BACK RIVER PROJECT
Quarry Management Plan

Type B Development Works Water Licence

August 2017

Version 2.0

BACK RIVER PROJECT
QUARRY MANAGEMENT PLAN

Table of Contents

List of Figures

FIGURE **PAGE**

List of Tables

TABLE **PAGE**

List of Appendices

Acronyms

ARD	acid rock drainage
FEIS	Final Environmental Impact Statement
GN-DCH	Government of Nunavut Department of Culture and Heritage
KIA	Kitikmeot Inuit Association
ML	metal leaching
MLA	Marine Laydown Area
Mt	million tonnes
NPAG	non-potentially acid generating
NWB	Nunavut Water Board
Project	Back River Project
PAG	potentially acid generating
QMP or Plan	Quarry Management Plan
ROQ	run of quarry
Sabina	Sabina Gold & Silver Corp.
WIR	Winter Ice Road

1. Introduction

The Back River Project (the Project) is a proposed gold project owned by Sabina Gold & Silver Corp. (Sabina) within the West Kitikmeot region of southwestern Nunavut. It is situated approximately 400 kilometres (km) southwest of Cambridge Bay, 95 km southeast of the southern end of Bathurst Inlet (Kingaok), and 520 km northeast of Yellowknife, Northwest Territories. The Project is located predominantly within the Queen Maud Gulf Watershed (Nunavut Water Regulations, Schedule 4).

The Project is comprised of two main areas with interconnecting winter ice roads (WIR): Goose Property (Appendix A of the MASD, base Figure 2) and the Marine Laydown Area (MLA) (Appendix A of the MASD, base Figure 3) situated along the western shore of southern Bathurst Inlet. The majority of annual resupply will be completed using the MLA, and an approximately 160 km long WIR will interconnect these sites.

This Quarry Management Plan (QMP or Plan) outlines the construction, operation, and closure approach of approved borrow and rock quarry areas within the Goose Property and MLA. The QMP is intended to support the Type B Water Licence Application for the Project.

The Plan was prepared following the requirements of:

- the Supplementary Information Guidelines (SIG) for Mining and Milling MM3 and Water Works M1, issued by Nunavut Water Board (NWB 2010 a, b);
- the Environmental Impact Statement Guidelines issued by the Nunavut Impact Review Board (NIRB) to Sabina (NIRB 2013); and
- in accordance with best management practices and in conformance with current Federal and Territorial statutory requirements.

The information presented herein is current as of August, 2017.

2. Scope and Objectives

This Quarry Management Plan has been written to meet requirements of a Type B Water Licence and entails the management of borrow and quarry material, explosives, dust, and water in relation to the site preparation and initial development work activities as described in Table 2-1. The Plan is supported by a suite of Project-specific mitigation, monitoring, and/or management plans that set out the Project's standards and requirements for particular areas of environmental management, including the:

- Comprehensive Spill Contingency Plan (August 2017);
- Fuel Management Plan (August 2017);
- Road Management Plan (August 2017);
- Borrow Pits and Quarry Management Plan (August 2017);
- Oil Pollution Emergency Plan (August 2017);
- Environmental Management and Protection Plan (August 2017); and
- Interim Closure and Reclamation Plan and cost estimate (August 2017) specific to development works.

Included within the plans are monitoring with adaptive management measures to confirm that the Project is executed as planned, that mitigation is successful, and potential adverse effects are minimized.

Table 2-1. List of Activities

GOOSE PROPERTY
Goose Exploration Camp Operation
Ice Airstrip Construction and Operation
Mobilize Fuel, Equipment, and Supplies
Winter Ice Road Construction and Operation
Operate Airstrip Quarry
Operate Umwelt Quarry
Locate Temporary Fuel Storage
Construct All-weather Service Roads and Water Crossings
Construct Goose Plant Site and Fuel Storage Area Pad
Airstrip Extension
Rascal Stream Re-alignment
Relocate Explosives Storage Area
Water Intake Installation
MARINE LAYDOWN AREA
Ice Airstrip Construction and Operation
Mobilize Fuel, Equipment, and Supplies (Air)
Upgrade Temporary Exploration Camp
Operate MLA Quarry
Construct All-weather Service Roads, Laydown Areas, and Fuel Storage Area
Mobilize Additional Fuel, Equipment, and Supplies (Vessels)
Install One Steel Bulk Fuel Tank
Water Intake/Discharge Installation

3. Applicable Legislation and Guidelines

Specific legislation, regulations, and guidelines related to borrow pits and quarry management in Canada, and specifically within Nunavut, are summarized in Table 3-1.

Sabina will also be bound by the terms and conditions of its land use permits to be issued by Indigenous and Northern Affairs Canada for Crown Lands and the Kitikmeot Inuit Association (KIA) for Inuit Owned Land, and its Type B Water Licence to be issued by the NWB.

Table 3-1. Applicable Legislation to Waste Management in Nunavut

Acts	Regulations	Guidelines
Federal		
Canadian Environmental Protection Act (CEPA 1999)		
Nunavut Agreement	Article 19	
Nunavut Waters and Nunavut Surface Rights Tribunal Act (2002)	Nunavut Water Regulations (2013)	
Fisheries Act (1985)		
Territorial Lands Act (1985)	Territorial Land Use Regulations (CRC, c.1524) Northwest Territories and Nunavut Mining Regulations (CRC, c.1516)	Implications of Global Warming and the Precautionary Principle in Northern Mine Design and Closure (BGC 2003) Northern Land Use Guidelines Pits and Quarries (INAC 2010)
Explosives Act (1985)	Explosives Regulations (SOR/2013-11)	
Territorial – Nunavut		
Nunavut *Environmental Protection Act* (1988)		
Wildlife Act (1988)	Wildlife General Regulations (NWT Reg (Nu) 026-92) Wildlife Licences And Permits Regulations (NWT Reg (Nu) 027-92) Wildlife Management Barren-Ground Caribou Areas Regulations (NWT Reg (Nu) 099-98) Wildlife Management Grizzly Bear Areas Regulations (NWT Reg (Nu) 155-96) Wildlife Management Zones Regulations (RRNWT (Nu) 1990 c W-17) Wildlife Regions Regulations (NWT Reg (Nu) 108-98) Critical Wildlife Areas Regulations, R.R.N.W.T. 1990 c. W-3 Polar Bear Defence Kill Regulations, N.W.T. Reg. 037-93 Wildlife Management Muskox Areas Regulations, R.R.N.W.T. 1990 c. W-11 Wildlife Management Polar Bear Areas Regulations, R.R.N.W.T. 1990 c. W-13 Wildlife Sanctuaries Regulations, R.R.N.W.T. 1990 c. W-20 Wildlife Preserves Regulations, R.R.N.W.T. 1990 c. W-18	
Mine Health and Safety Act (SNWT (Nu) 1994, c.25)	Mine Health and Safety Regulations (NWT Reg (Nu) 125-95)	

Borrow pits and rock quarries within Inuit Owned Land require a land use licence or commercial lease and quarry permit issued by the KIA. Quarry permits from the KIA include terms and conditions specifying how operations are to be conducted.

The discovery of any deposits of carving stone on Crown lands will be subject to Article 19 of the *Nunavut Agreement*. The use of explosives will comply with the *Explosives Regulations* and the *Mine Health and Safety Act and Regulations*. Use of rock and granular material from the quarries and borrow pits will require a water licence from the NWB under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and associated water regulations. The federal *Fisheries Act* may also apply if runoff water containing deleterious substances flow from the quarries/borrow pits into fish bearing water (see Section 6.2).

Other applicable legislation from the Government of Nunavut include the permitting of archaeological surveys completed in advance of operations (see Section 6.5) and compliance with the Nunavut *Wildlife Act* with respect to impacts to raptors and terrestrial animals (see Section 6.6).

4. Planning and Implementation

4.1 PLAN OVERVIEW

The MLA and Goose Property will require quarry material to facilitate the construction of initial development works. Goose Property will draw material from the existing rock quarry (Airstrip Quarry), and from a new quarry within the footprint of the future Umwelt Pit (Umwelt Quarry). Material will also be cut and filled from the Goose Plant Site pad area. The MLA will draw material from a cut and fill in the area of the future MLA Fuel Storage Area (MLA Quarry). These will allow for the development of all-weather service roads, airstrip extension, pads, and laydown areas. Quarries at the Goose Property are shown on base Figure 2 (Appendix A of the MASD), and the MLA Quarry is shown on base Figure 3 (Appendix A of the MASD).

4.1.1 Goose Property

Sabina proposes to construct all-weather service roads for development works (Appendix A of the MASD, base Figure 2). This road alignment, totaling approximately 7.4 km in length, is required to connect the existing rock quarry (Airstrip Quarry), Explosives Storage Area spur road, the new Umwelt Quarry, the Goose Plant Site pad, and the existing Goose Exploration Camp. Sabina intends to utilize, wherever possible, the same footprint for the initial development works as the full-scale Goose Property site layout. Rock will be placed directly onto the tundra to preserve the permafrost, and a layer of graded surfacing material will be placed to provide a protective trafficking layer. Refer to the Road Management Plan for details on all-weather service road requirements. The initial development works will also include the construction of the Goose Plant Site pad and the Goose Fuel Storage Area pad. Once service roads to the Goose Plant Site area are established, construction material will be sourced by cutting bedrock material from the Goose Plant Site pad area.

4.1.2 Marine Laydown Area

The initial development works at the MLA requires the construction of approximately 2 km of all-weather service roads and laydown areas, as well as the construction of at least one of the bulk fuel containment areas (Appendix A of the MASD, base Figure 3). These are required to facilitate material mobilization by ocean going vessels during the open water season. Sabina intends to utilize, wherever possible, the same footprint for the initial development works as the full-scale MLA site layout. Pending the outcome of a planned 2017 geotechnical program at the MLA (which is occurring post Type B application submission) and completion of Detailed Engineering work, the MLA layout may be further enhanced. Although the layout may alter due to construction limitations or efficiencies, the activities at the MLA as presented will not change. Should significant alterations be required to the proposed MLA layout, Sabina will provide the portions of the revised layout, and any other relevant enhancements, to the NWB 60 days prior to construction.

4.2 EXISTING BORROW AND ROCK QUARRY FACILITIES

During the 2013 season (March 1 to May 15, 2013), approximately 40,000 cubic metres (m^3) of rock material was quarried from a site (called the Airstrip Quarry; KIA permit KTP11Q001) approximately 750 m west of the existing Goose Exploration Camp. The run of quarry (ROQ) material was trucked over a WIR from the quarry to crushing equipment located at the all-weather airstrip. The material was crushed to 4 inch and ¾ inch aggregate. This material was used to build a pad and containment for bulk

fuel tanks at the existing Goose Exploration Camp, and to surface the all-weather airstrip and road connecting the airstrip to the Goose Exploration Camp.

There is also an approved borrow area at the Goose Property (permit KTP12Q001) that overlaps the footprint of the existing airstrip. This borrow area was accessed in 2012 but at this time Sabina does not intend to draw material from this permitted borrow.

The 2013 Construction Summary Report, which outlines additional details of the completed quarry activities, was submitted to the NWB on August 27, 2013. The overall Airstrip Quarry current extents is shown on base Figure 2 (Appendix A of the MASD), and a detailed survey of the quarry following completion of the 2013 extraction is shown as Figure 4.2-1.

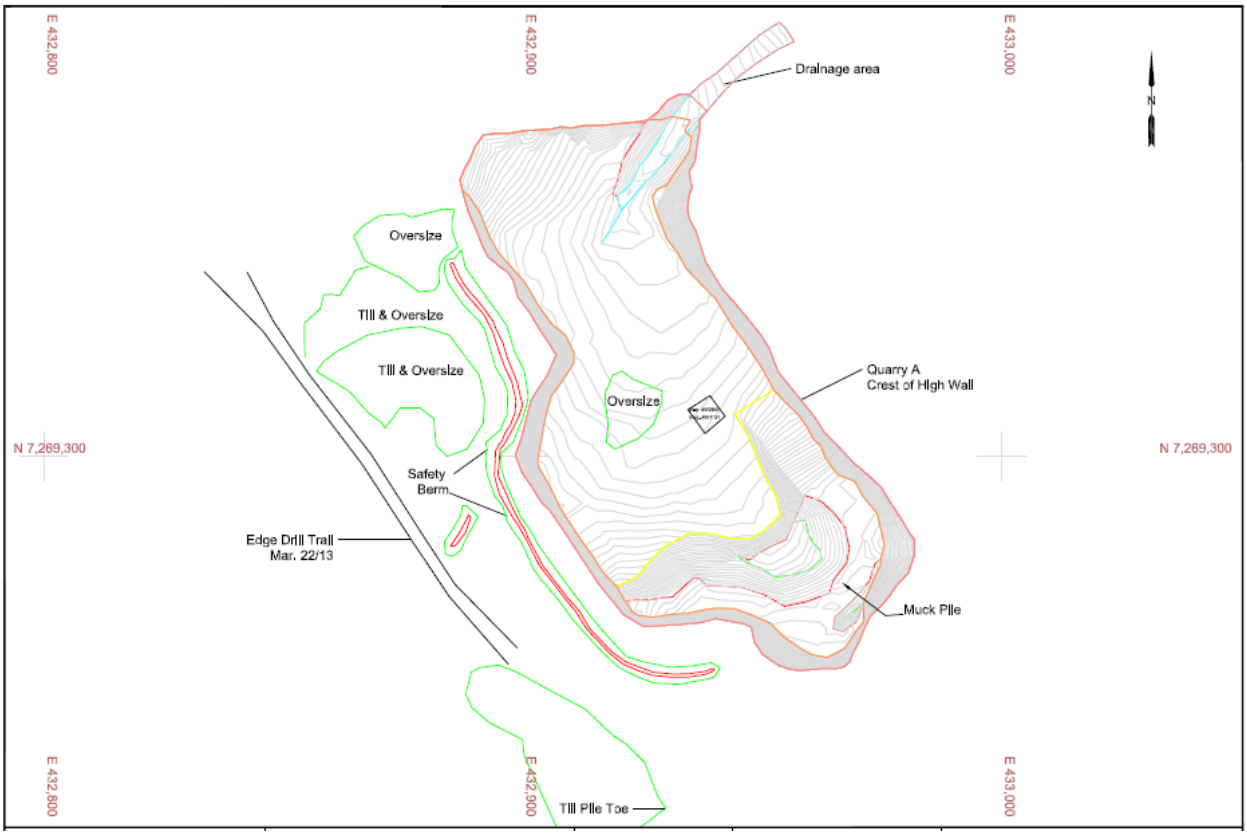

Figure 4.2-1. Existing Airstrip Quarry after Extraction in 2013

4.3 PROPOSED BORROW AND ROCK QUARRY FACILITIES

4.3.1 Goose Property Borrow and Quarry Facilities

At the Goose Property, an estimated 625,000 m^3 of ROQ will be required for initial development works. Two quarries have been identified for use: the existing quarry next to the airstrip (Airstrip Quarry) under 2BE-GOO1520, and a new quarry located within the footprint of the future Umwelt Pit (Appendix A of the MASD, base Figure 2). This 625,000 m^3 of ROQ will be extracted from one or both of these quarries, however the material used will not exceed this total volume. Overburden materials at the Goose Property

generally consist of poorly sorted till material (glacial sediments) that appear highly weathered and contain mostly refractory minerals.

4.3.1.1 Airstrip Quarry

The Airstrip Quarry is located on a rock outcrop. Further development of this existing quarry will involve drilling and blasting as was undertaken in the previous phase. A highwall will be created along the high point in the ridge along the western extent of the proposed Airstrip Quarry, and the quarry floor will be sloped to the east. A gentle slope to the quarry floor will ensure that the quarry is free-draining. The highwall may reach a height of 20 m in places, if the quarry is fully developed.

The existing quarry has minimal overburden. Any overburden generated and not used by the Project will be placed in stable stockpiles either above the highwall or along the toe of the quarry.

4.3.1.2 Umwelt Quarry

The Umwelt Quarry will be located within the footprint of the future Umwelt open pit. Quarry activities will target two large areas within the pit boundary where non-potentially acid generating (NPAG) and metal leaching (ML) waste rock has been identified (see Section 6.1).

The Umwelt deposit is overlain by overburden consisting of a mix of silt, sand, and gravel. The thickness of overburden ranges from about 2 to 6 m. The targeted areas for quarrying have a thinner overburden thickness. The general area proposed for quarrying based on geochemical characterization work is shown on base Figure 2 (Appendix A of the MASD). The final location and configuration of the quarry will be determined by the contractor.

To develop the quarry, it will be necessary to strip and stockpile the overburden. Though the ground is relatively flat across the deposit, the stockpile will be positioned on the upgradient side of the quarry so that the finished quarry can serve to collect runoff from the stockpile. Since the overburden may be frozen and therefore blasted during removal, some slumping is expected as water is released from the soil. The overburden stockpile will likely be constructed in a windrow fashion to an approximate maximum height of 6 m and sloping outward. This configuration could be modified based on observations in the field.

The final quarry design including size and depth will be determined by Sabina in consultation with its contractor, but it is likely not to exceed 30 m into the rock.

4.3.2 MLA Quarry

At the MLA, an estimated 400,000 m^3 of aggregate will be required for development of service roads, laydown pads, infrastructure foundations, and fuel storage and other containment areas. All of this material will be sourced from the cut/fill balance during development of the Fuel Storage Area, which is referred to as the MLA Quarry (Appendix A of the MASD, base Figure 3).

Overburden at the MLA generally consist of gravel to cobble sized material mixed in sand.

4.4 DEVELOPMENT AND OPERATION

The proposed areas will be developed, inspected, and maintained by Sabina or contractors charged with this responsibility under the direction of Sabina. Borrow pit and quarry locations are assessed by the geotechnical properties of the material, the geochemistry and acid rock drainage (ARD)/ML potential, available volume of material, proximity to infrastructure, and avoidance of environmentally sensitive (e.g., wildlife dens) and culturally sensitive (e.g., archaeological) areas.

4.4.1 Development Plans – Rock Quarries

Site development plans will augment this management plan with specific details. These development plans will include:

- Site layout and set-up with the following provisions:
  - minimum setback of 31 m from environmentally sensitive areas;
  - adequate room for all activities;
  - estimates of the resources to be extracted;
  - refuelling station with appropriate containment (if required);
  - confirmation of low ARD/ML potential and anticipated water quality;
  - confirmation of archeology, vegetation, and wildlife status;
  - expected permafrost conditions;
  - stockpiling location and any runoff control measures (if required);
  - equipment lists;
  - site development techniques;
  - explosive magazine locations;
  - dust and noise management;
  - waste management facilities (where applicable); and
  - water management facilities and any erosion control measures (if required).

The final quarry configuration will consist of a flat surface graded at approximately 1% in the down slope direction, adjoining a steeper angled rock surface that forms the transition to natural ground on the ridge above. Storm and snowmelt water will be diverted away from the quarry by a small berm on the upslope edges of the excavation.

4.4.2 Operations

Quarry operations may use explosives and the design, shape, and size of the blasts shall be planned with safety being the most important consideration. Should blasting be required, a predetermined pattern of drillholes will be drilled to a depth, not exceeding the overall depth of the quarry, and filled with explosives. Prior to the blast, all personnel and equipment will be moved to a safe distance. The blasted rock will be loaded into haul trucks using either a loader or a hydraulic shovel/excavator. The ROQ material is then hauled to the construction area, dumped, and placed using a track dozer and/or motor grader. This sequence is called a “drill, blast, load, haul, dump” sequence. Refer to the Spill Contingency Plan for mobile equipment spill management and other related topics.

Some of the ROQ will be moved to a crusher to produce aggregate of various sizes. The crusher will be offset from local waterways and may be shielded from the prevailing wind. When possible, the shielding will be managed by placing the crusher within the quarry behind a high wall to reduce the quantity of wind-blown dust and enabling dust to fall within the quarry boundaries.

Borrow pit operations may employ ripping methods using a track dozer. This loosens the material and allows it to be picked up using a loader or a hydraulic shovel/excavator. Standard drill and blast methods similar to quarry operations may be used in instances where ripping is not possible.

4.5 GEOCHEMICAL CHARACTERISTICS

4.5.1 Quarry Rock at the Goose Property

Detailed geochemical characterization studies to assess the ML/ARD potential of quarry rock associated with the Property were carried out; results can be found in the Geochemical Characterization Report (FEIS Volume 2, Appendix V2-7D). The testing program included acid-base accounting and trace element analyses on 40 samples from the Airstrip Quarry, and 16 samples from the Umwelt Quarry.

The Airstrip Quarry is mainly comprised of turbiditic meta-sedimentary rocks (greywacke and mudstone) with minor amounts of banded iron formation, large intrusive gabbro dykes, and smaller felsic to intermediate dykes. Results indicate that rock from the Airstrip Quarry has a variable potential for ARD (FEIS Volume 2, Appendix V2-7D). Based on these results, Sabina has committed to complete further testing within the existing quarry footprint to further delineate potentially acid generating (PAG) materials in advance of, or concurrent with, sourcing additional material from this quarry. Only NPAG quarry rock will be used for construction. The criteria that will be used to classify NPAG waste rock will be an NP/AP ratio greater than 3, or a sulphur content of less than 0.15%. The testing programs described in the Geochemical Characterization Report (FEIS Volume 2, Appendix V2-7C) show that these criteria provide an appropriate level of conservatism.

The Umwelt Quarry locations were selected to be entirely within the upper greywacke unit. The majority of these unit samples are classified as NPAG or low sulfide (S) material with a limited potential for ARD. Therefore, no special management measures are required at this location.

Refer to the 2015 Goose Property Overburden Geotechnical Investigation Program Report for additional details on drillhole logs, core photos, and hydraulic and geotechnical testing.

4.5.2 Quarry Material at the Marine Laydown Area

Preliminary geochemical characterization was completed on surface outcrop samples and sandy gravel representing quarry material that will be excavated during construction of the MLA Fuel Storage Area (MLA Quarry). These samples were described as weathered quartzite conglomerate, quartz arenite/quartzite (sandstone), and sandy gravel. The test results showed that these materials have a negligible potential for ML/ARD. Sabina intends to complete additional sampling and testing in advance of, or concurrent with, development to characterize materials from greater depths.

5. Roles and Responsibilities

The General Manager is ultimately responsible for the success of this plan and approves all relevant policies and documents, auditing, action planning, and the verification process.

The Operations Manager, along with their direct reports, will be responsible for the implementation of this plan including overall management of the Plan and internal reporting.

6. Environmental Protection and Mitigation Measures

The proper implementation of best management practices will ensure sound management of borrow and rock quarry material, explosives, and freshwater which will help to minimize potential impacts to the environment during the life of a quarry or borrow pit.

Table 6-1 outlines the general measures that will be considered for the development of borrow pits and quarry locations. The site development plan for each rock quarry (Section 4.4.1) will build on the proposed measures by providing site-specific details.

Table 6-1. Mitigation Measures to be Considered for Borrow Pit and Quarry Locations

Development Phase	Activities	Environmental Concerns	Mitigation Techniques
Site design and development	• Vegetation clearing • Overburden removal	• Habitat loss • Soil erosion • Sediment deposition	Minimize Project footprint Identify and avoid environmentally sensitive areas Locate the development in a well-drained area Maintain natural drainage patterns Retain vegetation buffer zones to maintain slope stability and protect waterbodies Construct ditches/diversion structures to direct runoff away from the site
Operations and monitoring	• Blasting • Excavating • Crushing • Piling material • Access road maintenance	• ML/ARD	Further delineation and segregation of PAG/NPAG quarry rock. Only NPAG quarry rock will be used for infrastructure construction
		• Soil erosion • Sediment deposition	Limit sediment movement using erosion controls (e.g., silt fence) Use rip-rap to reinforce drainage channel corners and water discharge points Use settling ponds before discharging water Revegetate and /or use riprap where required to stabilize slopes
		• Fuel spills • Blasting residue	Use proper fuel containment and explosives-handling techniques
		• Permafrost degradation	Limit pit or quarry depth to within the continuous permafrost zone Minimize in-pit water by directing surface water away from the site Thaw ice-rich material at a location where melt water will not re-enter the pit
		• Dust generation	Use water and dust skirts on conveyors to minimize dust

Modified from source: INAC (2010).

6.1 IDENTIFICATION, SEGREGATION, AND PLACEMENT OF QUARRY ROCKS

Only NPAG quarry rock will be used for construction. Sabina has committed to complete further testing within the existing Airstrip Quarry footprint to further delineate PAG materials in advance of, or concurrent with, sourcing additional material from this quarry. The confirmatory testing prior to excavation will also be completed for greater depths at the MLA Quarry, and will be considered at the Umwelt Quarry.

Identification and segregation of PAG and NPAG quarry rock from the Airstrip Quarry will either require further sampling and off-site testing in advance of quarry development, or sampling and on-site testing concurrent with quarry development. Sampling results will be provided in summary form within the annual report for the existing 2BE-GOO1520 Water Licence.

Quarry material at the MLA has been identified as having a negligible potential for ARD. However, Sabina has committed to completing confirmatory testing of samples from greater depths of excavation. In the unlikely event that PAG materials are found at the MLA, they would be consolidated and managed appropriately.

6.2 SURFACE DRAINAGE AND WATER MANAGEMENT FROM QUARRIES AND BORROW PITS

Water quality monitoring of contact water from the borrow pits and quarries serves to provide information on possible effects to the receiving environment. Surface drainage and water management procedures will be implemented at all quarry/borrow locations. A setback of at least 31 m will be established from the quarry operations and associated workings to any local waterbody. These buffers will be delineated prior to the commencement of work.

Additional management will include the grubbing of materials to expose rock surface for quarrying purposes. The principle concerns associated with grubbing and disposal of related debris are:

- Potential effects on water quality caused by erosion and sedimentation.
- Disturbance of the permafrost leading to ground failure (slumping and erosion).

All grubbing and disposal of debris near watercourses will comply with regulatory approvals. Measures that will be undertaken to minimize effects on aquatic habitat and resources are:

- Grubbing of the organic vegetation material and/or the upper soil horizons will be minimized, and left in place where possible due to the sensitivity of Arctic soils.
- If needed, the organic vegetation material and upper soil horizon material, which has been grubbed, will be spread in a manner that attempts to cover exposed areas. Any surplus of such material will be stored or stockpiled for site reclamation purposes elsewhere in the Project area. Topsoil will be stockpiled separately from overburden. The location of the stockpiles will be recorded and accessible for future rehabilitation purposes.
- During grubbing, care will be taken to ensure that the material will not be pushed into sensitive areas which are to be left undisturbed.
- Any evidence of erosion due to surface water flow from the quarries and borrow pits will be repaired by placing riprap over the affected area.

The quarry configuration will consist of a relatively flat surface graded such that water slopes to an area within, or adjacent to, the quarry boundaries. Since no extraction will occur below water level, and the

areas will be contoured to drain positively, there will be no residual ponds once the sites are closed. Any flowing water which may leave the working area will be sampled as part of ongoing monitoring and allowed to discharge to the environment if it meets discharge criteria as defined in the Type B water licence. Any problematic water will be directed away from waterbodies, or held in contact water event ponds with enough capacity to contain high runoff from the spring freshet. A notification of discharge will be submitted to appropriate regulatory parties under the land and water authorizations and also reported within annual reports.

Storm and snow melts will be diverted away from the quarry by small berms on the upslope edges of any excavation. Measures will be taken to reduce the velocity of the water (e.g., silt curtains and small dikes) and promote suspended sediments to settle out.

6.3 DUST MANAGEMENT

Crushers may be located near high obstacles to facilitate shielding from the prevailing winds and thereby reduce and restrict the quantity of dust to the quarry boundary. Run of quarry will be transported from the quarries and borrow pits within speed restrictions to help reduce dust along the road corridors.

6.4 GROUND ICE AND PERMAFROST PROTECTION

Quarry sites are expected to be free of ground ice and will not extend below the bottom limits of the continuous permafrost (up to 500 m deep). There will be some localized impacts to the surrounding active zone of the quarry locations, and any water seeps originating in the quarries as a result of permafrost melting, or precipitation events, will be monitored as part of surface water management.

Borrow pits are formed from glaciofluvial deposits and weathered bedrock. All borrows have positive topography rising about the local setting. These types of granular deposits are selected as they tend to be relatively free of ground ice. Minimal ground ice reduces the potential for thaw settlement, erosion caused by melt water, and external slumping. In the event that ground ice is prevalent, the area will be monitored and may be stabilized by covering the affected land with granular material. This would allow the permafrost to aggrade into the covering material and restrict the remaining ground ice from melting.

6.5 ARCHAEOLOGICAL PROXIMITY

At the Goose Property, one archeology site is identified as requiring mitigation based on the proposed design. At the MLA, three archeology sites are identified as requiring mitigation based on the proposed design. In all cases, this is due to the required placement of the fuel storage tanks. Other identified sites may also require mitigation. Information on exact location of archeology is not provided in this document as per guidance from the Government of Nunavut Department of Culture and Heritage (GN-DCH). However, all information on site locations has already been provided to GN-DCH in the form of annual archeology reports. A summary of sites within 1,000 m of the Goose Property and MLA can be found, along with proposed mitigation options, in the Cultural and Heritage Resources Protection Plan (FEIS Volume 10, Chapter 27).

The quarries and borrow pits were selected to avoid archaeological resources. If any potential archaeological site is identified during the operation of any quarry/borrow pit, work will stop, a professional archaeologist will be consulted, and GN-DCH will be informed of the discovery.

All equipment will remain within the boundaries of the quarries/borrow pits to ensure any nearby archaeological site is not inadvertently damaged.

Before any new quarry/borrow pit is selected, it will be surveyed for archaeological resources by a professional archaeologist registered in Nunavut. Sites with archaeological resources present will not be selected if there is a similar site devoid of archaeological resources nearby.

6.6 NATURAL ENVIRONMENT

Details on wildlife sites in proximity to the Goose Property and MLA, along with proposed mitigation measures, are provided in the Wildlife Mitigation and Monitoring Plan (Version 7, submitted with FEIS Addendum February 2017).

Noise from construction vehicles will be minimized as part of best management practices by installing noise control equipment on the vehicles, and maintaining them to operate according to specifications. Noise related to quarry/borrow pit operations will be of short duration and should be restricted primarily to the Pre-development and Construction phases of the Project. While noise can be expected to be heard in a 4 km radius, the majority of the noise should be within 1 km of the activities.

Other mitigation measures aimed at reducing effects on raptors and wildlife include reducing the Project footprint, enforcing speed limits on roads, and general housekeeping to avoid attracting wildlife and/or exposure to contaminants.

7. Monitoring

This section presents a summary of the monitoring programs that will be carried out during construction and operation activities related to quarry management.

Table 7-1 summarizes the monitoring activities for each borrow or quarry. Each monitoring activity will be further defined prior to commencing work at each quarry, and will be completed according to the approved environmental protocols. Details on other water monitoring related to the quarries are included in the Environmental Management and Protection Plan.

Table 7-1. Quarry Activities

Monitoring Component	Monitoring Frequency	Reporting
Routine visual inspections of quarries	Daily during active quarry operations; Monthly to semi-annually during inactive periods	Monitoring data will be used by Sabina internally
Elevation and geometry survey	Annually	
Quantities of NPAG quarry rock extracted and used in construction	Daily records	Monitoring data will be reported to the Regulators in the annual water licence report or annual inspection report
Geochemical monitoring to evaluate effectiveness of segregation program	A minimum of approximately one sample per 100,000 tonnes of quarry rock	
Dust monitoring	See Air Quality Monitoring and Management Plan (FEIS, Volume 10, Chapter 17)	
Geotechnical inspection by qualified Engineer	Annually	
Seepage and runoff water quality	Spring seep survey of all quarries and major infrastructure components except roads	

7.1 PIT WALL STABILITY (ROCK QUARRIES)

Regular visual monitoring of pit wall stability within active rock quarry areas will be completed and recorded. Inactive, open areas will be visually monitored (typically monthly) between July and September, and this monitoring will be recorded. Closed areas will be visually monitored annually (during the July to September period), and these observations will be recorded.

7.2 PERMAFROST AND GROUND ICE

Daily visual monitoring of permafrost and ground ice within active borrow and rock quarry areas will be completed and recorded. Inactive, but still open, areas will be visually monitored at least monthly between July and September, and this monitoring will be recorded. Closed areas will be visually monitored once the year following Closure (during the July to September period), and this monitoring will be recorded. Closed areas may require additional monitoring.

7.3 WILDLIFE

Wildlife monitoring will include maintaining a written log of species, number, and frequency of sightings near the workings. Data will be maintained by the Environmental Department and presented during inspections, and in accordance with permit conditions. More information can be found in the Wildlife Mitigation and Monitoring Plan (Version 7, submitted with FEIS Addendum February 2017).

8. Adaptive Management

The Plan will be reviewed, and if necessary, updated again prior to submission of the Type A Water Licence application. The Plan will be reviewed on a regular basis to incorporate any lessons learned, major changes to facility Operations or maintenance, and environmental monitoring results.

All employees will be informed of relevant updates, and the updated QMP will be located in a designated area at each site.

Results of water quality monitoring will be reviewed by an environmental specialist. Field water quality data and visual observations will trigger immediate corrective action if appropriate, and water quality results will be reviewed upon receipt from the laboratory. Adaptive management with respect to water quality monitoring at the quarries may include maintenance, repair or replacement of water management features, ceasing discharge of quarry water, or modifications to the handling of explosives to minimize spillage.

This plan represents an adaptive approach to understanding the effects of the Project on the landscape and the species that live there. In this context, the Plan is part of a continually evolving process that relies not only on the efficacy of data collection and analytical results, but is also dependent on feedback from the communities, government, Aboriginal groups, and the public. Having an adaptive and flexible program allows for appropriate and necessary changes to the design of monitoring studies, and the mitigation and monitoring plans. Some changes may come about through the observation of unanticipated effects or inadequacies in the sampling methods to detect measurable effects. Other changes may result from ecological knowledge acquired through working with Aboriginal community members and discussions with Elders, both in the field and through workshops.

Sabina is committed to considering and incorporating Traditional Knowledge into the Plan. The incorporation of Traditional Knowledge will occur throughout all stages of the Plan, including identification of mitigation measures, monitoring study design, data collection, and follow-up programs to obtain feedback.

9. Environmental Reporting

Environmental reporting will be conducted as identified in future permits, approvals, and authorizations. The Type A Water Licence is expected to be the primary regulatory instrument governing quarry and borrow management for the Project.

An annual summary report, including results of the geochemical inventory and monitoring programs, will be prepared. Prior to Closure, the Annual Report will include total volume of material quarried, and an assessment of the need for additional monitoring and reporting through the Closure Phase.

10. Reclamation and Closure

When Operations are complete, the overall reclamation objective for the quarry/borrow areas is to return the site to a natural condition that blends in with the existing topography and surrounding landscape. Ongoing operations and closure of quarry areas will focus on progressive reclamation measures to ensure the site:

- is secure to protect humans and the environment;
- has drainage and erosion control measures to minimize runoff to local waterways; and
- is cleared of all material, equipment, debris, and hazardous/contaminated materials.

Both temporary and final closure of the quarry areas will include:

- removal of all garbage and debris;
- removal of all temporary storages/structures/equipment;
- reclamation of access roads (all-weather or winter ice roads) to ensure free flow of water during melt;
- block access (if required) and flag boundaries;
- water quality monitoring; and
- quarry wall stability monitoring.

Refer to the Interim Closure and Reclamation Plan for additional details on Closure activities.

11. References

BGC (BGC Engineering Ltd.). 2003. Implications of global warming and the precautionary principle in northern mine design and closure; report prepared by BGC Engineering Ltd. for Indian and Northern Affairs Canada.

Canada. 1985. *Fisheries Act*. R.S.C., 1985, c. F-14.

Canada. 1985. *Territorial Lands Act.* R.S.C., 1985, c. T-7.

Canada. 1985. *Explosives Act*. R.S.C., 1985, c. E-17.

Canada. 1993. *Nunavut Land Claims Agreement Act*. S.C. 1993, c. 29.

Canada. 1999. Canadian Environmental Protect Act. S.C. 1999, c. 33.

Canada. 2002. *Nunavut Waters and Nunavut Surface Rights Tribunal Act*. S.C. 2002, c. 10.

GN (Government of Nunavut). 1988. *Consolidation of Wildlife Act*. R.S.N.W.T. 1988, c. W-4.

INAC (Indigenous and Northern Affairs Canada). 2010. Northern Land Use Guidelines: Volume 7 Pits and Quarries.

NIRB (Nunavut Impact Review Board). 2013. *Guidelines for the Preparation of an Environmental Impact Statement for Sabina Gold & Silver Corp.'s Back River Project*. NIRB File No. 12MN036).

NWB (Nunavut Water Board). 2010a. Mining and Milling Supplemental Information Guideline (SIG) for Mine Development (MM3). February 2010.

NWB. 2010b. Miscellaneous Supplemental Information Guideline (SIG) for General Water Works (including crossings, flood control, diversions, and flow alterations) (M1). February 2010.

Appendix A: Explosives Management Plan

BACK RIVER PROJECT
EXPLOSIVES MANAGEMENT PLAN

Table of Contents

List of Tables

TABLE **PAGE**

List of Appendices

Glossary and Abbreviations

Terminology used in the document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

AN	Ammonium Nitrate
ANFO	Ammonium Nitrate / Fuel Oil
ANSI	American National Standards Institute
CCME	Canadian Council of Ministers of the Environment
DFO	Fisheries and Oceans Canada
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EPS	Environmental Protection Service
ERAP	Emergency Response Assistance Plan
ERT	Emergency Response Team
ExMP	Explosives Management Plan
FO	Fuel Oil
FS	Fuel Storage Area
HAZCOM	Hazard Communication
HM	Hazardous Materials Storage Area
HMMP	Hazardous Materials Management Plan
HR	Human Resources
HSC	Occupational Health & Safety Committee
HW	Hazardous Waste Storage Area
IPC	Instantaneous Pressure Change
ISO	International Organization for Standardization
SDS	Safety Data Sheets
NIOSH	National Institute for Occupational Safety and Health
NRC	Natural Resources Canada
OHSA	Occupational Health and Safety Administration
OHSP	Occupational Health & Safety Plan
PPE	Personal Protective Equipment
PPV	Peak Particle Velocity
PVS	Peak Vector Sum

SD	Support Document
SGSP	Sabina Gold and Silver Project
SCP	Spill Contingency Plan
TDG	Transportation of Dangerous Goods
TDGA	*Transportation of Dangerous Goods Act*
WCB	Workers' Compensation Board
WHMIS	Workplace Hazardous Materials Information System

1. Introduction

The Back River Project (the Project) is a proposed gold project owned by Sabina Gold & Silver Corp. (Sabina) within the West Kitikmeot region of southwestern Nunavut. It is situated approximately 400 kilometres (km) southwest of Cambridge Bay, 95 km southeast of the southern end of Bathurst Inlet (Kingaok), and 520 km northeast of Yellowknife, Northwest Territories. The Project is located predominantly within the Queen Maud Gulf Watershed (Nunavut Water Regulations, Schedule 4).

The Project is comprised of two main areas with interconnecting winter ice roads (WIR): Goose Property (Appendix A of the MASD, base Figure 2) and the Marine Laydown Area (MLA) (Appendix A of the MASD, base Figure 3) situated along the western shore of southern Bathurst Inlet. The majority of annual resupply will be completed using the MLA, and an approximately 160 km long WIR will interconnect these sites.

2. Scope and Objectives

This plan provides information on explosives manufacture, transport, storage, handling and use at the Back River Project. Sabina intends to use explosives for controlled blasting of overburden rock, construction rock and granular material on surface during the initial development and Construction phases of the Back River Project.

Sabina will require the use of Ammonium Nitrate and Fuel Oil (ANFO) at the Back River Mine site to conduct blasting during Construction and Operations. Water-resistant explosives are not currently anticipated to be used at the Project.

2.1 OBJECTIVES

The objectives of this ExMP are summarized as follows:

1. Identify practices for handling, storing, and using explosives at the Back River mine site that are safe, secure, and environmentally sound.
2. To demonstrate compliance with applicable Federal and Territorial regulations.
3. Conform to Section 9.4.13 of the "NIRB EIS Guidelines for the Back River Project" April 2013 (NIRB File No. 12MN036).

3. Applicable Legislation and Guidelines

The control and use of explosives within Canada and Nunavut are covered by existing federal and territorial Acts and Regulations. The Back River Project will implement operational policies and procedures (e.g., SOPs) which meet or exceed the applicable legislation. Applicable Acts, Regulations and Guidelines related to explosives management are listed in Table 3-1. Additional documentation which also will be followed includes guidelines and operational policies and procedures developed by suppliers.

Table 3-1. Applicable Legislation to the Explosives Management Plan

Acts	Regulations	Guidelines
Federal		
Canadian Environmental Protection Act (1999 c.33)	Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (SOR/2008-197) Environmental Emergency Regulations (SOR/2003-307) Interprovincial Movement of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2002-301)	Canadian Council of the Ministers of Environment - Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products Notice with respect to substances in the National Pollutant Release Inventory Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil
Explosives Act (1985 c.E-17)	Explosives Regulations (C.R.C., c. 599) Ammonium Nitrate and Fuel Oil Order (C.R.C., c. 598)	
Fisheries Act (R.S.C. c. F-14)	Metal Mining Effluent Regulations (SOR/ 2002-2222)	
National Fire Code of Canada (2010)		
Transport of Dangerous Goods Act (1992, c.34)	Transportation of Dangerous Goods Regulations (SOR/2001-286)	
Hazardous Products Act	Controlled Products Regulations	Workplace Hazardous Materials Information System (WHMIS)
Territorial – Nunavut		
Environmental Protection Act (RSNWT (Nu) 1988, c E-7)	Spill Contingency Planning and Reporting Regulations (NWT Reg (Nu) 068-93) Used Oil and Waste Fuel Management Regulations (NWT Reg 064-2003)	Guideline for the General Management of Hazardous Waste in Nunavut Guideline for Industrial Waste Discharges in Nunavut Guideline for the Management of Waste
Mine Health And Safety Act (SNWT (Nu) 1994, c 25)	Mine Health And Safety Regulations (NWT Reg (Nu) 125-95)	
Explosives Use Act (RSNWT (Nu) 1988, c E-10)	Explosives Regulations (RRNWT (Nu) 1990 c E-27)	
Fire Prevention Act (RSNWT (Nu) 1988, c F-6)	Fire Prevention Regulations (RRNWT (Nu) 1990 c F-12)	
Safety Act (RSNWT 1988, c.S-1)	General Safety Regulations (RRNWT (Nu) 1990 c S-1) Work Site Hazardous Materials Information System Regulations (RSNWT 1988, C 81 (Supp))	
Transportation Of Dangerous Goods Act (1990, RSNWT (Nu) 1988, c 81 (Supp))	Transportation Of Dangerous Goods Regulations (1991, NWT Reg (Nu) 095-91)	

4. Planning and Implementation

Planning for the Explosives Management Plan started with the development of the DEIS, which identified existing (baseline) conditions, assessed potential impacts of the Project, developed conceptual mitigation strategies and developed specific mitigation measures to execute these strategies. Conceptual strategies and plans will continue to be elaborated and executed throughout the Construction, Operations, and Closure phases of mining. Environmental management and social aspects will be tracked, reviewed, and updated through ongoing maintenance of the plan. These updates will incorporate relevant feedback from the public, obtained during public consultation.

Significance criteria have been developed that assist in identifying priority aspects, establish management criteria and activity-specific mitigation measures. For social issues and effects, a key factor for determining significance is ongoing feedback from public consultation. These efforts will be used to communicate progress, and involve the public where necessary, on environmental performance.

Monitoring will be the principal mechanism to provide feedback to continually gauge the effectiveness of environmental performance. Operational control is facilitated through the contractor job-specific standard operating procedures (SOPs) work instructions, on-the-job instruction, tailgate meetings, contract requirements, and service agreements. The effectiveness of physical operational control will be reviewed according to preventative maintenance and review procedures and schedules.

5. Roles and Responsibilities

The Sabina General Manager in charge of the Back River Project will ultimately be responsible for the success of this plan and will approve all relevant policies and documents, auditing, action planning and the verification process.

The Mine Manager, Plant Manager and Safety Superintendent, along with their direct reports will be responsible for the implementation of this plan including overall management of the plan and internal reporting.

6. Safe Handling Procedures

6.1 PRODUCTS

The following chemical products will be required for the mixing of explosives at the Back River Project:

- Ammonium Nitrate (AN), and
- Fuel Oil (FO).

6.1.1 Ammonium Nitrate

Ammonium Nitrate (AN) is the oxidiser component of the Ammonium Nitrate and Fuel Oil (ANFO) explosive. It is a stable, inorganic, solid compound. The AN will be kept dry to ensure it remains effective for use in blasting. AN is completely soluble in water and also readily absorbs water from air. AN products vary in composition, blend, and surface treatment. AN prills (pellets) produced for use in ANFO explosives are intentionally porous to permit the Fuel Oil (FO) to be absorbed. Prills are generally white or off-white, and their shelf life in a tightly closed container is unlimited.

AN is not an explosive, but rather it is an oxidiser which can explode or decompose under specific conditions, such as:

- High temperature (between 160 degrees Celsius (°C) and 200°C).
- Bulk storage in a confined space.
- Contamination with organic substances such as oils or waxes.
- Contamination with inorganic materials such as chlorides and metals (e.g., chromium, copper, cobalt, and nickel).
- Exposure to strong shock waves from other explosions.

AN is not combustible; however, as an oxidizing agent it increases fire hazard when in contact with other combustible materials, even in the absence of air. AN must be stored in a dry, well-ventilated area away from all possible sources of heat, fire or explosion.

6.1.2 Ammonium Nitrate and Fuel Oil

Ammonium Nitrate and Fuel Oil (ANFO) is a mixture of two products: Ammonium Nitrate (AN) and Fuel Oil (FO); ANFO is the main explosive to be used for mining at the Back River Project. ANFO is formulated of approximately 94% AN and 5% FO by weight. ANFO requires a booster of primary and / or secondary explosives to ensure reliable detonation. ANFO is then placed in boreholes for efficient detonation and effective rock shattering (brisance).

The mixture of AN and FO when active using a detonator reacts to form nitrogen (N_2), carbon dioxide (CO_2), and water (H_2O) when complete, and some carbon monoxide (CO) and nitrogen oxides (NO_x) during incomplete combustion.

Water can interfere with the explosive function and the combustion reaction of ANFO. However, given the relatively dry climatic conditions, a water-resistant ANFO / emulsion blend is currently not anticipated to be used for surface blasting at the Project.

6.1.3 Other Supplies

The following other explosives products will be required to achieve blasting activities:

- Prepackaged explosives.
- Caps.
- Boosters.
- Detonating cord.

6.2 STORAGE LOCATIONS AND QUANTITIES

The explosive products outlined in Section 6.1 will be stored in two locations:

- Marine Laydown Area.
- Goose Property.

6.2.1 Marine Laydown Area

At this facility, there will be a laydown storage area for up to 3,900 tonnes of inert AN that will be used over the life of the Project.

This AN will be stored in ISO containers to provide secondary containment and will not be unloaded at the MLA but shipped to Goose Property for use; this significantly reduces the risk of any AN spills at the MLA. The ISO containers will be placed on an unlined laydown pad. Under normal conditions, runoff from the laydown areas will not be collected, and will discharge towards the Bathurst Inlet along the same flow paths as the predevelopment topography. Roads and pads will be designed to have runoff as dispersed sheet flow to minimize channelized flow.

During Operations, packaged explosives and blasting related products will be shipped by air directly to the Goose Property and therefore will not be stored at the MLA. During the construction of the MLA, there will be temporary storage and use of packaged explosives. Explosives will be stored using the magazines that will ultimately be permanently installed at Goose Property.

6.2.2 Goose Property

At the Goose Property, there will be a laydown and storage area for up to 3,900 tonnes of inert AN, as well as an AN Facility, a magazine capable of holding 32 t of explosives, and a cap magazine capable of holding approximately 600 cases of detonators. Explosives magazines for short-term use may be placed in proximity to the pits or construction areas, subject to quantity/distance regulations, and re-supplied from the explosives storage area.

Bulk Ammonium Nitrate (AN) prill will be shipped to site in 1-t tote bags within 20-ft ISO containers that provide secondary containment for transport and storage. The AN storage area is sized to allow for a maximum of 3,900 t of AN within 207 ISO containers. The ISO containers will be placed on a laydown pad at the AN Facility. Diversion berms will direct any runoff water to a sump at the AN Facility pad. Water from the AN Facility truck wash and collected runoff from the AN Facility area will be transported to a water management pond for treatment or discharge as appropriate, or will be collected and treated in an evaporator. The explosives storage magazines are located on separate pads. Runoff from these pads will not be collected. Ammonia management for the Project is described in Section 6.7.

6.3 SAFETY REQUIREMENTS

Each chemical component will be handled and used in accordance with information found within its respective safety data sheet (SDS). A SDS is a source of health and safety information for workers and emergency personnel. Information found within the SDS includes the following:

- Identification of the material.
- Hazard Information.
- Composition / Ingredients.
- First Aid Measures.
- Fire Fighting Measures.
- Accidental Release Measures.
- Handling and Storage.
- Exposure Controls / Personal protective equipment (PPE).
- Physical and Chemical Properties.
- Stability and Reactivity.
- Toxicological Information.
- Ecological Information.
- Disposal Considerations.
- Transport Information.
- Regulatory Information.
- Other Information.

Safety Data Sheets (SDS) will be available for all explosive products that are stored on the Project (Appendix A). This information will be available at various locations on the site such as the explosive storage areas and magazines. As an example, a summary of the minimum product safe handling measures is listed in Table 6.3-1. Note that these are protection measures against the materials themselves; they are not a substitute for the safe handling and use of explosives.

Table 6.3-1. Summary of Minimum Safe Handling Procedures for Ammonium Nitrate and Fuel Oil

Product	Handling Procedures
Ammonium Nitrate	• Protective clothing and impervious gloves must be worn during handling. • Do not ingest. • Do not smoke while handling. • Keep away from combustible or reducing agents. • Prevent dispersion of dust.
Fuel Oil	• Avoid contact with eyes, on skin or clothing. • Avoid breathing vapours, mist, fumes. • Do not ingest. • Wear protective equipment and/or garments if exposure conditions warrant. • Wash thoroughly after handling. • Launder contaminated clothing before reuse. • Use in areas with adequate ventilation. • Keep away from heat, sparks, and flames. • Store in a closed container in a well-ventilated area. • Bond and ground during transfer.

6.4 TRAINING AND CERTIFICATION REQUIREMENTS

Only trained and certified personnel will be assigned to work with and around explosives. All personnel working with explosives will undertake formal training, including on-the-job training to ensure compliance with legislation, or will show evidence of having done so. The training requirements may include but are not limited to:

- Specific fire procedures as per the federal *Explosives Act*.
- First Aid.
- Transportation of Dangerous Goods (TDG).
- Blasting Certificate.
- Workplace Hazardous Materials Information System (WHMIS).
- Additional site-specific procedures.

6.5 SET-UP AND USE REQUIREMENTS

Sabina, the explosives supplier, and the shipping contractors will have or will develop detailed manuals for the transportation, storage, handling, and use of explosives, and will be responsible for explosives management including employee training, hazardous operations analysis, and quality control.

In addition to the annual resupply of bulk inert ANFO components, explosives may be delivered to site by plane. Upon arrival of the explosives products onsite, the authorized mine blasting personnel will sign off to confirm the delivery. It is then the responsibility of the authorized mine blasting personnel to transport the explosives to the designated magazines immediately.

Prior to construction, Sabina will complete the following forms and submit them to the relevant authorities:

- Natural Resources Canada (NRC) Form F06-01 Magazine Licence Application (if it not a mine site, this federal form needs to be filled out).
- NRC Form F05-01A: Application – Division 1 Factory Licence or Satellite Site Certificate
- NRC Form F05-01B: Site Description
- NRC Form F05-01C: Manufacture and Storage of Explosives
- NRC Form F05-01D: Manufacturing Operations Description
- NRC Form F05-01E: Distances

6.6 HANDLING REQUIREMENTS

The handling of explosives on site will be carried out by certified Sabina employees or certified contractors.

All explosives shall be handled according to the manufacturer's specifications. In addition to the manufacturer's specifications, all applicable WSCC regulations will be complied with.

6.6.1 Transport

During the Construction and Operations phases of the Project, explosives and inert materials (AN and FO) will be received at the MLA during the annual sealift. Bulk Ammonium Nitrate (AN) prill will be shipped to site in 1-t tote bags within 20-ft ISO containers. Other supplies, including prepackaged explosives, caps, boosters, and detonating cord will be received by air freight.

Packaged explosives will be flown into the Goose Property, and transported to the explosives storage magazines in approved vehicles. Bulk AN will be transported to open pit blast patterns in the bulk ANFO truck. For underground use, ANFO will be mixed on surface and bagged at the AN Facility and transported underground in 1-t tote bags in approved vehicles by qualified personnel.

All on-site transportation will be completed in accordance with Section 14 of the Mines Act and Regulations as well as with the Transportation of Dangerous Goods Act.

6.6.2 Storage

Explosive storage at the Goose Property consists of three main components:

- Bulk Ammonium Nitrate (AN) storage;
- Ammonium Nitrate – Fuel Oil (ANFO) manufacturing; and
- Explosive storage magazines.

Bulk Ammonium Nitrate (AN) prill will be shipped to site and stored in 1-t tote bags within 20-ft ISO containers. The AN storage areas at the MLA and Goose AN Facility are sized to allow for a maximum of 3,900 t of AN prill within 207 ISO containers.

The ISO containers will be segregated in approximately 500-t divisions within the storage area with ample spacing around the stacks for access and regular site monitoring. The use of AN throughout the year will be completed on a first-in, first-out basis to avoid any long-term deterioration of the AN prill. As the AN will be restocked annually via the winter ice road, the maximum time an AN bag would be stored is 12 to 14 months.

ANFO required for open pit blasting will be mixed on a bulk ANFO truck at the blast hole. The bulk ANFO truck will take on Ammonium Nitrate and Fuel Oil at the Goose AN facility. Bulk AN will be augered from the 1-t tote bags into a 30-t silo that the bulk ANFO truck will drive under to load its AN bin. The AN auger is housed within a fabric building to prevent wind from spreading AN dust produced during the transfer of product from the tote bags to the silo. Fuel Oil will be loaded into the bulk ANFO truck from a 20,000-L double-wall fuel tank also located on the AN Facility pad.

Packaged explosives and explosive detonators will be stored in approved explosive magazines located on separate pads. The powder magazine will be a 40-ft container magazine capable of holding 32 t of explosives while the cap magazine will be a 20-ft container magazine capable of holding approximately 600 cases of detonators.

The design of all storage facilities will meet government regulations and will be located according to required separation distances as regulated by the Explosives Regulatory Division (ERD) of Natural Resources Canada (NRCan).

6.6.3 Blasting

Blasting will be required during quarry development, and cut and fill earthworks operations. Only trained and certified personnel will be assigned to work with and around explosives. Blasting, including preparation of blast sites before blasting and securing of blast sites after blasting, will be carried out in strict compliance with the applicable WSCC regulations.

6.6.4 Disposal

Explosives that have been identified as deteriorated or damaged will be removed from site or destroyed. The supplier will be consulted on the appropriate handling and disposal of deteriorated or damaged explosives.

If the quantities of deteriorated or damaged explosives are small, this material can be added to blast holes in a production blast. This will safely destroy the unusable explosives as the blast area will be evacuated and guarded as per normal blasting procedures, which are detailed in the following section.

If larger quantities require disposal or destruction, the explosives supplier would be asked to recommend the appropriate method of disposal and subsequent course of action to be followed.

6.7 AMMONIA MANAGEMENT PLAN

Ammonium nitrate, a component of ANFO, is the main explosive mixture to be used for development and construction at the Project. Ammonium nitrate will be delivered by sealift in solid form in tote bags within seacans. They will be protected from the elements to prevent contact with water during transport and storage. The seacans will be placed on a laydown pad at the Goose AN Facility. Diversion berms will direct any runoff water to a sump at the AN Facility pad. Water from the AN Facility truck wash and collected runoff from the AN Facility area will be transported to a water management pond for treatment or discharge as appropriate, or will be collected and treated in an evaporator. The explosives storage magazines are located on separate pads. Runoff from these pads will not be collected.

Ammonia concentration predictions for all sources were incorporated in the water and load balance model; these sources include blasting residues associated with rock, process plant/tailings contributions, and camp wastewater. Ammonia, nitrate, and nitrite concentrations as a result of blast residue were derived from methods described by Ferguson and Leask (1998). These methods calculate the annual release of total AN as nitrogen based on the powder factor, fraction of ammonium nitrate in ANFO, the

fraction of nitrogen content in AN, and the residual nitrogen remaining. Assumptions are presented in Table 4-7 of Section 4.2.7 of the Water and Load Balance Report (FEIS Volume 2, Appendix V2-7H).

With adherence to BMPs for AN storage and handling there is minimal risk of AN spillage; however, ammonium nitrate and/or ANFO may be spilled during handling or during use in onsite development. Spill locations would be generally limited to single storage bags within the AN Facility or seacans in the storage pad areas. These areas will be inspected regularly according to operating procedures. Spill prevention and response actions are described in Section 6.9.

6.8 SUPPLIER ERAP

An Emergency Response Assistance Plan (ERAP) will be prepared by the explosives supplier. The supplier ERAP will include but will not be limited to potential incidents involving manufacturing, transport, handling, and storage of explosives and related products. At minimum, it will outline actions that supplier's and Sabina's employees will take to ensure employee and public safety in the event of an emergency.

The following worse case scenarios will be addressed relative to explosives in this ERAP:

- Fire/explosion.
- Spills from product transport trucks.
- Spills from raw material from delivery.
- Shut down due to weather, floods, lightning, fires, explosions, and other threats to the security and operation of supplier's facilities, equipment, and material.
- Bomb threats.
- Quantities of spills and reportable to the supplier and authorities.

An explosives supplier has not yet been selected, therefore the supplier's ERAP is not currently available. The supplier's ERAP will be provided in an appendix in future versions of this ExMP. An example ERAP table of contents is provided for reference in Appendix B. Transport Canada's emergency response guides for ANFO (Guide 112) and AN (Guide 140) are provided in Appendix C.

6.8.1 Application Process for an Emergency Response Assistance Plan Approval

The process for applying for approval of an Emergency Response Assistance Plan (ERAP) is detailed by Transport Canada in Section 7.2 of the Consolidated Transportation of Dangerous Goods (TDG) Regulations including Amendment (SOR/2017-137). These guidelines are copied below for reference.

(1) A person must apply, in writing, to the Minister or a designated person for the approval of an ERAP.
(2) The application for an ERAP approval must be signed by the person submitting it and must include the following information:
    a) the name and address of the place of business of the applicant;
    b) the telephone number, including the area code and, if applicable, the electronic mailing address and facsimile number of the applicant;
    c) the classification of the dangerous goods to which the ERAP relates;
    d) the type and size of the means of containment used to transport the dangerous goods to which the ERAP relates;
    e) the geographical area covered by the ERAP;
    f) the telephone number, including the area code, to call to have the ERAP activated immediately;

g) a description of the emergency response capabilities available to the person offering for transport or importing dangerous goods including
   i. the number of persons qualified to give, by telephone, technical advice about the dangerous goods,
   ii. the number of persons qualified and available to give advice and assistance at the site of an emergency,
   iii. a list of the specialized equipment that can be transported to and used at the site of an emergency,
   iv. a general description of the response actions capable of being taken at the site of an emergency,
   v. a description of the transportation arrangements to bring specialized emergency response personnel and equipment to the site of an emergency, and
   vi. a description of the communications systems that can be made available at the site of an emergency;

h) a potential accident assessment including
   i. a general analysis of how an accidental release of dangerous goods could occur,
   ii. a general description of the potential consequences of an accidental release of dangerous goods, and
   iii. a description of the action the applicant is expected to take in the event of an accidental release or an imminent accidental release of dangerous goods; and

i) a copy of any formal agreement with a third party for the provision of assistance.

6.9 SPILLS

All spills will be reported and recorded as described in Sabina's Spill Contingency Plan. Further information regarding hazardous materials and spill management are provided in Sabina's Hazardous Materials Management Plan and Spill Contingency Plan.

6.9.1 Spill Prevention

With adherence to BMPs for AN storage and handling there is minimal risk of AN spillage. Spill locations would be generally limited to single storage bags within the AN facility or ISO containers in the storage pad areas. These areas will be inspected regularly according to operating procedures. Spill prevention and response actions will include the following:

- establish and use SOPs for handling and working around storage areas;
- ensure proper containers are used for the storage and transport of explosives and AN;
- restrict access to authorized and trained personnel;
- conduct regular inspections of storage areas, containers, and transport vehicles with frequency driven by activity levels;
- clean up dry AN according to established SOPs to minimize likelihood of nitrates entering watercourses;
- manage and limit contact with snow and water, with particular anticipation of spring thaw/freshet period; and
- properly dispose of spill material and any impacted rock pad material, which could include placing within a blast pattern prior to initiation.

6.9.2 Spill Response

Detailed spill response procedures will be provided with the supplier ERAP as described in Section 6.8. Simplified spill response for potential explosives are presented in Table 6.9-1 below. More information

will be provided as part of the supplier ERAP when it is available. Transport Canada's emergency response guides for ANFO (Guide 112) and AN (Guide 140) contain basic spill response information and are provided in Appendix C.

Table 6.9-1. Summary of Safe Handling Procedures for Ammonium Nitrate and Fuel Oil

Product	Location of Potential Spill	Potential Size of Spill	Response
Ammonium Nitrate	Broken bags in the explosives storage area Broken tote bags in the mixing plant	1000 kg or more depending on the number of bags damaged Part of 1000 kg	The blasting contractor or qualified mine personnel will clean up and salvage AN prill; damaged bags will be emptied into new bags and damaged bags burned in the incinerator.
ANFO	Broken transport bags in the mixing plant	Up to 1000 kg	The blasting contractor will clean up and salvage ANFO; the plant area will be completely cleaned of ANFO and damaged bags will be burned in the incinerator.
	Spilled transport bags on the site delivery vehicle	1000 kg or more depending on the number of bags spilled	The blasting contractor will clean up and salvage ANFO. The spill area will be cleaned up and the spilled ANFO burned by the blasting contractor. The delivery truck will be cleaned if required.
Detonators and blasting caps	Transport to blast site	One or more containers of products	Will be cleaned up and disposed by explosive contractor.

6.10 SECURITY

Explosives on site are at risk of theft, unexplained loss, possible sabotage, and unauthorized access. To reduce these risks, Sabina will have procedures in place to control access and document the movement of explosives.

During Construction, all storage containers will be locked, and a secondary lock will be used for entrances to explosive storage areas and magazines.

Warning signs such as 'Authorized Access Only' will be posted around these areas and security precautions such as alarms, patrols, and extra lighting will be used. Access keys will only be given to designated responsible employees; Sabina will keep a list of employees who have a key. Documentation will reconcile incoming and outgoing quantities of explosives. In underground magazines, access to the bays will be controlled with a bulkhead and man-door. The documentation will also track the authority of employees to remove and receive explosives. Further details on these procedures will be included in subsequent updates of the Explosives Management Plan.

Security incidents will be reported to the Safety Superintendent. If the incident cannot be resolved internally, the Safety Superintendent will report any unexplained loss, theft, attempted theft, or any other security incident to the authorities.

7. Environmental Protection Measures

Environmental protection measures include the applicable water and air quality guidelines (e.g., MMER and CCME) and guidelines such as DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (DFO 1998). Estimates of AN, nitrite, and nitrate loading from blasting residue can be found in Section 4.2.7 of the Water and Load Balance report in Volume 2 Appendix V2-7H: Water and Load Balance Report. Water will not be released to the receiving environment unless water licence criteria are met. No effects on fish (i.e., fish and incubating eggs) would occur from pressure changes and vibrations from blasting and excavation, as the closest fish-bearing lakes will be at sufficient setback distance from any blasting area (i.e., beyond the setback distances recommended in the guidelines).

The Transport of Dangerous Goods act sets regulations for the safe transport of explosives and AN. Best practices detailed in Section 6. Safe Handling Procedures and mitigation, and adaptive management measures outlined in Section 8 will help reduce the risk of spills during storage, transport and use of explosives.

Proper blast design and execution will help minimize NO_x emissions and nitrate losses in blasts. Blast areas will be confirmed clear of smoke, dust, and gases before anyone is permitted to re-enter them. A designated employee will be assigned to monitor the air quality, at each working location, to ensure appropriate air quality is met. This information will be collected after each blast, or as required per Health and Safety Regulations. The records of monitoring will be submitted to the site Safety Supervisor.

In the event that wildlife enters the mining area during blasting activities, blasting will be suspended until wildlife have either moved to safe zones or been deterred from the area.

8. Mitigation and Adaptive Management

Mitigation measures for Project activities will be applied to all phases of the Project (Table 8-1).

Table 8-1. Mitigation and Adaptive Management Measures

Topic / Activity	Phase	Mitigation Measures
Transport	Construction Operations Closure	• The supplier will provide AN, explosives magazines, mixing equipment and delivery trucks; the mine operator shall provide FO. • Certified and authorized Sabina employees or contractors will mix AN with FO at the on-site AN facility or on a bulk ANFO truck at the blast hole. • All explosives will be transported to site in dedicated containers; secondary containment will be used as required. • Only qualified personnel holding valid blasting certificates shall handle these materials. • Spills will be contained, cleaned up, and placed in suitable containers for use or disposal. All reportable spills will be reported to the spill response coordinator. • Containers and equipment shall be inspected prior to use when transporting explosives products on or between Project sites.
Storage	Construction Operations Closure	• All explosives will be deployed only at safe distances from facilities or personnel. • Explosives will be stored in a designated location within the explosives storage area and away from the explosive caps / detonator storage magazines. • The magazines will be dedicated to storing high energy explosives and blasting caps. • Mine personnel involved in explosives spill response will have explosives training. • Only qualified personnel holding valid blasting certificates will handle these materials. • Inventory will be used on a first-in, first-out basis to ensure quality control and prevent degradation due to cold weather storage. • Explosives stored in magazines will be clearly labelled. • Spills shall be contained, cleaned up, and placed in suitable containers for use or disposal. All spills will be reported to a spill response coordinator. • Access will be controlled to the AN facility and explosives storage area. • Access to the explosives plant is restricted to authorized personnel and log books shall be kept in each magazine for tracking purposes.
Blasting	Construction Operations	• Only certified and authorized mine employees or contractors will charge the holes, place the detonators and boosters, and tie-in the patterns. • All Blasting will follow applicable legislation such as DFO Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (DFO 1998). • The Air Quality Monitoring and Management Plan will be followed to reduce or eliminate impacts from air. • Wet blast holes will be lined with plastic liners prior to being loaded with ANFO. Packed explosives will be used as a backup to ANFO for situations when blast holes cannot be lined.

Topic / Activity	Phase	Mitigation Measures
		• Sleep time in loaded blastholes will be limited to minimize contact between ANFO and water. • Spills shall be contained, cleaned up, and placed in suitable containers for use or disposal. All spills will be reported to a spill response coordinator. • The mine shall record daily use of explosives. Records will be checked and reconciled on a regular basis. • Explosives identified as deteriorated or damaged will be destroyed or disposed of; the supplier shall be consulted on the appropriate handling and disposal.
Disposal	Construction Operations Closure	• All explosives will be removed from site at closure or temporary closure. • Explosives will be secured and stored safely or disposed of in case of temporary closure. • All explosives will be disposed of according to the SDS or manufacture. • Spills will be contained, cleaned up, and placed in suitable containers for use or disposal. All spills will be reported to the spill response coordinator.

9. Checking and Corrective Action

9.1 INTERNAL INSPECTIONS AND AUDITS

Internal audits and inspections will be conducted as required by the regulations on all components related to the ExMP. Inspections will be completed by qualified personnel on a regular basis for physical condition and serviceability, and the results recorded according to quality and safety standard operating procedures. In addition, qualified personnel will perform regular inspections of the storage area, such as sea cans, storage of the boosters, caps and explosives to ensure that inventory is documented.

Inspections will be required for and reported for:

- Magazines.
- Transportation containers.
- Equipment.
- Broken or contaminated bags.

9.2 EXTERNAL INSPECTIONS AND AUDITS

On occasion, external inspections and audits may be required by regulatory authorities. All recommendations and orders made by Natural Resources Canada (NRC) Explosives Branch Inspectors, Fire Marshals and Insurance Inspectors will be responded to and acted upon accordingly.

10. Record Keeping

Record keeping and inspections is an import way to document the effectiveness of this ExMP, as well as being mandatory by Sabina. Four forms of record keeping for include: explosives use tracking; monitoring records; inspections and audits; and incident reporting.

10.1 EXPLOSIVE USE TRACKING

Documentation will reconcile incoming and outgoing quantities of explosives. The documentation will also track the authority of employees to remove and receive explosives. Further details on these procedures will be included in subsequent updates of the Explosives Management Plan, including NRC's form F07-02.

10.2 INSPECTIONS AND AUDITS

Copies of all internal and external inspections and audits will be stored on site for review during annual ExMP reviews.

10.3 EXPLOSIVE INCIDENTS

All explosives-related incidents will be reported to the Safety Superintendent. If the incident cannot be resolved internally, the Safety Superintendent will report any unexplained loss, theft, attempted theft, or any other security incident to authorities.

If an explosives incident were to occur, an explosive incident report will be completed as required. NRC Form F07-01 Incident Report for Explosives and Restricted Components can be found at: http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/mineralsmetals/pdf/mms-smm/expl-expl/pdf/F07-01_E(1).pdf.

11. Environmental Reporting

Any spills or releases of explosives material or diesel fuel will be reported as part of this plan and will follow the incident response procedures of Sabina's Spill Contingency Plan and the Fuel Management Plan. All information about the spill or release will be documented according to the requirements of Spill Contingency Plan and the Fuel Management Plan.

12. Plan Effectiveness

The ExMP will be reviewed and updated at least annually. As part of the review, associated documents reporting use logs, and spill records will be incorporated into the annual review. Completion of the annual review of the ExMP will be documented through signatures of the personnel responsible for reviewing, updating and approving the ExMP.

A record will document all significant changes that have been incorporated in the ExMP subsequent to the latest annual review. The record will include the names of the persons who made and approved the change, as well as the date of the approval.

References

Explosives Act (Canada)

Explosive Regulations and the Industry: Tables of Quantity Distances (QD)
https://www.bnq.qc.ca/en/standardization/protection-and-safety/explosives-quantity-distances.html

Ferguson, K.D. and Leask, S.M. 1988. The export of Nutrients from Surface Coal Mines. Environment Canada, Conservation and Protection, Pacific and Yukon Region. Regional Program Report 87-12.

Fisheries and Oceans Canada (DFO). 1998. Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters.

NWT Mine Health and Safety Act and Regulations (NWT MHSAR), specifically Part XIV
http://www.canlii.org/en/nt/laws/regu/nwt-reg-125-95/latest/nwt-reg-125-95.html

Transportation of Dangerous Goods (TDG)

Workplace Hazardous Materials Information System (WHMIS)

Appendix A
Safety Data Sheets (SDS)

SDS Sheets will be provided in future iterations of the Plan

Sabina
GOLD & SILVER CORP.

Appendix B
Sample ERAP Table of Contents

Sabina
GOLD & SILVER CORP.

SITE EMERGENCY RESPONSE PLAN

Appendix C

Transport Canada Emergency Response Guides for ANFO and AN

Sabina
GOLD & SILVER CORP.

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **MAY EXPLODE AND THROW FRAGMENTS 1600 meters (1 MILE) OR MORE IF FIRE REACHES CARGO.**
- **For information on "Compatibility Group" letters, refer to Glossary section.**

HEALTH

- Fire may produce irritating, corrosive and/or toxic gases.

PUBLIC SAFETY

- **CALL EMERGENCY RESPONSE Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- Isolate spill or leak area immediately for at least 500 meters (1/3 mile) in all directions.
- Move people out of line of sight of the scene and away from windows.
- Keep unauthorized personnel away.
- Stay upwind.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- **Consider initial EVACUATION for 800 meters (1/2 mile) in all directions.**

Fire

- If rail car or trailer is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, initiate evacuation including emergency responders for 1600 meters (1 mile) in all directions.

*** FOR INFORMATION ON "COMPATIBILITY GROUP" LETTERS, REFER TO THE GLOSSARY SECTION.**

EMERGENCY RESPONSE

FIRE

CARGO Fire

- **DO NOT fight fire when fire reaches cargo! Cargo may EXPLODE!**
- Stop all traffic and clear the area for at least 1600 meters (1 mile) in all directions and let burn.
- **Do not move cargo or vehicle if cargo has been exposed to heat.**

TIRE or VEHICLE Fire

- **Use plenty of water - FLOOD it! If water is not available, use CO_2, dry chemical or dirt.**
- If possible, and WITHOUT RISK, use unmanned hose holders or monitor nozzles from maximum distance to prevent fire from spreading to cargo area.
- Pay special attention to tire fires as re-ignition may occur. Stand by with extinguisher ready.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- DO NOT OPERATE RADIO TRANSMITTERS WITHIN 100 meters (330 feet) OF ELECTRIC DETONATORS.
- **DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST.**

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

* FOR INFORMATION ON "COMPATIBILITY GROUP" LETTERS, REFER TO THE GLOSSARY SECTION.

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- These substances will accelerate burning when involved in a fire.
- Some may decompose explosively when heated or involved in a fire.
- May explode from heat or contamination.
- Some will react explosively with hydrocarbons (fuels).
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Containers may explode when heated.
- Runoff may create fire or explosion hazard.

HEALTH

- Inhalation, ingestion or contact (skin, eyes) with vapors or substance may cause severe injury, burns or death.
- Fire may produce irritating, corrosive and/or toxic gases.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL EMERGENCY RESPONSE Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

Small Fire

- Use water. Do not use dry chemicals or foams. CO_2 or Halon® may provide limited control.

Large Fire

- Flood fire area with water from a distance.
- Do not move cargo or vehicle if cargo has been exposed to heat.
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- Keep combustibles (wood, paper, oil, etc.) away from spilled material.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Do not get water inside containers.

Small Dry Spill

- With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

Small Liquid Spill

- Use a non-combustible material like vermiculite or sand to soak up the product and place into a container for later disposal.

Large Spill

- Dike far ahead of liquid spill for later disposal.
- **Following product recovery, flush area with water.**

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- Contaminated clothing may be a fire risk when dry.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.