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Baffinland Iron Mines: Mary River Project

Explosives Management Plan

Nunavut, Canada

Date: Aug.28, 2013

TABLE OF CONTENTS

1 Introduction……1

1.1 Project Description…….1

1.2 Explosives Project Description……..…….1

1.3 General Operating Considerations…….……2

1.4 Management Plan- General……...…….2

1.5 Products and Raw Materials- General……...…….2

2 Explosives Management……....…….3

2.1 Operational Phases Timelines…….3

2.2 Overview……...……..3

2.3 Mary River Site……...……3

2.4 Raw Material Storage…….…….4

2.5 Emulsion Manufacture……...…….4

2.6 On Site Handling……...……..5

2.7 Personal Qualification / Exposure……...……5

2.8 Process Vehicles……..……5

2.9 Daily Planning / Control……..……6

2.10 Blast Design/ Operations…….……6

3 Safety Procedures……6

4 Spills and Spill Containment……..… ……7

1 Introduction

1.1 Project Description

Baffinland Iron Ore Mines Corporation (BIM) is currently in the process of developing an iron ore mine at Mary River in the Territory of Nunavut, Canada. BIM retains the lease rights to four iron ore deposits in this area. This Explosives Management Plan focuses on the developments of the Mary River Mine Site.The Mary River project is located on the northern half of Baffin Island, approximately 160km south of Mittimatalik (Pond Inlet) and 1,000km northwest of Iqaluit, the capital of the Nunavut Territory. There is sea access from Milne Port, approximately 100km north of the project area. Milne Port is connected to the Mine Site via a tote road. This road will be maintained to facilitate transportation of all equipment, construction materials, and consumables (including pre-packaged explosives and raw materials required for explosives manufacture) required for supporting the project.

Approximately 145km south of the Mine site is a proposed location for a future dock facility (Steensby port). This port will be developed in the future and is proposed to receive all equipment, construction materials and consumables (again including pre-packaged explosives and raw materials required for explosives manufacture). A rail line may be constructed in the future to connect the proposed Steensby Port to the mine site which will be dedicated to ore shipment.

1.2 Explosives Project Description

In supporting the overall Mary River project development the use of explosives will be required to produce construction aggregates and during ore mining. The use of bulk and pre-packaged emulsion explosives will be used based on the expected site conditions. The purpose of this Explosives Management Plan is to outline the systems, procedures and best practices that will minimize environmental impacts, specifically impacts to water quality and wildlife during the period where blasting operations are conducted.

Explosive handling facilities and infrastructure to support this work includes:

- One modular emulsion manufacturing plant at the mine site,
- Storage areas for Ammonium Nitrate (in 1000 kg tote bags, stored inside weatherproof shipping containers) near the emulsion plant at the mine site,
- Storage for pre-packaged explosives at magazine depots which are separate from the emulsion plant at the mine site, and
- Raw Materials Storage *inside weatherproof shipping containers, located near the Milne port and at the mine site.*

Drawings outlining the various infrastructures are attached.

1.3 General Operating Considerations

Based on the remote nature of the site, ensuring adequate on-site support and response to potential environmental considerations is critical. All essential equipment required to support spill containment and recovery will be located on the mine site property and will be operated by Dyno Nobel Baffin Island (DNBI) and BIM mine site staff.

The design premise for all explosives manufacturing sites is based on working to achieve a zero effluent process. Contaminated waste water generated from manufacturing operations will be collected and re-used in the process including truck wash water.

1.4 Management Plan – General

This plan will outline the actions that will be taken to address any environmental spill issue at the point of origin related to the explosives manufacturing process which will in turn assist in the reduction of potential contaminant release into the environment

The control and use of explosives within Canada and the Territorial area are covered by existing federal and territorial regulations. Dyno Nobel Baffin Island will put into place operational policies and procedures which meet or exceed the required regulations.

The main applicable regulations in the case of the Mary River project include (but are not limited to):

- The Canada Explosives Act
- Transportation of Dangerous Goods Act
- Occupational Health & Safety, Nunavut – Explosives Use Act
- Northwest Territories / Nunavut Mine Health and Safety Act and Regulations

Dyno Nobel Baffin Island will maintain site specific Policies and Standard Operating Procedures. DNBI will utilize experienced personnel to design, construct, commission and manage the project.

A detailed Emergency Response Plan (ERP), prepared in accordance with the guidance provided in this standard will be prepared during development of the project. It will be integrated with the mine site ERP to maximize resource utilization, training and planning efforts.

1.5 Products & Raw Materials – General

DNBI will include a detailed procedures manual for the conduct of operations on the Mary River site for the purposes of transportation, storage, handling and manufacture of explosives. The recommended products are currently listed as approved products federally. They are industry proven for use in northern climates and are accepted globally. Dyno Nobel has experience operating in open pit iron ore mines within both Canada and globally. All proposed infrastructure and manufacturing processes will be licensed and approved by Natural Resources Canada (NRCan) – Explosives Regulatory Division (ERD).

In addition to the raw materials required for explosives manufacture, DNBI will be providing pre-packaged commercial products to support blasting operations at the Mary River sites. This will include detonators, boosters and pre-packaged explosives. All of these materials will be transported and stored in accordance with the regulations identified above. Magazine storage sites will be licenced by the Nunavut Workers Safety and Compensation Commission (WSCC).

2 Explosives Management

2.1 Operational Phases / Timelines

Based on the overall operational BIM mine site developmental planning the project will be delivered in two (2) distinct phases: 1) Construction / Pre-Development and 2) Mine Operations.

2.1.1
Construction Phase: The initial construction phase will begin with delivery of explosives, raw materials and infrastructure during a sea lift completed during the period July – October 2013. At this time pre-packaged explosives products will be shipped and stored for future use in approved and licensed explosives magazines. Magazines will be constructed in accordance with the 2001 Storage Standards for Explosives. Raw materials required for the production of bulk explosives will be shipped during the 2013 sea lift. These materials will include Ammonium Nitrate Prills. These raw materials will be stored in accordance with industry accepted storage procedures and will be subject to routine storage site inspections. Storage standards outlined in Appendix E to the Explosives Regulatory Division Bulk Guidelines, Revision 5 for the storage of large quantities of Ammonium Nitrate will be followed. The explosives manufacturing facility and support equipment will be shipped to the site during the 2013 sea lift, it will be commissioned late 2013 based on mine site forecasting. Construction phase will involve the use of explosives primarily outside the proposed open pit. The explosives will be used for the purpose of producing aggregates to construct roads, pads, settling ponds, and other sites.

2.1.2
Mine Operations Phase: Following completion of the construction phase the mine site will move into production. Based on the current mine site forecast it is anticipated that this phase will commence in October of 2014. Explosives will be used primarily in the open pit operations for blasting the iron ore and overburden/waste rock. Construction and Mine Operations phases may overlap, however handling of the explosives materials will be the same (*is this correct?)*.

2.2 Overview

DNBI maintains strict handling policies with regards to the safe handling, transportation, manufacture and storage of explosives and their associated components.

2.3 Mary River Site

2.3.1
The modular manufacturing plant located at the Mary River mine site will produce most of the explosives required for construction and operations. Some pre-packaged explosives will be required prior to plant start up and even after for special blasting situations. It is expected that the plant will produce between 2 and 5 million kgs annually until 2019.

2.3.2
As above there will be the requirement to provide pre-packaged explosive products to support the site construction activities. It is forecasted that up to 1 million kilograms of prepackaged product will be required to support these activities. The magazine storage site will be established respecting the requirements outlined in the NRCan ERD issued Quantity Distance Manual.

2.4 Raw Materials Storage

2.4.1
AN Prill. Ammonium Nitrate Prills (solid) will be stored in bulk within a dedicated storage area. AN Prill will be stored in 1 Tonne FIBC bulk bags approved for storage of this material loaded into shipping containers. If stored in this manner there will be 20 Tonne of AN Prill stored in each container. In order to ensure sufficient supply of emulsion for blasting and production of construction aggregates until a 2014 shipment is delivered to the site, a total of 2000 totes (2000 tonnes) of AN prill must be shipped in 2013. Quantities in subsequent years will vary depending upon mine forecasted production.

The AN Prill, in shipping containers will be transported from the bulk storage area to the manufacturing site using mine site heavy equipment. Container doors will be secured and internal 1 Tonne Flexible Intermediate Bulk Containers FIBC's will be tied closed to ensure no spillage during transportation from the storage site to the manufacturing site. The AN Prills will be transferred into the AN Handling Module located at the manufacturing facility for use in the manufacturing process. Individual AN 1 Tonne FIBC's will be loaded into a hopper / auger system. Spill containment will be in place in the AN handling module. The AN is augured into the AN melt tank to be manufactured into emulsion.

AN Prill is a granular or "pellet" "prill" form material. In the event of a spill of product it will be recovered using plastic or aluminum shovels, brooms and dust pans. Recovered material will be disposed of through consumption in subsequent blast holes or worked into manufactured product.

2.4.2
Fuel Phase. A fuel/emulsifier blend mixture "fuel phase" is used in the manufacturing process to enable the manufacture of bulk emulsion products. A fuel phase concentrate will be transported to the manufacturing site in IBC totes (inside containers). This material and other additives are blended with diesel fuel to create the "Fuel Phase" for supporting emulsion manufacture. These UN Approved portable containers will be stored separate from the manufacturing site and separate from the storage of bulk AN Prill. They will be transported to the manufacturing site as required to support the manufacturing process. The diesel fuel will be stored in double walled containers until required for the process. The fuel storage on site will only be used in the process and not to refuel the mobile equipment nor the trucks. This will be done by the BIM refuelling truck following SOP's for fuel transfer.

2.5 Emulsion Manufacture

The manufacturing process will be capable of producing up to 10 million kilograms of bulk emulsion product annually. The primary product to be produced will be based on a 100% emulsion. There will be no AN or ANFO added to the emulsion either in the plant or on the bulk explosive truck. The oxidizer phase (solution) is stored in ISO Tanks located above a containment system.

In the process AN Prill is blended with water and other additives and heated to create an oxidizer phase. This is then mixed, using proprietary processes with the fuel phase defined above to create an explosive emulsion. Quality control procedures are established to ensure consistency of manufactured product. The emulsion explosives manufactured will be transferred into a process vehicle for delivery to where the next blasting site is planned, and pumped into the blast holes.

The manufacturing process is an industry-proven process. It is utilized at multiple sites across Canada, USA and globally. There are documented processes and procedures for controlling the manufacturing process. Procedural items include the receiving of AN Prill, melting AN prill into ANSOL, Quality Control,

emulsion blending, equipment calibration and preventative maintenance procedures to highlight but a few.

DNBI maintains a rigid hazardous materials handling process. All chemical components are stored and handled in accordance with their respective MSDS and copies are located at the plant office. Chemical registers are also maintained and employees are trained in WHMIS.

2.6 On-Site Handling

All on-site transportation will be done in accordance with the Mines Act and Regulations as well as with the Transportation of Dangerous Goods Act. Non-process vehicles (i.e. skid steers, loaders, pick up trucks ,etc) will be maintained in sound mechanical condition and equipped with safety equipment as required under mine site policy / regulations. Process Vehicles will be maintained in accordance with internal maintenance schedules and will be subject to tank certifications under CAN/CSA B620-03.

2.7 Personnel Qualifications / Exposure

The site will be established with appropriate man-limits outlined in the NRCan Explosives Regulatory Division Factory Licence.
DNBI will employee experienced persons in the handling, manufacturing and storing of explosives and associated raw materials. DNBI will administer a training program which will be used to hire and train local people to work at the facility.

2.8 Process Vehicles

DNBI will utilize two new 10 tonne Titan Bulk Emulsion process vehicles for the purposes of delivering bulk emulsion into the blasthole. This vehicle has the capability to pump straight 100% “gassed” homogenized emulsion through a 1” hose up to 200ft. This allows for a variable density product. The homogenized emulsion also reduces seepage into cracks and voids. There is no AN or ANFO added thus reducing ammonia contamination due to spills and seepage into the rock.

This product allows for loading into wet holes and has longer sleep time than a product that contains AN or ANFO.

The truck monitors flow rates through electronic flow meters. The truck is also equipped with visual flow meters as a back up. The units are equipped with Pump Safety Shut Down Systems required by NRCan. Trucks are also equipped with battery master disconnect switches as well as mounted engineered fire suppression systems.

These vehicles adhere to a preventative maintenance program to ensure continued safe and compliant operation. Tanks installed on the process vehicle are subject to periodic testing requirements in accordance with CAN/CSA B620-03 as required by Transport Canada. In order to reduce the possibility of potential loss of containment of explosives product these tanks are designed to meet the TC-412 design specification.

2.9 Daily Planning / Control

The mine will provide DNBI operators with the daily load forecast. The bulk trucks will be loaded accordingly. Measurements will be taken to determine product used. This will be via a physical dip of the tank and by the onboard computer control system which monitors quantity pumped (per load and per hole)

DNBI maintains strict magazine management policies and procedures. Only explosives will be stored in explosives magazines. Detailed inventory management and authorized key control procedures ensure that only those authorized to handle explosives have access. Waste resulting from explosives packaging (boxes, etc) are considered contaminated and do not enter any landfill. They are disposed of through incineration. Resultant ash will be disposed of in accordance with the mine site waste disposal plan.
Any waste or scrap explosives product generated through the manufacturing process will be disposed of in the blast hole

2.10 Blast Design / Operations

Blast design and control of blasting parameters will be controlled by BIM. The product that will be utilized has been selected to minimize waste to due spills and seepage while maintaining optimum blast results.

Blast hole loading, stemming, shot tie in and detonation will be conducted by a qualified DNBI Blaster certified to blast in Nunavut.

3 Safety Procedures

DNBI will develop site specific Policies and Procedures(SOP's) which outline on-bench activities as well as safety systems required for the handling, transport and manufacture of explosives. In addition, a comprehensive training plan is used.
DNBI is committed to ensuring that federal and territorial individual mandated qualifications and skills are maintained.

Prior to undertaking any activities on bench a tool box meeting is conducted by the blaster in charge. Any access to the site must be authorized by the blasting supervisor. All loading is done under the direct supervision of the blaster in charge of the pattern. Loading is based on the engineered design.

As an example of standard blast protocols, no personnel are permitted within 500m of the blast area(or other appropriate distance as determined by the Blaster or Mine Engineering).
This safety zone is also under observation for the potential entry of local wildlife. Blast will not be fired if this area is not clear. When the area is clear and the pattern is ready for blasting, there are a number of notifications that will occur (including sirens and radio communications as required). Following the blast, guards will remain in place until the blaster issues the all clear.

The DNBI document "Blast Site Safety Manual" is available should additional information be required on safe blasting best practices.

4 Spills & Spill Containment

4.1 AN Spills

Ammonium Nitrate is commonly used in a variety of agricultural applications and as itself is not classified as an explosive. It is WHMIS classified as 5.1 (Oxidizer). AN is soluble in water and can be dissolved to create AN Solution (ANSOL) which is in turn used in the manufacture of explosives.

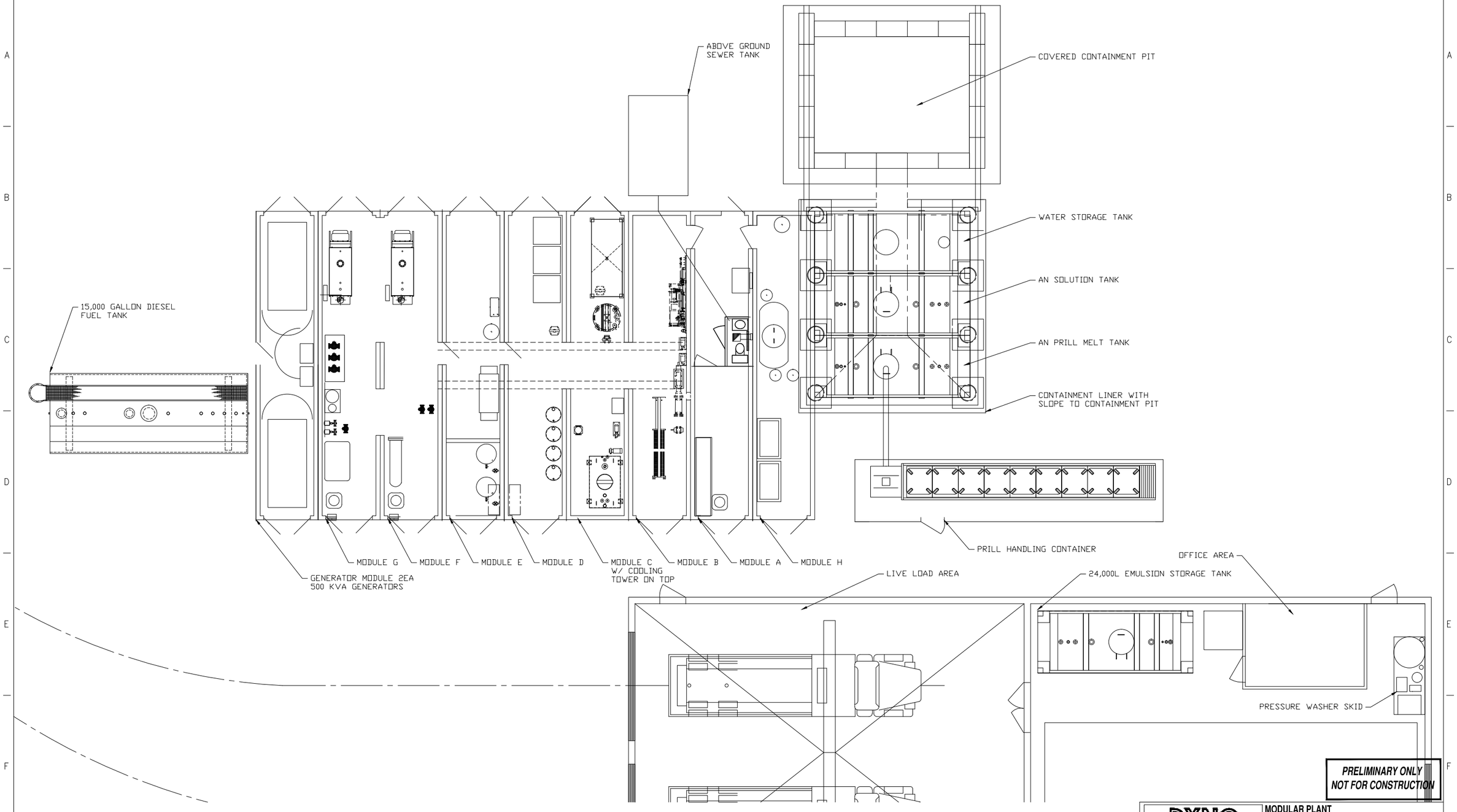
Typical spill response measures for AN Prill are recovery using non-sparking shovels and packaging into designated containers. Spilled AN Prill will be worked into product and consumed in subsequent blasts.

The plant will be constructed to ensure a spill containment capacity of 110% of the largest means of containment. In the event of an ANSOL spill inside the plant the material will be recovered and if possible reworked through the process.

AN totes are loading onto a conveyor and discharged into a hopper/auger that is located inside the AN Module. This process is enclosed and protected from the elements (wind, rain).

4.2 Other Chemical / Product Spills

All on site containers of hazardous material will be located inside the plant modules or storage containers. No material will be stored outside.
Where required tanks will be of double wall construction. Response to any chemical spill or loss of containment will be covered under the site emergency response plan.



PRELIMINARY ONLY NOT FOR CONSTRUCTION

REFERENCE DRAWINGS		REFERENCE DRAWINGS	
DWG. NO.	DESCRIPTION	DWG. NO.	DESCRIPTION

REVISIONS					
No.	BY	DATE	DESCRIPTION	CHK'D.	APP'D.

REVISIONS					
No.	BY	DATE	DESCRIPTION	CHK'D.	APP'D.
A	SMT	01-28-13	ISSUED FOR REVIEW	SMB	
B	SMB	04-22-13	ISSUED FOR REVIEW		

DYNO Dyno Nobel

MODULAR PLANT
GENERAL ARRANGEMENT
DYNO NOBEL INC
BAFFIN ISLAND EMULSION PLANT

PLANT No.	SCALE	S.F.	DRAWN	CHK'D	APP'D	DATE
X002	1"=30'	1:1	SMT			01-15-2013

DYNO NOBEL INC.
3000 West 8600 South
West Jordan, Utah 84088 USA
Phone: (801) 364-4800

DRAWING No. 167101-C204 1 OF 1

REV. 1

TITAN® XL 1000

Technical Information

Gassed Bulk Emulsion

Product Description

TITAN XL 1000 is a gassed, bulk emulsion made from TITAN 1000 or TITAN 1000 G specifically designed for quarry and open pit mining operations. Transported as an oxidizer, TITAN XL 1000 is formulated to be sensitized during the borehole loading process using Dyno Nobel's innovative chemical gassing and emulsion processing technology. The process used to manufacture TITAN XL 1000 enhances water resistance and detonation performance while improving loading characteristics. Chemical gassing allows the average density of TITAN XL 1000 to be varied as required to optimize its explosive performance for best blast results.

Application Recommendations

- The minimum cast booster weight recommended to prime TITAN XL 1000 explosive is a 340 g (12 oz) cast booster.
- TITAN XL 1000 can be used in boreholes up to 36 m (120 ft) deep.
- **ALWAYS** double prime when bulk explosive columns exceed 6 m (20 ft). One primer should be positioned near the bottom of the hole and the second near the collar.
- **ALWAYS** ensure primers are securely positioned in the explosive column.
- Do not use detonating cord as downlines with Titan XL 1000 without first consulting your dyno Nobel representative.

Properties

MSDS #1052

Density (g/cc) Avg	1.20
The average loading density can be varied from about 1.00 to 1.25 g/cc to best match rock type and application requirements.	
Energy[a] (cal/g)	680
(cal/cc)	815
Relative Weight Strength[a,b]	0.77
Relative Bulk Strength[a,b]	1.13
Velocity[c] (m/sec)	5,200
(ft/sec)	17,100
Detonation Pressure[c] (Kbars)	81
Gas Volume[a] (moles/kg)	45.0
Water Resistance	Excellent
Minimum Diameter	
(mm)	65
(inches)	2.5
Loading Method	Pumped
Fume Class[d]	IME1

[a] All Dyno Nobel Inc. energy and gas volume values are calculated using PRODET™, a computer code developed by Dyno Nobel Inc. for its exclusive use. Other computer codes may give different values.

[b] ANFO = 1.00 @ 0.82 g/cc

[c] Confined in 150 mm (6 in) diameter at average density.

[d] Approved for underground use as IME Fume Class 1.

Hazardous Shipping Description

TITAN XL 1000 is made from TITAN 1000 or TITAN 1000 G bulk emulsion matrix. Refer to the TITAN 1000 Technical Information Sheet for Hazardous Shipping Description information.

TITAN® XL 1000

Technical Information

Transportation, Storage and Handling

- TITAN XL 1000 can be stored for 3 months at temperatures between -18º C and 32º C (0º F and 90º F). Older product should be used first and all storage tanks should be kept clean of residual product.
- Use only pumps which have been approved by Dyno Nobel for 5.1 emulsion matrix transfer. Pump type, pump speed, worn pump parts, repeated repumping and pumping against high hose pressures can increase TITAN 1000 viscosity and decrease shelf life.
- **ALWAYS** monitor emulsion pump performance and check pumps periodically for excessively worn parts. Design storage facilities to minimize repeated pumping.
- Transport, store, handle and use TITAN XL 1000 in compliance with federal, state, provincial and local laws governing bulk oxidizing liquids.Refer to the TITAN 1000 or TITAN 1000 G Technical Information Sheet for Transportation, Storage and Handling requirements.
- Transport, store, handle and use TITAN XL 1000 in compliance with federal, state, provincial and local laws governing bulk explosives.

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DYNO® Dyno Nobel
Groundbreaking Performance™

NONEL® EZ DET® 1.1B

Nonelectric Blast Initiation System

Technical Information

Properties

MSDS #1122

Net Explosive Content per 100 units 0.1125 kg
0.1782 lbs

Nominal Time (msec)	Nominal Time (msec)	Nominal Time (msec)	Connector Block Color
17 / 350	17 / 500	17 / 700	Yellow
25 / 350	25 / 500	25 / 700	Red
42 / 350	42 / 500	42 / 700	White
25 / 375			Red

Product Description
NONEL® nonelectric delay detonator EZ DET® units consist of a length of orange shock tube with a surface detonator attached to one end and an in-hole, High Strength, detonator on the other. The surface detonator is inside a color-coded plastic EZ™ Connector block to facilitate easy connections to up to 6 shock tube leads. Easy-to-read, color-coded delay tags display the delay number and nominal firing time prominently.

NONEL EZ DET units can be easily connected to one another to satisfy basic blast design requirements in construction, mining, and quarry operations. They can also be used in combination with NONEL MS, NONEL EZTL™ and/or NONEL TD detonators to satisfy complex blast design requirements and minimize inventory of initiation system components.

Application Recommendations
For detailed application recommendations, **ALWAYS** request a copy of Dyno Nobel's *Product Manual: NONEL® and PRIMACORD®* from your Dyno Nobel representative.
- **ALWAYS** select a NONEL EZ DET unit having more than enough tubing length to extend from the planned primer location in the borehole to the collar of the next hole.

Hazardous Shipping Description
Detonator assemblies nonelectric,
1.1B, UN 0360 PG II

See Product Disclaimer on page 2.

DYNO Dyno Nobel
Groundbreaking Performance™

NONEL® EZ DET® 1.1B

Technical Information

Application Recommendations (continued)

- **ALWAYS** protect the plastic EZ Connector block and all shock tube leads from impact or damage during the loading and stemming operations. Use care when placing blasting mats and cover material on top of the blasting circuit. The EZ Connector block contains a detonator and is subject to detonation caused by abuse such as impact. Shock tube which has been cut, ruptured or damaged may cause misfires.
- **ALWAYS** be sure that the shock tube(s) are securely inserted, one at a time, into the EZ Connector block. The head of the EZ Connector block should rise to accept the shock tube and return to a closed position with an audible click.
- **ALWAYS** ensure that individual shock tubes remain aligned side by side in the connector channel and do not cross one over the another on insertion.
- **NEVER** use NONEL EZ DET units with detonating cord. The low strength surface detonator will not initiate detonating cord and may cause misfires.
- **NEVER** attempt to disassemble the delay detonator from the plastic EZ Connector block or use the detonator without the connector.
- **NEVER** place more than 6 shock tube leads into the plastic EZ Connector block. Misfires may result.
- **NEVER** pull, stretch, kink or put tension on shock tube such that the tube could break.
- **NEVER** splice NONEL EZ DET shock tube together to extend between holes.
- **NEVER** connect NONEL EZ DET units together until all holes have been primed, loaded and stemmed and the blast site has been cleared.

Transportation, Storage and Handling

- NONEL EZ Det must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations.
- For maximum shelf life (3 years), NONEL EZ Det must be stored in a cool, dry, well ventilated magazine. Explosive inventory should be rotated. Avoid using new materials before the old. For recommended good practices in transporting, storing, handling and using this product, see the booklet "Prevention of Accidents in the Use of Explosive Materials" packed inside each case and the Safety Library Publications of the Institute of Makers of Explosives.

Packaging

Length		Case Type	Quantity/ Case	
m	ft		case	subpack
3.5	12	D	200	100
4.5	16	D	180	90
7	24	D	140	70
9	30	DC	120	--
12	40	DC	120	--
15	50	DC	90	--
18	60	DC	90	--
24	80	DC	50	--
30	100	DC	40	--
37	120	DC	30	--

- Length rounded to nearest one-half meter.
- Case weight varies by length & delay; see case label for exact weight.

Case Dimensions

Detpak Case (DC)	48 x 45 x 26 cm	18 ¾ x 17 ¾ x 10 ¾ in
Detpak (D)		
subpack	44 x 22 x 25 cm	17 ½ x 8 ¾ x 10 in
strapped case	44 x 45 x 25 cm	17 ½ x 17 ⅝ x 10 in

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TROJAN® SPARTAN®

Technical Information

BOOSTERS • CORDS

Cast Booster

Product Description

TROJAN SPARTAN cast boosters are detonator sensitive, high density, high energy molecular explosives avaliable in various sizes designed to optimize initiation of all booster sensitive explosives. All TROJAN SPARTAN boosters are manufactured with an internal through-tunnel and detonator well for easy application with either electric, electronic or nonelectric detonators or 10.6 g/m (50 gr/ft) minimum strength detonating cord. TROJAN SPARTAN boosters are formulated from the highest quality PETN and other high explosive materials ensuring reliability, consistency and durability in all blasting environments. The fluorescent green container makes the TROJAN SPARTAN booster more visible on the blast site and reduces the possibility of misplaced charges.

Application Recommendations

- **NEVER** force the detonator into the through-tunnel, the detonator-well or otherwise attempt to clear these areas if obstructed. If the through-tunnel or detonator-well does not accommodate the detonator, do not use the booster. Notify your Dyno Nobel representative.
- **ALWAYS** use detonating cord with a coreload of 10.6 g/m (50 gr/ft) or higher when initiating the TROJAN SPARTAN booster with detonating cord.

Properties

MSDS #1108

Density	(g/cc) Avg	1.65
Velocity	(m/sec)	7,550
	(ft/s)	24,800
Detonation Pressure (Kbars)		235
Water Resistance		6 months with no loss of sensitivity
Shelf Life Maximum		5 years (from date of production)
Maximum Usage Temperature		60°C (150°F)

All Dyno Nobel Inc. energy and gas volume values except Velocity and Detonation Pressure are calculated using PRODET™ the computer code developed by Dyno Nobel Inc. for its exclusive use. Other computer codes may give different values.

Velocity and Detonation Pressure are the result of empirical methods during May 2009.

Hazardous Shipping Description

UN 0042 Boosters, 1.1D PG II

See Product Disclaimer on page 2.

DYNO Dyno Nobel

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TROJAN® SPARTAN®

Technical Information

Application Recommendations (continued)

- Minimum detonator is No. 8 strength for temperatures above -40º C (-40º F). A high strength detonator is recommended for temperatures below -40º C (-40º F).
- Extremely low temperatures do not affect the performance of cast boosters with commercial detonators. Low temperatures do affect detonators and detonating cord. Be certain your initiation system is suitable for your application in extremely low temperatures. Cast boosters are more susceptible to breakage during handling in extremely cold temperatures.

Transportation, Storage and Handling

- Dyno Nobel cast boosters must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations.
- For maximum shelf life (5 years), Dyno Nobel cast boosters must be stored in a cool, dry, well ventilated magazine. Explosive inventory should be rotated. Avoid using new materials before the old.

Packaging

Unit Weight		Unit Dimensions				Case Quantity	Gross Weight/ Case	
		Length		Diameter				
g	oz	cm	in	cm	in		kg	lbs
90	3.2	11.9	4.7	2.7	1.1	150	14.0	30.8
150	5.5	11.9	4.7	3.6	1.4	95	16.7	36.7
200	7	11.7	4.6	4.1	1.6	72	16.5	36.4
350	12	11.9	4.7	5.0	2.0	49	17.9	39.5
400	14	11.9	4.7	5.5	2.2	40	17.6	38.8
450	16	11.9	4.7	5.8	2.3	36	17.8	39.2
900	32	12.9	5.1	7.9	3.1	18	17.8	39.2

Note: All weights and dimensions are approximate.

Case Dimensions

42 x 33 x 14 cm 16 ½ x 13 x 5 ½ in

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