

# MEMORANDUM

[Confidential]

File:	001-QIA-Mary_River_Project
To:	Qikiqtani Inuit Association – Department of Major Projects
Attention:	Mr. Stephen Williamson Bathory, Director
Subject:	QIA 2015 Comprehensive Security Estimate
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Page Total:	18 + (Annexes – 13 pages)
Date:	December 5 <sup>th</sup> , 2014

## 1.0 INTRODUCTION

ARKTIS Solutions Inc. (ARKTIS) was commissioned by the Qikiqtani Inuit Association (QIA) to complete a financial security assessment for the Baffinland Iron Minerals Corporation's (BIMC) 2015 Work Plan for the Mary River Project (the Project) including all activities occurring on Inuit Owned Lands (IOL). The purpose of this security estimate was to determine the estimated marginal increase in required financial security resulting from planned BIMC activities to be completed in 2015, and to add the marginal increase to the **QIA 2014 Comprehensive Security Estimate** to form this **QIA 2015 Comprehensive Security Estimate**.

The assessment herein includes consideration of QIA and BIMC on-going discussions concerning areas having a high level of uncertainty and potential influence these discussions have on the financial security amount, the results of which are summarized for ease of reference in the **Annex A-C** of this report. When reviewing the figures contained within **Annex C**, it should be noted that these figures also represent a summary of QIA's revised 2014 financial security estimate as detailed in the **QIA 2014 Comprehensive Security Estimate**. QIA's revisions follow extensive monthly meetings with BIMC to seek resolution to areas of divergence as presented to the NWB during the 2014 Annual Security Review process. In other words, this security estimate presents both a revised 2014 security value and a 2015 marginal security value, when added together are referred to as the **QIA 2015 Comprehensive Security Estimate**.

A copy of the **QIA 2014 Comprehensive Security Estimate** will be filed as an addendum to this report and will provide additional background details related to the selection and application of unit rates which have been applied to both the **QIA 2014 Comprehensive Security Estimate** and the **QIA 2015 Comprehensive Security Estimate**. Included as **Annex C** to this report is a summary of the **QIA 2014 Comprehensive Security Estimate**. The addendum will not alter or seek to further adjust the calculation of security results presented within this report. The figures presented within this report should therefore be considered comprehensive and final.



On October 31<sup>st</sup>, 2014, BIMC submitted to the QIA, the 2015 Work Plan consisting of the main work plan document and several appendices as follows:

- 2015 Work Plan
- Appendix A: 2015 Work Plan Site Layouts
- Appendix B: 2015 Marginal Closure and Reclamation Financial Security Estimate (H349000-1000-07-126-0019)
- Appendix C: Borrow Source Management Plan – Km 2 (BAF-PH1-830-P16-0030)
- Appendix D: Borrow Source Management Plan – Km 97 (BAF-PH1-830-P16-0032)
- Appendix E: Commercial Lease Q13C301 – Land Lease Drawings
- Appendix E.1: Schedule A Updated Land Lease Drawings
- Appendix E.2: Montieth & Sutherland Land Lease Drawings
- Appendix F: Option Exercise Notice
- Appendix F.1: Option Exercise Notice for Aerodrome Aviation Safety
- Appendix F.2: Option Exercise Notice for the Landfarm at Milne Port
- Appendix F.3: Option Exercise Notice for the Hazardous Waste Berm at Milne Port
- Appendix G: Emergency Response Plan (BAF-PH1-830-P16-0007)
- Appendix H: Spill Contingency Plan (BAF-PH1-830-P16-0036)

This memorandum is structured as follows:

- Section 2.0 – Methodology
- Section 3.0 – Analysis and Results
- Section 4.0 – Discussion and Closing

## **2.0 METHODOLOGY**

The reclamation security estimate completed herein was developed in accordance with the methodologies detailed in the QIA 2014 Comprehensive Security Estimate, the QIA Abandonment and Reclamation Policy (QIA A&R Policy), and generally applies the principles outlined within the Nunavut Tunngavik Incorporated (2008) “Reclamation Policy” and AANDC (2002) “Mine Site Reclamation Policy for Nunavut”.

This 2015 marginal increase was calculated from the sum of direct costs and indirect costs associated with BIMC reported 2015 Work Plan activities occurring on IOL. The reclamation security estimate was based on the information available at the time of report development. The following primary documentation was utilized to define the activities and closure conditions:

- BIMC’s 2015 Work Plan;
  - BIMC’s 2015 Work Plan Site Layouts;
  - BIMC’s 2015 Marginal Closure and Reclamation Financial Security Estimate (H349000-1000-07-126-0019);
  - Mine Site Landfill and Landfarm Site Layout (H337697-4350-10-014-0001, Rev. A);
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- BIMC's Mechanical Equipment and Mobile Equipment List (H349000-1000-50-144-0001, Rev. 0);
- QIA 2014 Comprehensive Security Estimate;
- 2014 Sealift Manifests (Vessels 1 through 4); and,
- The QIA A&R Policy.

Using the above noted documentation, the resulting scope of activities for 2015 were interpreted as follows:

- Development of borrow sources at km 2 and km 97 along the Tote Road;
- Continued development of quarry Q1;
- Phase 1 development of the Waste Rock Stockpile pad;
- Waste Rock Stockpile road;
- Waste Rock Pond;
- Pit #1 Development;
- Construction of the Truck Weigh Scale Facility pad;
- Additional laydown areas;
- Development of a landfarm at the Mary River Mine Site;
- Extension of the Mary River Mine Site landfill for additional capacity;
- Construction of an additional warehouse complete with precast concrete foundation and slab on grade;
- New fuel tank containment area;
- Lined storage facility near the new warehouse; and,
- Provision of two new 50,000 L Jet-A and one 75,000 L Jet-A fuel storage tanks.

The 2014 sealift manifests, Vessels 1, 2, 3, and 4 were also reviewed. Primarily, the 2014 sealift manifests were used to identify what appeared to be additional items mobilized to the Project site as follows:

- Medium and light non-fuel tanks; and,
- Miscellaneous materials.

Direct costs and some indirect costs were calculated using developed/researched unit costs using one or more of the following methods (as applied in the QIA 2014 Comprehensive Security Estimate):

- Construction costing data (labour and equipment rates, equipment type and costs, and productivity) for North America, published by RS Means (developed by Reed Construction Data), with location factors to account for the Project area;
  - Shipping costs as published from a sealift company in the region (Nunavut Eastern Arctic Shipping or NEAS);
  - Crew transportation costing from jet charter data supplied by BIMC and charter for local Nunavut air transportation to surrounding communities;
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- Crew accommodation costs supplied by BIMC and determined from actual camp operation costs experienced by BIMC on-site;
- Actual hazardous materials and explosives back haul costs supplied to QIA by BIMC based on BIMC site experiences to date;
- Fuel backhaul cost data from QIA contacted dedicated charter vessel for marine transportation of fuel;
- QIA contractor experience in construction projects in the region.

Indirect costs were also calculated based on percentages associated with engineering; project management and contract administration; and, contingency fees. Engineering, project management and contract administration fees were calculated as the fee percentage multiplied by the direct costs. The contingency fee was calculated as the fee percentage multiplied by the direct cost and all indirect costs with the exception of mobilization and demobilization for the Project.

Based on the Consulting Engineers of British Columbia (CEBC, 2009), an engineering fee percentage of 3.9% for projects over \$20,000,000 and of average complexity could be expected. As such, a 3.9% engineering fee was used. The Ontario Society of Professional Engineers (OSPE) provides guidance on fees for project management and contract administration where a 9.4% fee is recommended. As such, a 9.4% fee for project management and contract administration was used herein. A global contingency of 15% was used in the financial security assessment, consistent with the requirements of the QIA A&R Policy.

## 2.1 BIMC Document Excerpts

The following BIMC supplied documentation reference excerpts were used to generate the above noted approach and discussion herein:

### 1. [BIMC's 2015 Work Plan, pg. 5 of 17, dated October 31, 2014]

*"During the sealift, most of the activities at Milne Port will focus on unloading the barges and positioning received equipment and material in designated laydown areas. In addition, the following construction activities will continue:*

- *Continued development of the Quarry Q1"*

### 2. [BIMC's 2015 Work Plan, pg. 5 of 17, dated October 31, 2014]

*"All equipment, material, fuel, and supplies required for construction and operation activities at the Mary River Mine Site will be transported from Milne Port to the Mine Site via the Tote Road. The upgrade of the road will continue throughout 2015. During 2015 the activities associated with the upgrade to the Tote Road will include:*

- *Continued development of Borrow P1. Commence development of Km 2 and Km 97 borrows (located near Km2 and 97 of the Tote Road). Continue the development of other approved quarry and borrow sources to provide access to aggregate for upgrades and sand for winter sanding, minor fill, and maintenance and other approved construction projects. If required, commence the development of Quarries Q7, Q11, and Q19."*

3. **[BIMC's 2015 Work Plan, pg. 6 of 17, dated October 31, 2014]**

*"Construction activities at the Mary River Mine Site will consist of:*

- *Construct, install and grade waste rock haul road, waste rock pad, drainage ditches and settling pond.*
- *Extend landfill to increase capacity based on the approved design area.*
- *Install approved two-50,000 L and one-75,000 L Jet-A fuel tanks at the aerodrome apron to service aircraft charters.*
- *Continue development of QMR2 quarry if required."*

4. **[BIMC's 2015 Work Plan, pg. 6 of 17, dated October 31, 2014]**

*"A summary of the expected quantities of quarried and borrow materials to be extracted during 2015 are provided in Table 2-3 below. The expected quarterly quantities of each specific substance per quarry site and borrow location is provided in Table 2-4 below".*

**Table 2-3: 2015 Quarry and Borrow Pit Quantities**

<b>Quarry and Borrow Source</b>	<b>Estimated Annual Volume 2015 (m<sup>3</sup>)</b>	<b>Estimated Annual Surface Area 2015 (m<sup>2</sup>)</b>
Q1	100,000	107,000
Q7	0	0
Q11	0	0
P1 & other approved borrow sources	275,000	55,000
Q19	0	0
QMR2	150,000	70,000
D1Q1	-	0
D1Q2	-	0
<b>TOTAL</b>	<b>525,000</b>	

5. **[BIMC's 2015 Work Plan, pg. 13 of 17, dated October 31, 2014]**

*"To the extent practicable, all materials and supplies required to execute the 2015 Work Plan and the work scheduled for January to June 2015 were received during the 2014 sealifts. Additional materials and supplies to support operations through the remainder of 2015 and 2016 will arrive on the 2015 sealift including:*

- *Delivery of ammonium nitrate (AN): 520,000 kg.*
- *Delivery of pre-packaged explosives: 83,000 kg."*

6. **[BIMC's 2015 Marginal Closure and Reclamation Financial Security Estimate, pg. 10, dated October 31, 2014]**

*"This cost allocation is based on 369,795 m<sup>2</sup> of disturbed areas not considered in previous estimates at a unit rate of \$1.81/m<sup>2</sup>. These areas are comprised of:*

- *Km 2 and km 97 Borrow Sources – 41,795 m<sup>2</sup>*

- Waste Rock Road (2 km x 10 m) – 20,000 m<sup>2</sup>
- Waste Rock Stockpile Phase 1 Pad – 190, 000 m<sup>2</sup>
- Pit #1 Development – 55,000 m<sup>2</sup>
- Truck Weigh Scale Facility Pad – 13,000 m<sup>2</sup>
- Additional Laydown Areas – 20,000 m<sup>2</sup>

7. **[BIMC's 2015 Marginal Closure and Reclamation Financial Security Estimate, pg. 10, dated October 31, 2014]**

*"This cost allocation is based on an additional 21,383 m<sup>2</sup> of area with liner not considered in previous estimates at a unit rate of \$5.31/m<sup>2</sup>. These areas are comprised of:*

- Waste Rock Pond – 6,000 m<sup>2</sup>
- Mary River Mine Site Landfarm (tentative) – 14,083 m<sup>2</sup>
- Storage facility near warehouse (30 m x 30 m) – 900 m<sup>2</sup>
- Fuel tank Containment Area – 400 m<sup>2</sup>

8. **[BIMC's 2015 Marginal Closure and Reclamation Financial Security Estimate, pg. 11, dated October 31, 2014]**

*"The 2015 Marginal Reclamation and Closure Security Estimate allocates an additional \$31,000 plus cover material application costs to account for the closure and reclamation cost of two (2) 50,000L and one (1) 75,000L Jet A (Type-1) Fuel Tanks located at the Mary River Mine Site aerodrome apron."*

9. **[BIMC's 2015 Marginal Closure and Reclamation Financial Security Estimate, pg. 12, dated October 31, 2014]**

*"The 2015 Marginal Reclamation and Closure Security Estimate allocates an additional \$277,000 in closure and reclamation costs to account for a marginal increase of one (1) warehouse building at Mary River Mine Site. This cost allocation is based on an additional footprint of 1,296 m<sup>2</sup> not considered in previous estimates."*

10. **[BIMC's 2015 Marginal Closure and Reclamation Financial Security Estimate, pg. 12, dated October 31, 2014]**

*"The 2015 Marginal Reclamation and Closure Security Estimate allocates an additional \$17,000 in closure and reclamation cost to account for a marginal increase of materials to be disposed on-site in an unforeseen closure scenario. This cost allocation is based on an additional 2,358 m<sup>3</sup> of additional compacted volume of material disposed on site not considered in previous estimates. It was assumed that the material to be disposed of will have a depth of six (6) meters and therefore the total area to be covered by fill was identified as 393 m<sup>2</sup>, at a unit rate of \$44.37/m<sup>2</sup>."*

11. **[BIMC's 2015 Marginal Closure and Reclamation Financial Security Estimate, pg. 13, dated October 31, 2014]**

*"Each person-day on site is assumed to consume 116L of Type-1 fuel for heat and power generation."*

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12. **[BIMC's 2015 Marginal Closure and Reclamation Financial Security Estimate, pg. 13, dated October 31, 2014]**

*"In the event of unplanned closure, the 2015 Marginal Reclamation and Closure Security Estimate allocates \$553,000 to account for the removal and disposal of the highest amount of explosives on-site during the 2015 Work Plan. This cost is based on explosives reclamation unit rate of \$2.37/kg and an assumption of an additional 233,380 kg of explosives is on-site, and not accounted for in previous estimates, which require reclamation for the purpose of the 2015 Marginal Reclamation and Closure Security Estimate."*

13. **[BIMC's 2015 Marginal Closure and Reclamation Financial Security Estimate, pg. 14, dated October 31, 2014]**

*"Cost for accommodation and camp operation is assumed to be \$225/person-day and includes camp maintenance, catering, housekeeping, and fuel costs."*

## **3.0 ANALYSIS AND RESULTS**

### **3.1 Direct Cost Analysis**

Through the methodology described above ARKTIS determined unit costs and quantities for reclamation activities, which from review of the 2015 Work Plan and the 2014 Sealift Manifests (Vessels 1, 2, 3, and 4), were categorized under the following headings detailed in the QIA 2014 Comprehensive Security Estimate:

- Fill Application;
- Grade and Re-Contour;
- Grade and Re-Contour with Liner Removal;
- Fold-away, Soft-Walled, and Other Buildings (Contaminated);
- Precast Foundations;
- Slab on Grade;
- Medium Mobile Fuel Tanks;
- Light and Medium Non-Fuel Storage Tanks; and,
- Miscellaneous Items.

A summarized list of direct cost reclamation activities can be found in **Table 1** below and are summarized here with detailed description provided in the QIA 2014 Comprehensive Security Estimate. A full itemized list of direct cost reclamation activities are provided in **Annex A, Table A1**.

Note that a new reclamation activity was reported by BIMC involving new Jet-A fuel storage tanks identified as "Medium Mobile Fuel Tanks". As such, the development of an associated unit cost for the reclamation of the Jet-A fuel storage tanks was detailed below.

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### 3.1.1 Fill Application

Fill application relates to the required quantity of cover material to be quarried and placed over landfilled items generated through closure and reclamation of the mine. Quantities are based on assumed disposal of the new fold-away warehouse, warehouse precast foundations, decontaminated medium mobile fuel tanks, light and medium non-fuel storage tanks, and miscellaneous items; and, additional cover for the expansion of the Mary River landfill (refer to Section 2.1, Excerpt Item 3 above) not included in the QIA 2014 Comprehensive Security Estimate. The total sum of volumes was found to be 4,830 m<sup>3</sup>. Determination of volumes occupied by reclaimed materials in the landfill are consistent with the QIA 2014 Comprehensive Security Estimate. Based on an assumed landfill depth of 10 m, the resulting area for fill application cover was 483 m<sup>2</sup>. The additional area of cover for the Mary River landfill based on reported expansion of the landfill and not including the 6,821 m<sup>2</sup> included in the QIA 2014 Comprehensive Security Estimate was 6,404 m<sup>2</sup> (based on an available landfill area of 13,225 m<sup>2</sup> obtained from drawing H337697-4350-10-014-0001, Rev. A – Mine Site Landfill and Landfarm Site Layout). As such the total area for fill application was found to be **6,887 m<sup>2</sup>**.

The unit cost used to determine the 2015 marginal security increase for the additional fill application was **\$43.31/m<sup>2</sup>**.

Refer to the QIA 2014 Comprehensive Security Estimate for quantity and unit cost development details.

### 3.1.2 Grade and Re-Contour

Quantities for grade and re-contour were determined primarily from the quantities reported by BIMC within the BIMC 2015 Marginal Closure and Reclamation Financial Security Estimate, but also from Table 2-3 of the 2015 Work Plan (refer to Section 2.1, Excerpt Item 4 above) where additional volume and surface area for quarry Q1 were provided and used herein. The resulting area for grade and re-contour was found to be **446,795 m<sup>2</sup>**.

The unit cost used to determine the 2015 marginal security increase for the additional grade and re-contour was **\$1.93/m<sup>2</sup>**.

Refer to the QIA 2014 Comprehensive Security Estimate for unit cost development details.

### 3.1.3 Grade and Re-Contour with Liner Removal

Quantities for grade and re-contour with liner removal were also determined from quantities reported by BIMC within the BIMC 2015 Marginal Closure and Reclamation Financial Security Estimate and included the new landfarm, waste rock pond, storage facility near the warehouse and fuel tank containment area. The resulting area for grade and re-contour with liner removal was found to be **21,383 m<sup>2</sup>**.

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The unit cost used to determine the 2015 marginal security increase for the additional grade and re-contour with liner removal was found to be a combination of the grade and re-contour unit cost and the unit cost for liner removal which were \$1.93/m<sup>2</sup> and \$3.41/m<sup>2</sup>, respectively; resulting in a total unit cost for grade and re-contour with liner removal of **\$5.34/m<sup>2</sup>**.

Refer to the QIA 2014 Comprehensive Security Estimate for unit cost development details.

#### 3.1.4 Fold-away, Soft-Walled, and Other Buildings (Contaminated)

Within the BIMC 2015 Marginal Closure and Reclamation Financial Security Estimate, BIMC reports the need for a new warehouse building to be installed at the Mary River Mine Site, on a granular pad (pad included in QIA 2014 Comprehensive Security Estimate and not herein) adjacent to the aerodrome facility. The warehouse will reportedly consist of a contaminated fold-away building, precast foundation (refer to Section 3.1.5 below) and concrete slab on grade floor (refer to Section 3.1.6 below). The building footprint was provided within the BIMC 2015 Marginal Closure and Reclamation Financial Security Estimate as **1,296 m<sup>2</sup>**.

The unit cost used to determine the 2015 marginal security cost for the additional fold-away building teardown (contaminated) was **\$143.71/m<sup>2</sup>**.

Refer to the QIA 2014 Comprehensive Security Estimate for unit cost development details.

#### 3.1.5 Precast Foundation

As per Section 3.1.4 above, the area footprint of the new warehouse building will be **1,296m<sup>2</sup>**.

The unit cost used to determine the 2015 marginal security increase for the additional precast foundation removal was found to be **\$36.54/m<sup>2</sup>** and was derived from a volumetric unit cost to remove precast concrete of \$140.52/m<sup>3</sup> and the assumption that the quantity of precast foundations was 0.26 m<sup>3</sup> per 1 m<sup>2</sup> of building.

Refer to the QIA 2014 Comprehensive Security Estimate for unit cost development details.

#### 3.1.6 Slab on Grade

Slab on grade reclamation is limited to drilling of holes through the slab to allow through slab drainage of water. The total quantity of slab considered herein is equal to the building footprint noted above of **1,296m<sup>2</sup>**.

The unit cost to determine the 2015 marginal security increase for the additional slab on grade was **\$28.16/m<sup>2</sup>**.

Refer to the QIA 2014 Comprehensive Security Estimate for unit cost development details.

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### 3.1.7 Medium Mobile Fuel Tanks

The reclamation activity associated with removal of medium mobile fuel tanks was new to the Project financial security estimate and specific to the QIA 2015 Comprehensive Security Estimate. Medium mobile fuel tanks are defined by BIMC as diesel tanks of 3,000 L to 500,000 L storage capacity. The development of unit cost, including the disassembly and decontamination, loading and hauling to landfill of two new 50,000 L Jet-A and one new 75,000 L Jet-A fuel storage tanks, was determined using assumptions of person and equipment hours stated in BIMC's 2015 Marginal Closure and Reclamation Financial Security Estimate, which upon examination and review appeared to be reasonable. However, ARKTIS labour and equipment rates were applied to these person and equipment hours to develop an independent unit cost. Detailed calculation of this new unit cost can be found in **Annex B**. The resulting unit cost was found to be **\$9,141.50/medium mobile fuel tank**.

The quantity of medium mobile fuel tanks was provided in BIMC's 2015 Work Plan Marginal Financial Security Estimate, and is indicated above, totalling **3 units medium mobile fuel tanks**.

### 3.1.8 Light and Medium Non-Fuel Storage Tanks

Using the 2014 Sealift Manifest (Vessels 2 through 4; it is assumed that the contents of Vessel 1 were on-site during the 2014 Site Audit completed by ARKTIS and therefore, included in the QIA 2014 Comprehensive Security Estimate) and cross referencing with the QIA 2014 Comprehensive Security Estimate, 2013 Sealift Manifests and BIMC Mechanical Equipment and Mobile Equipment List, ARKTIS noted an apparent increase in non-fuel tanks mobilized to the Project site. A total of **ten (10) light non-fuel tanks** and **six (6) medium non-fuel tanks** additional to those included in the QIA 2014 Comprehensive Security Estimate were calculated.

The unit costs used to determine 2015 marginal security increase for additional light and medium non-fuel tanks were **\$2,462.81/light tank** and **\$6,604.21/medium tank**.

Refer to the QIA 2014 Comprehensive Security Estimate for unit cost development details.

### 3.1.9 Miscellaneous Items

The 2014 Sealift Manifest (Vessel 2 through 4) provided evidence that additional non-hazardous miscellaneous items were shipped to the Project site in 2014. The total number of items was calculated using the weight of all non-hazardous materials listed on the 2014 Sealift Manifest and dividing by 200 kg (a miscellaneous item is defined in the BIMC 2014 Complete Project Financial Security Assessment as an item of 200 kg or less), to obtain **425 miscellaneous items** additional to those included in the QIA 2014 Comprehensive Security Estimate.

The unit cost used to determine 2015 marginal security increase for additional miscellaneous items was **\$80.21/each**.

Refer to the QIA 2014 Comprehensive Security Estimate for unit cost development details.

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### 3.2 Indirect Cost Analysis

The following indirect costs were included herein:

- Explosives
- Fuel
- Mobilization of Workers Required for Reclamation
- Worker Accommodations & Camp Operations
- Mobilization and Demobilization of Reclamation Equipment
- Fuel for Reclamation Mobile Equipment
- Engineering Fees
- Supervision, Project Management & Contract Administration
- Contingency

#### 3.2.1 Explosives

Within the BIMC 2015 Work Plan (refer to Section 2.1, Excerpt Item 5 above), the total number of explosive mobilized to site was reported to be 520,000 kg of ammonium nitrate (AN) and 83,000 kg of pre-packaged explosives totalling 603,000 kg of explosive. However, based on consumption of explosives and the allocation of 369,620 kg of explosives within the BIMC 2014 Complete Project Financial Security Assessment, the BIMC 2015 Marginal Closure and Reclamation Financial Security Estimate assumes a total explosives liability of **233,380 kg**. This was the value used herein.

A unit cost to backhaul and dispose of explosives of **\$2.37/kg** was supplied by BIMC within their 2014 Complete Project Financial Security Assessment and was also used herein.

Refer to the QIA 2014 Comprehensive Security Estimate for more details.

#### 3.2.2 Fuel

ARKTIS considered a marginal increase in fuel stored on-site requiring backhaul in the event of unplanned closure of the mine in an amount equal to 50% (as directed by QIA) of the capacity of the two new 50,000 L Jet-A and single 75,000 L Jet-A fuel storage tanks included in the 2015 Work Plan. In total, a volume of **87,500 L** was assumed to be remaining for backhaul, at a cost of **\$0.10/L**.

Refer to the QIA 2014 Comprehensive Security Estimate for more details.

ARKTIS recognizes that assumptions related to fuel remain a topic that QIA and BIMC continue to discuss.

#### 3.2.3 Mobilization of Workers Required for Reclamation

Based on all of the reclamation activities required under the 2015 Work Plan and the industry standard crew productivities provided by RS Means, the total number of crew person-days to

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complete reclamation of the 2015 planned activities was determined to be **649 person days** (based on 10 hrs./day).

As per the QIA 2014 Comprehensive Security Estimate, mobilization of workers by charter flight was based on lump sum costs for return flights between communities in the Qikiqtaaluk (Baffin) Region and the Mine Site for Northern residents who were assumed to represent 30% of the reclamation work force; and, charter flight between the Mine Site and a single hub in southern Canada for the remaining 70% workforce.

In keeping with the methods detailed in the QIA 2014 Comprehensive Security Estimate, crew rotations of three weeks (21 days), or 20 productive days (1 day used for travel) determined the total number of return flights required to facilitate reclamation. The results found that less than one (1) flight for both northern residents and southern workforces. As such, a cost per person-day was developed. As per the QIA 2014 Comprehensive Security Estimate, a cost of \$118,000/southern charter and \$24,000/northern charter with 77 passengers and 19 passengers, respectively, and considering 20 productive days, was used to determine the cost per passenger-days of **\$76.62/southern charter** and **\$63.16/northern charter**.

Based on the workforce distribution above, 195 person days were associated with a northern workforce and 454 person days for the southern workforce with resulting mobilization costs of \$12,315.79 and \$34,787.01, respectively. Therefore the total worker mobilization cost was calculated to be **\$47,102.80**.

Refer to the QIA 2014 Comprehensive Security Estimate for more details regarding worker mobilization cost development.

#### 3.2.4 Worker Accommodations & Camp Operations

Using the BIMC supplied unit cost of **\$226/person/day** based on current camp accommodation costs incurred during the construction of the mine and the total person days of 649 noted above, a worker accommodation cost associated with the additional 2015 Work Plan activities was calculated to be **\$146,674.00**.

Refer to the QIA 2014 Comprehensive Security Estimate for more details regarding worker accommodation cost development.

#### 3.2.5 Fuel for Reclamation Mobile Equipment

Fuel required for the reclamation mobile equipment was calculated based on the crews and associated equipment required for the additional 2015 Work Plan reclamation activities detailed above and based on productivities provided by RS Means. Similar to calculation of person-days, the total equipment-days was calculated. For the 2015 Work Plan activities, a total of 296 equipment-days was required. Considering a ten (10) hour work day, the total equipment-hours for 2015 Work Plan reclamation was calculated to be 2,960 equipment-hours. Based on on-line research for heavy equipment fuel consumption, an average fuel consumption of 30 L/h was assumed. As such, the total reclamation fuel for mobile equipment was determined to be 88,800

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L (2,960 equipment-hours x 30 L/h). In addition, within the BIMC 2015 Marginal Closure and Reclamation Financial Security Estimate, BIMC indicates that on average 116 L of fuel is consumed per person-day to facilitate accommodation operations. This results in an additional 75,284 L of consumed fuel based on the above noted person-days of 649 to complete 2015 Work Plan reclamation. The total reclamation fuel required to be mobilized to site was therefore calculated to be **164,084 L**.

The reclamation fuel mobilization unit cost of **\$0.38/L** was used to determine 2015 marginal security increase, resulting in a lump sum cost of **\$62,351.92**.

Refer to the QIA 2014 Comprehensive Security Estimate for more details regarding fuel mobilization unit cost development.

#### 3.2.6 Engineering Fees

As per the QIA 2014 Comprehensive Security Estimate, engineering fees were calculated to be 3.9% of direct costs only. The direct cost (refer to **Table 1** below) was determined to be \$1,672,000.00. As such the total engineering fees were **\$65,220.72**.

#### 3.2.7 Supervision, Project Management & Contract Administration

As per the QIA 2014 Comprehensive Security Estimate, supervision, project management and contract administration costs were calculated to be 9.4% of direct costs. The total cost for supervision, project management and contract administration was calculated to be **\$157,198.67**.

#### 3.2.8 Contingency

As per the QIA 2014 Comprehensive Security Estimate, contingency applied to the direct costs and all indirect costs with the exception of mobilization and demobilization costs was 15%, in conformance with the QIA A&R Policy. The resulting cost for contingency was determined to be **\$305,000.35**.

### 3.3 Summarized Results

**Table 1, 2 and 3** below summarizes the 2015 marginal security increase results for activities occurring in 2015 and additional to those included in the QIA 2014 Comprehensive Security Estimate. For consistency, **Table 1, 2 and 3** below resemble the summary table in the QIA 2014 Comprehensive Security Estimate despite the fact that not all reclamation activities from previous security estimates are applicable to the 2015 Work Plan activities. Also note that the summary tables, do not address the Type B Exploration licence (2BE-MRY1421). A detailed breakdown of all direct and indirect costs; and, ARKTIS result comparison to BIMC determined financial security for the 2015 Work Plan activities is provided in **Annex A, Table A3**.

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**Table 1:** Summary of QIA 2015 Marginal Security Increase – Direct Costs.

Direct Costs					
Area	Item	Quantity	Unit	Unit Cost (\$)	Direct Cost
Site Works	Fill Application	6,887	m <sup>2</sup>	\$43.31	\$298,248.32
	Grade and Re-Contour	446,795	m <sup>2</sup>	\$1.93	\$863,892.78
	Grade and Re-Contour of Building Footprints	-	-	-	-
	Grade and Re-contour with Liner	21,383	m <sup>2</sup>	\$5.34	\$114,185.22
	Grade and Re-contour Significant Disturbed Areas	-	-	-	-
	Culvert Removal	-	-	-	-
	Bridge Removal	-	-	-	-
	Timber Cribbing	-	-	-	-
	Precast Foundations	1,296	m <sup>2</sup>	\$36.54	\$47,355.84
	Slab on Grade	1,296	m <sup>2</sup>	\$28.16	\$36,495.36
Mobile Equipment	Light Mobile Equipment	-	-	-	-
	Light Mobile Equipment (Assumed 3rd Part Equipment)	-	-	-	-
	Medium Mobile Equipment	-	-	-	-
	Medium Mobile Equipment (Assumed 3rd Party Equipment)	-	-	-	-
	Heavy Mobile Equipment	-	-	-	-
	Heavy Mobile Equipment (Assumed 3rd Party Equipment)	-	-	-	-
Buildings (Contaminated)	Single Trailer (Modular)	-	-	-	-
	Double Trailer (2 or More)	-	-	-	-
	Prefabricated Special Modular	-	-	-	-
	Fold Away Building	1,296	m <sup>2</sup>	\$143.71	\$186,248.16
	Soft Walled Building (Tent)	-	-	-	-
	ISO Shipping Containers	-	-	-	-
	Other Buildings	-	-	-	-
Buildings (Not Contaminated)	Single Trailer (Modular)	-	-	-	-
	Double Trailer (2 or More)	-	-	-	-
	Prefabricated Special Modular	-	-	-	-
	Fold Away Building	-	-	-	-
	Soft Walled Building (Tent)	-	-	-	-
	Temporary Construction Warehouses and Office Allowances	-	-	-	-



Direct Costs					
Area	Item	Quantity	Unit	Unit Cost (\$)	Direct Cost
	ISO Shipping Containers	-	-	-	-
	Other Buildings	-	-	-	-
Bulks	Piping	-	-	-	-
	Cable	-	-	-	-
Packaged Facilities	Incinerator	-	-	-	-
	Potable Water	-	-	-	-
	Sewage Treatment Plant	-	-	-	-
	Truck Wash Facility	-	-	-	-
Mechanical Equipment	Light Equipment	-	-	-	-
	Light Equipment (Assumed 3rd Party Equipment)	-	-	-	-
	Medium Equipment	-	-	-	-
	Medium Equipment (Assumed 3rd Party Equipment)	-	-	-	-
	Heavy Equipment	-	-	-	-
	Heavy Equipment Assumed 3rd Party Equipment)	-	-	-	-
	Light Tanks	10	ea.	\$2,462.81	\$24,628.10
	Medium Tanks	6	ea.	\$6,604.21	\$39,625.29
	Light Diesel Tanks	-	-	-	-
	Medium Mobile Diesel Tanks	3	ea.	\$9,141.50	\$27,424.49
	Medium Diesel Tanks	-	-	-	-
	Large Diesel Tanks	-	-	-	-
	Largest Diesel Tanks	-	-	-	-
	Miscellaneous Items	425	ea.	\$80.21	\$34,090.27
	Reclaim Conveyor	-	-	-	-
Not Included by BIMC	Contaminated Soil (Excavate)	-	-	-	-
	Airstrip Lighting	-	-	-	-
	Camp Mats (Size 1)	-	-	-	-
	Camp Mats (Size 2)	-	-	-	-
	Container Water Crossings	-	-	-	-
	Sea Containers	-	-	-	-
SUB-TOTAL DIRECT COSTS					\$1,672,000.00



**Table 2:** Summary of QIA 2015 Marginal Security Increase – Indirect Costs

Indirect Costs		
Item		Indirect Cost
Off-site Disposal	Waste & Material	-
	Fuel	\$8,750.00
	Ammonium Nitrate	\$553,110.60
Soil	Contaminated Soil Treatment	-
Mob. & Demob.	Mobilization of Workers Required for Reclamation	\$47,102.80
	Worker Accommodation & Camp Operations	\$146,674.00
	Mobilization and Demobilization of Equipment and Materials by Sealift	\$167,232.63
	Fuel for Reclamation Mobile Equipment	\$62,351.92
Monitoring and Reporting	Geotechnical Inspections	-
	Project Environmental Site Assessment	-
	Closure & Post Closure Monitoring	-
Other	Engineering Fees	\$65,220.72
	Supervision, Project Management & Contract Administration	\$157,198.67
	Contingency	\$305,000.35
<b>SUB-TOTAL INDIRECT COSTS</b>		<b>\$1,513,000.00</b>

**Table 3:** Summary of Direct and Indirect Costs and Resulting QIA 2015 Marginal Security Increase

Total Costs	
Costing Type	Value
Direct Cost Estimate	\$1,672,000
Indirect Cost Estimate	\$1,513,000
<b>Total 2015 Work Plan Marginal Financial Security Estimate</b>	<b>\$3,185,000</b>

Therefore, the total 2015 marginal security increase was determined to be **\$3,185,000**.



## 4.0 DISCUSSION AND CLOSING

Based on the above noted results, areas of discrepancy were noted between the QIA 2015 marginal security increase results and the BIMC 2015 Marginal Closure and Reclamation Financial Security Estimate (refer to comparison tables in **Annex A, Table A3**), in particular, the reclamation activities for fill application and grade and contour.

As detailed in the 2015 Work Plan and as per Section 2.1, Excerpt Item 3, ARKTIS included fill application (cover material) associated with the expansion of the Mary River landfill. It appeared that BIMC did not consider the fill application associated with the expanded landfill. It is possible that BIMC had included fill application for the full landfill design size within their 2014 Complete Project Financial Security Assessment and as such, did not include landfill cover fill application in the 2015 Work Plan marginal security estimate. However, within the QIA 2014 Comprehensive Security Estimate, the full landfill design size was not included; instead, the existing landfill size as measured at the time of the 2014 Site Audit completed by QIA in August 2014 was used. As such, additional fill application to account for additional landfill area was included within this QIA 2015 Comprehensive Security Estimate. This is one reasonable explanation for discrepancy in fill application quantities and costs between BIMC and ARKTIS.

In combination with BIMC reported grade and re-contour quantities ARKTIS included quantities for the reported quarry Q1 2015 development amount of 107,000 m<sup>2</sup>, where it seems that BIMC has not. The Q1 quarry management plan indicates that the quarry surface area is approximately 200,000 m<sup>2</sup>; since only 64,200 m<sup>2</sup> was included in the QIA 2014 Comprehensive Security Estimate, the 107,000 m<sup>2</sup> reported within the BIMC 2015 Work Plan, as per Section 2.1, Excerpt Item 4, was assumed to be additional. This explains quantity and cost discrepancies associated with the grade and re-contour activity. As well, it appears based on the BIMC reported quantity for grade and re-contour reclamation activities of 369,795 m<sup>2</sup>, unit cost of \$1.81/m<sup>2</sup>, and resulting additional cost of \$461,000, that an error may exist in BIMC's 2015 Work Plan calculation. From inspection, 369,795 m<sup>2</sup> multiplied by \$1.81/m<sup>2</sup> equals \$669,000 (rounded to nearest '000). This potential error in BIMC's 2015 Work Plan further explains cost discrepancies between parties.

The discrepancy in fill application and grade and re-contour costs between BIMC and ARKTIS were further exacerbated by the indirect costs that were determined by a percentage of the direct costs. Since the ARKTIS direct costs were higher than the BIMC direct costs based on above discussion, so were the indirect costs. Potential adjustment by BIMC of their financial security results, in particular with regards to the potential calculation error, could narrow the gap between parties.

The 2015 marginal security increase (\$3,185,000) added to the QIA 2014 Global Estimate (\$41,855,000) represents the financial security for all Project activities occurring on IOL up to the end of 2015; with the exception of the activities associated with the Type B Exploration licence (2BE-MRY1421). To date, it is unclear whether BIMC has developed an A&R plan as required by the 2BE-MRY1421 licence, this has been a major limitation in the ability to accurately assess security for these specific project activities. In addition, activities on Crown Lands (e.g. Steensby Inlet, Mid-Rail Camp) are not included in this security assessment. Therefore, the resulting QIA

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2015 Comprehensive Security Estimate for activities occurring on IOL was calculated to be **\$45,040,000.**

We trust the preceding is satisfactory. Please do not hesitate to contact ARKTIS Solutions Inc. should any questions, comments or concerns arise.

**ARKTIS Solutions Inc.**

A handwritten signature in black ink, appearing to read 'G. Fairthorne', with a stylized flourish at the end.

Greg Fairthorne, P.Eng.  
VP, Infrastructure Engineering



**ANNEX A**  
**2015 MARGINAL SECURITY INCREASE DETAILED**  
**RESULTS (DIRECT AND INDIRECT COSTS)**



Table A1: 2015 Marginal Security Increase – Detailed Direct Cost Results

Cost Type	Item Description	# of Items	Type	RECLAMATION ACTIVITIES	Area (m²)/ Item	Area (m²) Total	Height (m)	Volume/ Item	Volume (Total)	Unit Rate	Unit	Reclamation Cost
Direct	km 2 and km 97 Borrow Sources	1	Quarry/Borrow Area	GRADE AND RE-CONTOUR	41795.00	41795.00	-	-	-	\$1.93	/m²	\$80,812.00
Direct	Quarry Q1	1	Quarry/Borrow Area	GRADE AND RE-CONTOUR	107000.00	107000.00	-	-	-	\$1.93	/m²	\$206,888.01
Direct	Quarry QMR2	1	Quarry/Borrow Area	GRADE AND RE-CONTOUR		0.00	-	-	-	\$1.93	/m²	\$0.00
Direct	Waste Rock Road (2 km x 10 m)	1	Road	GRADE AND RE-CONTOUR	20000.00	20000.00	-	-	-	\$1.93	/m²	\$38,670.66
Direct	Waste Rock Stockpile Phase 1 Pad	1	Areas	GRADE AND RE-CONTOUR	190000.00	190000.00	-	-	-	\$1.93	/m²	\$367,371.23
Direct	Pit #1 Development	1	Open Pit	GRADE AND RE-CONTOUR	55000.00	55000.00	-	-	-	\$1.93	/m²	\$106,344.30
Direct	Truck Weigh Scale Facility Pad	1	Areas	GRADE AND RE-CONTOUR	13000.00	13000.00	-	-	-	\$1.93	/m²	\$25,135.93
Direct	Additional Laydown Areas	1	Areas	GRADE AND RE-CONTOUR	20000.00	20000.00	-	-	-	\$1.93	/m²	\$38,670.66
Direct	Waste Rock Pond	1	Bermed/Lined Areas	GRADE AND RE-CONTOUR	6000.00	6000.00	-	-	-	\$1.93	/m²	\$11,601.20
Direct	Waste Rock Pond (Liner)	1	Bermed/Lined Areas	LINER REMOVAL	6000.00	6000.00	-	-	-	\$3.41	/m²	\$20,477.73
Direct	Mary River Mine Site Landfarm	1	Bermed/Lined Areas	GRADE AND RE-CONTOUR	14083.00	14083.00	-	-	-	\$1.93	/m²	\$27,229.94
Direct	Mary River Mine Site Landfarm (Liner)	1	Bermed/Lined Areas	LINER REMOVAL	14083.00	14083.00	-	-	-	\$3.41	/m²	\$48,064.65
Direct	Storage Facility Near Warehouse	1	Bermed/Lined Areas	GRADE AND RE-CONTOUR	900.00	900.00	-	-	-	\$1.93	/m²	\$1,740.18
Direct	Storage Facility Near Warehouse (Liner)	1	Bermed/Lined Areas	LINER REMOVAL	900.00	900.00	-	-	-	\$3.41	/m²	\$3,071.66



Cost Type	Item Description	# of Items	Type	RECLAMATION ACTIVITIES	Area (m²)/ Item	Area (m²) Total	Height (m)	Volume/ Item	Volume (Total)	Unit Rate	Unit	Reclamation Cost
Direct	Fuel Tank Containment Area	1	Bermed/Lined Areas	GRADE AND RE-CONTOUR	400.00	400.00	-	-	-	\$1.93	/m²	\$773.41
Direct	Fuel Tank Containment Area (Liner)	1	Bermed/Lined Areas	LINER REMOVAL	400.00	400.00	-	-	-	\$3.41	/m²	\$1,365.18
Direct	50,000 L Jet-A Fuel Tank	2	Fuel Tanks	REMOVE MEDIUM MOBILE FUEL TANKS	-	-	-	-	-	\$9,141.50	EACH	\$18,282.99
Direct	75,000 L Jet-A Fuel Tank	1	Fuel Tanks	REMOVE MEDIUM MOBILE FUEL TANKS	-	-	-	-	-	\$9,141.50	EACH	\$9,141.50
Direct	Additional Warehouse Building	1	Buildings	FOLD-AWAY BUILDING TEARDOWN - NOT CONTAMINATED	1296.00	1296.00	-	-	-	\$143.71	/m²	\$186,242.52
Direct	Additional Warehouse Building [Precast Foundation Concrete Blocks (>4 m3; < 5 m3)]	1	Non-Hazardous	REMOVE PRECAST CONCRETE FOUNDATIONS	1296.00	1296.00	-	-	-	\$36.54	/m³	\$47,350.01
Direct	Additional Warehouse Building (SOG)	1	Foundation	DRILL SLAB	1296.00	1296.00	-	-	-	\$28.16	/m²	\$36,500.53
Direct	Landfill Extension	1	Areas	FILL APPLICATION	6404.00	6404.00	-	-	-	\$43.31	/m²	\$277,326.82
Direct	Landfill (50,000 L Jet-A Fuel Tank)	2	Landfill	FILL APPLICATION	5.00	10.00	-	-	-	\$43.31	/m²	\$433.05
Direct	Landfill (75,000 L Jet-A Fuel Tank)	1	Landfill	FILL APPLICATION	7.50	7.50	-	-	-	\$43.31	/m²	\$324.79
Direct	Landfill (Additional Warehouse Building)	1	Landfill	FILL APPLICATION	395.28	395.28	-	-	-	\$43.31	/m²	\$17,117.70
Direct	Landfill (Additional Warehouse Building Precast Concrete Blocks)	1	Landfill	FILL APPLICATION	23.50	23.50	-	-	-	\$43.31	/m²	\$1,017.67

[illegible]



Table A2: 2015 Marginal Security Increase – Detailed Indirect Cost Results

[illegible]



Table A3: BIMC 2015 Marginal Financial Security Results Compared to QIA 2015 Marginal Security Increase Results

Direct Costs									
Area	Item	BIMC		QIA		BIMC	QIA	BIMC	QIA
		Qty	Unit	Qty	Unit	Unit Cost (\$)	Unit Cost (\$)	Direct Cost	Direct Cost
Site Works	Fill Application	393	m <sup>2</sup>	6,887	m <sup>2</sup>	\$44.37	\$43.31	\$17,000.00	\$298,248.32
	Grade and Re-Contour	369,795	m <sup>2</sup>	446,795	m <sup>2</sup>	\$1.81	\$1.93	\$461,000.00	\$863,892.78
	Grade and Re-Contour of Building Footprints	-	-	-	-	-	-	-	-
	Grade and Re-contour with Liner	21,383	m <sup>2</sup>	21,383	m <sup>2</sup>	\$5.31	\$5.34	\$114,000.00	\$114,185.22
	Grade and Re-contour Significant Disturbed Areas	-	-	-	-	-	-	-	-
	Culvert Removal	-	-	-	-	-	-	-	-
	Bridge Removal	-	-	-	-	-	-	-	-
	Timber Cribbing	-	-	-	-	-	-	-	-
	Precast Foundations	1,296	m <sup>2</sup>	1,296	m <sup>2</sup>	\$38.47	\$36.54	\$50,000.00	\$47,355.84
Slab on Grade	1,296	m <sup>2</sup>	1,296	m <sup>2</sup>	\$33.11	\$28.16	\$43,000.00	\$36,495.36	
Mobile Equipment	Light Mobile Equipment	-	-	-	-	-	-	-	-
	Light Mobile Equipment (Assumed 3rd Part Equipment)	-	-	-	-	-	-	-	-
	Medium Mobile Equipment	-	-	-	-	-	-	-	-
	Medium Mobile Equipment (Assumed 3rd Party Equipment)	-	-	-	-	-	-	-	-
	Heavy Mobile Equipment	-	-	-	-	-	-	-	-
	Heavy Mobile Equipment (Assumed 3rd Party Equipment)	-	-	-	-	-	-	-	-
Buildings (Contaminated)	Single Trailer (Modular)	-	-	-	-	-	-	-	-
	Double Trailer (2 or More)	-	-	-	-	-	-	-	-
	Prefabricated Special Modular	-	-	-	-	-	-	-	-
	Fold Away Building	1,296	m <sup>2</sup>	1,296	m <sup>2</sup>	\$142.41	\$143.71	\$184,000.00	\$186,248.16
	Soft Walled Building (Tent)	-	-	-	-	-	-	-	-
	ISO Shipping Containers	-	-	-	-	-	-	-	-
	Other Buildings	-	-	-	-	-	-	-	-
Buildings (Not Contaminated)	Single Trailer (Modular)	-	-	-	-	-	-	-	-
	Double Trailer (2 or More)	-	-	-	-	-	-	-	-
	Prefabricated Special Modular	-	-	-	-	-	-	-	-
	Fold Away Building	-	-	-	-	-	-	-	-
	Soft Walled Building (Tent)	-	-	-	-	-	-	-	-
	Temporary Construction Warehouses and Office Allowances	-	-	-	-	-	-	-	-
	ISO Shipping Containers	-	-	-	-	-	-	-	-
	Other Buildings	-	-	-	-	-	-	-	-
Bulks	Piping	-	-	-	-	-	-	-	-
	Cable	-	-	-	-	-	-	-	-
Packaged Facilities	Incinerator	-	-	-	-	-	-	-	-
	Potable Water	-	-	-	-	-	-	-	-
	Sewage Treatment Plant	-	-	-	-	-	-	-	-
	Truck Wash Facility	-	-	-	-	-	-	-	-
Mechanical Equipment	Light Equipment	-	-	-	-	-	-	-	-
	Light Equipment (Assumed 3rd Party Equipment)	-	-	-	-	-	-	-	-
	Medium Equipment	-	-	-	-	-	-	-	-
	Medium Equipment (Assumed 3rd Party Equipment)	-	-	-	-	-	-	-	-
	Heavy Equipment	-	-	-	-	-	-	-	-
	Heavy Equipment (Assumed 3rd Party Equipment)	-	-	-	-	-	-	-	-
	Light Tanks	-	-	10	ea.	-	\$2,462.81	\$0.00	\$24,628.10
	Medium Tanks	-	-	6	ea.	-	\$6,604.21	\$0.00	\$39,625.26
	Light Diesel Tanks	-	-	-	-	-	-	-	-
	Medium Mobile Diesel Tanks	3	ea.	3	ea.	\$10,481.00	\$9,141.50	\$31,000.00	\$27,424.49
	Medium Diesel Tanks	-	-	-	-	-	-	-	-
	Large Diesel Tanks	-	-	-	-	-	-	-	-
	Largest Diesel Tanks	-	-	-	-	-	-	-	-
	Miscellaneous Items	-	-	425	ea.	-	\$80.21	\$0.00	\$34,089.25
Reclaim Conveyor	-	-	-	-	-	-	-	-	
Not Included by BIMC	Contaminated Soil (Excavate)	-	-	-	-	-	-	-	-
	Airstrip Lighting	-	-	-	-	-	-	-	-
	Camp Mats (Size 1)	-	-	-	-	-	-	-	-
	Camp Mats (Size 2)	-	-	-	-	-	-	-	-
	Container Water Crossings	-	-	-	-	-	-	-	-
	Sea Containers	-	-	-	-	-	-	-	-
SUB-TOTAL DIRECT COSTS								\$900,000.00	\$1,672,000.00
Indirect Costs									
Item								BIMC	QIA
								Indirect Cost	Indirect Cost
Off-site Disposal	Waste & Material							-	-
	Fuel							\$5,000.00	\$8,750.00
	Ammonium Nitrate							\$553,000.00	\$553,110.60
Soil	Contaminated Soil Treatment							-	-
Mob. & Demob.	Mobilization of Workers Required for Reclamation							\$54,000.00	\$47,102.80
	Worker Accommodation & Camp Operations							\$148,000.00	\$146,674.00
	Mobilization and Demobilization of Equipment and Materials by Sealift							\$90,000.00	\$167,232.63
	Fuel for Reclamation Mobile Equipment							\$28,000.00	\$62,351.92
	Geotechnical Inspections							-	-
Monitoring and Reporting	Project Environmental Site Assessment							-	-
	Closure & Post Closure Monitoring							-	-
	Other	Engineering Fees							\$35,000.00
Supervision, Project Management & Contract Administration								\$165,000.00	\$157,198.67
Contingency								\$256,000.00	\$305,000.35
SUB-TOTAL INDIRECT COSTS								\$1,334,000.00	\$1,513,000.00
TOTAL COST								\$2,234,000.00	\$3,185,000.00





**ANNEX B**  
**DETAILED MEDIUM MOBILE FUEL STORAGE TANK UNIT COST**  
**DEVELOPMENT**



Table B1: Unit Cost for Medium Mobile Fuel Tank

Medium Mobile Fuel Tanks (3,000 L to 500kL)											
					U.S. Average		Ottawa Cost Index	Ottawa Costs	Nunavut Index	Nunavut Costs	
Disassemble and Decontaminate	Crew	N/A	2 Skilled Workers			Hourly	Daily		Hourly		Hourly
			1 Truck Driver (Heavy)			\$146.50		1.05	\$153.83	1.6	\$246.12
			1 Truck Tractor, 6x4, 450 H.P.			\$37.55		1.05	\$39.43	1.6	\$63.08
			1 Tank Trailer, 5000 Gal.			\$92.80	\$742.40	1.038	\$96.33	2.5	\$240.82
				\$17.70	\$141.60	1.038	\$18.37	2.5	\$45.93		
										\$595.95	/hr
	Crew	N/A	Daily Output (Volume) = 0.55 each								
			Daily Cost (8 hour day) = \$4,767.61								
			Cost each = \$8,641.30 each								
	Load	Crew	N/A	1 Laborer			\$56.55		1.05	\$59.38	1.6
1 Equipment Operator Medium				\$74.15		1.05	\$77.86	1.6	\$124.57		
1 F.E. Loader, W.M., 2.5 CY				\$71.89	\$575.08	1.038	\$74.62	2.5	\$186.54		
									\$406.12	/hr.	
Crew		N/A	Daily Output (Volume) = 2.00 each								
			Daily Cost (8 hour day) = \$3,248.94								
			Cost each = \$1,624.47 each								
Haul	Crew	N/A	1 Truck Driver (heavy)			\$57.30		1.05	\$60.17	1.6	\$96.26
			1 Truck Tractor, 220 H.P.			\$50.38	\$403.04	1.038	\$52.29	2.5	\$130.74
			1 Flatbed Trailer, 40 Ton			\$20.90	\$167.20	1.038	\$21.69	2.5	\$54.24
										\$281.24	/hr
	Crew	N/A	Daily Output (Volume) = 2 each								
			Daily Cost (8 hour day) = \$2,249.88								
			Cost per m3 = \$1,124.94								
Unit Cost Medium Mobile Fuel Tank Disposal (ARKTIS) =										\$9,141.50	each



**ANNEX C**  
**SUMMARIZED RESULTS FROM THE QIA 2014**  
**COMPREHENSIVE SECURITY ESTIMATE**  
**(DIRECT AND INDIRECT COSTS)**

Table C1: QIA 2014 Comprehensive Security Estimate – Summarized Results (Direct Costs)

Direct Costs					
Area	Item	Quantity	Unit	Unit Cost (\$)	Direct Cost
Site Works	Fill Application	20484	m <sup>2</sup>	\$43.31	\$887,055.03
	Grade and Re-Contour	2498189	m <sup>2</sup>	\$1.93	\$4,830,330.34
	Grade and Re-Contour of Building Footprints	27569	m <sup>2</sup>	\$1.93	\$53,305.57
	Grade and Re-contour with Liner	115708	m <sup>2</sup>	\$5.34	\$617,880.72
	Grade and Re-contour Significant Disturbed Areas	188533	m <sup>2</sup>	\$2.90	\$546,802.11
	Culvert Removal	383	ea.	\$978.78	\$374,873.23
	Bridge Removal	4	ea.	\$251,552.72	\$1,006,210.86
	Timber Cribbing	16068	m <sup>2</sup>	\$20.60	\$330,939.96
	Precast Foundations	6032	m <sup>2</sup>	\$36.54	\$220,385.79
	Slab on Grade	9751	m <sup>2</sup>	\$28.16	\$274,623.23
Mobile Equipment	Light Mobile Equipment	180	ea.	\$938.16	\$168,869.33
	Medium Mobile Equipment	84	ea.	\$1,559.26	\$130,978.15
	Heavy Mobile Equipment	122	ea.	\$2,251.31	\$274,659.41
Buildings (Contaminated)	Single Trailer (Modular)	327	m <sup>2</sup>	\$184.43	\$60,354.63
	Double Trailer (2 or More)	1340	m <sup>2</sup>	\$184.43	\$247,060.44
	Prefabricated Special Modular	1161	m <sup>2</sup>	\$184.43	\$214,068.11
	Fold Away Building	8567	m <sup>2</sup>	\$143.71	\$1,202,668.37
	Soft Walled Building (Tent)	2562	m <sup>2</sup>	\$143.71	\$368,183.80
	ISO Shipping Containers	461	m <sup>2</sup>	\$70.08	\$32,301.87
	Other Buildings	51	m <sup>2</sup>	\$143.71	\$7,269.51
Buildings (Not Contaminated)	Single Trailer (Modular)	914	m <sup>2</sup>	\$61.48	\$56,204.92
	Double Trailer (2 or More)	1414	m <sup>2</sup>	\$61.48	\$86,933.32
	Prefabricated Special Modular	12073	m <sup>2</sup>	\$61.48	\$742,193.04
	Fold Away Building	1672	m <sup>2</sup>	\$41.35	\$69,154.66
	Soft Walled Building (Tent)	9279	m <sup>2</sup>	\$41.35	\$383,733.23
	Temporary Construction Warehouses and Office Allowances	995	m <sup>2</sup>	\$61.48	\$61,146.41
	ISO Shipping Containers	1092	m <sup>2</sup>	\$35.73	\$39,008.99
	Other Buildings	642	m <sup>2</sup>	\$41.35	\$26,567.81
Bulks	Piping	19623	m	\$58.43	\$1,146,650.61

Direct Costs					
Area	Item	Quantity	Unit	Unit Cost (\$)	Direct Cost
Packaged Facilities	Cable	27300	m	\$27.78	\$758,394.10
	Incinerator	2	ea.	\$9,422.75	\$18,845.50
	Potable Water	2	ea.	\$9,422.75	\$18,845.50
	Sewage Treatment Plant	2	ea.	\$10,772.79	\$21,545.57
	Truck Wash Facility	1	ea.	\$144,173.40	\$144,173.40
Mechanical Equipment	Light Equipment	175	ea.	\$1,784.11	\$312,219.24
	Medium Equipment	111	ea.	\$4,276.14	\$474,651.94
	Heavy Equipment	27	ea.	\$41,937.03	\$1,132,299.94
	Light Tanks	32	ea.	\$2,462.81	\$78,809.92
	Medium Tanks	16	ea.	\$6,604.21	\$105,667.44
	Light Diesel Tanks	29	ea.	\$3,080.58	\$89,336.70
	Medium Diesel Tanks	8	ea.	\$17,169.52	\$137,356.19
	Large Diesel Tanks	2	ea.	\$112,668.70	\$225,337.39
	Largest Diesel Tanks	4	ea.	\$180,864.02	\$723,456.10
	Miscellaneous Items	385	ea.	\$80.21	\$30,881.78
	Reclaim Conveyor	1	ea.	\$1,329,441.31	\$1,329,441.31
Not Included by BIMC	Contaminated Soil (Excavate)	2862	m <sup>3</sup>	\$30.79	\$88,136.30
	Airstrip Lighting	4000	m	\$27.78	\$111,120.01
	Camp Mats (Size 1)	36	ea.	\$517.57	\$18,632.58
	Camp Mats (Size 2)	67	ea.	\$729.02	\$48,844.52
	Container Water Crossings	50	ea.	\$2,437.53	\$121,876.65
	Sea Containers	579	ea.	\$694.00	\$401,826.00
SUB-TOTAL DIRECT COSTS					\$20,852,000.00



Table C2: QIA 2014 Comprehensive Security Estimate – Summarized Results (Indirect Costs)

Indirect Costs		
Area	Item	Indirect Cost
Off-site Disposal	Waste & Material	\$679,932.00
	Disposal Cost Waste & Material	\$1,289,068.00
	Fuel	\$2,550,000.00
	Ammonium Nitrate	\$875,999.40
Soil	Contaminated Soil Treatment	\$246,536.50
Mob. & Demob.	Mobilization of Workers Required for Reclamation	\$972,000.00
	Worker Accommodation & Camp Operations	\$2,907,490.00
	Mobilization and Demobilization of Equipment and Materials by Sealift	\$2,085,200.00
	Fuel for Reclamation Mobile Equipment	\$999,400.00
Monitoring and Reporting	Geotechnical Inspections	\$316,200.00
	Project Environmental Site Assessment	\$71,580.00
	Closure & Post Closure Monitoring	\$851,000.00
Other	Engineering Fees	\$813,228.00
	Supervision, Project Management & Contract Administration	\$2,099,707.75
	Contingency	\$4,245,300.97
SUB-TOTAL INDIRECT COSTS		\$21,003,000.00

Table C3: QIA 2014 Comprehensive Security Estimate – Summarized Results (Direct and Indirect Costs)

Total Costs	
Costing Type	Value
Direct Cost Estimate	\$20,852,000
Indirect Cost Estimate	\$21,003,000
<b>Total 2015 Work Plan Marginal Financial Security Estimate</b>	<b>\$41,855,000</b>



Table C4: BIMC 2014 Complete Project Results Compared to QIA 2014 Comprehensive Security Estimate Results

Direct Costs									
Area	Item	BIMC		QIA		BIMC		QIA	
		Qty	Unit	Qty	Unit	Unit Cost (\$)	Unit Cost (\$)	Direct Cost	Direct Cost
Site Works	Fill Application	29285	m <sup>2</sup>	20484	m <sup>2</sup>	\$44.37	\$43.31	\$1,299,000.00	\$887,055.03
	Grade and Re-Contour	2498189	m <sup>2</sup>	2498189	m <sup>2</sup>	\$1.81	\$1.93	\$4,523,000.00	\$4,830,330.34
	Grade and Re-Contour of Building Footprints	27569	m <sup>2</sup>	27569	m <sup>2</sup>	\$1.81	\$1.93	\$50,000.00	\$53,305.57
	Grade and Re-contour with Liner	115708	m <sup>2</sup>	115708	m <sup>2</sup>	\$5.34	\$5.34	\$618,000.00	\$617,880.72
	Grade and Re-contour Significant Disturbed Areas	188533	m <sup>2</sup>	188533	m <sup>2</sup>	\$2.72	\$2.90	\$512,000.00	\$546,802.11
	Culvert Removal	383	ea.	383	ea.	\$1,094.48	\$978.78	\$419,000.00	\$374,873.23
	Bridge Removal	4	ea.	4	ea.	\$201,839.00	\$251,552.72	\$807,000.00	\$1,006,210.86
	Timber Cribbing	1893	m <sup>2</sup>	16068	m <sup>2</sup>	\$20.78	\$20.60	\$39,000.00	\$330,939.96
	Precast Foundations	9610	m <sup>2</sup>	6032	m <sup>2</sup>	\$38.47	\$36.54	\$370,000.00	\$220,385.79
	Slab on Grade	16173	m <sup>2</sup>	9751	m <sup>2</sup>	\$33.11	\$28.16	\$536,000.00	\$274,623.23
Mobile Equipment	Light Mobile Equipment	180	ea.	180	ea.	\$941.09	\$938.16	\$169,000.00	\$168,869.33
	Medium Mobile Equipment	84	ea.	84	ea.	\$1,494.13	\$1,559.26	\$126,000.00	\$130,978.15
	Heavy Mobile Equipment	122	ea.	122	ea.	\$2,618.87	\$2,251.31	\$320,000.00	\$274,659.41
Buildings (Contaminated)	Single Trailer (Modular)	283	m <sup>2</sup>	327	m <sup>2</sup>	\$143.42	\$184.43	\$41,000.00	\$60,354.63
	Double Trailer (2 or More)	1338	m <sup>2</sup>	1340	m <sup>2</sup>	\$143.42	\$184.43	\$192,000.00	\$247,060.44
	Prefabricated Special Modular	1105	m <sup>2</sup>	1161	m <sup>2</sup>	\$143.42	\$184.43	\$159,000.00	\$214,068.11
	Fold Away Building	10626	m <sup>2</sup>	9571	m <sup>2</sup>	\$142.41	\$143.71	\$1,513,000.00	\$1,346,841.76
	Soft Walled Building (Tent)	2131	m <sup>2</sup>	2562	m <sup>2</sup>	\$148.35	\$143.71	\$316,000.00	\$368,183.80
	ISO Shipping Containers	238	m <sup>2</sup>	461	m <sup>2</sup>	\$143.42	\$70.08	\$34,000.00	\$32,301.87
	Other Buildings	0	m <sup>2</sup>	51	m <sup>2</sup>	\$0.00	\$143.71	\$0.00	\$7,269.51
	Buildings (Not Contaminated)	Single Trailer (Modular)	781	m <sup>2</sup>	914	m <sup>2</sup>	\$59.38	\$61.48	\$46,000.00
Double Trailer (2 or More)		1642	m <sup>2</sup>	1414	m <sup>2</sup>	\$59.38	\$61.48	\$98,000.00	\$86,933.32
Prefabricated Special Modular		12608	m <sup>2</sup>	12073	m <sup>2</sup>	\$59.38	\$61.48	\$749,000.00	\$742,193.04
Fold Away Building		2082	m <sup>2</sup>	1672	m <sup>2</sup>	\$41.57	\$41.35	\$87,000.00	\$69,154.66
Soft Walled Building (Tent)		13809	m <sup>2</sup>	9279	m <sup>2</sup>	\$47.51	\$41.35	\$656,000.00	\$383,733.23
Temporary Construction Warehouses and Office Allowances		2	Lot	995	m <sup>2</sup>	\$25,000.00	\$61.48	\$50,000.00	\$61,146.41
ISO Shipping Containers		268	m <sup>2</sup>	1092	m <sup>2</sup>	\$29.69	\$35.73	\$8,000.00	\$39,008.99
Other Buildings		0	m <sup>2</sup>	642	m <sup>2</sup>	\$0.00	\$41.35	\$0.00	\$26,567.81
Bulks	Piping	19623	m	19623	m	\$66.23	\$58.43	\$1,300,000.00	\$1,146,650.61
	Cable	27300	m	27300	m	\$26.49	\$27.78	\$723,000.00	\$758,394.10
Packaged Facilities	Incinerator	2	ea.	2	ea.	\$9,975.93	\$9,422.75	\$20,000.00	\$18,845.50
	Potable Water	2	ea.	2	ea.	\$9,975.93	\$9,422.75	\$20,000.00	\$18,845.50
	Sewage Treatment Plant	2	ea.	2	ea.	\$11,035.58	\$10,772.79	\$22,000.00	\$21,545.57
Mechanical Equipment	Light Equipment	175	ea.	175	ea.	\$1,980.80	\$1,784.11	\$347,000.00	\$312,219.24
	Medium Equipment	130	ea.	111	ea.	\$4,261.34	\$4,276.14	\$554,000.00	\$474,651.94
	Heavy Equipment	27	ea.	27	ea.	\$41,205.45	\$41,937.03	\$1,113,000.00	\$1,132,299.94
	Light Tanks	14	ea.	32	ea.	\$2,148.33	\$2,462.81	\$30,000.00	\$78,809.92
	Medium Tanks	21	ea.	16	ea.	\$7,387.31	\$6,604.21	\$155,000.00	\$105,667.44
	Light Diesel Tanks	11	ea.	29	ea.	\$3,693.66	\$3,080.58	\$41,000.00	\$89,336.70
	Medium Diesel Tanks	8	ea.	8	ea.	\$16,166.40	\$17,169.52	\$129,000.00	\$137,356.19
	Large Diesel Tanks	2	ea.	2	ea.	\$106,338.74	\$112,668.70	\$213,000.00	\$225,337.39
	Largest Diesel Tanks	4	ea.	4	ea.	\$171,468.15	\$180,864.02	\$686,000.00	\$723,456.10
	Miscellaneous Items	13	ea.	385	ea.	\$529.83	\$80.21	\$7,000.00	\$30,881.78
Not Included by BIMC	Reclaim Conveyor	1	ea.	1	ea.	\$1,329,441.31	\$1,329,441.31	\$1,329,000.00	\$1,329,441.31
	Contaminated Soil (Excavate)	0	m <sup>3</sup>	2862	m <sup>3</sup>	\$0.00	\$30.79	\$0.00	\$88,136.30
	Airstrip Lighting	0	m	4000	m	\$0.00	\$27.78	\$0.00	\$111,120.01
	Camp Mats (Size 1)	0	ea.	36	ea.	\$0.00	\$517.57	\$0.00	\$18,632.58
	Camp Mats (Size 2)	0	ea.	67	ea.	\$0.00	\$729.02	\$0.00	\$48,844.52
	Container Water Crossings	0	ea.	50	ea.	\$0.00	\$2,437.53	\$0.00	\$121,876.65
	Sea Containers	0	ea.	579	ea.	\$0.00	\$694.00	\$0.00	\$401,826.00
SUB-TOTAL DIRECT COSTS								\$20,426,000.00	\$20,852,000.00
Indirect Costs									
Area	Item	BIMC		QIA					
		Indirect Cost		Indirect Cost					
Off-site Disposal	Waste & Material	\$0.00		\$679,932.00					
	Disposal Cost Waste & Material	\$1,969,000.00		\$1,289,068.00					
	Fuel	\$3,099,000.00		\$2,550,000.00					
	Ammonium Nitrate	\$876,000.00		\$875,999.40					
Soil	Contaminated Soil Treatment	\$234,000.00		\$246,536.50					
Mob. & Demob.	Mobilization of Workers Required for Reclamation	\$839,000.00		\$972,000.00					
	Worker Accommodation & Camp Operations	\$2,217,000.00		\$2,907,490.00					
	Mobilization and Demobilization of Equipment and Materials by Sealift	\$2,042,000.00		\$2,085,200.00					
	Fuel for Reclamation Mobile Equipment	\$0.00		\$999,400.00					
Monitoring and Reporting	Geotechnical Inspections	\$150,000.00		\$316,200.00					
	Project Environmental Site Assessment	\$90,000.00		\$71,580.00					
	Closure & Post Closure Monitoring	\$851,000.00		\$851,000.00					
Other	Engineering Fees	\$797,000.00		\$813,228.00					
	Supervision, Project Management & Contract Administration	\$2,006,000.00		\$2,099,707.75					
	Contingency	\$3,274,000.00		\$4,245,300.97					
SUB-TOTAL INDIRECT COSTS								\$18,450,000.00	\$21,003,000.00
TOTAL COST								\$38,876,000.00	\$41,855,000.00