Figure 2-1 Gunghi Creek Crossing at km 131.2 ITH (No. 10)

Mr. Lee McMann (Allen Services & Contracting Ltd.), Mr. Riaz Abbas, P.Eng. (Wood) and Mr. Arshed Mahmood, P.Eng. (Wood) conducted a site visit on July 25, 2019 to assess site conditions for the Gunghi Creek hydrotechnical assessment and constructability of an open bottom concrete arch structure. The depth of water measured downstream of the existing culvert was 0.5 m, which was estimated to be related to a flow in the order of 0.60 m^3/s. The following photos were taken during the July 25, 2019 site visit.

Figure 2-2 Gunghi Creek Crossing at km 131.2 ITH (No. 10) looking upstream

Figure 2-3 Gunghi Creek Crossing at km 131.2 ITH (No. 10) looking downstream

Figure 2-4 Gunghi Creek Crossing at km 131.2 ITH (No. 10) measuring water depth

Table 2-1 provides a summary of the flows assessed for this study.

Table 2-1: Estimated Flows for Gunghi Creek Crossing

Return Period	Flow (m^3/s)
Q_{100}	16
3Q10 (fish passage flow)	6.6
Q_2	4.8
Qdesign for berm	0.6

As construction activities under this contract are being carried out in the winter, the potential for surface erosion and creek flow is very low. The Contractor has been and will continually monitor the site for signs

of overflow erosion and creek flow due to sudden rise in temperature and will develop and update the water management plan if necessary.

The Contractor will install silt fencing to reduce the chance of erosion and/or silt contaminating the waterbodies once the thaw occurs. All erosion and sediment control (ESC) measures will be inspected regularly to ensure that they are functioning properly and are maintained, cleaned and/or upgraded as required until complete revegetation of all disturbed areas is achieved.

Where the watercourse is dry or frozen to the channel bottom at the time of work, the requirement to isolate the instream worksite from flowing water does not apply. Any instream works in flowing water conditions will be isolated during construction. A hundred percent of flow should be diverted downstream at all times. All diverted water will meet the requirements of the federal water quality guidelines (CCME 2002).

3.0 Water Management Plan

During the July 2019 visit, a flow of 0.6 m^3/s with a depth of flow of 0.5 m was estimated downstream of the existing Gunghi Creek culvert located along ITH at km 131.2. It is expected that low or no flow will be present at the site during construction since construction will be occurring in winter.

A water management plan was developed for this project with two phases as per Attachment 1 and Attachment 2. These phases of the water management plan were and will be implemented if any flow is observed during construction. For phase 1 (see Attachment 1), the water management plan was implemented by the Contractor during the early stage of the winter construction based on field conditions. At that time, there was seepage/groundwater in the construction area. Therefore, phase 1 included construction of a diversion channel to divert seepage water coming from the roadway north embankment to the downstream inlet sump (located in the northeast side of the crossing). The diversion channel located along the north side of the crossing was above and beyond the active creek, as per Attachment 1. There was another sump located southwest of the crossing that collected local seepage water. The water from these sumps was allowed to settle out for a 24 hr period before being pumped out. This provided the opportunity for any fine sediment material to settle out in the sumps before being pumped, ensuring no turbid water was pumped out. Initially, seepage/groundwater was collected in the sumps and was pumped out away from the creek in an upland vegetated area. Later, there was no water present in a liquid state at the Project site, due to the freezing winter temperatures. Frozen water from the diversion channel and sumps was removed and disposed in an upland vegetated area away from the creek channel. Later on, the diversion channel area was excavated to install thermosyphon support foundation piles to keep the foundation piles frozen all year long. Since this area is above and beyond the active creek channel, it was backfilled with roadway embankment material.

Phase 2 of the water management plan (see Attachment 2) will be implemented if the air temperature rises above freezing. Berms/dams upstream and downstream of the construction area will be installed to isolate the construction area, as per Attachment 2. At the early stage of the winter construction, a 1-800 mm diameter CSP culvert was installed under the detour road to divert water if required as shown on the Attachment 1. The detour road was made of an ice embankment. If required, the upstream and downstream berms/dams will comprise of standard sandbags wrapped with an impermeable liner fabric or approved

equivalent. The upstream and downstream berms/dams height was estimated to be in the order of 1 m. Pumps and hoses will be used to divert the flow if any, downstream of the construction area. If required, the water will be pumped into a filter bag/settling basin to settle out any fine sediment material. If any water is present within the construction area, it will be pumped on an upland vegetated area in the vicinity of the creek into a filter bag/settling basin to settle out and remove any fine sediment material prior to being released into the creek.

Phase 2 of the water management plan will need to be adjusted by the Contractor as per field conditions encountered during the construction period. Instream worksite isolation measures to be implemented as part of the Project are listed in Section 3.1.

3.1 Instream Worksite Isolation

Instream work will be carried out in a manner that isolates the instream construction site and eliminates the flow of surface water through the construction area. The following measures relating to the isolated worksite will be implemented as part of the Project.

- Where the watercourse is dry or frozen to the channel bottom at the time of work the requirement to isolate does not apply.
- Any instream works in flowing water conditions will be isolated during construction. 100% of downstream flow should be maintained at all times. Where ice is present, the diverted water will be returned to the watercourse under the ice, wherever possible. All diverted or discharged water will meet the requirements of the federal water quality guidelines (*Canadian Water Quality Guidelines for the Protection of Aquatic Life: Total Particulate Matter*) and or Part D, Item 9 of the Water Licence N5L1-1843.
- Any bypass pumping or water withdrawal will be conducted as follows:
    - Water will also be diverted downstream by using pump(s) as per the attached water management plan.
    - Must pass through a screen with openings that are no larger than 2.54 mm and at a velocity that does not result in the entrainment and entrapment of fish or fish fry.
    - The pump outlet should be on class 1 riprap to arrest any soil erosion.
    - The fish screen must be constructed of materials that can withstand extreme winter temperatures.
    - The screen should be kept clean of ice and debris, be inspected for damage before each withdrawal, pump should be stopped if any sign of fish impingement or entrainment, and a secondary screen should be kept onsite in case the primary screen gets frozen or damaged.
    - The inlet screen will not be placed directly on the bottom of the water body and will be placed in a manner that prevents disturbance on the channel bed material.
    - All openings for guides and seals will be smaller than the opening width of the screen material (2.54 mm) so fish cannot pass through.
    - Protect large screens with trash racks fabricated of bar (150 mm spacing is typical) or grating in areas where there is debris loading (i.e. woody material, leaves or algae mats).
    - Approach velocity directly in front of the screen will not exceed the designed approach velocity at any location.

    - Ensure there is enough structural support to prevent sagging or collapsing of the screen panel.
    - Where ice is present on the water body, the diverted water will be returned to the water body downstream of the instream worksite, under the ice.
- Materials in isolation berms will be made of non-earthen materials and not introduce clay or silt into any watercourse. Instream works will be confined to the isolated channel section.
- Accumulations of deposited sediment will be removed from within the isolated area prior to removing the isolation barrier.
- Should the need for dewatering arise, water will be released into a well vegetated area or settling basin and not directly into any water body. Water returning to the watercourse will be of equal or better quality than the water in the watercourse.
- If water, standing or flowing, is present in the isolated work zone at the time of construction, a fish rescue program will be completed prior to the start of instream work to ensure all fish are protected.
- Any fish will be rescued from the isolated area prior to construction and be relocated, unharmed, into an area containing sufficient flow and cover. Fish rescue may require a territorial licence. Rescue operations employing effective methods (e.g. electrofishing, seine netting, minnow trapping) carried out as stipulated in the research license.
- An additional pump shall be available on standby site under active construction or isolation as a contingency for more extreme flood events.
- The contractor shall always have available onsite at least one standby pump for each category of pump being used for water management plan.
- Hoses will be used to divert flows.
- The contractor shall provide standby power enough for operation of all required water management equipment.
- The contractor must inspect all water management equipment and infrastructure at regular intervals (once every 12 hours), verify that the pumps are operating, there is enough fuel, and cold weather protection is adequate.
- Adjust the time interval between inspections to correspond with the type and nature of weather and the work in progress.
- All damage to any part of the work caused by water, snow, or ice due to failure of the water management measures must be repaired.
- Dewatering and temporary diversion works shall be finished to a neat condition.

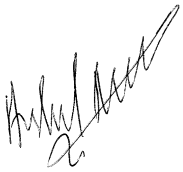
4.0 Closure

Please contact the undersigned should you have any questions or comments regarding this report.

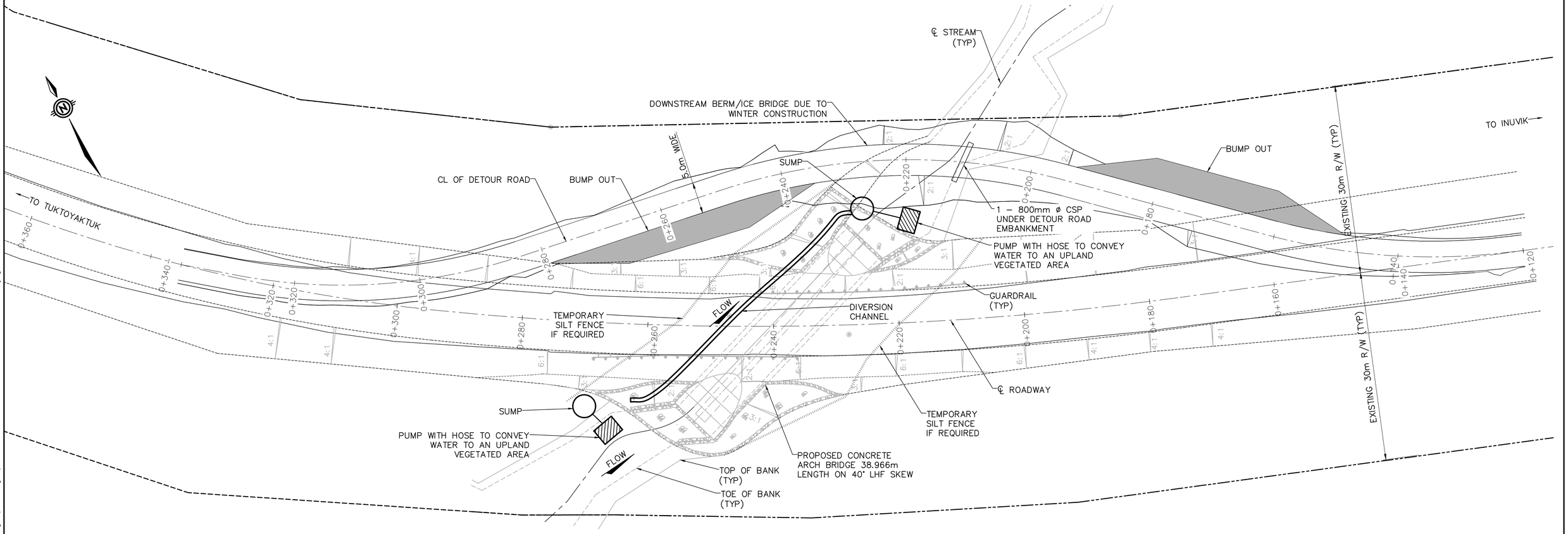
Wood Environment & Infrastructure Solutions,

Claudine Girouard, M.Sc., P.Eng.
Bridge / Water Resource Engineer

Reviewed by:



Arshed Mahmood, M.Sc., P.Eng.
Bridge / Water Resource Engineer



WATER MANAGEMENT PLAN – PHASE 1

1:300

wood.

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ENVIRONMENT & INFRASTRUCTURE SOLUTIONS
A DIVISION OF WOOD CANADA LIMITED

SCALES SHOWN ARE CORRECT FOR 22" x 34" SHEET SIZE

JOB No. EB193003

REV	DATE	REVISIONS	BY
6			
5			
4			
3			
2			
1	2021-03-24	ISSUED FOR CONSTRUCTION	AM

DEPARTMENT BAR CODE

DATE 2021-03-24

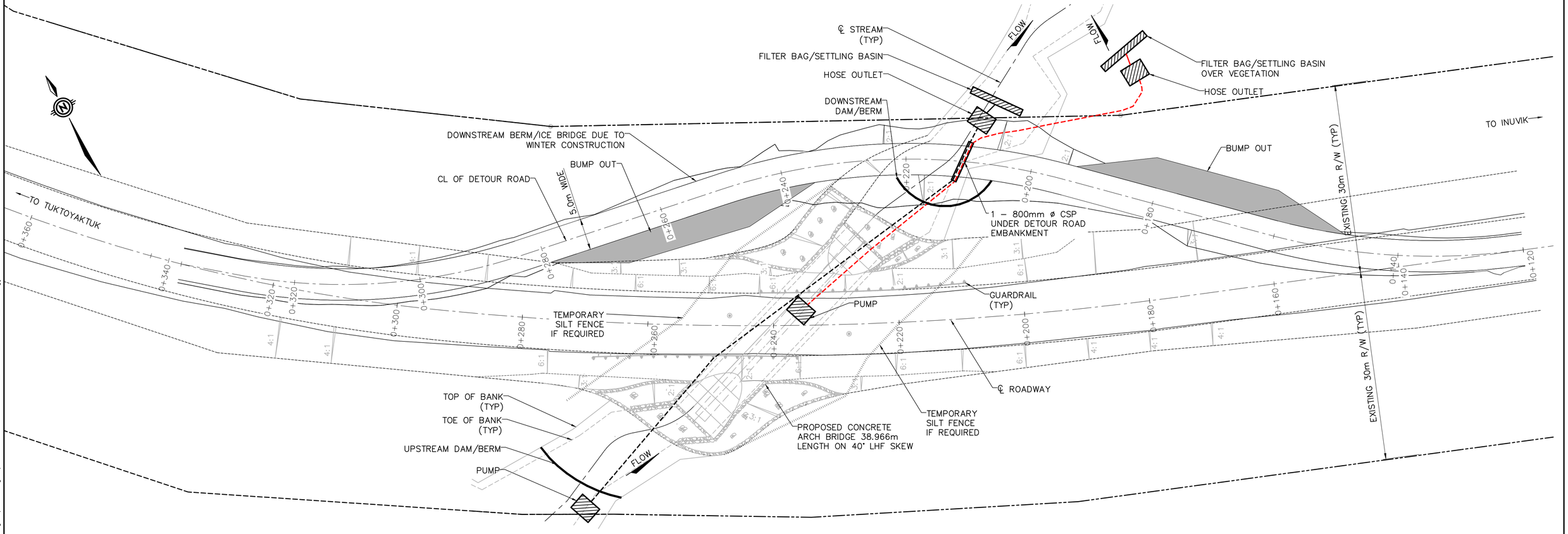
DESIGNER

DATE

GOVERNMENT OF THE NWT
DEPARTMENT OF INFRASTRUCTURE

ITH 131.2
GUNCHI CREEK
WATER MANAGEMENT PLAN

STREAM	LOCATION	HIGHWAY	FILE	SHEET	DRAWING
GUNGHI CREEK	INUVIK TO TUKTOYAKTUK HIGHWAY	LOCAL	–	1 OF 1	ATTACH–01



WATER MANAGEMENT PLAN – PHASE 2

1: 300

LEGEND:

- WATER FROM CREEK BEING DIVERTED DOWNSTREAM WITH A HOSE
- WATER WITHIN CONSTRUCTION AREA BEING DIVERTED DOWNSTREAM WITH A HOSE

NOTES:

- SAND BAGS WRAPPED WITH IMPERMEABLE LINER FABRIC OR APPROVED EQUIVALENT WILL BE UTILIZED FOR DAM/BERM CONSTRUCTION.
- DAM/BERM HEIGHT WILL BE IN THE ORDER OF 1m (TO BE VERIFIED IN FIELD BY CONTRACTOR)
- IF REQUIRED, BERM HEIGHT WILL BE INCREASED WITH RISING WATER LEVEL.

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5			
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1	2021-03-17	ISSUED FOR CONSTRUCTION	AM

DESIGNER

DATE

GOVERNMENT OF THE NWT
DEPARTMENT OF INFRASTRUCTURE

ITH 131.2
GUNCHI CREEK
WATER MANAGEMENT PLAN

DEPARTMENT BAR CODE	DATE	STREAM	LOCATION	HIGHWAY	FILE	SHEET	DRAWING
	2021-03-17	GUNGHI CREEK	INUVIK TO TUKTOYAKTUK HIGHWAY	LOCAL	–	1 OF 1	ATTACH–02