Baffinland Iron Mines LP
Mary River Expansion Stage 3

Definitive Study Report

Section 5 – Mining

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5. Mining

Mine production is based on the RPA December 31, 2016 resource model, reported within a December 2016 pit design by Hatch. The design consists of five phases, and is based on mining 12 Mtpa direct-shipping ore, to be transported by rail to port.

5.1 Mineral Reserves

Mineral Reserves have been estimated for Deposit No. 1, based on Measured and Indicated Resources within the pit design. Inferred Resources within the pit design are minimal, and have been treated as waste. A cut-off grade of 55% Fe was used to achieve a target head grade of >65% Fe.

Table 5-1 Summary of Mineral Reserves – December 31, 2016

Baffinland Iron Mines Corporation – Mary River Project

Category	Tonnes (Mdmt)	Tonnes (Mwmt)	Fe %	P %	S %	Mn %	SiO_2 %	Al_2O_3 %
Proven & Probable	292	298	66.0	0.027	0.18	0.2	2.6	1.2

Notes:
1. CIM Definition Standards are followed for Mineral Reserves.
2. Mineral Resources are estimated at a cut-off grade of 55% Fe.
3. Mineral Resources are estimated using a long-term iron ore price of $60/t Fe, and a US$/C$ exchange rate of 1.28 C$/US$.
4. Bulk density is based on a formula relating bulk density to iron content.
5. Mineral Reserves are reported in dry and wet tonnes, and dry grades. Moisture content is estimated to be 2%, reflecting additions during processing and transport.
6. Numbers may not add due to rounding.

Mineral Reserves have not been estimated for Deposit Nos. 2 and 3.

5.1.1 Dilution & Extraction

Dilution and extraction (mining loss) are addressed by an algorithm in the block model that assesses the percentage of each 10 m x 10 m x 5 m block within the resource wireframe. Only blocks that are 85% or higher are considered for conversion to Mineral Reserves. Those blocks are diluted by the portion outside the model, at grades based on drill hole assays (approximately 32% Fe). The diluted blocks are assessed against the cut-off grade of 55% Fe, and included or excluded on that basis.

This process has the effect of applying mining losses at the edges, and adding small amounts of dilution to the Mineral Reserves.

5.2 Mining Methods

This study describes an expansion from current operations, at nominally 5 Mtpa, to 12 Mtpa. Mining is by conventional truck and shovel open pit methods.

5.2.1 Current Operations

Current operations at the Mary River Project, referred to as the "Early Revenue Phase" in previous studies, is permitted to mine and ship up to 4.2 Mtpa lump and fine iron ore through the port at Milne Inlet. The permit allows for unused capacity (i.e., in 2015 and 2016) to be carried forward. Mining is carried out using a Baffinland workforce. Existing facilities consist of:

- An open pit mine with associated haul roads at Deposit No. 1
- A waste rock dump
- A mobile mining equipment fleet based on 90 t haul trucks
- Mobile crushing and screening equipment
- A 120 t ore haul truck fleet for transportation of ore to Milne Port
- Stockpile locations at the port, equipped with stacking and reclaim equipment, of nominally 4 Mt capacity
- Maintenance shops
- Warehousing
- Accommodation facilities and utility systems
- Power generation facilities and fuel tank farm
- Airstrip

5.2.2 Mine Expansion

Expansion to 12 Mtpa ore mining rate will be achieved using a new fleet of larger equipment:

- 220 T haul trucks
- 570 T hydraulic shovels

The new fleet is scheduled to arrive on sealift in Q3 2019, for commissioning and deployment. As production ramps up with the new equipment, the current fleet will be retired.

5.3 Mine Design

Mineral Reserves are based on an updated resource block model, reported within a design by Hatch that was carried out on the previous resource block model, and the December 31, 2016 pit topography. RPA reviewed the changes within the pit volume, and investigated potential for new pits via pit optimization.

The Hatch pit design was found to be reasonable for use in reporting of Mineral Reserves – pit optimizations on the new model result in larger pits.

5.3.1 Geotechnical Parameters

Pit wall slopes are based on previous analyses, and are summarized in Table 5-2:

Table 5-2 Pit Slope Summary
Baffinland Iron Mines Corporation – Mary River Project

Azimuth	Min. Bench Width (m)	Bench Face Angle (degrees)	Inter-Ramp Slope Angle (degrees)
0-40	13.0	70	45
40-79	12.6	60	40
79-177	13.0	70	45
177-224	11.0	60	42
224-256	12.6	60	40
256-343	11.0	60	42
343-360	13.0	70	45

5.3.2 Pit Design Parameters

Pit design parameters were selected based on the overall pit geometry, geotechnical data and information, and the mine production rate. Hatch applied the following parameters:

- Bench Height: 20 m (double-benched)
- Ramp Width: 31.9 m (dual-lane traffic)
- Ramp Grade: 10%
- Minimum bench width: 60 m (phases) or 30 m (ultimate pit)

5.3.3 Pit Phasing

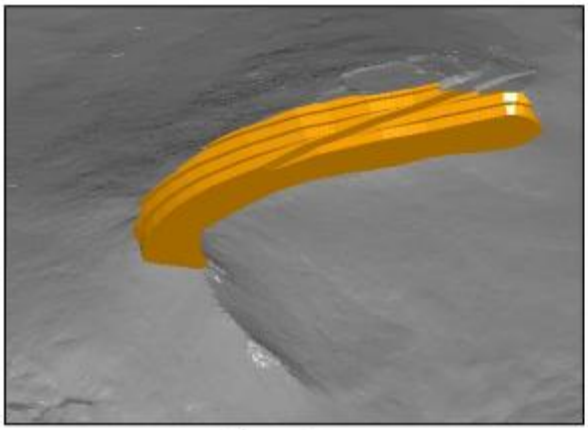
The pit was designed in five phases, summarized in Table 5-3:

Table 5-3 Pit Phase Summary
Baffinland Iron Mines Corporation – Mary River Project

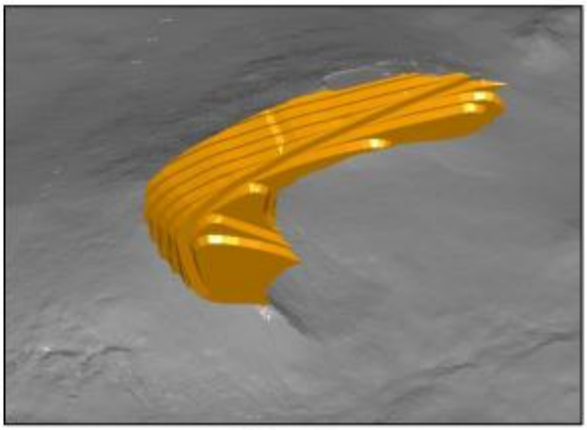
Phase	Ore (Mt)	Fe (%)	Waste (Mt)	Strip Ratio	Total Mined (Mt)
1	17.4	66.6	3.8	0.22	21.2
2	38.8	67.1	15.3	0.40	54.1
3	96.9	66.0	86.7	0.90	183.4
4	63.2	65.7	150.8	2.39	213.9
5	76.1	65.4	93.0	1.22	169.1
Total	**292.1**	**66.0**	**349.6**	**1.20**	**641.7**

Isometric, plan, and section views of the pit phases are shown in Figures 5-1 to 5-3:

Figure 5-1 Pit Phase Designs – Isometric View



Stage 1



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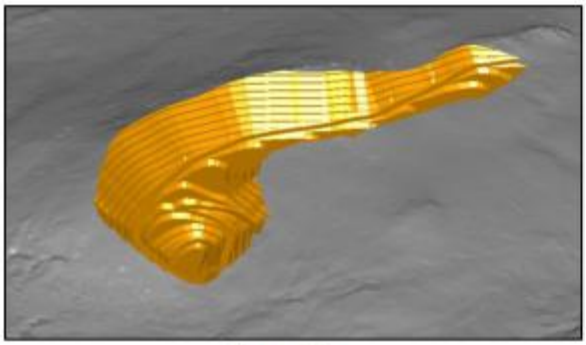

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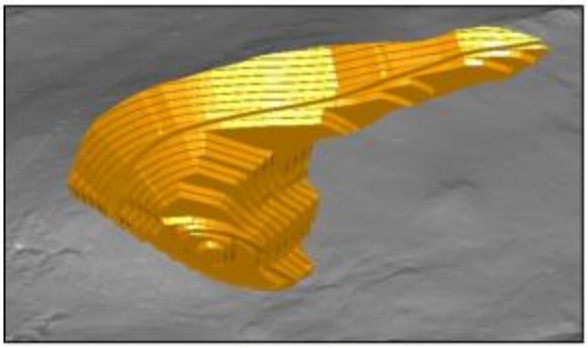

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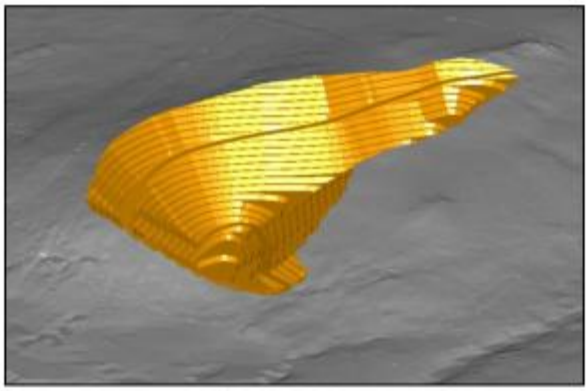


Ultimate Pit

Figure 5-2 Pit Phase Designs – Plan View

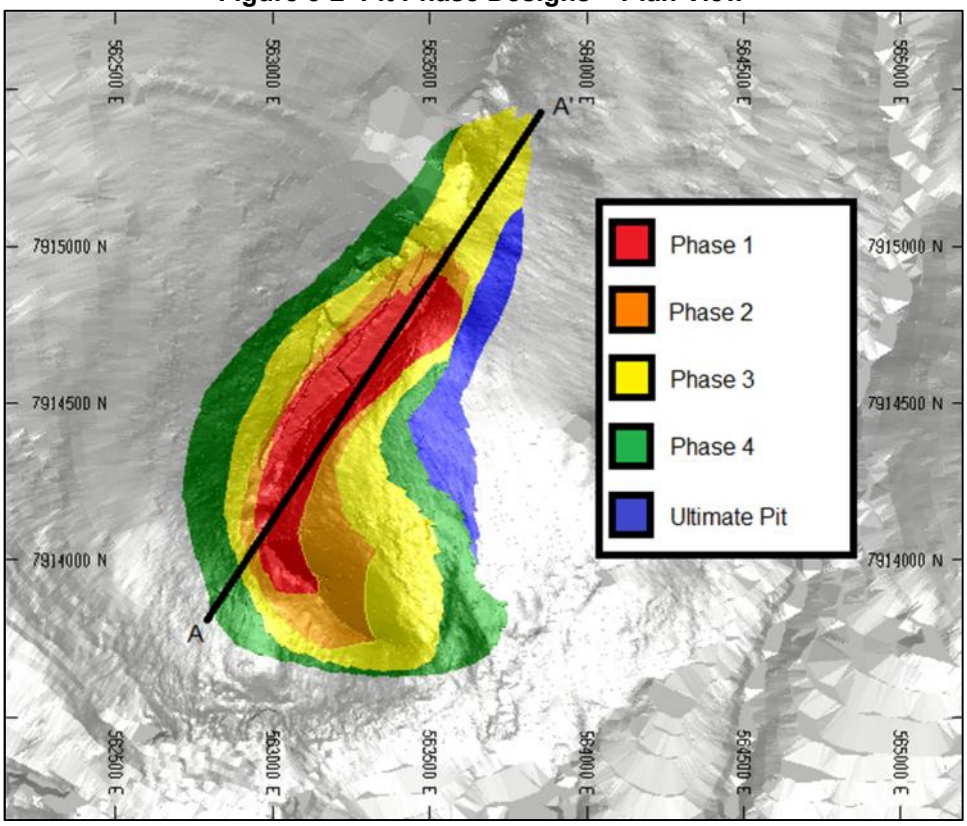
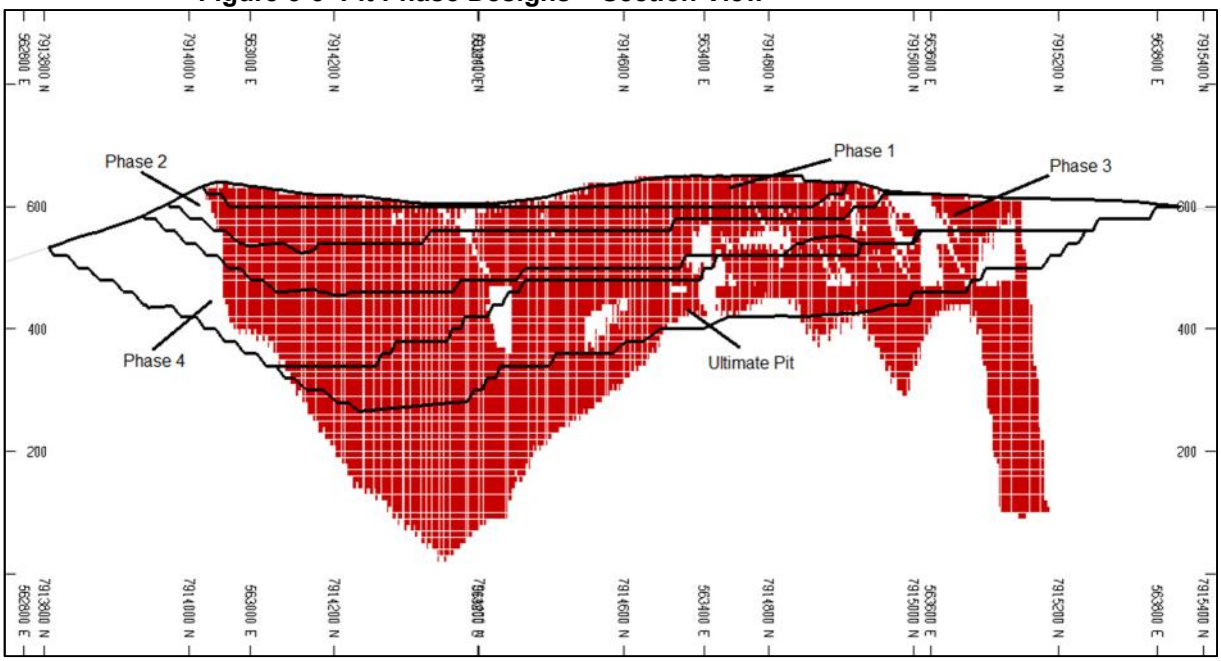


Figure 5-3 Pit Phase Designs – Section View



5.4 Production Schedule

The mine production schedule was prepared for a 12.0 Mtpa mining rate for a direct shipping iron ore product, consisting of 75% lump and 25% fines.

Open pit mining is carried out on two 12-hour shifts per day, seven days per week. Total annual effective working days is budgeted at 330, including an allowance of five weeks (35 days) of bad weather delay during the year.

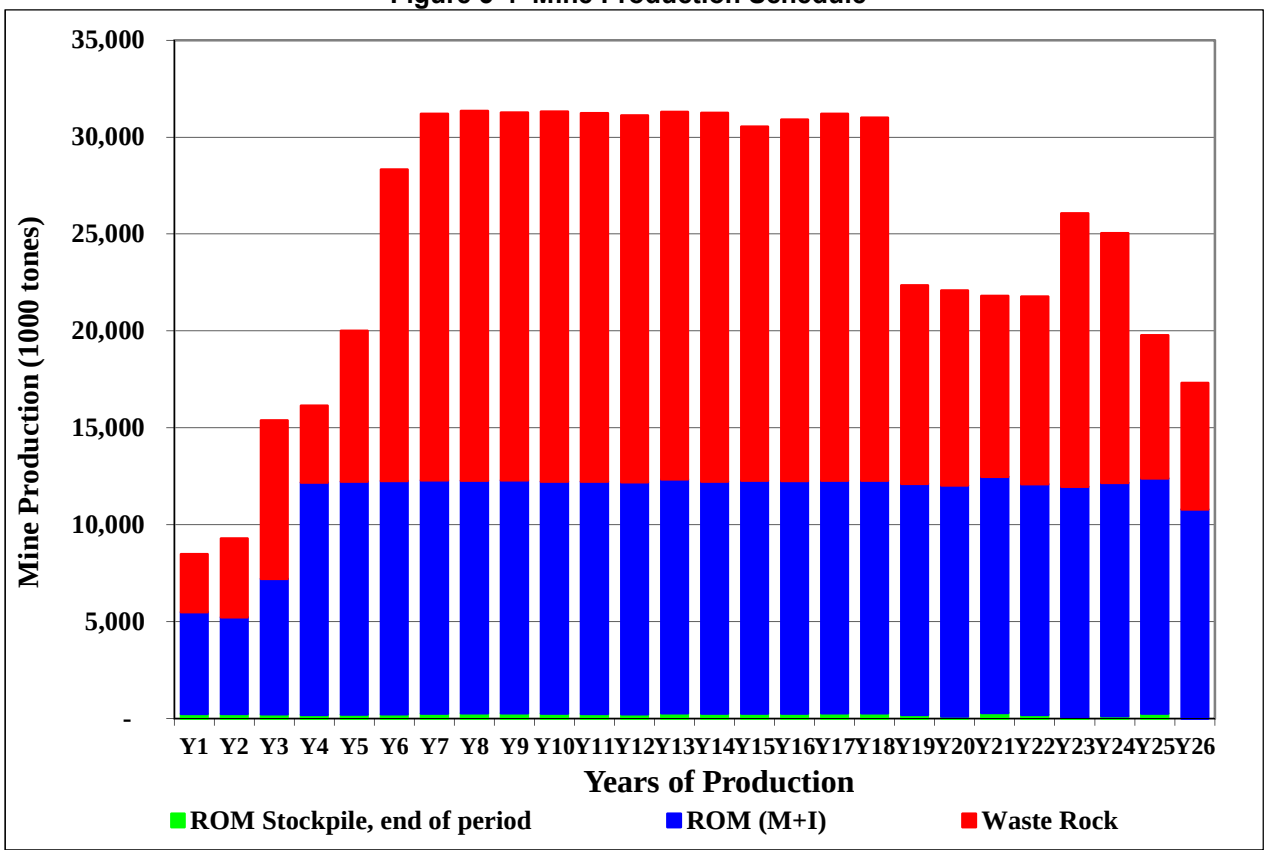
The production schedule starts on January 1, 2017, with continuation of current operations, and covers a ramp-up to 12 Mtpa starting in 2019, as ore handling infrastructure (rail and port facilities) is completed.

The production schedule is summarized in Table 5-4 and Figure 5-4:

Table 5-4 Mine Production Schedule
Baffinland Iron Mines Corporation – Mary River Project

Year	Ore (Mt)	Fe (%)	Waste (Mt)	Strip Ratio	Total Mined (Mt)
2017	5.2	66.5	3.0	0.57	8.2
2018	5.0	66.4	4.0	0.81	9.0
2019	7.0	66.6	8.2	1.17	15.2
2020	12.0	66.6	4.0	0.33	15.9
2021	12.0	66.9	7.8	0.65	19.8
2022	12.0	66.8	16.1	1.34	28.1
2023	12.0	66.3	18.9	1.57	30.9
2024	12.0	65.2	19.1	1.59	31.1
2025	12.0	65.7	19.0	1.58	31.0
2026	12.0	66.4	19.1	1.59	31.0
2027	12.0	66.9	19.0	1.58	31.0
2028	12.0	66.6	18.9	1.58	30.9
2029	12.1	66.3	18.9	1.57	31.0
2030	12.0	65.7	19.0	1.59	31.0
2031	12.0	65.6	18.3	1.52	30.3
2032	12.0	66.2	18.6	1.55	30.6
2033	12.0	66.1	18.9	1.58	30.9
2034	12.0	65.5	18.7	1.56	30.7
2035	11.9	65.0	10.2	0.86	22.2
2036	11.9	64.9	10.0	0.84	22.0
2037	12.2	65.3	9.3	0.77	21.5
2038	11.9	65.3	9.7	0.81	21.6
2039	11.9	65.0	14.1	1.18	26.0
2040	12.0	65.3	12.9	1.07	24.9
2041	12.1	66.1	7.4	0.61	19.5
2042	10.8	66.5	6.5	0.60	17.3
Total	**292.1**	**66.0**	**349.6**	**1.20**	**641.7**

Figure 5-4 Mine Production Schedule



5.5 Waste Dump Design

The following is taken from Hatch (2016):

The proposed waste dump is located northwest of the pit, which also delineates the crest of the constrained resources pit shell. Waste and noneconomic mineralized rock should be categorized into potentially acid-generating (PAG) rock and clean waste. As detailed studies and investigations into the possible occurrence and/or volume of PAG waste rock within the mining limit are ongoing, no waste quantities per category were estimated.

The following criteria were used for the dump design and incorporate recommendations from previous studies:

- Setback distance of 100 m from pit crest
- 2H:1V overall effective slopes
- 1.5H:1V individual bench slopes
- 15 m berms between benches
- 30 m final bench face height

- 150 m segments (5 benches)

Assuming the occurrence of PAG waste rock, the following management criteria will be applied:

- Minimum 50 m thickness of non-PAG placed between overburden and final waste rock dump face
- Minimum 50 m thickness of non-PAG placed between PAG and final waste rock dump face
- Minimum 20 m thickness of non-PAG placed below PAG
- Minimum 10 m thickness of non-PAG placed as a cap above PAG

The waste dump capacity is estimated to be 158 Mm^3 by using a swell factor of 25% for all rock types. As directed by the client, it was assumed that 15% of the waste mined and dedicated for waste deposition will be designated as PAG material. This factor was implemented due to the lack of waste characterization modeling which in turn is due to the lack of waste characterization data.

5.6 Mine Equipment

The mine equipment fleet for the expanded open pit operation is summarized in Table 5-5. Fleet sizing was based on the 220 t haulage truck as the primary hauling unit and is at peak equipment requirements. The estimation of drilling, loading, and hauling requirements were carried out based on the LOM production schedule and the existing and projected haul distances to waste dump and crusher. Ancillary equipment was selected for road maintenance, snow clearing, equipment maintenance, secondary mining activities, and other related earthworks.

Table 5-5 Mine Equipment Summary
Baffinland Iron Mines Corporation – Mary River Project

Equipment Type	Quantity
Haulage Truck 220 t	10
Hydraulic Shovel 570 t	2
Front End Loader 32 t	1
Rotary Drill	7
Tracked Dozer 450 kW	3
Wheel Dozer 370 kW	1
Ancillary Drill	5
Grader	1
Water/Sander Truck	2
Tow Haul Tractor/Gooseneck/Lowbed	1
Fuel/Lube Truck	2
Stemming Loader	1

5.7 Mine Infrastructure

The following is taken from Hatch 2016.

5.7.1 Material Handling

The mineralized material and waste will be hauled out of the pit with the off-highway equipment fleets listed previously. The material deemed as waste rock will be transported to the waste dump, located northwest of the open pit. The ROM will be delivered nearby the primary crusher. Crushing and screening will be performed prior to stockpiling and then railing to Milne Inlet port.

5.7.2 Dewatering

A pumping network will be installed to pump water run-off from the open pit. Pumped water will be directed through a water treatment system comprising settling/polishing ponds prior to its release into the environment.

5.7.3 Explosives

Detonators and explosives are stored and prepared in approved explosives magazines and plant. They are located at a safe distance from the mining operations, and managed by a specialized supplier/contractor.