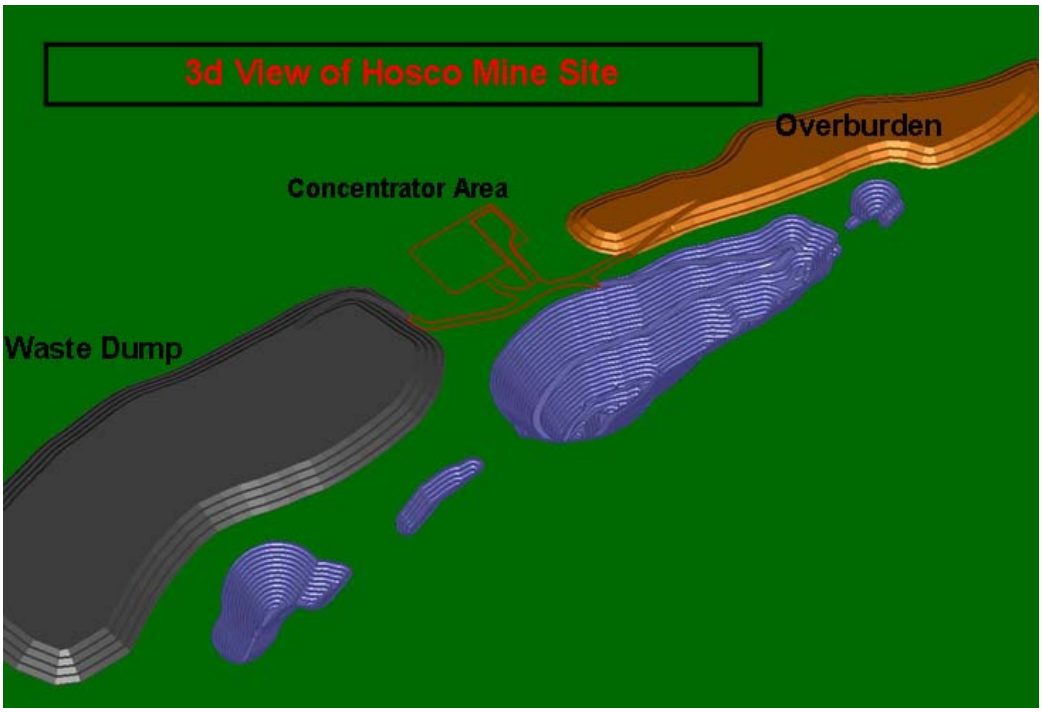
AURIZON MINES LTD.

Technical Report NI 43-101

Preliminary Assessment for the

Joanna Gold Project

(Rouyn-Noranda, Quebec)



Prepared by:

Patrice Live, Eng.

Enzo Palumbo, Metallurgist

BBA

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LIST OF MAIN ABBREVIATIONS

Aurizon	Aurizon Mines Ltd.	mm	Millimetre
ABAT	Action boréale de l'Abitibi-Témiscamingue	M	Million
BBA	BBA Inc.	MDDEP	Ministère du Développement durable, de l'Environnement et des Parcs
°C	degrees centigrade	opex	operating expenditure
capex	capital expenditure	OB	Overburden
CIM	Canadian Institute of Mining, Metallurgy and Petroleum	oz	ounce troy (31.10 grams)
CoG	cut-off grade	PA	Preliminary Assessment
g	gram	POX	Pressure oxidation
Geostat	Systèmes Geostat International Inc.	ppm,ppb	Parts per million, parts per billion
h	hour	RQD	rock quality designation
ha	hectare (10,000 m^2)	ROM	run of mine
IRR	internal rate of return	SG	specific gravity
kg	kilogram	Stellar	Stellar Pacific Ventures Inc.
Km, km/h	Kilometre, kilometre per hour	S/R	stripping ratio
kPa	kilopascal	Vantex	Vantex Resources Inc.
kt	1000 tonnes	t (or tonnes)	tonne (metric)
kV	kilovolt	t/d or tpd	tonnes per day
kW	kilowatt	t/h or tph	tonnes per hour
l	litre	t/m^3	tonnes per cubic meter
LG 3D	Lerchs-Grossman 3D algorithm	t/y ot tpy	tonnes per year
m	metre	URSTM	Unité de recherche et de service en technologie minérale
m^2	square metre	y	Year
m^3	cubic metre		
$	Canadian dollar		

DISCLAIMER

This Report on the Preliminary Assessment for the Joanna Gold Project was prepared for Aurizon Mines Ltd by BBA Inc. The Report is based in part upon data believed to be reliable and supplied by other consultants engaged by Aurizon Mines Ltd.

The content of the Report is the expression of the professional opinions of BBA Inc. based solely on information available at the time of preparation. The quality of the estimates and projections contained in the Report is consistent with the intended level of accuracy as set out in this report.

Caution to Readers

This Preliminary Assessment is based on mineral resources estimated as at September 2007 and is preliminary in nature. Mineral resources that are not mineral reserves do not have demonstrated economic viability. The Preliminary Assessment includes inferred mineral resources which are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. Furthermore, there is no certainty that the results projected in the Preliminary Assessment will be realized and actual results may vary substantially.

1. EXECUTIVE SUMMARY

1.1 Introduction

BBA Inc. (BBA) was mandated by Aurizon Mines Ltd (Aurizon) in October 2007 to undertake a Preliminary Assessment (PA) for the Joanna Gold Project near the town of Rouyn-Noranda, Quebec. The objective of the PA was to estimate the potential in-pit mineral resources for a stand-alone open-pit operation. This Technical Report was prepared in compliance with the guidelines set out under the National Instrument "Form 43-101F1 Technical Report" for the Standards of Disclosure for Mineral Projects, Section 143 of the Security Act of the Ontario Securities Commission.

Unless stated otherwise, all currencies are expressed in Canadian dollars (C$).

1.2 Site Visit & Qualified Persons

A site visit was conducted by Patrice Live and Isabelle Leblanc of BBA on September 12, 2007 for a general acquaintance with the property and verification of surface conditions for potential waste and tailings disposals as well as infrastructures location.

This report is based on the Preliminary Assessment conducted by BBA on the Joanna project and the Technical Report entitled "Resource modeling and estimation update" authored by Geostat on September 2007 and posted October 29, 2007 on Sedar. To BBA's knowledge, there has not been any material change in the information since that date.

1.3 Property Description and Location

The Joanna project is located along the Cadillac Break, in the Joannès Township. The property is situated 20 km east of Rouyn-Noranda, next to Highway 117, in the province of Quebec. The project is located on map 32D02 of the NTS system. The Joanna project is located two (2) km north-east of the Rouyn-Noranda airport.

The Joanna property extends east-west for more than 8 km and reaches 3 km in width. The 2,608 ha property is comprised of 92 contiguous claims. The property is accessible via a gravel road to the old shaft collar of the Hosco mine. The north-south gravel road crosses a railway line, which runs east-west. A 120 kV power line passes 2.7 km north of the Hosco deposit while local electrical distribution is provided from the power line along Highway 117.

From 1944 to 1949, two underground mines, Hosco and Heva, were in operation on the Joanna property. Some concrete slabs remain as witness of the past mining operations. The old shaft collar of the Hosco mine is accessible via the north-south gravel road.

Topography is generally flat. The elevation varies between 300 and 320 meters above sea level. A 350m above sea level hill is located south-east of the Hosco deposit. The property is poorly drained and mainly covered by a swamp. The slope is gently dipping towards the north in the swamp. The Joanna property overburden has a thickness of 5 to 15 meters. Its composition is as follows: a thin layer of organic material and a layer of silt and clay.

1.4 Local Resources

The Abitibi region has a long history of mining activity, and mining suppliers and contractors are locally available. The town of Rouyn-Noranda has a population of more than 39,000 citizens. Rouyn-Noranda and Val-d'Or could provide qualified personnel for a new mine. All major services are available in these cities. The area is traditionally a mining area with several mines in operation and active exploration companies.

1.5 History

The Hosco and Heva gold properties have been explored over the last sixty years by various owners and optionees.

In 1948-1949, the Hosco underground mine started production at a rate of 100 tonnes/day. A total of 45,872 tonnes grading 6.58 g/t were extracted from 9 shrinkage stopes and milled at the nearby McWatters Gold Mines Ltd. property.

From 1951 to 1953, a total of 47,475 tonnes of ore grading 6.86 g/t Au was extracted from the Heva underground mine before the operation was stopped due to a shortage of mine labour. A total of 960 m of drifting and crosscutting was completed from 1946 to 1953.

From 1986 to 1989, 21,555 tonnes of ore grading 2.65 g/t was extracted and stockpiled on surface. Presently, this stockpile remains in place on surface.

1.6 Geology and Mineralization

The east-west striking zone favourable for gold mineralization is closely related to the Cadillac fault. It is underlain from south to north by sedimentary rocks of the Pontiac, Temiskaming and Cadillac groups. The Pontiac and Temiskaming Groups are mainly composed of greywacke. Temiskaming Group is identified by extensive polygenic conglomerate units. A tuffaceous horizon of felsic composition marks the contact between the two groups while the Cadillac fault occurs at the top of the Temiskaming Group. The Cadillac group occurs north of the Cadillac fault. It mainly consists of greywacke with siltstone, mudstone and arkose units.

Gold appears to be mainly associated with finely crystallized sulphides in a biotite rich schist with minor deformed millimetric to pluri-centimetric quartz veins. Mineral assemblage also includes variable concentrations of white mica, carbonate, albite, garnet, and possible other alumino-silicates. Amphibole and tourmaline rich replacement zones have been locally identified.

Gold enrichment is adjacent to the mafic unit, and is related to fine grain arsenopyrite in a biotite rich matrix. The veins are included within a 100 to 190 meter wide lower grade halo of 0.5 to 2.0 grams per tonne. The corridor extends along a 2,200 meter east-west trend and can be followed down to a depth of 400 meters. Mineralization follows multiple distinct zones, along a dip of 55 degrees to the north with a western plunge.

1.7 Mineral Processing

BBA carried out the review of the metallurgical testwork. Following this review, two conceptual flowsheets were considered. Typically for certain type of gold ores, pressure oxidation is required before leaching in order to achieve gold recoveries of 85%. However, due to the scale of the project, pressure oxidation may not be economical; therefore a flowsheet without pressure oxidation and with a lower overall gold recovery was also considered in the present Preliminary Assessment (PA).

The basic process design criteria used in the PA are as follows:

- The production rate is 5,500 tpd of run-of-mine ore;
- The gold and sulphur content of ore are 1.7 g/t and 1.3%, respectively;
- The ore grindability characteristics are typical of gold pyrite/arsenopyrite ores. The crusher work index (CRI), ball mill Bond Work Index (BWI), and the SAG mill specific energy requirement are 10.5 kWh/t, 15 kWh/t, and 10.6 kWh/t, respectively;
- The plant will operate 365 days a year with 90% equipment utilization;
- The process flowsheet would include gravity concentration, flotation concentration, intensive cyanidation of gravity concentrate in a Gekko inline reactor, and leaching of the flotation concentrate with and without pressure oxidation pre-treatment;
- 47% of the contained gold would be recovered in the gravity concentrate, with a weight recovery of 1%;
- About 84% of the gold in the gravity tails would report to the flotation concentrate, with a weight recovery of 15%;
- 95% of the gold contained in gravity and flotation concentrates would be recovered in the pregnant solutions if pressure oxidation is used. Without pressure oxidation, it is assumed that the gold recovery would be 70%;
- 95% of the gold would be recovered during high intensity leaching of the gravity concentrate. This assumption is based on experience at Casa Berardi.

The estimated overall gold recoveries, with and without pressure oxidation are 87 and 77%, respectively. The above basic design criteria are based on limited test work and published literature. Additional test work is required to either establish or confirm some of the basic design criteria.

1.8 Mineral Resource Estimate Update (Geostat, September 2007)

Using the latest exploration data available, the mineral resource estimate has been updated by Geostat. Resources of Joanna have been estimated independently in the Hosco and Heva sectors, corresponding to the old Hosco and old Heva mines respectively as follows:

- The resource for the Hosco sector is obtained by ordinary kriging using 2m composites and classification is done using an indicated solid with limits on each bench;
- Resource for the Heva sector is obtained with interpolation by inverse of the distance using 1m composites.

Table 1-1 shows the total undiluted mineral resource for the Joanna project as of September 2007 as well as the resource estimate as of August 2007. The cut-off grade is set at 0.5 g/t Au.

Table 1-1 : Total Undiluted Mineral Resource (Geostat, September 2007)

(CoG at 0.5 g/t Au)

Resource		September, 2007			August, 2007		
		Tonnes	Grade (g/t)	Gold (oz)	Tonnes	Grade (g/t)	Gold (oz)
Mineral Indicated Resources	Hosco	8,200,000	1.6	420,000	5,398,000	1.8	309,000
	Heva	3,098,000	2.1	210,000	1,669,908	1.9	103,000
	Total	**11,298,000**	**1.7**	**630,000**	**7,067,908**	**1.8**	**412,000**
Mineral Inferred Resources	Hosco	24,300,000	1.5	1,150,000	21,838,000	1.6	1,100,000
	Heva	4,265,000	1.9	263,000	2,689,000	1.9	161,000
	Total	**28,565,000**	**1.6**	**1,413,000**	**24,527,000**	**1.6**	**1,261,000**

Since the preparation of the Technical report on the resources by Geostat in September 2007 to May 31, 2008, a total of 76,494 metres of drilling in 229 holes was drilled on the property in an attempt to improve the Inferred resource category material to Indicated or Measured resource.

1.9 Dilution

Using the resource block model, the dilution rate was estimated for both Hosco and Heva open-pit mines. The dilution was estimated by assigning a minimum working width of 5m and a contact dilution of 0.65m at the ore/waste contact. The dilution was estimated on eight (8) selected benches using the MineSight software package. From the 8 selected benches, five (5) benches were taken from the Hosco main pit and three (3) benches were taken from the Heva main pit.

The results of the estimation are as follows:

- A dilution rate of 9% at an average grade of 0.17g/t Au can be expected for Hosco;
- A dilution of 13% at an average grade of 0.06g/t Au is expected for Heva.

For the purpose of this study, an average dilution factor of 10% at a grade of 0 g/t Au is assumed for the project.

1.10 Cut-off Grade (CoG)

BBA has calculated the mill cut-off grade to be approximately 0.5 g/t Au using the economical and technical parameters used for the pit optimizations.

1.11 In-pit Resources

The pit optimization studies and mine design have delineated diluted in-pit resources as presented in Table 1-2.

Table 1-2 : Diluted In-Pit Resources for Hosco and Heva (March 2008)

(Based on a Cut-Off Grade of 0.5g/t Au)

		Hosco			Heva			TOTAL		
Material Type		Material (tonnes)	Grade (Au g/t)	Au oz (77% rec.)	Material (tonnes)	Grade (Au g/t)	Au oz (77% rec.)	Material (tonnes)	Grade (Au g/t)	Au oz (77% rec.)
Ore	Indicated	9,082,065	1.475	331,733	348,450	1.991	17,174	9,430,516	1.495	348,907
	Inferred	9,062,530	1.433	321,434	869,757	1.663	35,801	9,932,287	1.453	357,235
Waste										
	Waste	71,397,197			5,271,093			76,668,290		
	Overburden	12,395,374			348,220			12,743,594		
	Total	**83,792,571**			**5,619,313**			**89,411,884**		
	S/R	4.62			4.61			4.62		

The diluted in-pit resource contained in the detailed pit design amounts to 19.36M tonnes of ore at a grade of 1.47 g/t Au based on a cut-off grade of 0.5g/t Au. The amount of stripping is 89.41M tonnes for an overall mine-life strip ratio of 4.62 tonnes of waste per tonne of ore.

The total metal recovered is 706,142 ounces of gold using a mill process recovery of 77%. For the Hosco sector only, the total metal recovered is 653,167 ounces of gold, representing 93% of the total metal.

1.12 Mining Plan

Due to the relatively small amount of resources in the Heva pit (less than 53,000 oz Au metal vs. over 653,000 for Hosco pit) as well as the 3 km long haul distance to the primary crushing plan and waste dump, the Hosco pit has been selected as the main target for initial development. At this stage of the PA, the Heva pit will not be included in the mining plan.

Mining will follow the standard practice of an open-pit operation with conventional drill and blast, load and haul cycle using drill/truck/shovel mining fleet. The overburden and waste rock material will be hauled to the overburden and waste disposals near the pit.

In terms of mill throughput, BBA has envisaged that the resource should be mined in a period between 8 to 10 years. Based on a mining rate of 5,500 tpd on the Hosco sector only, the mine life is approximately 9 years. If the exploration drilling increases the mineral resources, a higher production rate would probably be a better choice.

Owners' mining is envisaged for the development of Joanna project while the removal of overburden will be carried out by contract mining.

1.13 Waste Material Management

Overburden material will be placed in a nearby dump site. A significant portion of overburden will be used for the tailings dam construction and as well as for reclamation work.

The overburden and rock waste dumps have been designed according to the waste and overburden requirements from the designed pits and are located around the periphery of the mine to minimize the haulage distance and reduce costs.

Two (2) waste disposal dumps will be constructed for the Joanna mine operations:

- The Hosco waste dump, located along the north-west side of the main pit with a total capacity of 34 million m^3 (70 million tonnes);
- The Hosco overburden dump, located north-east of the main pit with a capacity of 8 million m^3 (12.3 million tonnes);

In order to reduce the waste dump's footprint, the possibility of in-pit backfill should be considered during the project Feasibility Study stage.

1.14 Mine Equipment

The selection of the mine equipment is carried out using the following criteria:

- The main loading equipment is the hydraulic O&K front shovel RH-90C (or equivalent) with a rated bucket capacity of 10 m^3;
- A secondary loading equipment is the front loader 992G with a bucket capacity of 10 m^3;
- The trucks are Caterpillar 777 (or equivalent) with a capacity of 91 metric tonnes (100 short tons);
- The drills are DM45 Atlas Copco (or similar) with a hole diameter of 6.5 inches.

In order to perform routine road maintenance and various other functions within the mine, service equipment has also been selected.

Table 1-3 shows the list of mining and support equipment required over the life-of-mine.

Table 1-3 : Major Mine Equipment List for 5 500 tpd

Type	2010 Yr 0	2011 Yr 1	2012 Yr 2	2013 Yr 3	2014 Yr 4	2015 Yr 5	2016 Yr 6	2017 Yr 7	2018 Yr 8	2019 Yr 9
Front Shovel (RH90)	1	1	1	1	1	1	1	1	1	1
Haulage Truck (777)	5	6	6	6	6	6	5	5	5	5
Wheel Loader (992G)	1	1	1	1	1	1	1	1	1	1
Wheel Dozer (824H)	1	1	1	1	1	1	1	1	1	1
Track Dozer (D9T)	2	2	2	2	2	2	1	1	1	1
Motor Grader (16H)	1	1	1	1	1	1	1	1	1	1
Water Truck (10,000 liters)	1	1	1	1	1	1	1	1	1	1
Compactor	1	1	1	1	1	1	1	1	1	1
Small Excavator (324D)	1	1	1	1	1	1	1	1	1	1
Utility Trucks [1]	5	5	5	5	5	5	5	5	5	5
Drill (DM45 or equivalent)	1	1	2	2	2	2	1	1	1	1
Total Fleet	20	21	22	22	22	22	19	19	19	19

1.15 Infrastructure

1.15.1 Relocation of the Railroad

The railroad, owned by "Compagnie des Chemins de Fer Nationaux du Canada", presently crosses the future site of the Heva open-pit mine and near the Hosco open-pit. The railroad has to be relocated at a safe distance outside the pit limits without interruption of service.

The approximate length of the railroad to be relocated is 4 km, beginning less than 1 km west of the Hosco pit and ending 1 km from the eastern extremity of the Hosco pit.

The majority of the material for construction will use waste rock from the open-pit mine.

1.15.2 Electrical Power

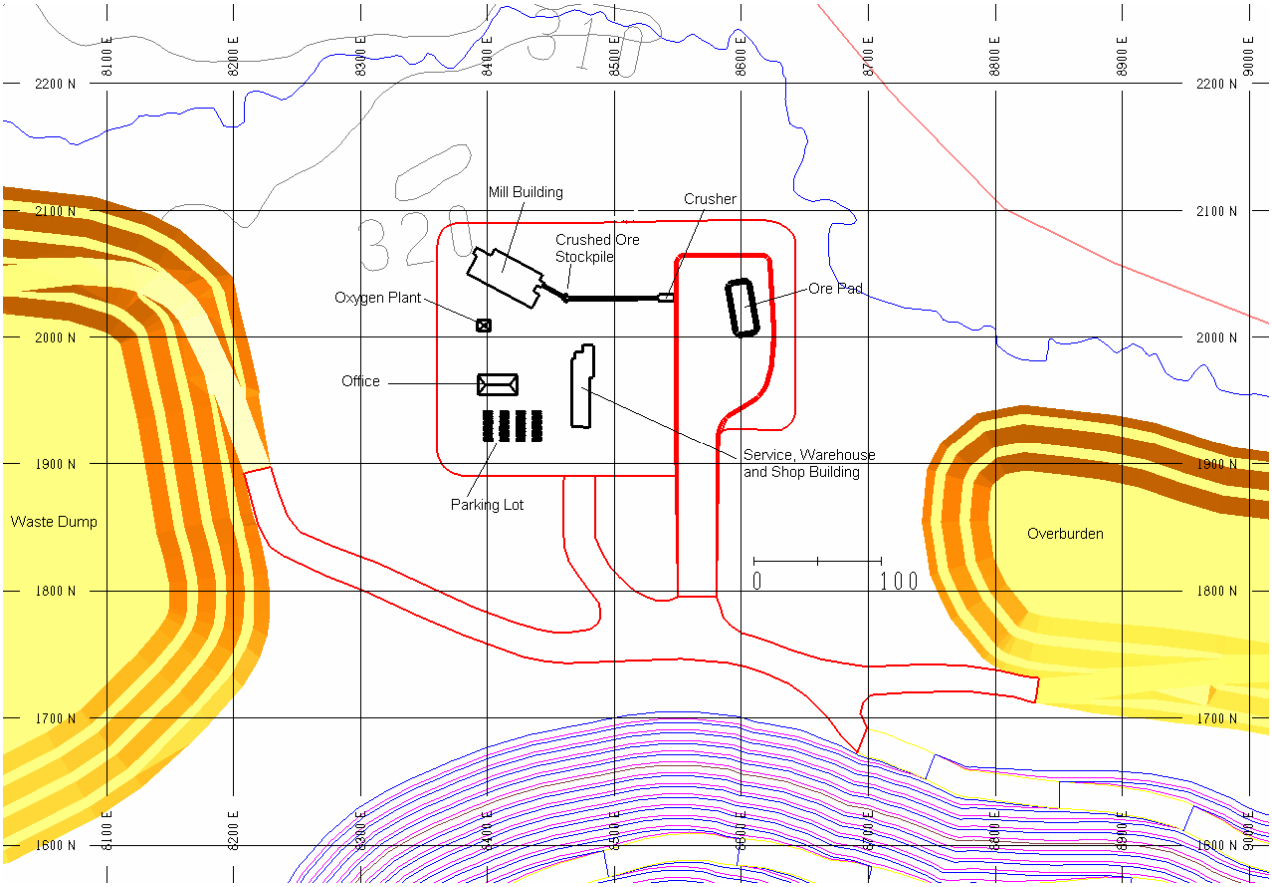
Based on discussions with the TransEnergie overseeing the Abitibi region, a derivation of the 120 kV line wood posts will have to be built by Hydro-Quebec over a length of approximately 2.7 km from one of the three existing 120 kV lines, namely L1313, L1322 and L1306, going through the area. Hydro-Quebec has pointed out that the three obsolete lines have a limited capacity, but would probably have sufficient capacity to provide a new load varying from 15 to 20 MW. In the event of any electrical power supply problem, Hydro-Quebec will proceed to the reinforcement of one of these three 120 kV lines. As the majority of the mining equipment is diesel powered, only a single 120-4.16 kV of 15/20 MVA transformation is required for the Joanna project.

1.15.3 Civil Structure

The processing site is located near the Hosco pit entrance and includes a workshop, a warehouse, a fuelling station and an administrative office nearby.

Figure 1-1 shows the general arrangement of the site facilities.

Figure 1-1 : General Site View



1.15.4 Tailings Management

Three (3) possible locations have been considered for the construction of the tailings impoundment. Each option represents a tailings pond capacity of 12 million m^3. The total height of the dam is 11m for Option 1, 7m for Options 2 and 3.

1.16 Cost Estimate for the Base Case Scenario

The capital and operating costs have been estimated using the following assumptions:

- The mining rate is 5,500 tpd;
- Mining the Hosco sector only;
- No autoclave oxidation;

The range of accuracy of the capital and operating cost estimates are +/- 35%.

1.16.1 Capital Costs

The capital costs include the purchase of all mining equipments, the mill, the infrastructures and indirect costs. A 20% contingency allowance is included in the cost estimate for further detailed designs and investigations. The total capital cost is estimated at $140.6 million, including pre-production costs. The capital expenditures have been assumed to occur during construction years -1 and 0.

1.16.2 Operating Costs

The operating costs include all mining costs, the crushing, processing and the administration costs.

Overall operating costs have been calculated and are summarized as follows:

- Mining : 2.00($/t mined
- Crushing and processing : 6.93($/t milled)
- General and Administration : 0.60($/t milled)

1.17 Alternate Mining Scenario

As an alternate mining scenario to improve the economic potential of the Joanna deposit, a production schedule based on a mining rate of 7,500 tpd and a 6.5-year mine life was prepared using the following assumptions:

- Mining the Hosco sector using a production rate of 7,500 tpd;
- Inter-ramp pit slope angle of 55°;
- No autoclave oxidation plant;
- 30% reduction on purchase of used or foreign-sourced process equipment.

The Hosco in-pit resource resulting from the alternate mining scenario amounts to 9.1 millions tonnes in the indicated category at an average grade of 1.5 g/t Au for a total of 332,000 oz Au after recovery and 9.1 millions tonnes in the inferred category at an average grade of 1.4 g/t Au for a total of 321,000 oz Au after recovery. The stripping ratio is 3.4.

Under these parameters, the mine operating costs have been adjusted. The operating cost for the mine is $1.84/tonne mined, $6.23 milled for the processing and $0.43/tonne milled for the administration. The capital cost has also been adjusted to the amount of $152.0 million.

BBA is confident that the purchase of used or foreign-sourced process equipment, to lower the cost by 30%, is a realistic option. BBA is also confident that a 7,500 tpd production rate is feasible. Additional geotechnical investigation would be required to confirm the use of a 55° inter-ramp pit slope angle. However, it is considered that a 55° inter-ramp angle is reasonable in view of the rock conditions at other mining operations in the region. The alternate mining scenario demonstrates the best attractive option and is retained for the for the development of the Joanna property.

1.18 Environment

In order to minimize or eliminate green-house gas emissions and the impact of mining activities to the surrounding areas, the Joanna project will be developed with a green mining operation approach from the project design stage to the construction, operation and closure stages.

1.18.1 Green Mining

Green mining at Joanna involves an attachment to a corporate sustaining development policy which has to be in force on all of the existing operations of the company with a special emphasis on the following:

- Environmental approach for the whole life cycle of the mine, from concept through closing plan;
- Emphasis on tailings management that has to be restored to Green (forest) state or close to pre-existing environment;
- Use of recycled materials as much as possible;
- Use energy efficient process for production (solar panels, windmills, etc.);
- Minimize water consumption (recycle as much as possible);
- Commitment to implement good environmental practices;
- Need a good and green closure plan, i.e. to determine what and how the waste and tailings areas will be used for: agricultural (energy producing crops), forestry, wild life preservation, etc. ;
- Involve the surrounding communities from the early stages.

1.18.2 Sustaining Development

The development of mineral resources will adhere to the economic environment, physical environment and social environment in a 10 principles policy as follows:

Economic Environment

A. Responsible Production and consumption
B. Economic efficiency

Physical Environment

C. Environmental protection
D. Biodiversity preservation
E. Protection of cultural heritage
F. Prevention

Social Environment

G. Health and quality of life
H. Participation and commitment
I. Social equity and solidarity
J. Access to knowledge

1.19 Potential Areas for Improvement

The main area for potential improvement to the project is to complete the exploration drilling between the two proposed pits in the attempt to connect them and to increase the in-pit resources.

1.20 Recommendations

Based on the results of the Preliminary Assessment of the Joanna property, recommendations for the Project are as follows:

- The preliminary assessment is based on a substantial amount of resources classified in the inferred category and consequently, the reliability of the estimate is uncertain. BBA recommends that a drilling program be carried out to increase the indicated and measured resources, as well as to convert the inferred resources into indicated or measured resources. The drilling program should focus on high grade zones in order to increase the average grade;

- Additional geotechnical work is recommended to characterize the pit slope in the hard rock;

- Further testwork to evaluate the potential for acid mine drainage of the waste rock and ore;

- Environmental organizations should be consulted and negotiations should begin concerning the destruction of swamp areas;

- The Compagnie des Chemins de Fer Nationaux du Canada should be contacted on the subject of the railway deviation.

In addition, BBA recommends the following:

- To investigate cheaper alternatives to pressure oxidation;

- To establish the optimum gold recovery that can be achieved without pressure oxidation on representative ore samples (i.e. ore samples containing about 1.7g/t Au.) This would include:

    - Whole ore cyanidation tests on representative ore samples (i.e. ore containing about 1.7g/t Au);
    - Conventional leaching tests on representative gravity and flotation concentrates, without oxidation pre-treatment;
    - Intensive leaching tests of representative gravity and flotation concentrates.

- Carry out grindability and Gravity Recoverable Gold (GRG) tests to better define the grinding circuit for the Joanna project.

As drilling continues on the Joanna project, BBA believes that there is potential to improve the inferred resources category material to measured or indicated resources as well as potential for the expansion of the resources. BBA recommends the project to be advanced to the next phase with the commissioning of a pre-feasibility study on the Joanna project.

The budget estimate to conduct such a pre-feasibility study on the Joanna gold project, including the current in-fill and exploration drilling program on the property, is as follows:

Table 1-4 : Cost Estimation for Pre-Feasibility Study

Cost Estimate - Pre-Feasibility Study	**Cost**
Items	($)
Diamond Drilling (44,000m @ $105/m)	4,620,000
Resource Update	60,000
Metallurgical Testwork	250,000
Pit Slope Stability - Tailings Storage	250,000
Environmental Impact Assessment	80,000
Pre-Feasibility (including consultant Fees)	300,000
Sub-total	5,560,000
Contingency - 10%	667,200
Total Pre-Feasibility	6,227,200

2. INTRODUCTION

2.1 Introduction

BBA Inc. (BBA) was mandated by Aurizon Mines Ltd (Aurizon) in October 2007 to undertake a Preliminary Assessment (PA) for the Joanna Gold Project in Rouyn-Noranda, Quebec.

The objective of the PA is to estimate the potential in-pit mineral resources for a stand-alone open-pit operation based upon a new estimation of the mineral resources.

The scope of work of the present study includes the following:

- Open-pit optimization and assessment;
- Preliminary mine design and production schedules;
- Review of metallurgical testwork and mineral processing options appropriate to provide the best economic returns;
- Prepare a simple infrastructure for site facilities, waste disposal, tailing ponds, etc.;
- Order of magnitude capital and operating costs estimates;
- Discussion on possibilities concerning environmental issues, sustainable development and green mining approach;
- Recommendations: issues, opportunities and future work.

2.2 Basis of the Technical Report

The PA study was carried out using information contained in, but not limited to, the following reports and documents:

- A Technical Report prepared by Geostat International Inc titled “Resource modeling and estimation update of the Joanna gold deposit”, October 2007;
- A report titled “Essais métallurgiques sur le minerai Joanna” prepared by the URSTM in April 2007;
- A report titled “Étude de caractérisation environnementale de la propriété Joanna” prepared by ROCHE in December 2007;
- A report titled “Étude de planification stratégique de la propriété Joanna” prepared by ROCHE in November 2007;
- A report titled ‘’An Investigation of the Recovery of Gold from Hosco-Heva project samples’’ prepared by Lakefield Research in April 1987;
- A report titled ‘’Essai de lixiviation de l’or du minerai de Heva-Hosco’’ submitted by Centre de Recherches Minérales in November 1987;

- A report titled ‘’Essai de lixiviation diagnostique sur le minerai Joanna’’ prepared by the URSTM in July 2007;

- Three reports titled ‘’Tests gravimétriques, rapport d’étape no. 1’’, ‘’Tests gravimétriques, rapport d’étape no. 2’’ and ‘’Tests de flottation, rapport d’étape no. 5’’ prepared by Laboratoire LTM Inc. from August to December 2007.

A detailed list of the source of information is given in Section 22 in this report.

Unless stated otherwise, all currencies are expressed in Canadian dollars (C$).

2.3 Site Visit & Qualified Persons

A site visit was conducted by Patrice Live and Isabelle Leblanc of BBA in September 2007 for general acquaintance with the property and verification of potential dump site as well as general infrastructures location.

This report is based on the Preliminary Assessment study conducted by BBA on the Joanna project, on information from the Technical Report titled “Resource modeling and estimation update” submitted by Geostat and both were prepared by a Qualified Person following the guidelines of the “Canadian Securities Administrators” National Instrument 43-101 and Form 43-101F1 and in conformity with generally accepted CIM “Exploration Best Practices” and “Estimation of Mineral Resources and Mineral Reserves Best Practices” Guidelines.

3. RELIANCE ON OTHER EXPERTS

The qualified persons preparing and supervising this Technical Report have not relied on a report, opinion or statement of a legal or other expert, who is not a qualified person for information concerning legal, environmental, political or other issues and factors relevant to the Technical Report.

4. PROPERTY DESCRIPTION AND LOCATION

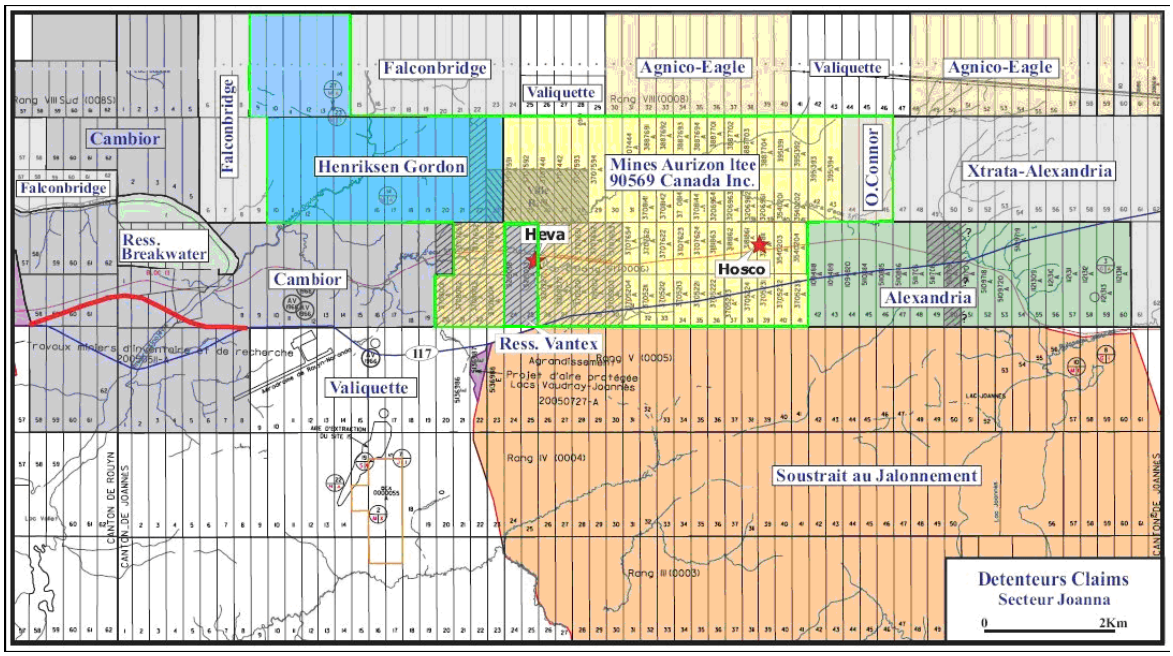
4.1 Location

The Joanna project is located along the Cadillac Break, in the Joannès Township. The property is situated 20 km east of Rouyn-Noranda, next to Highway 117, in the province of Quebec. The project is located on map 32D02 of the NTS system. The Joanna project is located two (2) km north-east of the Rouyn-Noranda airport. The general location of the mine is shown in Figure 4-1.

Figure 4-1 : Joanna Property - Location Map

The Joanna property extends east-west for more than 8 km and reaches 3 km in width. The 2,608 ha property is comprised of 92 contiguous claims (green contours, Figure 4-2 below). The property is accessible via a gravel road to the old shaft collar of the Hosco mine. Some concrete slabs remain as evidence of the previous mining activities. The north-south gravel road crosses a railway line, which runs east-west.

Figure 4-2 – Joanna Claims with Green Contours



4.2 Royalties

Pursuant to a letter of intent dated June 29, 2006, Aurizon has an option to earn a 100% interest in the Joanna claims, subject to a 2% net smelter royalty, by incurring exploration expenditures of $3.5 million over three years, payments of $500,000 in cash or shares and the issuance of 50,000 shares of Aurizon. On December 31, 2007, the equivalent of $300,000 in cash, or shares, has been paid and the exploration expenditures of $3.5 million have been completed. An advance royalty of $500,000 is payable upon completion of a feasibility study on the Joanna claims**.**

Early 2007, Aurizon acquired for cash a 100% interest in three claims from Terrence O'Connors. The claims are situated along the eastern boundary of the property and along the strike of the gold bearing system. Aurizon plans to initiate a surface drill program on these claims in 2007. No royalty is payable on the O'Connor claims.

Aurizon has also signed an agreement to acquire, by way of option, a 100% interest in the Henriksen block, subject to a 2% net smelter royalty, from Crus Tal Exploration. To earn a 100% interest in the Henriksen Property, Aurizon will be required to incur aggregate exploration expenditures of $350,000 and make cash payments totaling $100,000, over three years.

At the end of summer 2007, Aurizon has also signed a letter of intent to acquire Vantex's 75% interest in the Joanna-Heva property. Aurizon's letter of intent to acquire Vantex's 75% interest in the Joanna-Heva Property is subject to an underlying 1% net smelter royalty interest. Stellar Pacific Ventures Inc. owns the remaining 25% interest in the property. In order to earn the 75% interest in the Joanna-Heva property, Aurizon will make cash payments over a twelve (12) month period and Vantex will retain a 1.5% net smelter royalty. Aurizon has an option to buy back 50% of the Vantex royalty at any time. Vantex will be entitled to advance royalties at certain milestones including feasibility and commercial production.

5. ACCESSIBILITY, CLIMATE, WINDS, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHIC

5.1 Accessibility

The Joanna property lies approximately 20 km east of Rouyn-Noranda, along the Highway 117. Provincial road 117 connects Rouyn-Noranda to Montreal. The property is accessible via a gravel road to the old shaft collar of the Hosco mine. The north-south gravel road crosses a railway line, which runs east-west. The nearest commercial airport, Rouyn-Noranda Airport, is located two (2) km south-west of the property.

5.2 Climate and Precipitation

The area has average temperatures ranging from -16°C in winter to 17°C in summer. The average annual temperature is 1.6°C and the average total precipitation is 926 mm. Rain precipitation is highest in September, averaging 103 mm of water. Snow precipitation is registered between October and April, but its peak falls on the period between November and March, when its monthly average reaches 26 mm, expressed in mm of water.

5.3 Winds

The anemometric data collected in Val-d'Or between 1961 and 1991 show that from June to January the southwest winds are dominant, whereas from February to May the winds coming from the northwest are most frequent. Furthermore, in this sector, the winds have an average velocity varying between 11 and 14 km/h for an average of 13 km/h during the year.

5.4 Local Resources

The Abitibi region has a long history of mining activity, and mining suppliers and contractors are locally available. The town of Rouyn-Noranda has a population of more than 39,000 citizens. Rouyn-Noranda and Val-d'Or could provide qualified personnel for a new mine. All major services are available in these cities. The area is traditionally a mining area with several mines in operation and active exploration companies.

5.5 Infrastructure

Some concrete slabs remain as witness of the past mining operations. The old shaft collar of the Hosco mine is accessible via the north-south gravel road and crosses an east-west railway. A 120 kV power line passes 2.7 km north of the Hosco deposit while local electrical distribution is provided from the power line along Highway 117.

5.6 Physiographic

Topography is generally flat. The elevation varies between 300 and 320 meters above sea level. A 350m above sea level hill is located south-east of the Hosco deposit. The property is poorly drained and mainly covered by a swamp. The slope is gently dipping towards the north in the swamp. The Joanna property overburden has a thickness of 5 to 15 meters. Its composition is as follows: a thin layer of organic material and a layer of silt and clay.

The Joanna property overburden has a thickness of 5 to 15 meters, composed of a thin layer of organic material and a layer of silt and clay. The vegetation of the surrounding area is characterized by trembling aspens and balsam poplars. Formations of balsam fir trees are in pure settlements or associated white spruce and, to a lesser extent, black spruce are present. The Stitchman stream crosses the property.

6. HISTORY

The principal source of the following historical information is M. Jean Descarreaux's report of March 1985 titled "Report on the Hosco Property". All the following historical statements of resources or reserves are not NI 43-101 compliant and their reliability has not been established. They are provided only for historical reference purposes.

The Hosco gold property has been explored over the last sixty years by various owners and optionees, as indicated below:

1944-1945: Hosco Gold Mines conducted a Magnetic survey and 81 diamond drill holes totaling 20,000 meters.

1946: Sinking of an inclined shaft (55°) to a vertical depth of 131 meters. Three levels opened, i.e. 40 meters, 80 meters, and 120 meters.

1946-1947: Drifting and crosscutting on the three levels as indicated below:

Level	Vertical depth		Drifts+ Xcuts	
	Metres	feet	Metres	feet
1	40	130	95	312
2	80	260	1042	3419
3	120	395	1262	4140
			Total: 2399	7871

1948-1949: Production at a rate of 100 tonnes/day. A total of 45,872 tonnes grading 6.58 g/t were extracted from 9 shrinkage stopes and milled at the nearby mill of McWatters Gold Mines Ltd.

Mill head was 4.90 g/t.

1949: Production stopped. Proven ore reserves of 75,344 tonnes grading 9.60 g/t.

1949-1972: No work is reported to have been conducted on the property.

1972: The property is staked by G. and Y. Vezina.

1973: Ore reserves calculations by Derry, Mitchener and Booth: probable and possible reserves amount to 954,556 tonnes grading 5.14 g/t.

1979: SOQUEM acquires the mining rights. Relogging of the 1944-1945 diamond drill holes. Some sections are reassayed.

1980-1981: SOQUEM drilled 7 holes totaling 1,128 meters.

Compilation of previous work and ore reserves calculations by SOQUEM: a total of 612,440 tonnes grading 4.30 g/t in the probable and possible categories.

1984: SASU Investments Inc. acquires an option on the Hosco property.

Drilling of 10 holes totaling 2,988 meters.

New ore reserves calculations by Louvicourt Mining Management Company Ltd. Ore reserves amount to 1,081,620 tonnes grading 4.10 g/t all in the drill indicated category.

SASU Investments Inc. acquires an option to the property. An economic evaluation by Roche Ltd. resulted in outlining the same ore reserve as that completed by SOQUEM. Ten diamond drill holes totaling 2,988m were completed.

1985: Jean Descarreaux and Associates Ltd. completed an economic assessment and review of the SOQUEM and Louvicourt Mining Management reserve estimates.

1986-1987: Louvicourt Mining Management Ltd., agent for Eastern Mines Ltd. and Silver Sceptre Resources Ltd. completed a $4.1 M exploration program consisting of 9,798 m of diamond drilling to depth of 100 m, 389 m of overburden drilling, 484 m of exploration ramping to a vertical depth of 107,392 m of crosscutting, 238 m of drifting, 20 m of raising, and extraction of approximately 21,555 tonnes at 2.65 g/t of mineralization stockpiled on surface. This stockpile remains in place on surface.

Metallurgical testing of four 10 kg drill core samples by the Canmet and the Centre de Recherche Minerales in Sainte Foy Quebec and metallurgical testing of one composite core sample by Lakefield Research was also completed. A sample of the Lakefield flotation concentrate was sent to Hydrochem Developments for an evaluation of the NITROX process using the Hosco gold mineralization. A total of 15 grab samples of Hosco mineralization and 15 grab samples of Hosco barren waste rock was collected in order to estimate the specific gravity of the Temiskaming Group sediments and the gold-bearing mineralization.

1997: The access ramp was blocked and the portal was filled in at the request of the minister of the environment of Quebec for security purposes.

1998-2004: 1149127 Ontario Inc. acquires 100% interest in its mining claims. There are no outstanding obligations on these claims except for a 1% net smelter royalty held by Cambior (Vallée 2004).

1149127 Ontario Inc. property transfer to 90569 Canada Inc. in a name change.

2004: Chris Davis MSc. P. Geo conducted an assessment of the historical works on the Heva-Hosco property for 90569 Canada Inc.

2006: Aurizon Mines Ltd. optioned the property in June from 90569 Canada Inc. as detailed conditions in the previous property description. A total of 2% net smelter royalty is held by 90569 Canada Inc. and IAMGOLD (formerly Cambior). Computerization of the historical data and initiation of an independent estimation of resources by Geostat Systems International Inc.

Geology on the field during summer 2006 by Aurizon:

- 3 days of geological field work completed.
- 33 rock samplings done on the low grade ore pad close to the Hosco and Heva shaft location and on some of the outcrop. The mineralized samples will be used to connect the content to certain visual criteria (such as type and quantity of sulphides and the alteration).

- Visit to 8 outcrops located south of the Cadillac break, up to 1.5 km around the old Hosco mine infrastructures. The mapping and the measurements collected in the environment of the quartz veins allowed to connect the concentrations of veins to the development of folds of few meters of amplitude inside the main foliation associated to the corridor of the Cadillac fault. Those structural features show a plunge dip to North West between 50 and 65°.

2007: Startup of exploration and validation with diamond drilling and completion of the first NI 43-101 compliant historical resource estimates by Geostat.

Startup of the Technical Report on the Preliminary Assessment study for the Joanna gold project by BBA.

Drilling of 104 holes for 46,916m on the Joanna property.

For the West block (Heva) the principal source of the following historical information is Mr. Chris Davis M.Sc. P.Geo report of August 15th 2004 "Review and assessment of the Hosco-Heva Gold Property". All the following historical statements of resources or reserves are not NI 43-101 compliant and their reliability has not been established. They are provided only for historical reference purposes.

The Heva gold property has been explored over the last sixty years by various owners and optionees, as indicated below:

1944-1945: Heva Cadillac Gold Mines Ltd. drilled 56 diamond drill holes totaling 9,960 m. A-50 degrees N inclined three compartment shaft was excavated to a vertical depth of 122 m. Underground work consisted of drifting and crosscutting on 84 m and 122 m levels.

1946: Company name change to Heva Gold Mines Ltd.

1947: The shaft was deepened to a vertical depth of 177 m and the 160 m level was excavated.

1948: Mines and Resources Canada completed an investigation of the Heva gold mineralization. The report indicated that the 99% of the gold could be recovered by direct cyanidation. Seven underground drill holes were completed from the 122m level. Nine surface drill holes were completed. Operations were suspended and the mine was allowed to fill with water.

1951-1953: The mine is dewatered and underground operations are resumed. A total of 47,475 tonnes of ore grading 6.86 g/tonne Au was produced before the operations are stopped due to a shortage of mine labour. A total of 960 m of drifting and crosscutting was completed from 1946 to 1953.

1975: Yvon and Gaston Vezina acquire the mining rights.

1978-1981: SOQUEM Exploration options the property. The surface geology is mapped and the base line resurveyed. A total of 6,920 m of surface diamond drilling is completed.

1982: SOQUEM Exploration completed a detailed mineralogical study. This consisted of 69 thin sections from the 1980 and 1981 diamond drill core.

1983: SOQUEM Exploration completed a humus geochemical survey.

1984: SASU Investments Inc. acquires an option to the property.

1985: New Goldcore Ventures and Amberquest Resources Ltd option the Heva Block. Norgold Management Ltd. agent for New Goldcore Ventures and Amberquest Resources Ltd. hired Ovaltex Inc. to complete 28 surface diamond drill holes totaling 7,967 m.

1986-Jul. 1987: Louvicourt Mining Management, agent for Eastern Mines Ltd. and Silver Sceptre Resources Ltd. completed 11,126 m of surface diamond drilling and installation of the following surface infrastructure; access road, powder storage, sedimentation basin, septic system, new power line, service building, dewatering facilities, hoist and a head frame in preparation for completion of an advanced underground exploration program. The program was suspended on July 28, 1987 due to surface overburden caving into stope 2-15 shortly after dewatering had started.

August 1987-1988: Starting on August 1, 1998 Louvicourt Mining Management Ltd., agent for Eastern Mines Ltd. And Silver Sceptre Resources Ltd. completed a revised advanced exploration program. It consisted of 7,614 m of surface diamond drilling, and an evaluation of the 2-15 cave in area, sinking of vertical three compartment 7 m by 3 m shaft to a depth of 227 m, 260 m of cross cutting, 122 m of drifting on the new 200 m level and 148 m of underground bazooka drilling. The 2-15 stope assessment consisted of a seismic survey, overburden drilling, 32 diamond drill holes and an overburden analysis. Shaft stations were excavated to correspond to the same levels within the old workings and a 40 m pillar was established above the new 200 m level. A loading pocket was established on the 200 m level. A total of 1,386 tonnes of mineralization was extracted and piled on surface.

1999: T. P. O'Connor acquired Lots 24 and 25 in Range VI of Joannes Township

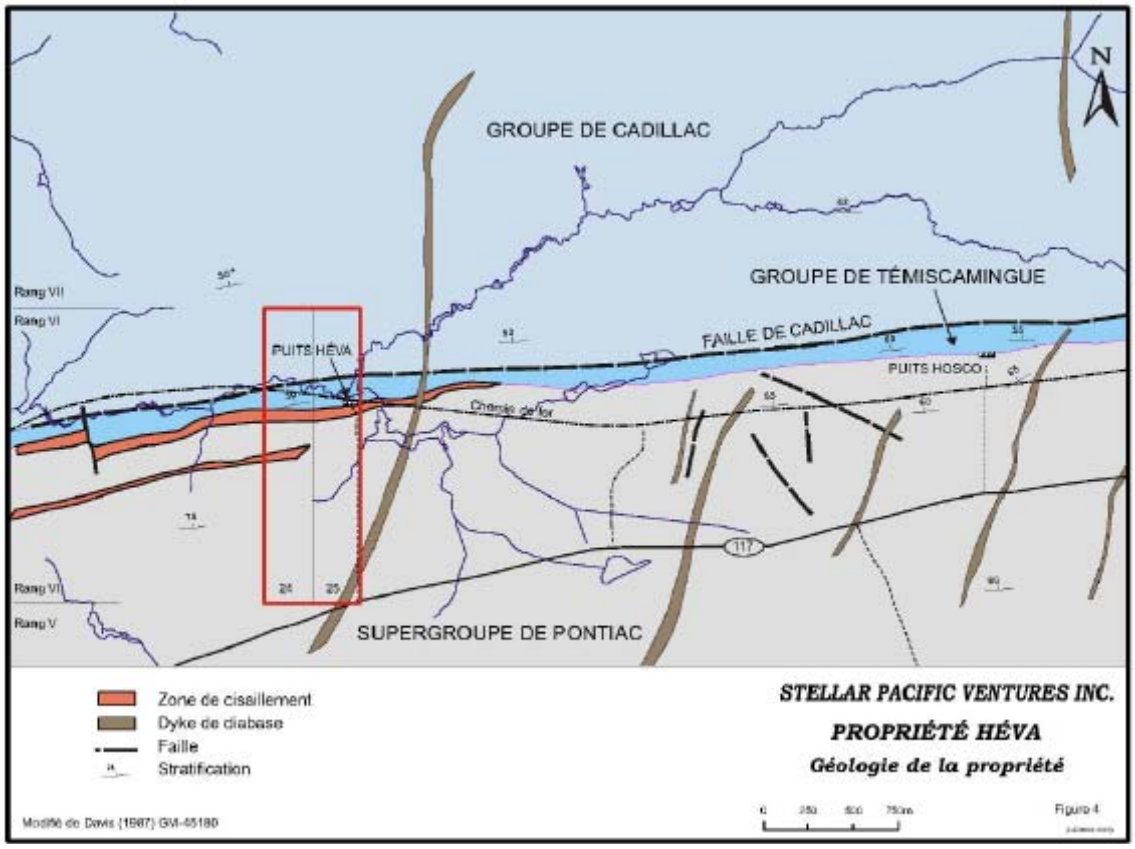
In 2004, mineral rights are transferred to Vantex Resources Limited from O'Connor and Gauthier.

In 2005, Stellar Pacific Ventures signs agreement to carry out exploration work and acquire 25% of the property. Figure below shows Claims location on which Stellar has carried out exploration work in 2005.

In 2007, Aurizon signs agreement for the acquisition of 100% of the 75% Vantex ownership of the two Heva claims.

Figure 6-1 presents the location of the Heva Vantex-Stellar claims.

Figure 6-1 – Heva Vantex-Stellar Claims Block (from Pierre O'Dowd report)



7. GEOLOGICAL SETTING

7.1 Regional Geology

The following information is based on three sources: Descarreaux's 1985 report, an internal report prepared by Ghislain Fournier P. Eng. of Aurizon in January 2006 and information provided by Martin Demers P.Geo of Aurizon.

The Joanna property (formerly the Hosco-Heva) is situated in Joannes Township in the south central portion of the Abitibi Greenstone Belt, within the Superior structural province of the Canadian Shield. All rocks are Archean in age except for the late crosscutting Proterozoic diabase dykes.

The Rouyn-Noranda mining district is well known for its polymetallic volcanogenic massive sulfides deposits associated with the Blake River Group but several gold only deposits in the immediate vicinity of the Cadillac Break have been defined over the years.

Thick sequences of Archean lavas of the Blake River Group, aged between 2,696 million years and 2,690 million years and ranging form the Southern part of the Abitibi geological Sub-Province. Pyroclastic equivalents of mafic to felsic lavas occur intercalated with massive flows. Younger flyshic and locally fluviatile sedimentary sequences aged between 2,690 and 2,676 million years sit on top of volcanic domain and form continuous units in a East-West direction. Volcanic assemblages are internally tightly folded developing a regional losangic or lenticular shaped pattern with mostly sub-vertical north or south dip.

A wide variety of syn-volcanic to late tectonic intrusive rocks ranging from peridotite to hyperaluminous granite occur throughout the region. Proterozoic diabase dykes trend northeast-southwest and occur discordant to all lithologies. Metamorphism vary from subgreenschist to greenschist facies throughout the region and increases quickly to amphibolite facies immediately South of the Cadillac Break in the Pontiac Sub-Province.

The main structural feature of the region is the Cadillac Break. It is a large-scale regional tectonic feature extending for 200 km from Kirkland Lake Ontario to Val d'Or Quebec. It generally strikes east-west and dips northward and is characterized by a wide zone of talcchlorite schist separating the Temiskaming and Cadillac groups. Other local scale north easterly trending faults occur throughout the region.

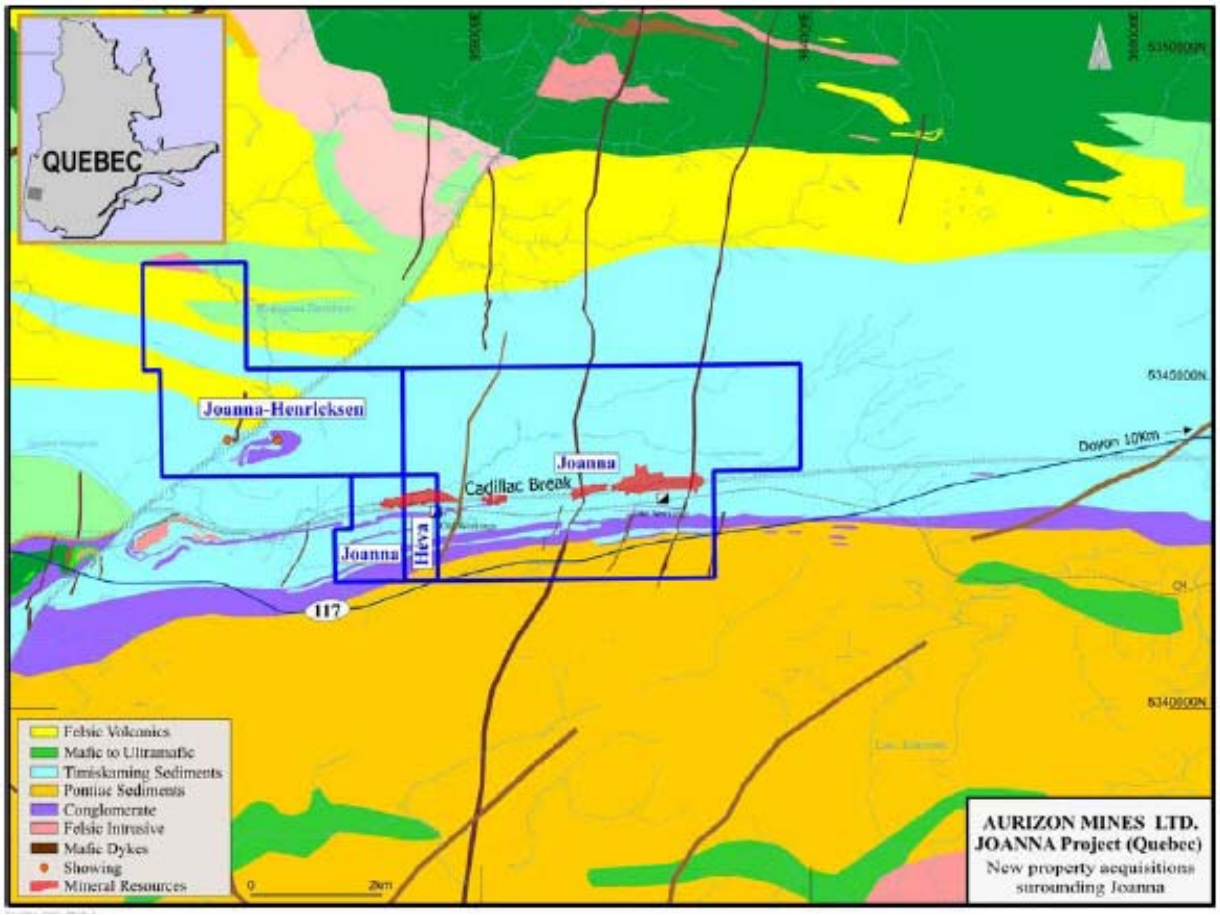
A number of gold showings occur in the region typically associated with the Cadillac Break. Besides the Hosco and Heva old mines, the previously mined McWatters gold mine is the best-known gold deposit near the property.

7.2 Local Geology

The east-west striking zone favourable for gold mineralization is closely related to the Cadillac fault. It is underlain from south to north by sedimentary rocks of the Pontiac, Temiskaming and Cadillac groups. The Pontiac and Temiskaming Groups are mainly composed of graywackes. Temiskaming Group is identified by extensive polygenic conglomerate units. A tuffaceous horizon of felsic composition marks the contact between the two groups while the Cadillac fault occurs at the top of the Temiskaming Group. The Cadillac group occurs north of the Cadillac fault. It mainly consists of greywacke with siltstone, mudstone and arkose units.

Figure 7-1 shows the local geology of the Joanna property.

Figure 7-1 – Geology Map with Property Boundaries in 2007

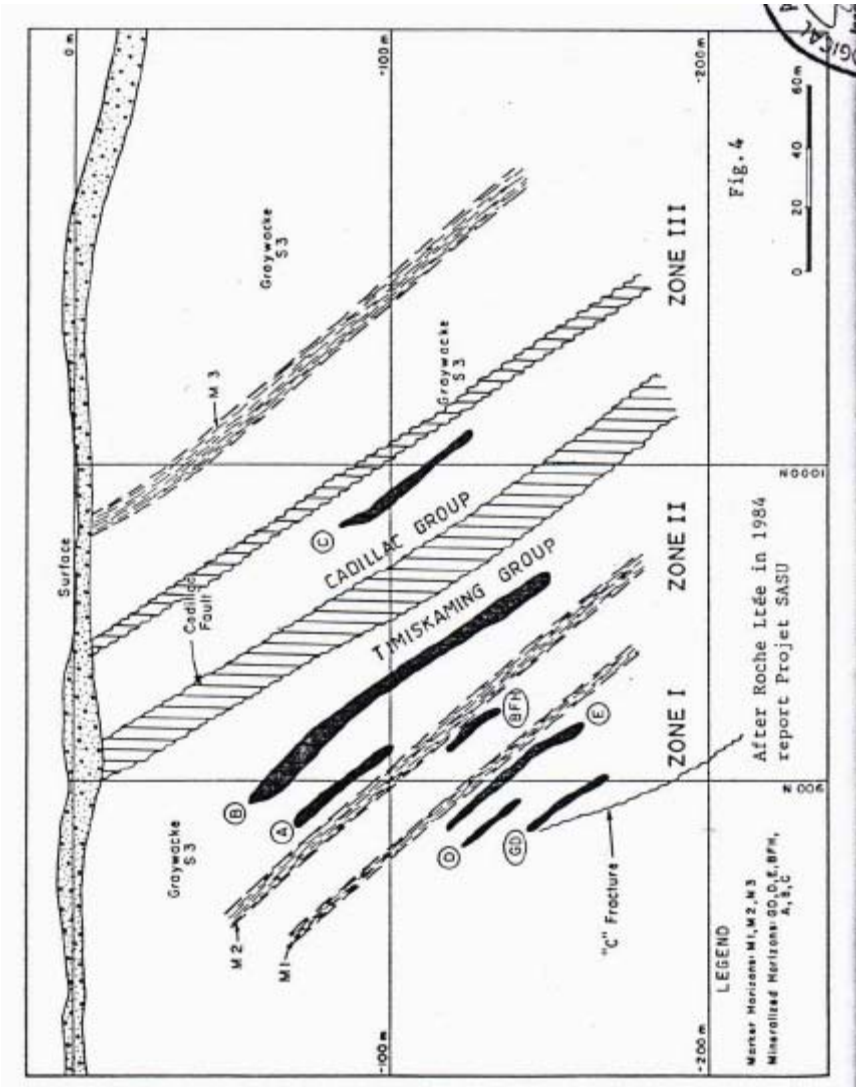


8. DEPOSIT TYPES

The gold deposit at Joanna may be described as a sediments hosted orogenic gold deposit related to the structural control of the Cadillac fault. Mineralization is mainly developed in the form of finely disseminated sulfides envelopes (pseudo-lenses) with minor quartz veining in Cadillac Group sediments in contact with mafic layers corresponding possibly to sill. The main brittle-ductile deformation comprising the Cadillac Fault is concentrated in these metasedimentary layers. The genetics of the deposit has not been studied in detail. Historically, previous exploration was focused on quartz veins within the deformation and mineralization corridor where gold was present in higher grades.

Figure 8-1 shows a cross section of the mineralization.

Figure 8-1 – Historical Cross Section of the Mineralization (After Roche SASU in 1984)



9. MINERALIZATION

The description of the mineralization is based on information from different reports included in the References section of Geostats' Technical Report, site visit observations of core and information provided by Aurizon geologists.

Gold appears to be mainly associated with finely crystallized sulfides in a biotite rich schist with minor deformed millimetric to pluri-centimetric quartz veins. Mineral assemblage also includes variable concentrations of white mica, carbonate, albite, garnet, and possible other alumino-silicates. Amphibole and tourmaline rich replacement zones have been locally identified.

9.1 Historical Nomenclature of the Zones

Historically eight zones of gold mineralization were defined (see previous figure 8-1) within access of the current Hosco underground workings above a depth of 140 m. These include the A, B, C, D, E, BFH, GD and Double D zones. The A, B, C, D, E, BFH and GD zones occur between sections 8310 E and 9230 E, and have strike lengths ranging from 500-900 m. The mineralization occurs as discontinuous possibly westward plunging lenses. Each zone has been explored at that time to a depth of approximately only 140 m and remains open to depth and along strike to the east and west.

The Hosco Double D Zone sediments are characterized by quartz veinlets with specks and disseminations of pyrite and arsenopyrite. It has a confirmed strike length of 200 m, averages 10 m thick and has been defined to a depth of 80 m. It has been defined by surface drilling and with 1987 underground excavations from the ramp. The merging of the GD, D and E zones of mineralization was confirmed. The Double D Zone is not continuous to surface as it separates into smaller individual zones of mineralization 10 m below the bedrock-overburden interface.

Similar gold mineralization as the A, B, C, D, E, BFH and GD zones occurs 1,200 m west of the Hosco underground workings (Hosco West Zone). It has been intersected in drill hole 79-1 above a depth of 50 m. It occurs within Temiskaming Group sediments as quartz veinlet-rich horizons and veins and may represent the western extension of the mineralization defined within the workings or a possibly new ore zone.

9.2 New Labeling of the Mineralized Corridors

The historical work focused on separating and labeling narrow high grade lenses. These high grade zones are within the new zones. With the approach of defining larger mineralized zones for the evaluation of open pit potential of the lower grade, higher tonnage material, the zones are connecting well and five important zones have been identified, modeled and the resources have been estimated within these new revised envelopes with the new Aurizon drilling as presented in the mineral resources section of this report.

Observation of the core during site visit shows strongly silicified zones and some are showing a cherty aspect. Brechiated zones are also present.

Figure 9-1 and 9-2 present the mineralization observed in core.

Figure 9-1 – Mineralization Observed in Core Prior to Core Splitting

Figure 9-2 – Detailed Aspect of the Mineralization, Quartz Veining with Disseminated Sulfides in Control Core after Splitting

Generally speaking, most of the zones look alike in terms of structure and mineralization, some differentiate lightly by the content in quartz vein, arsenopyrite, pyrrothite, pyrite, white mica, carbonate, biotite and chlorite but for now they are believed to be all related to the same geological event. Narrow, widely spaced, quartz veins with higher grades have been intersected.

In the high grade zones of underground openings mapping and sampling plans, we have observed continuous mineralization with some pinch and swell along the partially mined out quartz vein high grade zone, even this high grade zone within the low grade corridor is always there with variation of the thickness and grades. The mineralized system is continuous.

Deformation within the sediments can be difficult to evaluate as a result of the high grade metamorphism. Interlayered mafic units are strongly deformed with tectonic breccias and gauge associated with the Cadillac fault system. Some sediment intervals show mineral segregation in a tectonic fabric and sulfides remobilization along foliation planes indicating a strong ductile deformation level.

Gold enrichment is adjacent to the mafic unit, and is related to fine grain arsenopyrite in a biotite rich matrix. The veins are included within a 100 to 190 metre wide lower grade halo of 0.5 to 2.0 grams per tonne. The corridor extends along a east-west trend of approximately 2,000 metre and can be followed down to a depth of 400 meters. Mineralization follows multiple distinct zones, along a dip of 55 degrees to the north with a western plunge.

Five zones have been clearly identified, with two of them, the Principal North and North East zones, on the north side of the Cadillac fault. Three zones, the Principal South, South West and South East zones are located south of the Cadillac fault, which separates the mineralized zones and is barren in terms of gold mineralization. More details are presented in the Mineral Resource section of this report.

9.3 Other Mineralization

To our knowledge, there is no other significant mineralization on the property. A metal scan on one third of the control samples has been done by Geostat in order to see if there was other mineralization such as silver. Unfortunately, silver values are not significant.

The following is a copy of the metal scan of the independent control samples.

Figure 9-3 – Metal Scan of One Third of the Control Samples

Report Date: 12/04/2007

Analyte Symbol	Ag	Cd	Cu	Mn	Mo	Ni	Pb	Zn	Al	As	Ba	Be	Bi	Ca	Co	Cr	Fe
Unit Symbol	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	%
Detection Limit	0.2	0.5	1	2	2	1	2	1	0.01	10	1	1	10	0.01	1	2	0.01
Analysis Method	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP
18951	< 0.2	0.6	47	461	4	78	3	53	0.66	150	257	< 1	< 10	0.3	26	197	3.11
18954	< 0.2	< 0.5	54	562	4	107	< 2	64	0.82	78	147	< 1	< 10	0.6	29	220	3.92
18957	< 0.2	< 0.5	51	635	3	106	3	82	0.91	51	228	< 1	< 10	0.4	34	192	4.18
18960	< 0.2	1.4	41	445	5	71	3	60	0.51	1870	154	< 1	< 10	0.49	25	180	2.92
18963	< 0.2	1.1	42	464	5	79	5	64	0.61	1110	169	< 1	< 10	0.73	26	159	3.17
18966	0.2	0.7	39	459	6	62	6	59	0.46	5030	95	< 1	< 10	0.24	20	164	2.54
18969	< 0.2	0.8	39	425	5	60	4	66	0.45	3940	148	< 1	< 10	0.27	17	177	2.44
18972	0.2	1.5	31	544	5	88	5	49	0.48	13900	30	< 1	< 10	0.66	33	231	4.05
18975	< 0.2	1.7	43	579	7	85	< 2	60	0.63	2430	69	< 1	< 10	0.56	25	245	3.38
18978	< 0.2	3.4	48	581	6	90	2	63	0.71	974	168	< 1	< 10	0.63	27	288	3.53
18981	< 0.2	1.3	47	496	6	88	3	71	0.56	4560	78	< 1	< 10	0.28	27	265	3.42
18984	< 0.2	1	43	459	3	570	3	63	0.8	4390	131	< 1	< 10	0.74	54	858	3.43
18987	< 0.2	1.3	60	505	5	179	5	80	0.74	3480	55	< 1	< 10	0.33	34	344	3.9

Report Date: 12/04/2007

Analyte Symbol	K	Mg	Na	P	Sb	Sc	Sn	Sr	Ti	V	W	Y	Zr	S
Unit Symbol	%	%	%	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%
Detection Limit	0.01	0.01	0.01	0.001	10	1	10	1	0.01	1	10	1	1	0.001
Analysis Method	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP	AR-ICP
18951	0.97	0.61	0.07	0.051	< 10	9	< 10	16	0.19	85	< 10	11	33	0.217
18954	0.54	0.68	0.05	0.063	< 10	9	< 10	18	0.14	95	< 10	11	28	0.172
18957	1.41	0.7	0.05	0.065	< 10	9	< 10	18	0.21	100	< 10	14	33	0.186
18960	1.03	0.58	0.05	0.044	< 10	7	< 10	19	0.17	71	< 10	10	29	0.644
18963	0.73	0.6	0.06	0.059	< 10	6	< 10	32	0.12	64	< 10	10	28	0.387
18966	0.85	0.57	0.05	0.035	< 10	6	< 10	12	0.12	64	18	7	29	0.826
18969	0.79	0.56	0.07	0.031	< 10	7	< 10	14	0.13	72	13	7	29	0.624
18972	0.95	0.64	0.06	0.033	< 10	10	< 10	17	0.11	95	23	8	37	2.147
18975	1.29	0.65	0.08	0.045	< 10	12	18	23	0.19	103	< 10	11	33	0.85
18978	1.4	0.66	0.08	0.047	< 10	13	< 10	25	0.22	115	< 10	11	32	0.554
18981	1	0.66	0.1	0.058	< 10	13	< 10	18	0.15	109	13	11	42	0.935
18984	0.44	0.84	0.04	0.037	< 10	8	< 10	30	0.08	86	< 10	5	24	0.65
18987	1.25	0.76	0.09	0.055	< 10	13	< 10	20	0.16	108	15	9	44	1.167

10. EXPLORATION

Exploitation history of the property is directly linked to the history of the discovery and development of the Hosco and Heva mine previously discussed in this report.

In 1984 Roche Ltd. submitted a feasibility study of the property outlining the same ore reserve as that completed by SOQUEM for SASU Investments Inc. The ore reserve calculations by Louvicourt Mining Management Company Ltd., which are not NI 43-101 compliant, stated reserves amounted to 1,081,620 metric tons, grading 4.10 g/t all in the drill indicated category, and ten diamond drill holes totaling 2,988m were completed. The reference made to the historical resource estimate above is included for illustrative purposes only and does not conform to the standards and definitions required by NI 43-101. This estimate should not be relied upon as a measure of the resources within the Joanna project. The above historical estimate uses terminology that differs from those set out in sections 1.2 and 1.3 of NI 43-101. A more recent updated Mineral Resource Estimate is found in Section 17 of this report.

During 2006, Aurizon Mines Ltd. obtained access to historical data pursuant to its agreement with the past owner and has carried out extensive computerization and integration of historical data.

A senior Geologist (Martin Demers) employed by Aurizon carried out surface mapping in the summer of 2006.

Exploration holes were incorporated into a database in electronic format at the end of 2006. Easily computerizable reliable underground data is also included in the new database.

At the end of March, 2007, 15 diamond drill holes had been completed for 9,204 meters, and the resampling of 20 old holes had been completed.

With respect to the database used for the past March 2007 resource estimation, we now have a total of 26 new surface holes (ids from JA-07-01 to JA-07-25) as well as several re-assayed intervals in the old drill holes for the September 2007 updated resource statement.

Independent samples were taken from two holes by Claude Duplessis QP from Geostat who also supervised the preparation and sampling protocol, where the sample bags were sealed and sent personally to the lab. Further details are provided in the Data Verification section of this report.

Aurizon has carried mapping and sampling works on the Henricksen sector of the Joanna claims, but results and compilation map is pending at the moment of writing this report.

To the Author's knowledge, Aurizon possesses all the permits required to conduct the exploration work recommended in this report other than those specifically mentioned.

10.1 Survey

The actual positioning of the new holes is done with a single hand held GPS while the casing will be surveyed at the end of the current drilling campaign by a certified surveyor.

10.1.1 Grids Used on the Property

Aurizon staff has integrated all the historical data into a local mining grid called: GML (Gestion Minière Louvicourt).

Geostat has created a database with its own available Geobase/Sectcad software package. Resource related information and modeling are based on the local GML integrated mining grid in metric attached to the UTM system. A conversion table showing both databases is presented in the following Figure 10-1.

Figure 10-1 – Local GML Grid Conversion Parameters

Parametres, Transformation HOSCO à GML

Translation Nord	Est	Radians	Degré.Décimal	Rotation Degré	min	Sec
521.0940	6 586.0880	6.2816	359.90961	359	54	34.6

			COORDONNÉES - SYSTÈME HOSCO					COORDONNÉES - SYSTÈME GML				
POINT	DESCRIPTION		LONG.		LAT.		ELEV.	LONG.		LAT.		ELEV.
BASE 13			1 000.000	E	1 000.000	N		7 587.664	E	1 519.515	N	
BASE 9			2 000.000	E	1 000.000	N		8 587.663	E	1 517.938	N	
BASE 7			2 900.000	E	1 000.000	N		9 487.662	E	1 516.518	N	
ZÉRO			0.000	E	0.000	N		6 586.088	E	521.094	N	
1	POINT 2		2 364.900	E	962.700	N	311.36	8 952.504	E	1 480.062	N	311.36
2	POINT 6		2 363.030	E	1 077.270	N	311.06	8 950.815	E	1 594.635	N	311.06
3	POINT 7		2 364.720	E	927.560	N	311.36	8 952.268	E	1 444.922	N	311.36
4	POINT 8		2 334.150	E	962.930	N	311.41	8 921.754	E	1 480.340	N	311.41
5	POINT 9		2 335.100	E	927.900	N	311.15	8 922.649	E	1 445.309	N	311.15
6	POINT 10		2 326.200	E	1 071.900	N	311.05	8 913.976	E	1 589.323	N	311.05
7	POINT 11		2 394.200	E	1 026.390	N	311.35	8 981.904	E	1 543.706	N	311.35
8	POINT 12		2 394.500	E	977.300	N	311.36	8 982.127	E	1 494.615	N	311.36
9	POINT 13		2 392.400	E	953.300	N	311.36	8 979.989	E	1 470.619	N	311.36
10	POINT 14+14		2 631.840	E	1 029.230	N	311.57	9 219.548	E	1 546.171	N	311.57
11	POINT 1W		2 208.880	E	1 029.930	N	310.95	8 796.590	E	1 547.538	N	310.95
12	POINT 2W		2 039.520	E	1 029.020	N	310.57	8 627.229	E	1 546.895	N	310.57
13	POINT 3W		1 907.080	E	1 026.640	N	309.95	8 494.785	E	1 544.724	N	309.95
14	POINT 4W		1 753.320	E	1 028.360	N	309.40	8 341.028	E	1 546.687	N	309.40
15	POINT 5W		1 602.720	E	990.100	N	308.86	8 190.368	E	1 508.664	N	308.86
16	POINT 6W		1 452.140	E	943.150	N	308.16	8 039.714	E	1 461.952	N	308.16
17	POINT 7W		1 293.580	E	929.750	N	307.39	7 881.133	E	1 448.802	N	307.39
18	POINT 8W		1 148.700	E	916.900	N	306.37	7 736.233	E	1 436.181	N	306.37
19	POINT 9W		996.800	E	903.900	N	305.70	7 584.313	E	1 423.420	N	305.70
20	POINT 10W		845.000	E	890.900	N	305.10	7 432.492	E	1 410.660	N	305.10
21	POINT 11W		1 944.320	E	1 027.400	N	310.07	8 532.026	E	1 545.425	N	310.07
22	POINT 12W		1 985.000	E	1 030.200	N	310.35	8 572.711	E	1 548.161	N	310.35
23	POINT 13W		2 011.220	E	1 028.590	N	310.49	8 598.928	E	1 546.510	N	310.49
24	POINT 14W		2 077.380	E	1 030.700	N	310.69	8 665.091	E	1 548.515	N	310.69
25	POINT 15W		2 115.300	E	1 033.100	N	310.62	8 703.015	E	1 550.856	N	310.62
26	POINT 16W		2 153.080	E	1 034.080	N	310.74	8 740.797	E	1 551.776	N	310.74
27	POINT 17W		2 178.600	E	1 033.000	N	310.80	8 766.315	E	1 550.656	N	310.80
28	POINT 18W		2 246.500	E	1 034.200	N	310.97	8 834.217	E	1 551.749	N	310.97
29	POINT 19W		2 284.190	E	1 036.140	N	311.08	8 871.910	E	1 553.629	N	311.08
30	POINT 20W		2 339.200	E	1 039.900	N	311.18	8 926.926	E	1 557.302	N	311.18
31	POINT 21W		2 423.030	E	1 046.440	N	311.13	9 010.766	E	1 563.710	N	311.13
32	POINT 22W		1 869.400	E	1 029.100	N	309.60	8 457.109	E	1 547.244	N	309.60
33	POINT 23W		1 830.900	E	1 029.200	N	309.64	8 418.609	E	1 547.404	N	309.64
34	POINT 24W		1 792.990	E	1 027.900	N	309.49	8 380.697	E	1 546.164	N	309.49
35	POINT 25W		1 716.730	E	1 018.600	N	309.15	8 304.423	E	1 536.984	N	309.15
36	POINT 26W		1 679.120	E	1 009.000	N	309.09	8 266.798	E	1 527.444	N	309.09
37	POINT 1W2		2 052.000	E	1 082.700	N	310.35	8 639.793	E	1 600.555	N	310.35
38	POINT 2W2		2 097.400	E	1 085.200	N	310.43	8 685.197	E	1 602.984	N	310.43
39	POINT 3W2		2 143.100	E	1 088.600	N	310.64	8 730.903	E	1 606.312	N	310.64
40	POINT 4W2		1 986.900	E	1 078.000	N	310.04	8 574.686	E	1 595.958	N	310.04
41	POINT 5W2		1 899.700	E	1 073.400	N	309.81	8 487.479	E	1 591.496	N	309.81
42	POINT 6W2		1 824.000	E	1 067.500	N	309.63	8 411.770	E	1 585.715	N	309.63
43	POINT 7W2		1 755.500	E	1 065.500	N	309.13	8 343.267	E	1 583.823	N	309.13
44	POINT 8W2		1 678.930	E	1 059.800	N	308.81	8 266.688	E	1 578.244	N	308.81
45	POINT 9W2		1 940.600	E	1 073.900	N	309.95	8 528.380	E	1 591.931	N	309.95
46	POINT 10W2		2 014.600	E	1 080.200	N	310.23	8 602.390	E	1 598.114	N	310.23
47	POINT 11W2		2 210.600	E	1 093.500	N	310.65	8 798.410	E	1 611.105	N	310.65
48	POINT 1W3		1 829.600	E	917.400	N	309.73	8 417.133	E	1 435.607	N	309.73
49	POINT 2W3		1 904.500	E	922.000	N	310.23	8 492.040	E	1 440.088	N	310.23
50	POINT 3W3		1 980.700	E	925.800	N	310.28	8 568.246	E	1 443.768	N	310.28
51	POINT 4W3		2 056.500	E	929.700	N	310.28	8 644.052	E	1 447.549	N	310.28
52	POINT 5W3		2 133.400	E	934.000	N	310.89	8 720.959	E	1 451.727	N	310.89
53	POINT 6W3		2 209.700	E	938.670	N	311.09	8 797.266	E	1 456.277	N	311.09
54	POINT 7W3		2 285.300	E	944.000	N	311.60	8 872.874	E	1 461.488	N	311.60
55	POINT PUITS		2 365.930	E	812.910	N	312.76	8 953.297	E	1 330.271	N	312.76

11. DRILLING, MAPPING AND TRENCHES

Different drilling companies have drilled on the property over time.

The recent 26 diamond drilling holes and a geotechnical drilling investigation on Hosco overburden has been completed this year by Aurizon.

Results of the first phase of drilling by Aurizon are available and are included in this study; mineral resource section presents details of the drilling and statistics.

Table 11-1 below summarizes past exploration, development and production work.

Table 11-1 : Past Exploration, Development and Production Work

Exploration and development:

Date	Surface drilling (m)	Underground drilling (m)	Sinking of shaft (m)	Ramp development (m)	Lateral development (m)
1944-1945	20 000	3 000	160		2 400
1980-1981	1 128				
1984	2 988				
1986-1989	9 768			484	630
Total	**33 884**	**3 000**	**160**	**484**	**3 030**

Production :

Date	ore (tonnes)	Grade (g/t Au)	Processed grade (g/t Au)	Recovery (%)
1948-1949	45 872	6.58	4.90	74.5
1986-1989	21 555	2.65	Stockpile on site	n/a

No core is stored on site. Historical and new core is stored in the suburb of Rouyn-Noranda at the geological contractor's core shack.

Figure 11-1 and 11-2 show the plan view of the holes.

Figure 11-1 : Plan View of the Holes on the Joanna Property East Block (Hosco), local GML grid

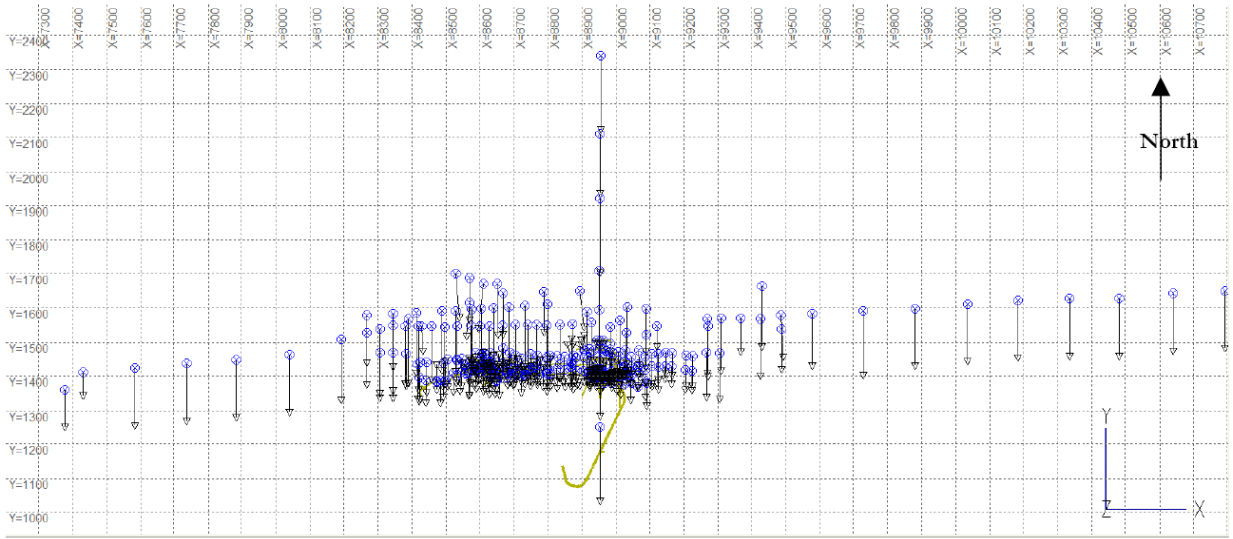
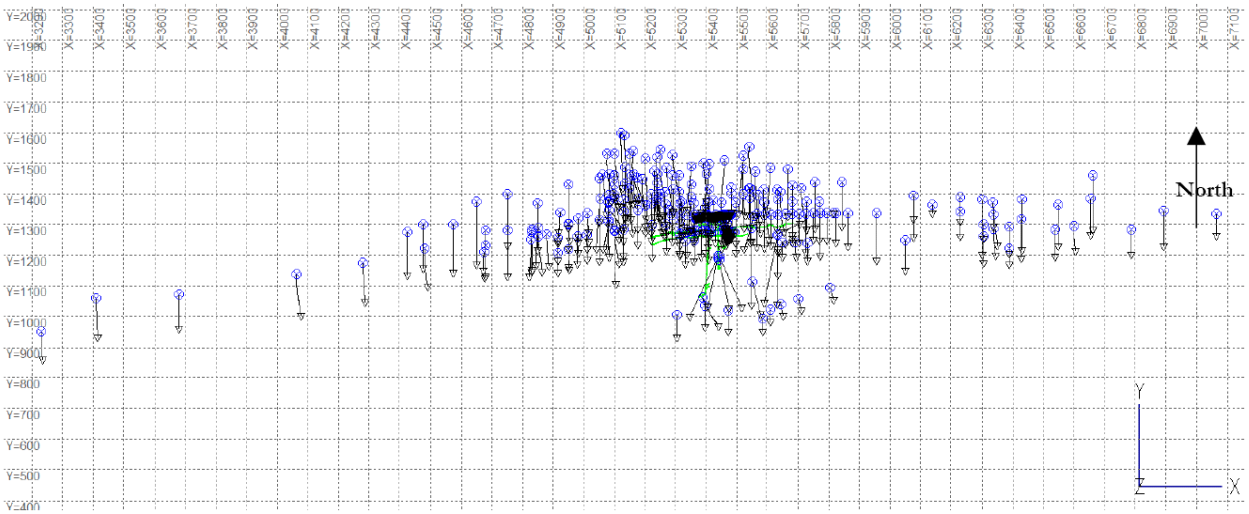


Figure 11-2 : Plan View of the Holes on the Joanna Property West Block (Heva), local GML grid



11.1 Recent Drilling and Validation

The scheduled 2006 drill campaign did not start until January 2007, due to warm weather conditions. Based on the availability of information, a decision was made to use only the historical data together with the re-assay results from the current control program for the estimate of mineral resources in March 2007. Now for the update resource Aurizon's 2007 drilling results of 11,620 meters in 25 holes with 6,844 samples are incorporated into the resources estimates. A site visit was undertaken by M. Claude Duplessis QP from Geostat to validate the control program on March 8th 2007.

Figure 11-3 : Core Rack at the Geological Contractor Site in BelleCombe

Previous surface and underground exploration by previous operators focused mainly on a stacking of high grade veins close to a brittle fault. The veins are, in fact, included within a 100 to 190 metre wide lower grade halo of 0.5 to 2.0 grams of gold per tonne. Compilation of existing data indicates that the corridor extends along a east-west trend of approximately 2,000 metre and can be followed down to a depth of 400 meters.

12. SAMPLING METHODS AND APPROACH

As previously referenced, since beginning of work on the Joanna gold deposit, different drilling campaigns have taken place. We do not have much information on the detailed methodology of sampling used during these different campaigns. The drill holes were sampled according to the geologist's interpretation. Sample boundaries were generally dictated by the presence of mineralization (quartz veinlets with sulfides).

Different core sizes were used during these exploration and definition drilling periods. We are aware that some re-sampling campaign has taken place from one owner to the other as stated in some documents.

Some of the core of previous campaigns has been retrieved by Aurizon and re-assaying is taking place in addition to additional sampling of core not previously sampled. The available information at this stage is fragmented but shows satisfactory results with increase in the mineralized length along the core. The drill hole samples have an average length of 1.11 meters (minimum of 0.01 metre, maximum of 78 meters) the 78m sample comes from historical composite data. The most frequent lengths used are 0.5 m and 1.0 m.

The core recovery of the observed new and old core is generally very good. Based on Mr. Duplessis' observations on site in the core shacks, we consider that the sample quality is good and that the samples are generally representative.

At the Hosco mine, the drifts and underground developments were sampled and test holes drilled through the walls to verify the presence of mineralization out of the developed drift. The face samples (chips) are also used in this estimation of resources.

Examples of the computerized test holes data are presented in Figure 12-1 and 12-2.

Figure 12-1 : Example of the Computerized Test Holes Data on Level 4889 mZ (Hosco)

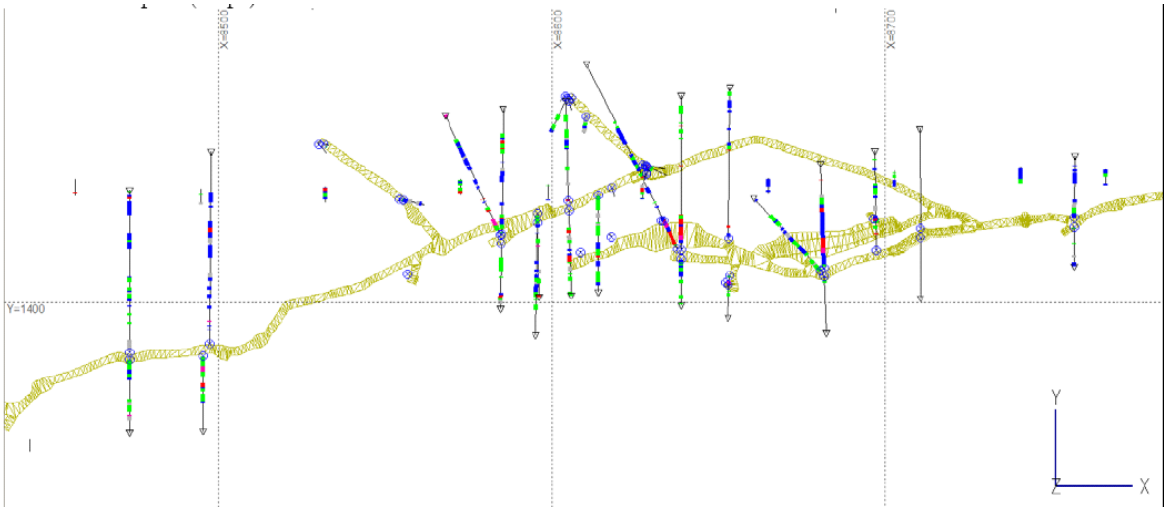
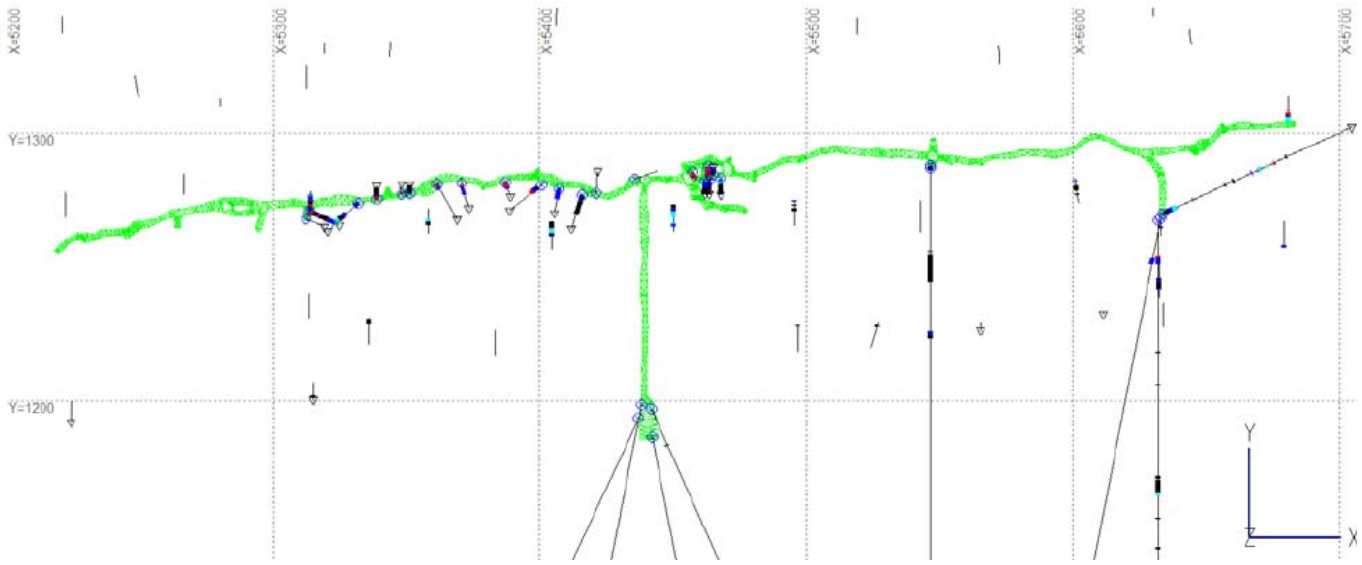


Figure 12-2 : Example of the Computerized Test Holes Data on Level 4882mZ (Heva)



The sampling method is straight forward. After logging, the sections to be assayed are identified in the core box. The technician saws the core in half and bags the sample to send to the lab and the other half is kept for further analysis, if necessary. Samples are in general 1 metre long. Drilling is conducted by a contractor, Benoit Drilling Ltd.

13. SAMPLE PREPARATION, ANALYSES AND SECURITY

13.1 Sample Preparation and Analysis

All of the new samples at Joanna (drill holes) are assayed at Laboratoire Expert in Rouyn-Noranda. All the gold samples are assayed by fire assay using the laboratory's equipment and protocol.

The core is split using an electric core saw, bagged, tagged at the geological contractor core shack at BelleCombe and sent to the laboratory. Picture below shows mining technician preparing sample under Claude Duplessis QP supervision.

Figure 13-1 : Sawing of Core and Sampling at Contractor's Core Shack

NQ core from surface exploration hole is split in half to preserve a witness in the core racks. For the old historical holes, half of the half (1/4) is sampled and the other part is retained. Geostat did not carry out independent sampling of the old holes in order to preserve a witness core.

13.1.1 Sample Preparation at the Laboratory

Laboratoire Expert of Rouyn-Noranda provided Geostat the following description of the procedures followed by that laboratory in sample preparation.

Receiving Samples

Upon receipt, samples are placed in numerical order and compared with the client packing list to verify receipt of all samples. If the client does not provide a packing list with the shipment, one will be prepared by the person unpacking the samples. If the samples received do not correspond to the client list, the client will be notified.

Sample Preparation

Samples are dried if necessary and then reduced to -1/4 inch with a jaw crusher. The jaw crusher is cleaned with compressed air between samples and barren material between sample batches. The sample is then reduced to 90% -10 mesh with a rolls crusher. The rolls crusher is cleaned between samples with a wire brush and compressed air and barren material between sample batches. The first sample of each sample batch is screened at 10 mesh to determine that 90% passes 10 mesh. Should 90% not pass, the rolls crusher is adjusted and another test is done. Screen test results are recorded in the log book provided for this purpose. The sample is then riffled using a Jones type riffle to approximately 300g. Excess material is stored for the client as a crusher reject. The 300g portion is pulverized to 90% -200 mesh in a ring and puck type pulverizer, the pulverizer is cleaned between samples with compressed air and silica sand between batches. The first sample of each batch is screened at 200 mesh to determine that 90% passes 200 mesh. Should 90% not pass, the pulverizing time is increased and another test is done. Screen test results are recorded in the log book provided for this purpose.

13.1.2 Analysis at the Laboratory

The following procedure was described to Geostat by **Laboratoire Expert** of Rouyn-Noranda.

Gold Fire Assay Gravimetric

A 29.166g sample is weighed into a crucible that has been previously charged with approximately 130g of flux. The sample is then mixed and 2g of silver nitrate is added. The sample is then fused at 1,800 F for approximately 45 minutes. The sample is then poured in a conical mold and allowed to cool, after cooling, the slag is broken off and the lead button weighing 25-30 gm is recovered. This lead button is then cupelled at 1,600 F until all the lead is oxidized. After cooling, the dore bead is flattened with a hammer and placed in a porcelain parting cup. The cup is filled with 1:7 nitric acid and heated to dissolve the silver. When the reaction appears to be finished, a drop of concentrated nitric acid is added and the sample is observed to ensure there is no further action. The gold bead is then washed several times with hot distilled water, dried, annealed, cooled and weighed.

Each furnace batch comprises 28 samples that include a reagent blank and gold standard. Crucibles are not reused until we have obtained the result of the sample that was previously in each crucible. Crucibles that have had gold values of 3.00 g/t are discarded. The lower detection limit is 0.03 g/t and there is no upper limit. All values over 3.00 g/t are verified before reporting.

13.2 Quality Control Program

Geostat did not visit the laboratory installations during its site visit. Geostat inspected the laboratory assay sheets and assay certificates produced by the laboratory. They consist of Excel spreadsheets containing sample numbers and assay results. The laboratory uses a relatively standard file format. Assay certificates contain duplicate results.

A follow-up of the laboratory quality control is done using blanks and standards from Aurizon as described below:

The following Quality Assurance and Quality Control ("QA/QC") protocol was supplied by Elise Bourgault geologist of Aurizon (translated from original French version):

Control Procedures and Quality Assurance of Analytical Results from Drill Hole

In addition to the normal laboratory quality control program, Aurizon has put in place a quality program to secure the validity of the results. The lab carries duplicate at every 12 samples as a standard procedure.

The QA/QC program has four steps:

1. Insertion of a standard reference material at every 25 samples (1000, 1025, 1050 …). There are three standards used: 1.02g/t, 4.75g/t and 9.65g/t, and those are randomly inserted.

2. 10% of the coarse reject of the samples of the first lab are re-assayed at a secondary lab. Most continuous mineralized intervals are reassayed. Coarse rejects are done with AA and gravimetric finish to obtain a second result and the original pulp is tested with gravimetric finish to repeat the first lab result.

3. Insertion of blanks within identified mineralized zones, frequency varies according to intersected zones.

4. For the old holes (101 holes recovered (64 holes on Hosco)): re-assays are done on 20% of the holes. Moreover, new samples are taken on extensions of already sampled sections, and this is done on all the old recovered holes.

The procedures are considered valid and adequate to detect anomalies in the sampling and analysis process, should any major problem occur.

13.3 Security

The deposit is an historical known gold occurrence. Past work demonstrates the existence of gold in addition to Geostat's independent samples. Moreover, the current sampling is done by an independent contractor for Aurizon.

The author is confident that Aurizon procedures are secure and reliable.

14. DATA VERIFICATION

Within the frame of Geostat's visit done in 2005, they proceeded with an analytic verification of selected core samples.

Mr. Claude Duplessis QP has verified the database assay table against the original paper logs on a random basis and did not find major errors during its validation process. The collar location, azimuth, dip, hole length, assay values, and assay length were checked. Available historical cross sections on paper were reviewed and compared with on screen equivalent cross sections.

In conclusion, we consider that the drill hole database is adequate to support a Mineral Resources estimate.

Independent samples were taken from two holes by Claude Duplessis QP who also supervised the preparation and sampling protocol, where the sample bags were sealed and sent personally to the lab.

14.1 Independent Sampling

During the visit to the core shack in Bellecombe, 38 independent samples were taken from two new holes just being drilled. The hole JA-07-01 from 304 to 332 meters and hole JA-07-03 from 174 to 184 meters are controlled.

The rock samples were assayed at the main lab of Aurizon (Lab –Expert of Rouyn), while the pulp samples were sent to ALS Chemex of Val d'Or for between lab verification.

A one out of three sample were also sent for a metal scan, and these results are presented in the Mineralization section of this report.

As presented in the following tables, the control assay does not show bias with the test sign from one sampling of the core to another and from one laboratory to another. Even if average grades are slightly different, bias is not proven or observed. This confirms that results are reliable from either laboratory.

Average gold grade of the control sample above 0.5 g/t (22/38) is 1.91g/t for Geostat control samples, while it is 2.08g/t for Aurizon.

The Geostat 1 assay results in the table 6 are from Lab-Expert while Geostat 2 assays are from ALS Chemex.

Table 14-1 shows the control assay results from laboratories while Table 14-2 shows the between laboratory verification table.

Table 14-1 : Control Assay Results from Laboratories

CONTROL SAMPLES				SAMPLE	Grams per tonne gold		
HOLE #	From(m)	To(m)	Core(length)	number	Geostat 2	Aurizon	Geostat 1
JA-07-01	309	310	1.00	18956	0.03	0.01	0.01
JA-07-01	310	311	1.00	18957	-0.01	0.01	0.01
JA-07-01	308	309	1.00	18955	0.01	0.01	0.01
JA-07-01	307	308	1.00	18954	0.01	0.01	0.01
JA-07-01	315	316	1.00	18962	0.03	0.02	0.02
JA-07-01	305	306	1.00	18952	0.04	0.03	0.03
JA-07-03	180	181	1.00	18985	0.05	0.03	0.04
JA-07-01	314	315	1.00	18961	0.03	0.03	0.03
JA-07-03	181	182	1.00	18986	0.04	0.04	0.04
JA-07-01	330	331	1.00	18977	0.07	0.07	0.06
JA-07-01	316	317	1.00	18963	0.21	0.13	0.19
JA-07-01	321	322	1.00	18968	0.19	0.18	0.10
JA-07-01	329	330	1.00	18976	0.25	0.28	0.17
JA-07-01	320	321	1.00	18967	1.84	0.32	0.43
JA-07-01	324	325	1.00	18971	0.46	0.40	0.39
JA-07-03	179	180	1.00	18984	0.37	0.45	0.35
JA-07-01	331	332	1.00	18978	0.40	0.58	1.84
JA-07-01	319	320	1.00	18966	1.47	0.61	1.51
JA-07-01	318	319	1.00	18965	0.78	0.68	0.71
JA-07-03	175	176	1.00	18980	0.73	0.72	0.85
JA-07-01	313	314	1.00	18960	0.87	0.87	0.84
JA-07-03	182	183	1.00	18987	1.25	0.89	0.94
JA-07-03	174	175	1.00	18979	0.62	0.99	0.77
JA-07-03	183	184	1.00	18988	0.97	1.03	0.78
JA-07-03	177	178	1.00	18982	1.66	1.30	2.03
JA-07-01	328	329	1.00	18975	1.28	1.51	1.56
JA-07-03	178	179	1.00	18983	1.66	1.58	2.35
JA-07-03	176	177	1.00	18981	1.69	1.65	1.98
JA-07-01	312	313	1.00	18959	2.03	2.16	1.98
JA-07-01	304	305	1.00	18951	0.36	2.26	0.36
JA-07-01	326	327	1.00	18973	2.57	2.30	2.71
JA-07-01	322	323	1.00	18969	1.24	2.33	1.20
JA-07-01	306	307	1.00	18953	0.59	2.91	0.57
JA-07-01	323	324	1.00	18970	1.25	2.91	1.57
JA-07-01	311	312	1.00	18958	2.86	3.15	2.57
JA-07-01	317	318	1.00	18964	3.36	3.57	3.53
JA-07-01	327	328	1.00	18974	4.69	4.25	5.28
JA-07-01	325	326	1.00	18972	5.53	7.58	6.00

Geostat 1 – Assay results obtained by Lab-Expert
Geostat 2 – Assay results obtained by ALS Chemex

Table 14-2: Between Laboratory Verification Table

VO07027817 - Finalized							
CLIENT : MINAUR - Mines Aurizon Ltée							
# of SAMPLES : 38							
DATE RECEIVED : 2007-03-19							
PROJECT : 504							
CERTIFICATE COMMENTS :							
PO NUMBER : 14442							
	Au-AA25						
SAMPLE	Au						
DESCRIPTION	Geostat2	Aurizon	Geostat1	Geo1vsGeo2	difsorted	Geo2vsAuri	difsorted
18951	0.36	2.26	0.359	-0.001	-1.408	-1.9	-2.32
18952	0.04	0.026	0.032	-0.008	-0.309	0.014	-2.05
18953	0.59	2.91	0.571	-0.019	-0.291	-2.32	-1.9
18954	0.01	0.014	0.014	0.004	-0.193	-0.004	-1.66
18955	0.01	0.013	0.007	-0.003	-0.088	-0.003	-1.09
18956	0.03	0.01	0.009	-0.021	-0.08	0.02	-0.37
18957	-0.01	0.012	0.008	0.018	-0.072	-0.022	-0.29
18958	2.86	3.15	2.569	-0.291	-0.07	-0.29	-0.23
18959	2.03	2.16	1.981	-0.049	-0.049	-0.13	-0.21
18960	0.87	0.872	0.842	-0.028	-0.041	-0.002	-0.182
18961	0.03	0.029	0.032	0.002	-0.028	0.001	-0.13
18962	0.03	0.016	0.023	-0.007	-0.021	0.014	-0.08
18963	0.21	0.128	0.191	-0.019	-0.019	0.082	-0.06
18964	3.36	3.57	3.527	0.167	-0.019	-0.21	-0.034
18965	0.78	0.683	0.71	-0.07	-0.019	0.097	-0.022
18966	1.47	0.606	1.507	0.037	-0.008	0.864	-0.004
18967	1.84	0.32	0.432	-1.408	-0.007	1.52	-0.003
18968	0.19	0.18	0.102	-0.088	-0.007	0.01	-0.002
18969	1.24	2.33	1.199	-0.041	-0.007	-1.09	0
18970	1.25	2.91	1.571	0.321	-0.005	-1.66	0
18971	0.46	0.402	0.388	-0.072	-0.003	0.058	0.001
18972	5.53	7.58	6.001	0.471	-0.001	-2.05	0.008
18973	2.57	2.3	2.71	0.14	0.002	0.27	0.01
18974	4.69	4.25	5.277	0.587	0.004	0.44	0.014
18975	1.28	1.51	1.562	0.282	0.018	-0.23	0.014
18976	0.25	0.284	0.17	-0.08	0.037	-0.034	0.02
18977	0.07	0.07	0.063	-0.007	0.124	0	0.022
18978	0.4	0.582	1.838	1.438	0.14	-0.182	0.04
18979	0.62	0.99	0.77	0.15	0.15	-0.37	0.058
18980	0.73	0.722	0.854	0.124	0.167	0.008	0.08
18981	1.69	1.65	1.979	0.289	0.282	0.04	0.082
18982	1.66	1.3	2.034	0.374	0.289	0.36	0.097
18983	1.66	1.58	2.353	0.693	0.321	0.08	0.27
18984	0.37	0.45	0.351	-0.019	0.374	-0.08	0.36
18985	0.05	0.028	0.043	-0.007	0.471	0.022	0.362
18986	0.04	0.04	0.035	-0.005	0.587	0	0.44
18987	1.25	0.888	0.941	-0.309	0.693	0.362	0.864
18988	0.97	1.03	0.777	-0.193	1.438	-0.06	1.52
	1.091578947	1.259342105	1.153473684				

15. ADJACENT PROPERTIES

With the new agreement signed, the Vantex Ressources Ltd blocks are now part of Aurizon Joanna property.

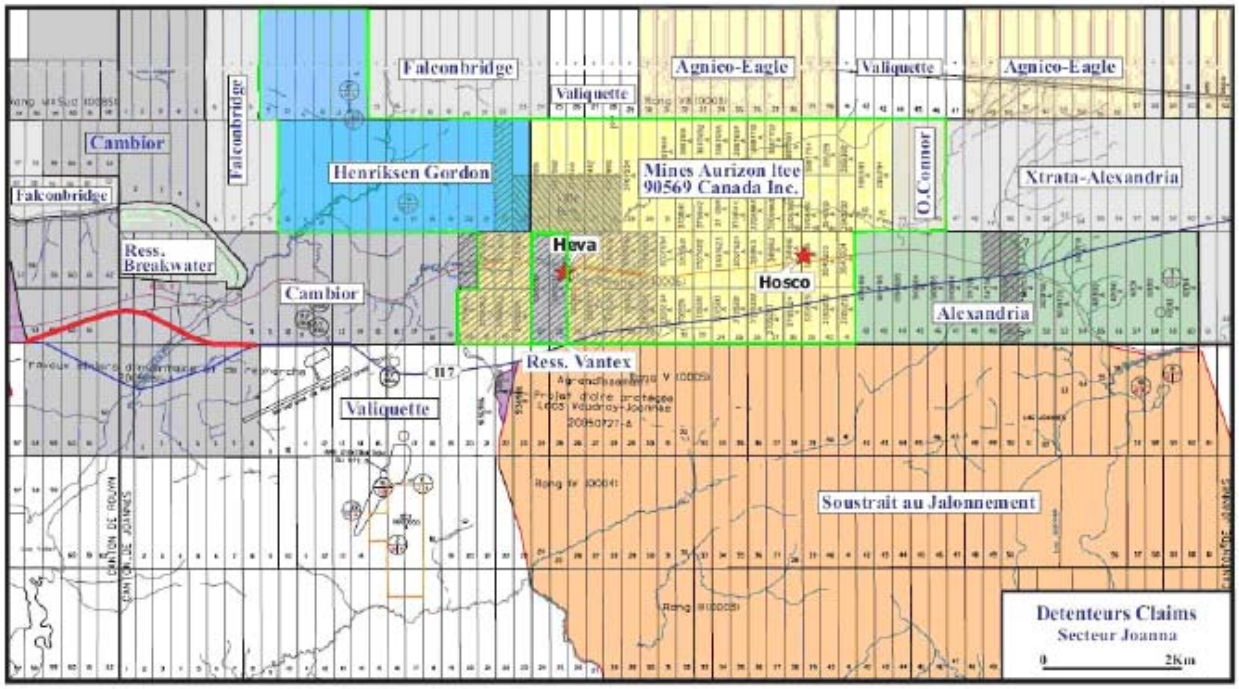
The Joanna property is surrounded by claims owned mostly by Agnico Eagle, Valiquette, IAMGOLD (Cambior), Alexandria and Xstrata (Falconbridge) as shown in Figure 15-1.

- The Alexandria Mineral property is located to the East and is made of 19 claims along the range VI from lot 42 to 60 (approximately 1.3 km N–S & 4.0 km E-O).

- The Rouyn Merger property belongs to IAMGOLD (Cambior) and is located to the west of Joanna, and is made up of 49 continuous claims. An inclined shaft at -50°, 251m vertical depth is on lot 61 of the range VI canton Joannes. The lands of the regional airport of Rouyn Noranda are south of these lots outside the property.

- The Alexis-Noranda belongs to X-Strata (Noranda-Falconbridge); it is north of the Alexandria property and is made up of 18 continuous claims.

Figure 15-1 : Adjacent Properties (Perimeter of All Joanna Properties in Green)



Neither BBA' staff nor Geostat's staff has direct or indirect mining interest in the sector.

16. PROCESSING PLANT AND METALLURGICAL TESTWORK

16.1 Metallurgical Testwork on Hosco-Heva Properties

Metallurgical testwork on samples from the Heva property was carried out in 1984. The results indicated that gold was in a liberated form and that gold recoveries of 99% were achievable. No information was found on the treatment of the mineral produced between 1951-1953[1].

16.1.1 1987 Testwork at Lakefield Research[2]

In 1987, testwork was carried out on six samples from the Hosca-Heva project. The samples averaged 2.67 g/t gold and 0.6% arsenic. The purpose of the test program was to investigate gold recovery by cyanidation and by flotation, pressure oxidation and cyanidation of the flotation concentrate. A sample of flotation concentrate was also sent to Hydrochem Developments Ltd. for evaluation of the NITROX process.

16.1.1.1 Direct Cyanidation

Direct cyanidation tests were carried out on each of the six samples in bottles on rolls at 33% solids. The cyanide concentration was maintained at 0.5 g/l NaCN and the pH at 11. The results are summarized in Table 16-1.

Table 16-1: Direct Cyanidation Results

Test no.	Sample No.	% -200 mesh	Time (h)	Reagent cons., (kg/t)		% Rec. Au	Residue g/t Au	Head g/t Au
				NaCN	CaO			
1	1	78	24	0.61	0.36	53.9	1.25	2.71
2	1	78	48	0.32	0.42	54.4	1.36	2.98
3	2	78	24	0.2	0.36	49.1	1.21	2.38
4	2	78	48	0.2	0.38	45.2	1.22	2.23
5	3	78	24	0.28	0.38	46.7	2.24	4.20
6	3	78	48	0.22	0.4	53.0	2.21	4.71
7	4	81	24	0.5	0.36	46.6	1.39	2.60
8	4	81	48	0.31	0.42	48.5	1.33	2.59
9	5	79	24	0.42	0.38	41.8	1.52	2.61
10	5	79	48	0.29	0.43	36.8	1.22	2.01
11	6	77	24	0.40	0.38	61.0	1.45	3.72
12	6	77	48	0.34	0.42	45.3	1.25	2.28

[1] Description des propriétés le long de la faille Larder Lake-Cadillac-Secteur des mines Heva, Hosco et New Rouyn Merger, rapport préparé par Ghislain Fournier, janvier 2006
[2] An Investigation of the Recovery of Gold from Hosco-Heva project samples, submitted by Louvicourt Mining Management Co. ltd., Progress Report No. 1, project No. LR 3232, Lakefield Research, April 16, 1987.

The extraction of gold was limited to 40-60%. Extending the retention time from 24 to 48 hours did not improve gold recovery. The effect of a finer grind on gold recovery was not investigated.

16.1.1.2 Flotation Testwork

Three flotation tests were carried out on a composite of the samples provided to Lakefield Research. In each test, three rougher concentrates were recovered with stage additions of PAX and Aerofloat 208. In two of the tests, copper sulphate was added and the pH was adjusted to 9.5 with soda ash. The fineness of grind ranged between 82% and 89% minus 200 mesh. The head grades of the flotation feed samples ranked between 2.6 g/t and 3.01 g/t.

The recovery of gold was about 96% in 18% of the weight. The addition of copper sulphate did not improve gold recovery.

16.1.1.3 Pressure Oxidation and Cyanidation of Flotation Concentrate

Pressure oxidation and cyanidation tests were carried out on a flotation concentrate. Pressure oxidation was carried out in a 2-litre Parr autoclave at 200°C and 20% solids. After oxidation, the pulp was filtered and washed. The residue was re-pulped at 33% solids in a 1g/L NaCN solution and leached for 24 hours.

Table 16-2: Pressure Oxidation and Cyanidation of Flotation Concentrate

Test No.	% -400 mesh	Pressure Oxidation			Cyanidation			Head Calc. (g/t Au)
		Time (h)	PO_2 (psig)	H_2SO_4 (g/L)	% Au Recovery		Residue (g/t Au)	
					Individual	Overall		
17	89	4	100		88.6	83.6	1.53	12.3
20	89	4	100	11	73.0	70.1	2.55	9.97
21	97	6	150		91.5	87.8	0.72	8.98

Treating the concentrate by pressure oxidation to destroy the sulphides and expose the gold increased the gold recovery from 40-60% (direct cyanidation) to 75-90%.

16.1.1.4 NITROX Testwork

A sample of flotation concentrate was sent to Hydrochem Developments Limited for treatment by the NITROX process under full oxidation conditions. Oxidation is achieved with HNO_3 at ambient pressure[3]. Hydrochem reported complete oxidation in two hours. The precipitate from the oxidation procedure was split in two. One part was leached by Hydrochem in two 24-hour stages using a carbon-in-leach procedure. The other part was leached by Lakefield Research under similar conditions except that carbon was not used. A comparison of the test results are shown below.

Table 16-3: Comparison – Cyanidation of NITROX Precipitate

Laboratory	% Au Extraction by Cyanidation		Residue (g/t Au)	Head (g/t Au)
	24 h	48h		
Hydrochem	71.5	96.7	0.51	15.7
Lakefield	73.2	90.7	1.29	13.8

These tests indicate that under appropriate oxidation conditions, gold extractions of greater than 90% are achievable.

16.1.2 1987 Testwork at Centre de Recherches Minérales[4]

In 1987, samples were sent to Centre de Recherches Minérales for a series of gold extraction treatments which included but not limited to:

- Flotation tests;
- Direct cyanidation of the ore with and without oxidation;
- Leaching of ore with thiourea;
- Pressure cyanidation of ore with oxygen;
- Pressure cyanidation of ore with oxygen in presence of bromine;
- Pressure oxidation under acidic, neutral, and basic conditions;
- Bacterial leaching of flotation concentrate.

Direct cyanidation of the ore or pressure cyanidation with oxygen gave similarly poor results, with gold extractions of about 55%.

With cyanidation as the final gold extraction process, pressure oxidation pretreatment of the ore in the presence of sulphuric acid, caustic soda, under neutral conditions, and in the presence of nitric acid provided gold extractions of 95.28%, about 70%, 96.97% and 89.8%, respectively.

[3] Kwasi Donyina, PhD., Oxidation, Precipitation and Cyanidation of Flotation Concentrate #3232-16, Hydrochem Developments Ltd., March 1987.
[4] Essai de lixiviation de l'or du minerai de Heva-Hosco, rapport final, Centre de Recherches Minerales, 30 novembre 1987.

Although gold extractions with pressure oxidation in the presence of sulphuric acid or under neutral conditions were good, the consumption of cyanide and lime were enormous at about 2.8 kg/t and 6.1 kg/t, respectively.

With the same pretreatment of the ore, cyanidation always gave better results than leaching with thiourea.

A flotation test was carried out on an ore sample ground to 95% minus 200 mesh at a pulp density of 30% solids. The reagents used include Aerofloat 208, Aero 350, $CuSO_4$, Na_2CO_3, MIBC, and NaOH.

The flotation concentrate represented 11% of the original sample and contained 80.2% of the gold at a grade of 20 g/t. The calculated head grade was 2.7 g/t, while the analyzed head grade was 2.3 g/t. No attempt was made to optimize the flotation conditions.

Pressure oxidation of the flotation concentrate under neutral conditions followed by cyanidation resulted in a gold recovery of 93.6%. The cyanide and lime consumptions were 2.1 kg/t and 3.0 kg/t, respectively. Since the concentrate represented 11% of the original sample weight, the reagent consumptions were 0.2 kg/ t mineral and 0.3 kg/t mineral, respectively.

16.1.3 2007 testwork at Laboratoire LTM

In 2007, ore samples from the Joanna project were sent to Laboratoire LTM inc. for a series of gold extraction treatment tests which included:

- Ore grade verification;
- Direct cyanidation gold extraction versus fineness of grind;
- Knelson Gravity tests;
- Flotation tests.

16.1.3.1 Direct cyanidation Gold Extraction Versus Fineness of Grind

Direct cyanidation tests were carried out on seven 1-kg samples which were ground to size distributions ranging from 70% minus 200 mesh to 94.7% minus 400 mesh. The average head grade was 1.59 g/t with a peak of 2.07 g/t.

The results are shown in Table 16-4.

Table 16-4: Gold Extraction Versus Fineness of Grind

Test No	% passing 200 mesh	Head grade (g/t Au)	Reject grade (g/t Au)	Recovery (%)
AJ-2	100	1.43	0.61	57.4
AJ-3	95	2.07	0.72	65.2
AJ-4	90	1.68	0.75	55.3
AJ-5	85	1.59	0.68	57.4
AJ-6	80	1.56	0.68	56.3
AJ-7	75	1.69	0.79	53.4
AJ-8	70	0.8	0.8	25.9

For samples finer than 75% minus 200 mesh, the gold recovery was about 55%.

16.1.3.2 Knelson Gravity and Flotation Testwork[5,6,7]

Knelson gravity tests carried out at Laboratoire LTM showed that recoveries of up to 50% can be achieved on ore ground to 100% minus 35 mesh and containing about 1.3 g/t Au. The optimum water pressure is about 3 psi at a flowrate 0.2 kg/t. The weight recovery was about 1%.

Flotation tests were carried out on a composite of the Knelson gravity test rejects. The composite contained about 0.67 g/t Au. Sub-samples of the composite were ground to size distributions ranging from 70% minus 200 mesh to 95% minus 200 mesh. The best results were obtained for 70% minus 200 mesh at 76.93% Au recovery. However, there was not a significant difference in Au recovery between the coarser and finer size distributions. The average weight recovery for the 70% minus 200 mesh samples was 6.3%. The overall gravity and flotation Au recovery was 87.2%. If the initial head grade was 1.7 g/t and the flotation reject remained at 0.18 g/t gold, the overall gravity and flotation Au recovery would have been about 90%.

[5] Les Mines Aurizon Ltée, Projet Joanna, Tests gravimétriques, rapport d'étape no.1, préparé par Edmond St-Jean, Laboratoire LTM inc., août 2007
[6] Les Mines Aurizon Ltée, Projet Joanna, Tests gravimétriques, rapport d'étape no.2, préparé par Edmond St-Jean, Laboratoire LTM inc., octobre 2007
[7] Les Mines Aurizon Ltée, Projet Joanna, Tests de flottation, rapport d'étape no.5, préparé par Edmond St-Jean, Laboratoire LTM inc., décembre 2007

16.1.4 2007 Testwork at Unité de recherche et de service en technologie minérale (URSTM)[8,9]

In 2007, a series of metallurgical tests were carried out at URSTM on ore samples from the Joanna project. The testwork program included:

- Static cyanidation tests in bottles for three different grind granulometries;
- Kinetic cyanidation test;
- Knelson gravimetric tests followed by cyanidation of the rejects to establish the proportion of liberated gold in the mineral;
- Combined gravity concentration, flotation, and concentrate cyanidation test.

It should be noted that the head grades of all ores samples used in the above tests ranged between 2.98 g/t to 9.92 g/t Au, with an average of about 5.8 g/t. Therefore, the results are not entirely representative of the Joanna project, which has an estimated average head grade of 1.7 g/t Au.

16.1.4.1 Static Cyanidation Tests

24-hour cyanidation tests were carried out in 4-litre bottle for three different ore granulometries (D_{80} = 58, 64, and 125 microns). In each test, 350g of ore sample was used at a solids density of 41%. The results are given in Table 16-5.

Table 16-5: Static Cyanidation Test Result

Sample	D80 (microns)	Head grade (g/t Au)	Reject grade (g/t Au)	% Recovery
A	125	4.82	0.54	88.8
B	64	9.82	0.51	94.8
C	58	4.29	0.65	84.8

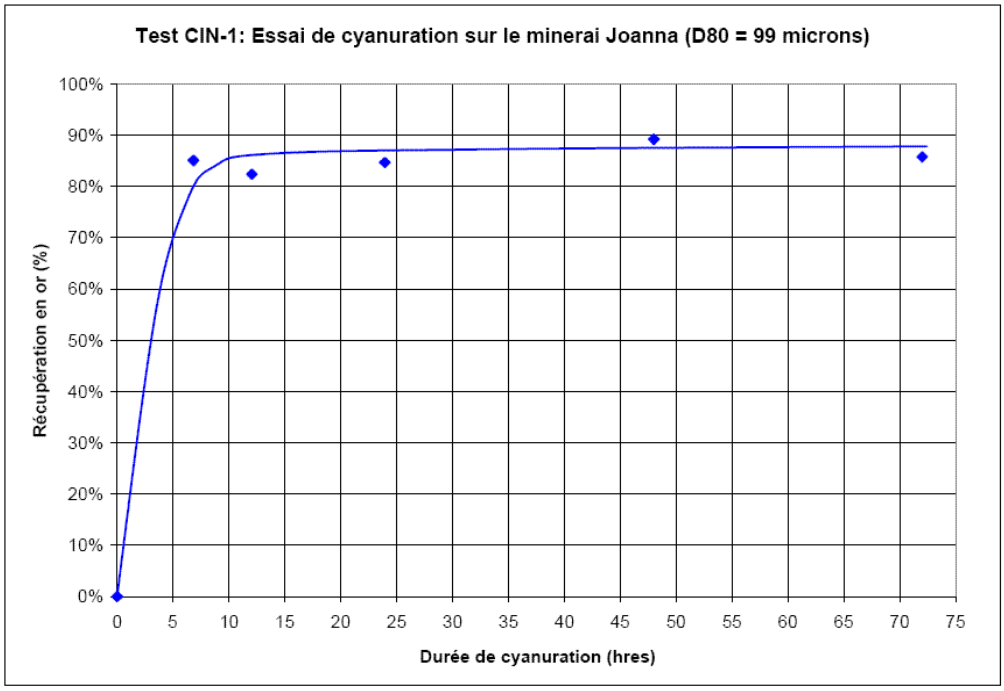
Although the recoveries were all 85% or greater, the head grades of the ores were quite high, ranging from 4.29 g/t to 9.82 g/t. If the head grade was 1.7 g/t and the tails remained at 0.5-0.65 g/t Au, the gold recovery would range between 60 and 70%.

[8] Essais métallurgiques sur le minerai Joanna, Rapport D'étape du 27 Avril 2007 (version préliminaire), Projet PU-2007-03-289, Jean Lelièvre, URSTM, 25 avril.
[9] Essai de lixiviation diagnostique sur le minerai Joanna, Rapport PU-2007-05-294, Jean Lelièvre, URSTM, juillet 2007.

16.1.4.2 Kinetic Cyanidation Test

A 72-hour kinetic cyanidation test was carried out in a 9-litre bottle using 1,000g of ore containing 3.1 g/t Au and having a D_{80} of 99 microns. The test was carried out at a solids density of 42% and samples were taken after 7, 12, 24, 48, and 72 hours of cyanidation. The NaCN concentration was 0.5 kg NaCN/t solution and the pH was maintained at 11.4. The results are summarized in Figure 16-1.

Figure 16-1 : Kinetic Cyanidation Test Result



The kinetic test shows that a gold recovery of 85% can be achieved after only 8 hours. The reject contained about 0.45 g/t Au. If the head sample contained 1.7g/t and the reject remained at 0.45 g/t, the gold recovery would have been about 74%.

16.1.4.3 Knelson Gravimetric Concentration Followed by Kinetic Cyanidation Test

A 5-kg sample of ore containing 2.98 g/t Au was ground to 70.8% passing 200 mesh. Gravimetric concentration of the ore sample was carried out on a Knelson concentrator followed by cyanidation of the Knelson concentrator reject. The overall Au recovery was 87.8%, of which 68.1% was recovered by cyanidation of the Knelson concentrate and 19.7% was recovered by cyanidation of the Knelson reject. The Knelson concentrate contained 73.4% of the gold in the feed and represented 1.7% of the total feed weight. About 93% of the gold in the Knelson concentrate reported to the leach solution, while 74% of the gold in the Knelson reject reported to the leach solution. The final combined tailings contained 0.36 g/t Au.

16.1.4.4 Combined Knelson Gravimetric Concentration, Flotation, and Concentrate Cyanidation

A test combining gravity concentration and flotation followed by cyanidation of the gravity and flotation concentrates was carried out on a 2-kg sample containing 8.92 g/t Au with a granulometry of 79.8% minus 200 mesh. The overall recovery was 84.9%, which is in the same order as previous tests.

The recovery of gold to the Knelson concentrate was only 27.3%. The low recovery was attributed to an elevated water pressure at 16-17 kPa. Gold recovery during flotation was 97.7%, while gold recoveries during cyanidation of flotation and Knelson concentrates were 86% and 87%, respectively. The flotation reject contained 0.18 g/t Au, which is in line with other flotation tests conducted. The combined rejects contained 1.35 g/t Au.

16.2 Flowsheet Selection

For the present Preliminary Assessment study, two conceptual flowsheets were considered. Typically for certain type of gold ores, pressure oxidation is usually required before leaching in order to achieve gold recoveries of over 85%. However, pressure oxidation is capital intensive and due to the scale of the project, pressure oxidation may not be economical, therefore a flowsheet without pressure oxidation and lower overall gold recovery was also considered. The conceptual flowsheet with pressure oxidation is shown in Figure 16-2, while a conceptual flowsheet without pressure oxidation is shown in Figure 16-3.

Figure 16-2 : Conceptual Flowsheet with Pressure Oxidation

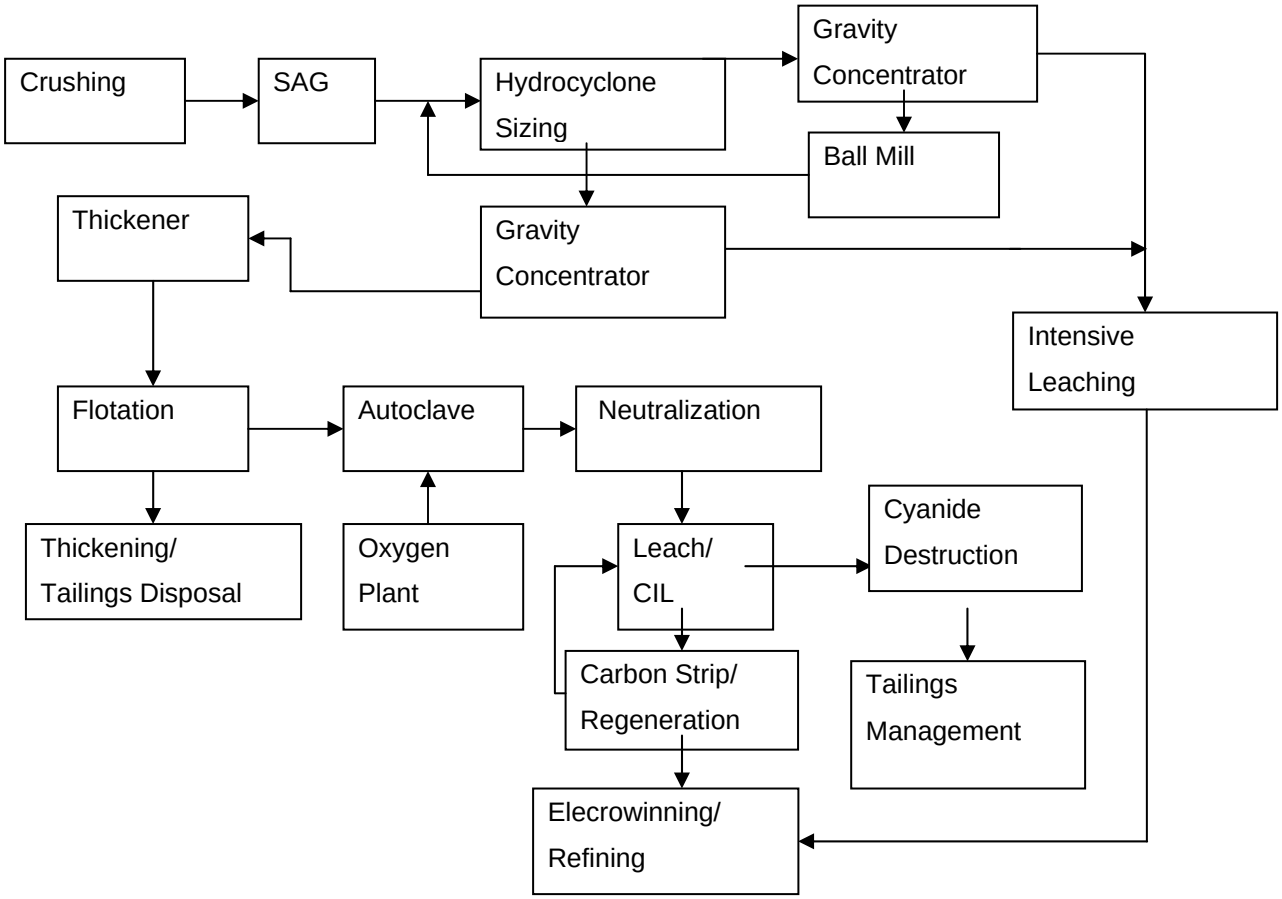
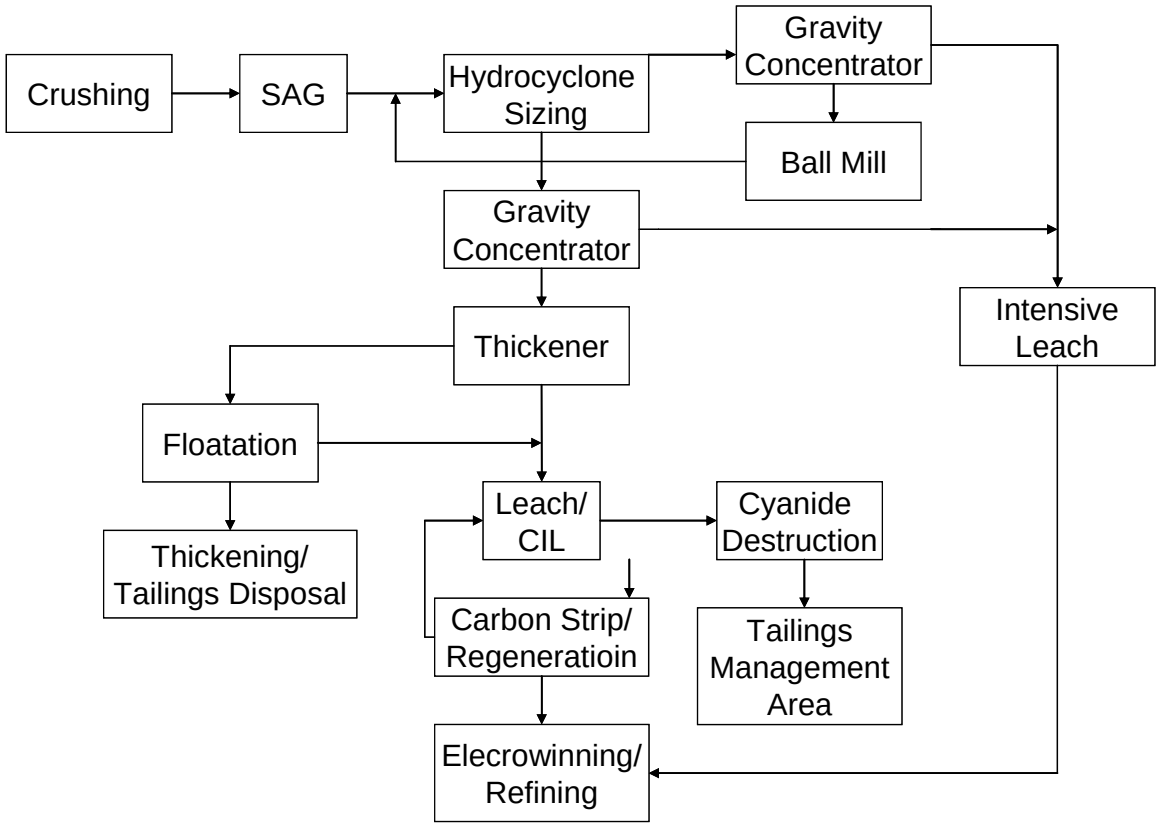


Figure 16-3: Conceptual Flowsheet without Pressure Oxidation



Preliminary gravity concentration tests indicated that approximately 50% of the gold can be recovered in a gravity concentrate representing about 1% of the weight, and based on experience at Casa Berardi, intensive leaching of gravity concentrate results in high gold recovery.

It must be emphasized that the final flowsheet will most likely be modified as more testwork is undertaken to more closely define the critical process parameters reflecting the characteristics of the ore body.

16.3 Process Development and Plant Description

16.3.1 Design Criteria

The basic process criteria for the present Preliminary Assessment are the following:

- The capacity of the plant is 5,500 tpd of run-of-mine ore;
- The gold and sulphur content of ore are 1.7 g/t and 1.3%, respectively;
- The ore grindability characteristics are typical of gold pyrite/arsenopyrite ores. The crusher work index (CRI), ball mill Bond Work Index (BWI), and the SAG mill specific energy requirement are 10.5 kWh/t, 15 kWh/t, and 10.6 kWh/t, respectively;

- The plant will operate 365 days a year with 90% equipment utilization;
- The process flowsheet would include gravity concentration, flotation concentration, intensive cyanidation of gravity concentrate in a Gekko inline reactor, pressure oxidation and leaching of the flotation concentrate;
- 47% of the contained gold would be recovered in the gravity concentrate, with a weight recovery of 1%;
- About 84% of the gold in the gravity tails would report to the flotation concentrate, with a weight recovery of 15%;
- 95% of the gold contained in gravity and flotation concentrates would be recovered in the pregnant solutions if pressure oxidation is used. Without pressure oxidation, it is assumed that the gold recovery would be 70%.

The estimated overall gold recovery, with and without pressure oxidation, are 87 and 77%, respectively. The above basic design criteria are based on limited test work and published literature. Additional test work is required to either establish or confirm some of the basic design criteria.

More detailed process design criteria are presented in Table 16-6.

Table 16-6: Detailed Process Design Criteria

PROCESS DESIGN CRITERIA			
Parameter	**Unit**	**Value**	**Source**
Throughput	Tpd	5,500	
operating days	Days	365	
operating hours per day	Hours	24	
Availability	%	90	
annual throughput	Tpy	1,806,000	
head grade	g/t	1.7	
Sulphur content	%	1.3	
gold processed per year	g/yr	2,792,200	
specific gravity		2.86	
Crushing			
Crusher work Index	kWh/t	10.5	
P80	Microns	110,000	
F80	Microns	600,000	
crusher availability	%	50	
material passing without grinding	%	35	
Grinding			
SAG specific energy requirement	kWh/t	10.6	
Ball Mill Bond Index	kWh/t	15	
SAG mill ball consumption	kg/t milled	0.6	
Ball mill ball consumption	kg/t milled	0.8	

PROCESS DESIGN CRITERIA			
Gravity separation			
knelson concentrator gold recovery	%	50	
knelson concentrator weight recovery	%	20	
Sulfur deportment to gravity concentrate	%	25	
Flotation circuit			
Thickener unit area	m^2/(t/h)	0.229	
Flotation feed solids density	%	40	
Flotation gold recovery	%	84.5	
Flotation weight recovery	%	18	
Pressure oxidation			
Oxygen pressure	Psig	150	
Oxygen purity	%	98	
Sulpfur conversion	%	99	
Oxygen efficiency	%	72	
Intensive Leaching of gravity concentrate			
Gold recovery	%	95	
CIP/stripping			
Gold recovery (with pressure oxidation)	%	95	
Gold recovery (without pressure oxidation)	%	70	
Carbon loading	g/t	3,720	
Stripping cycle	cycle/d	1	
Electrowinning			
Pregnant solution loading	g/t	150	
Gold recovery	%	100	
Cell residence time	Min	60	
power consumption	kWh/t sol.	0.5	Mineral Processing Plant Design, Practice and Control
Induction furnace melting			
typical furnace charge	Kg	37	
typical melt time/charge (including charging and pouring)	Hr	4	
charging and pouring time	Hr	1	
flux/charge	Kg	13.6	
pour temp	°C	1,038	
theoretical power required	kW/kg	0.246486	calculated from HSC
Efficiency	%	50	
safety factor		0.7	
installed power	kW	10	

16.3.2 Process Description

Run-of-mine ore is transported by rear dump haulage trucks from the open-pit and dumped directly into a 150-tonne capacity receiving hopper. Ore is withdrawn from the hopper into a vibrating grizzly. The oversize material is reduced by a 44"x56" jaw crusher to 80% minus 150 mm. The crusher discharge and grizzly undersize are transported by a discharge conveyor to a stacker conveyor which transfers the crusher ore to an approximately 6,000 tonne live external stockpile. Ore is withdrawn from the stockpile through an underground tunnel using apron feeders and transported to a 24' x 10' semi-autogenous (SAG) mill by belt conveyor. The ball loading of the SAG mill is no more than 20% by volume. The discharge from the autogenous mill reports to the ball mill pump box where it is pumped to a cluster of hydro-cyclones for sizing. The coarse fraction from the hydrocyclone is sent to a Knelson concentrator while the fine fraction (80% minus 200 mesh) is sent to a Falcon concentrator for gravity gold recovery. The Knelson and Falcon gravity concentrates, which represent about 1% of the total run-of-mine ore weight are combined and sent for intensive cyanide leaching in a Gekko In Line Leach Reactor. The concentrated pregnant solution is sent directly to electrowinning. The Falcon concentrator tails are thickened to 40% solids in a thickener prior to being sent to the flotation circuit. The Knelson concentrator tails are sent to secondary grinding in a ball mill. The ball mill discharge reports to the ball mill pump box and back to the hydrocyclone cluster for sizing.

The thickened Falcon concentrator tails are sent to a 15 m3 conditioning tank where chemicals are added to promote the flotation of a pyrite/arsenopyrite concentrate. The conditioned concentrate slurry is then treated in a series of seven 370m^3 flotation cells to produce a rougher concentrate. The collected concentrate froth is dewatered to 40% solids prior to being sent to an autoclave for pressure oxidation. Flotation tails are thickened prior to being sent to the tailings pond.

Pressure oxidation of the flotation concentrate is carried out to remove the sulphides and expose the gold for more efficient leaching. Pressure oxidation is carried out at 200°C and at pressure of 150 psig with 98% oxygen supplied by a 200 tpd cryogenic oxygen plant. The autoclave discharge slurry is cooled and neutralized in a series of tanks. The pH of the slurry is raised from a pH of about 1.5 to 10.5 with lime for subsequent cyanide leaching. The higher pH assures that hydrogen cyanide gas is not generated during leaching.

The neutralized slurry is leached in a conventional CIL circuit. The loaded activated carbon from the CIL circuit is sent to a carbon stripping circuit where the loaded gold is eluted from the activated carbon with hot cyanide solution, producing a concentrated "pregnant" gold cyanide solution for electrowinning. The stripped carbon is sent to a carbon regeneration kiln where the activated carbon is heated to 600°C to drive off organic contaminants before it is sent back to the CIP circuit. The slurry from the last CIL stage passes over a safety screen to retain any activated carbon. The retained activated carbon is returned to the CIL circuit while the underflow slurry is sent to cyanide destruction and then to a thickener to reclaim as much of the water for recycle use. The underflow slurry is sent to a separate tailings management area than the flotation tailings. Water from the tailings management area is reclaimed as recycle water.

The gold deposited during electrowinning is sent to the refinery for melting and casting in gold bars.

16.4 Recommendations

As was mentioned in section 16.2, the final flowsheet configuration is likely to be modified as more testwork is undertaken to more closely define the critical process parameters reflecting the characteristics of the ore body. In order to treat the Joanna auriferous ore, a key assumption in the conceptual flowsheet is that pressure oxidation would be required prior to conventional leaching in order to obtain gold recoveries of over 85%. However, this adds considerable capital cost to the project.

Furthermore, grindability testwork has not been carried out on the Joanna ore, and therefore, the crushing and grinding circuit is based on typical gold ore characteristics.

In order to carry out a more detailed study on possible processing plant for Joanna ore, it is recommended that the following be undertaken:

- To investigate cheaper alternatives to pressure oxidation;
- To establish the optimum gold recovery that can be achieved without pressure oxidation on representative ore samples (i.e. ore samples representative of the grade of the ore in the deposit at about 1.7g/t Au.) This would include:
    - Whole ore cyanidation tests on representative ore samples (i.e. ore containing about 1.7g/t Au);
    - Conventional leaching tests on representative gravity and flotation concentrates, without oxidation pre-treatment;
    - Intensive leaching tests of representative gravity and flotation concentrates;
- Carry out grindability and Gravity Recoverable Gold (GRG) tests to better define the grinding circuit for the Joanna project.

17. MINERAL RESOURCE ESTIMATES

17.1 Mineral Resources

Resources of Joanna have been estimated by Geostat independently in the Hosco and Heva sectors, corresponding to the old Hosco and old Heva mines respectively.

17.1.1 Resources of the Hosco Sector _ East block

For resource computation purposes, the Hosco sector corresponds to that part of the property between coordinates 7000E and 9500E in the local grid system.

17.1.1.1 Drillhole Data Used

The drill hole database used for resource estimation of the Hosco sector of Joanna is in *file Joanna_total_19juillet07_MERGE.mdb* dated August, 08, 2007. That database has information for 1,074 drill holes and channel samples from all over Joanna. For the Hosco sector, we can extract from that database 777 drill holes and channel samples with a collar between coordinates 7000E and 9500E of the local grid. Details about those drill holes and channel samples are in Table 17-1 original data from Aurizon Mines Ltd. have not been changed except for the addition of 32 old mineralized intervals in holes C1980-1. With respect to the database used for the March 2007 resource estimation, Geostat have 26 new surface holes (ids from JA-07-01 to JA-07-25) as well as several re-assayed intervals in the old drill holes.

Table 17-1 : Basic Statistics of 2m Composites

DH/Sample id	#.	Cum. Length (m)	Aver. Length. (m).	# int.	Length Int (m).	Aver. g/t Au	Comments
1W to 26W	26	6113	235.1	892	1151	0.94	Max 20.3 g/t over 0.5m Not counted : 10W = 0g/t
184E1 to 290E2	10	2990	299.0	865	1015	0.60	Max 22.6 g/t over 0.5m
79-1 to 80-56	9	1610	178.9	590	851	0.56	Max 7.2 g/t over1.5m
8310-1 to 9310-2	36	3920	108.9	1270	1162	0.90	Max 36.0 g/t over 0.8m 20m spacing along EW
C1960-1 to C2540-2	45	4911	109.1	3107	3196	0.67	Max 75 g/t over 0.5m (next is 19.6g/t)
C1960-1 to C2540-2[1]				3139	3223	0.67	
C86-1 to C86-15	15	1297	86.5	945	940	0.90	Max 2.4 g/t over 0.4m
DR4921-01 to DR4955-185	458	1008	2.2	1015	1004	2.09	Horizontal and vertical channels at Z=4921, 4933 and 4955) Max 43g/t (next is 14.8g/t)
HC-1 to HC-16	18	3849	213.8	649	896	0.62	Max 25.7 g/t over 1.5m
HOSCO-1W2 to HOSCO-11W2	18	4177	232.1	1044	1378	0.61	Max 68.7 g/t over 0.25m (next is 17.7g/t)
JA-07-01 to JA-07-25	26	11620	446.9	6844	8262	0.19	New holes (2007) Max 17.7 g/t over 1m
ST-2M11 to ST-BZ-4	116	4012	34.6	1836	1828	2.45	Short UG holes from Z=4890-4960. Max 1007 g/t over 0.18m (11 intervals above 30g/t over lengths from 0.06 to 0.58m)
All	777	45506	58.6	19057	21683	0.73	
All[1]	777	45506	58.6	19089	21788	0.72	

[1] after adding 32 old mineralized intervals in hole C1980-1

17.1.1.2 Mineralized Envelope

Like in the March 2007 resource estimation of the Hosco sector, resources are limited to mineralized solids the limits of which are defined at a low cut-off (from 0.5 to 1.0 g/t) on drill sections. Limits on drill sections are then connected through limits on level maps at 5m vertical intervals from elevation 5007.5 down to elevation 4532.5 (maximum of ninety six (96) 5m-benches i.e. a 480m maximum depth). The mineralized zones are disseminated sulfide corridors with thin quartz veins varying continuous laterally and at depth.

The interpretation of the mineralized structures has started from highly documented levels with underground works at 85 m (4927 mZ) and 120 m (4889 mZ) below surface. Surface elevation of the swamp GML mining grid is at 5 011m. The general strike orientation of the zones is Azimuth 260° with a dip of 55° to the northwest. Some of the zones are connected and disconnected depending of the elevation with respect to the Cadillac fault, which the zones never cross. The presence of underground openings from the former exploration work has been taken into account during the mineral resource estimation. Production records have been excluded of tonnage from the final resources estimation instead of cutting the underground volumes.

Labeling of the corresponding mineralized zones has not changed since the March 2007 resource study. The mineralization of the Joanna property can be divided into two sectors: the mineralized corridors North and South of the Cadillac fault and are labeled respectively to their location of the fault; and the old Hosco shaft in terms of East and West. Many zones or limbs exist in the modeling. Five zones have been clearly identified, with two of them, the Principal North and North East zones, on the north side of the fault. Three zones, the Principal South, South West and South East zones, are located south of the Cadillac fault, which separates the mineralized zones and is barren in terms of gold mineralization. Figure 17-1 presents the zones at 4957.5m elevation.

Figure 17-1 : Plan View of the Zones at 4957.5m Elevation

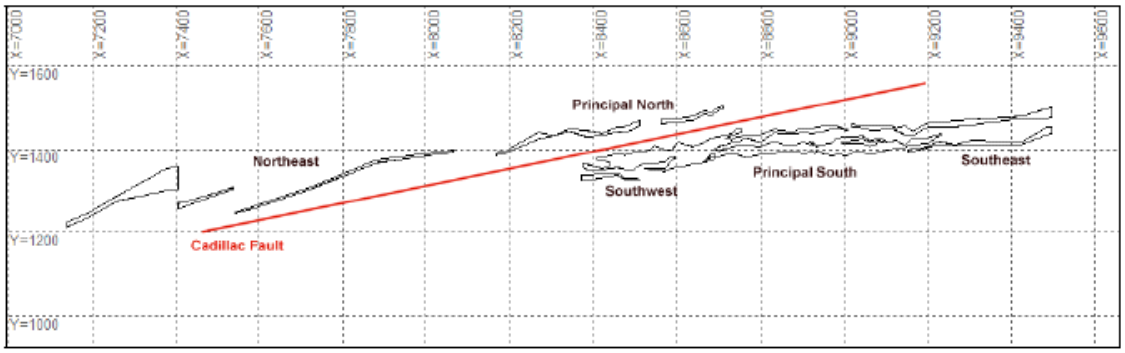
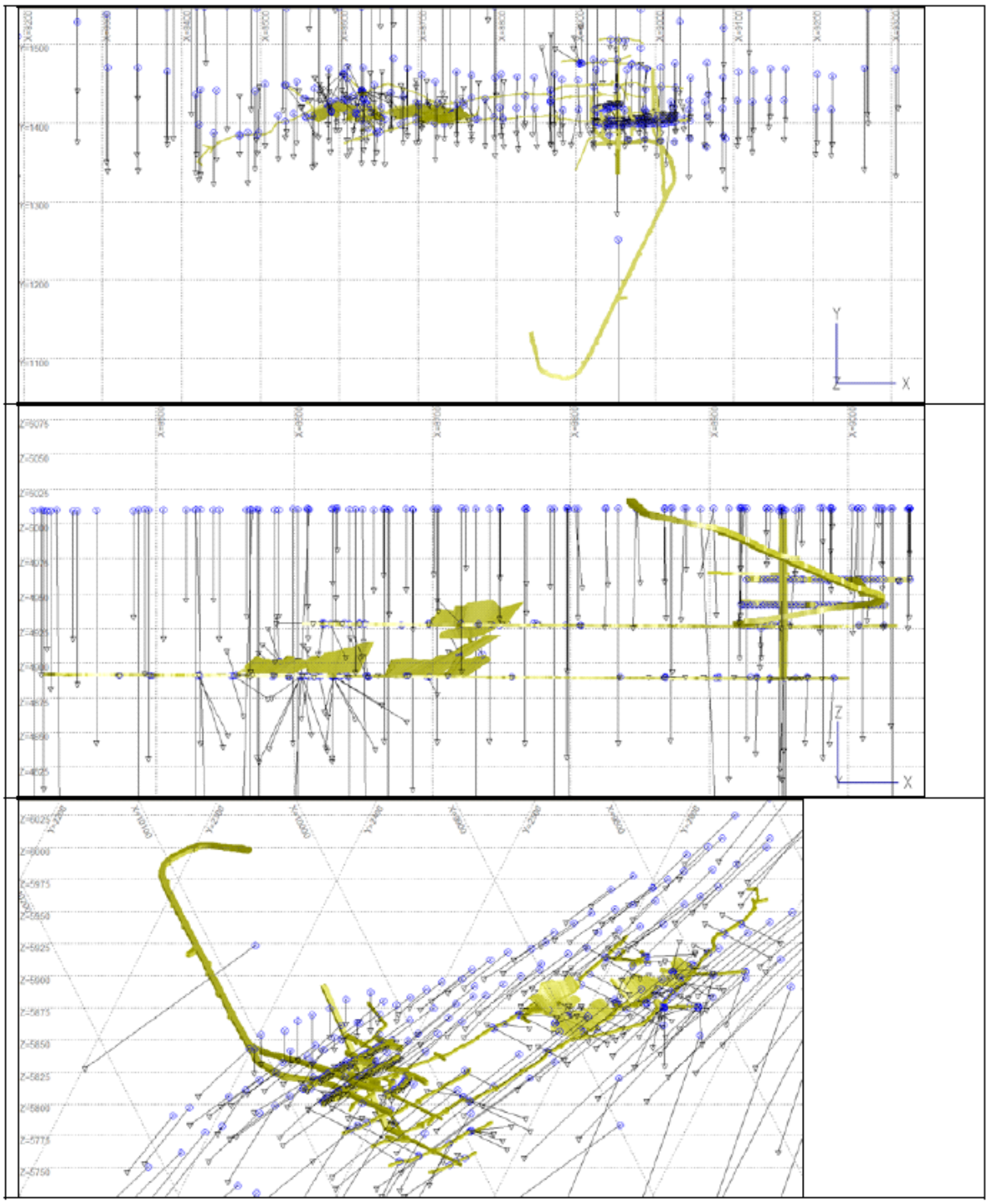


Figure 17-2 illustrates the existing underground openings of the old Hosco mine. Figure 17-3 illustrates the changes to interpreted mineralized zone limits on sections with new drill holes.

Table 17-2 shows the mineralized volume on a bench-by-bench basis before (March 2007 study) and after the new JA-07 holes. Globally they contribute to an increase of about 16% of that mineralized volume, principally at depth.

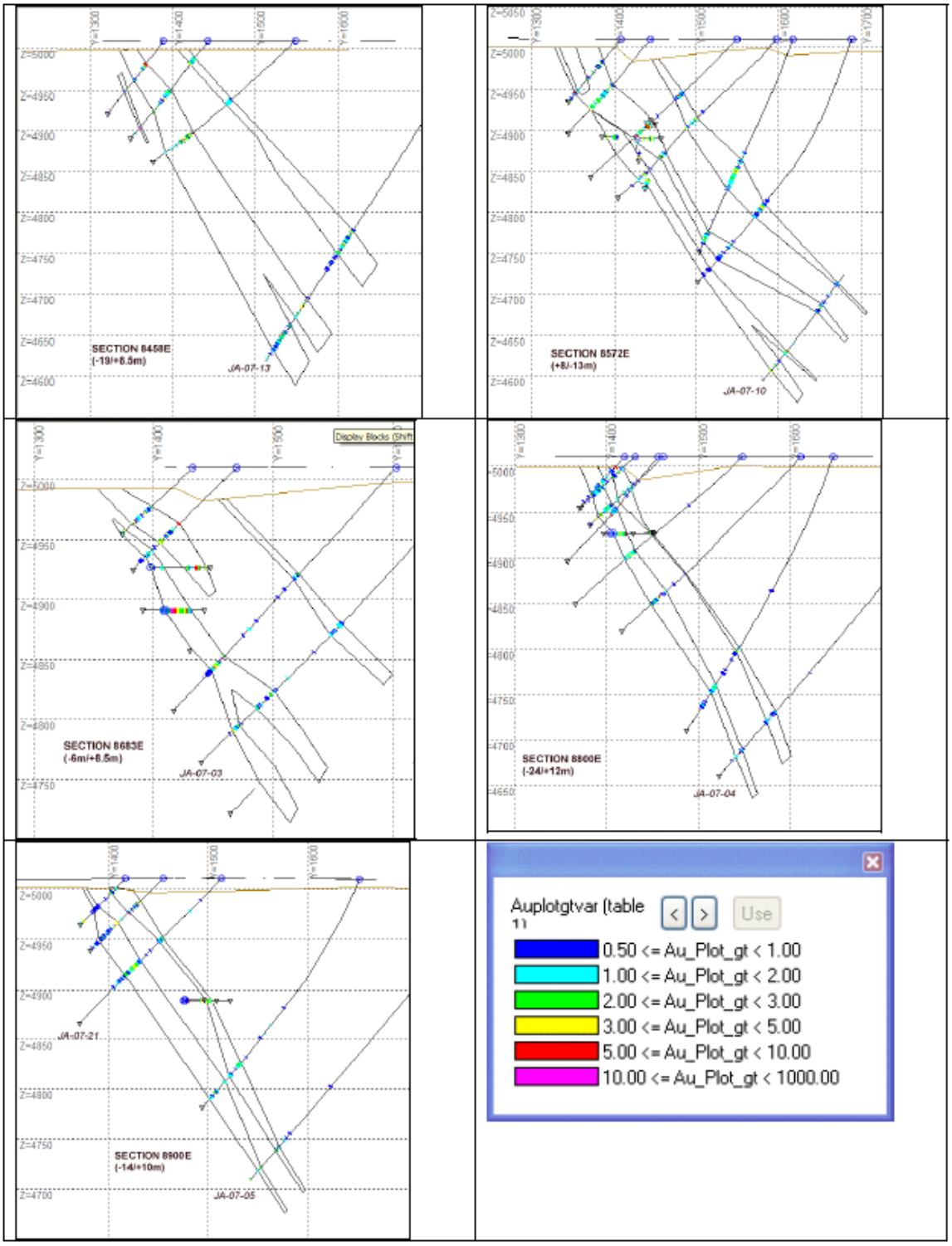
Figure 17-2 : Old Underground Workings and Drill Holes in the Hosco Sector of Joanna



In the figures, X is east, Y is north and Z is elevation (coordinates in meters).

Top = plane view. Middle: view to north (long section). Bottom: perspective view looking southwest downward.

Figure 17-3 : Mineralized Zone Limits on Sections with New Drill Holes (Hosco Sector)



Not all sections with new drill holes are shown. As a general rule, new drill holes (JA-07-xx) confirm the extension of mineralized zones at depth.

Table 17-2 : Mineralized Volume in Hosco Sector Before and After New Holes

Bench	Z	Old m3	New m3	%Diff	Bench	Z	Old m3	New m3	%Diff
1	5007.5	0	0		49	4767.5	94,200	136,500	44.9%
2	5002.5	28,729	36,706	27.8%	50	4762.5	93,950	130,200	38.6%
3	4997.5	108,289	110,331	1.9%	51	4757.5	89,650	124,050	38.4%
4	4992.5	144,284	173,548	20.3%	52	4752.5	81,700	121,450	48.7%
5	4987.5	166,016	206,340	24.3%	53	4747.5	89,950	116,750	29.8%
6	4982.5	178,841	221,223	23.7%	54	4742.5	86,900	111,400	28.2%
7	4977.5	186,200	229,000	23.0%	55	4737.5	89,950	108,600	20.7%
8	4972.5	193,500	237,800	22.9%	56	4732.5	82,750	105,900	28.0%
9	4967.5	203,450	246,400	21.1%	57	4727.5	76,300	102,700	34.6%
10	4962.5	207,900	250,900	20.7%	58	4722.5	70,600	101,200	43.3%
11	4957.5	211,700	253,300	19.7%	59	4717.5	64,350	96,650	50.2%
12	4952.5	213,350	254,200	19.1%	60	4712.5	69,000	90,500	31.2%
13	4947.5	219,350	257,700	17.5%	61	4707.5	67,250	92,900	38.1%
14	4942.5	229,250	259,050	13.0%	62	4702.5	64,450	93,950	45.8%
15	4937.5	241,150	262,800	9.0%	63	4697.5	62,900	91,750	45.9%
16	4932.5	246,500	265,000	7.5%	64	4692.5	59,750	86,600	44.9%
17	4927.5	246,950	267,250	8.2%	65	4687.5	56,250	83,050	47.6%
18	4922.5	254,900	265,100	4.0%	66	4682.5	48,850	81,250	66.3%
19	4917.5	252,700	265,700	5.1%	67	4677.5	40,550	73,150	80.4%
20	4912.5	260,850	273,950	5.0%	68	4672.5	43,700	66,450	52.1%
21	4907.5	267,400	281,700	5.3%	69	4667.5	43,150	59,950	38.9%
22	4902.5	275,100	283,700	3.1%	70	4662.5	38,300	50,750	32.5%
23	4897.5	276,350	282,100	2.1%	71	4657.5	33,350	44,750	34.2%
24	4892.5	276,450	288,150	4.2%	72	4652.5	28,150	39,450	40.1%
25	4887.5	274,850	286,300	4.2%	73	4647.5	24,900	34,050	36.7%
26	4882.5	275,750	271,550	-1.5%	74	4642.5	20,150	28,700	42.4%
27	4877.5	275,550	263,200	-4.5%	75	4637.5	15,650	26,600	70.0%
28	4872.5	246,000	251,350	2.2%	76	4632.5	13,250	25,250	90.6%
29	4867.5	246,800	232,100	-6.0%	77	4627.5	11,650	25,350	117.6%
30	4862.5	238,850	215,450	-9.8%	78	4622.5	10,450	24,900	138.3%
31	4857.5	236,550	208,650	-11.8%	79	4617.5	9,150	23,700	159.0%
32	4852.5	224,850	201,150	-10.5%	80	4612.5	7,800	23,050	195.5%
33	4847.5	213,050	195,700	-8.1%	81	4607.5	0	21,700	
34	4842.5	199,000	183,550	-7.8%	82	4602.5	0	19,200	
35	4837.5	180,700	185,000	2.4%	83	4597.5	0	18,150	
36	4832.5	162,450	166,900	2.7%	84	4592.5	0	14,900	
37	4827.5	140,100	164,900	17.7%	85	4587.5	0	11,700	
38	4822.5	134,500	164,550	22.3%	86	4582.5	0	8,100	
39	4817.5	126,300	164,000	29.8%	87	4577.5	0	7,450	
40	4812.5	120,000	162,300	35.3%	88	4572.5	0	6,250	
41	4807.5	127,000	157,550	24.1%	89	4567.5	0	5,600	
42	4802.5	128,750	155,250	20.6%	90	4562.5	0	5,450	
43	4797.5	122,400	152,500	24.6%	91	4557.5	0	5,350	
44	4792.5	117,750	147,600	25.4%	92	4552.5	0	4,850	
45	4787.5	113,600	142,800	25.7%	93	4547.5	0	3,600	
46	4782.5	109,500	140,400	28.2%	94	4542.5	0	2,700	
47	4777.5	103,500	137,350	32.7%	95	4537.5	0	1,250	
48	4772.5	104,150	135,700	30.3%	96	4532.5	0	300	
					TOTAL		10,800,109	12,515,797	15.9%

Mineralized volume does not take into account ore extracted from the old Hosco mine.

17.1.1.3 Mineralized Intercepts

Mineralized intercepts are that part of drill holes or channel samples inside the interpreted limits of mineralized zones. Most intercepts in drill holes are complete (start and end points at zone limits) while most intercepts in old channel samples are incomplete since they do not cross the whole mineralized zones.

Table 17-3 compares the statistics of the current mineralized intercepts to those in the March 2007 resource study. Mineralized intercepts are classified according to drill hole type (see Table 17-1). All together the cumulated length of mineralized intercepts increases by 26%. A large part of that increase is obviously coming from the new JA-07 holes (+606m i.e. 9% of the overall 26% increase) but a good deal of it is also coming from more intercepts defined in the old underground holes (+212m in 24 ST holes) and old channel samples (+709m in 318 channels).

At the same time, the proportion of the assayed portions of mineralized intercepts in the old drill holes is increasing. It goes from 86% to 93% for holes 184E1 to 290E2, from 80% to 84% for holes 8310-1 to 9310-2 and from 89% to 96% for holes C1960-1 to C2540-2. Improvement in assay coverage is not as well marked for holes HC-1 to HC-16, HOSCO holes and ST underground holes with proportions of respectively 84%, 94% and 64%. Because of the large influence of the latter holes on those statistics, the overall assay coverage of mineralized intercepts in old holes improves by 5%, from 83% to 88%. Since missing assays within mineralized intercept limits are assumed to be zero grade, it means however that the dilution of intercept grade coming from those missing assays is reduced from 17% to 12%.

Overall mean grade of assayed portions does not change much (from 1.88 g/t Au to 1.87 g/t Au for uncut data) while overall mean grade of full intercepts (with dilution from missing portions set to zero) increases from 1.56 to 1.64 g/t Au (still uncut).

Although some assay intervals have a very high grade (maximum grade is a 1,006 g/t but over a 18 cm long interval), capping of the 20 intervals above 25 g/t (out of a total of 7,109 intervals) to that limit does not change much the overall mean grade of mineralized intercepts with a gold metal loss of just 2.7%.

Table 17-3 : Basic Statistics of 2m Composites

Type	Old/ New	Nb Intercepts	Cum. length Intercepts (m)	Nb. assays	Cum. Length assays (m)	%Assay .	Mean g/tAu uncut	Mean. g/tAu cut
1W to 26W	Old	50	618.9	469	575.0	92.9%	1.61	1.61
1W to 26W	New	50	632.1	477	586.8	92.8%	1.58	1.58
184E1 to 290E2	Old	26	490.9	356	422.9	86.1%	1.27	1.27
184E1 to 290E2	New	26	446.2	349	413.9	92.8%	1.29	1.29
79-1 to 80-56	Old	14	270.7	189	270.7	100.0%	1.31	1.31
79-1 to 80-56	New	15	275.9	192	275.9	100.0%	1.30	1.30
8310-1 to 9310-2	Old	66	678.8	623	540.2	79.6%	1.67	1.64
8310-1 to 9310-2	New	69	707.8	663	591.6	83.6%	1.56	1.53
C1960-1 to C2540-2	Old	81	1076.5	1162	961.0	89.3%	1.62	1.62
C1960-1 to C2540-2	New	89	1217.4	1322	1163.8	95.6%	1.54	1.51
C86-1 to C86-15	Old	23	374.6	411	370.1	98.8%	1.76	1.76
C1960-1 to C2540-2	New	28	415.4	439	414.6	99.8%	1.69	1.69
DR4921-01 to DR4955-185	Old	45	168	172	168	100.0%	2.29	2.29
DR4921-01 to DR4955-185	New	363	877.1	880	870.2	99.2%	2.35	2.33
HC-1 to HC-16	Old	20	327.6	220	271.9	83.0%	1.82	1.82
HC-1 to HC-16	New	21	326.9	224	276.4	84.6%	1.82	1.82
HOSCO-1W2 to 11W2	Old	37	497.9	397	466.7	93.7%	1.52	1.50
HOSCO-1W2 to 11W2	New	37	497.9	397	466.7	93.7%	1.52	1.50
ST-2M11 to ST-BZ-4	Old	111	2059.6	1404	1400.5	68.0%	2.66	2.53
ST-2M11 to ST-BZ-4	New	125	2271.9	1561	1580.3	69.6%	2.69	2.46
JA-07	New	42	606	605	606	100.0%	1.40	1.40
All	**Old**	**473**	**6563.4**	**5403**	**5447.0**	**83.0%**	**1.88**	**1.84**
All	**New**	**865**	**8274.5**	**7109**	**7246.3**	**87.6%**	**1.87**	**1.82**

For each type of drill hole or channel sample, Table 17-3 gives the number of mineralized intercepts and their cumulated length in meters. It also gives the number of assay intervals within the limits of mineralized intercepts and their cumulated length too (from those two numbers, one can easily deduce that assay intervals are generally 1m long). The ratio of the two cumulated lengths is the %Assay i.e. lengthwise the percentage of intercept material with a measured gold grade. Last two columns are for average gold grade of assay intervals, uncut and cut to a maximum of 25 g/t.

17.1.1.4 Compositing of Assay Intervals within Mineralized Intercepts

Since original assay intervals do not have the same length and high assays tend to apply to rather short intervals (best example is the maximum grade of 1,006 g/t over a 18 cm interval), it is necessary to standardize the length of the grade “support” through numerical compositing before assigning grade to dimensionless “points” in the 3D space (the composite centers) in the block grade interpolation.

Since a majority of assay intervals in old and new drill holes have a length of 1m, this is naturally the composite length that comes to mind and it is actually the composite length which has been used in the March 2007 resource study.

Compositing is done down hole from the start of mineralized intercepts. As indicated in the previous section, any missing assay is assumed to be zero grade. At the end of the mineralized intercepts, the last composite kept is the one with at least a 0.5m length. A total of 8,275 valid 1m composites are defined in this manner.

Figure 17-4 shows the histogram and cumulative frequency plot of the calculated grade of those 1m composites. The 25 g/t cap limit for the grade of those 1m composites corresponds quite clearly to the first important gap of grade data in the top end of the distribution.

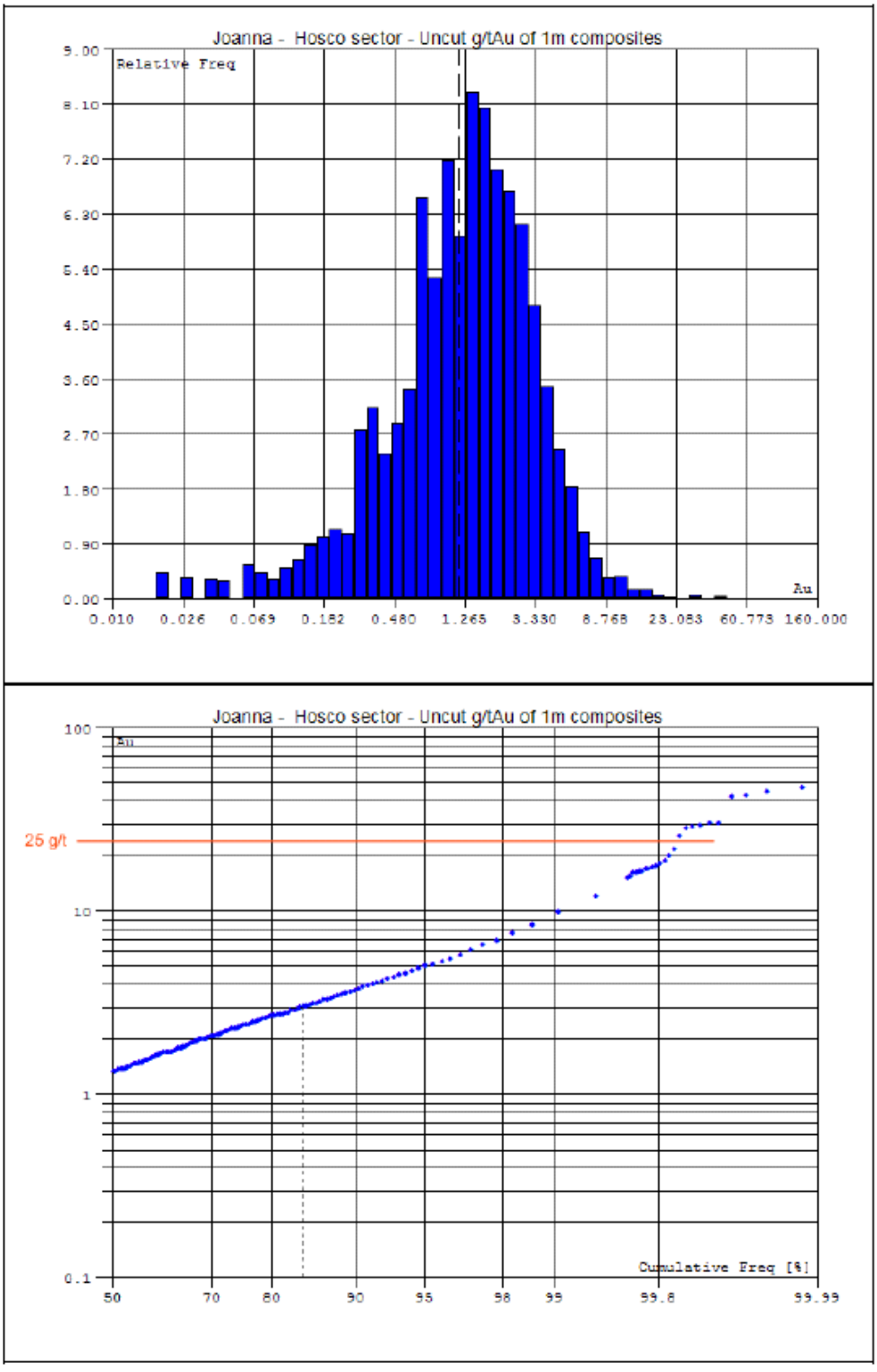
The grade of blocks in the final resource model for the Hosco sector of Joanna are interpolated from grades of 2m composites rather than 1m composites. It is felt that those longer composites better reflects the grade dilution of 2m thick blocks (see next). Those 2m composites are defined in the same way as 1m composites but with a minimum 1m composite length. The capping limit corresponding to the 25 g/t of 1m composite is 15 g/t.

Statistics of composite grades (old and new 1m and new 2m) are in Table 17-4. On that table, one can see the effect of additional drilling as well as re-assaying of some old drill hole portions (the increase of number of 1m composites by 23% plus the decrease of the proportion of 1m composites with zero grade from 15% to 12%) as well as the added grade dilution of 2m composites (less very low and very high grades than with 1m composites).

Table 17-4 : Statistics of Composite Grades in the Hosco Sector

Composites	March 2007	October 2007	October 2007
Length (m)	1m	1m	2m
Number	6735	8275	4258
Percent zero grade	14.7%	11.6%	7.2%
Percent >=0.5g/t	71.3%	72.7%	78.1%
Percent >=1.0g/t	55.0%	55.9%	59.4%
Percent >=2.0g/t	27.2%	28.4%	28.2%
Percent >=5.0g/t	4.7%	4.4%	3.8%
Percent >=10.0g/t	0.9%	0.8%	0.6%
High cap (g/tAu)	25	25	15
Number capped	8	12	10
Mean uncapped (g/t Au)	1.60	1.65	1.67
Mean capped (g/t Au)	1.58	1.62	1.63

Figure 17-4 : Histograms of the Uncut Grade of 1m Composites in the Hosco Sector



Top is the regular histogram but with a log scale for grade. Bottom is the cumulative frequency plot with the same log scale for grade. The cap limit of 25 g/t corresponds to the first inflexion of the line in the top end of grade data.

17.1.1.5 Spatial Continuity of Composite Grades

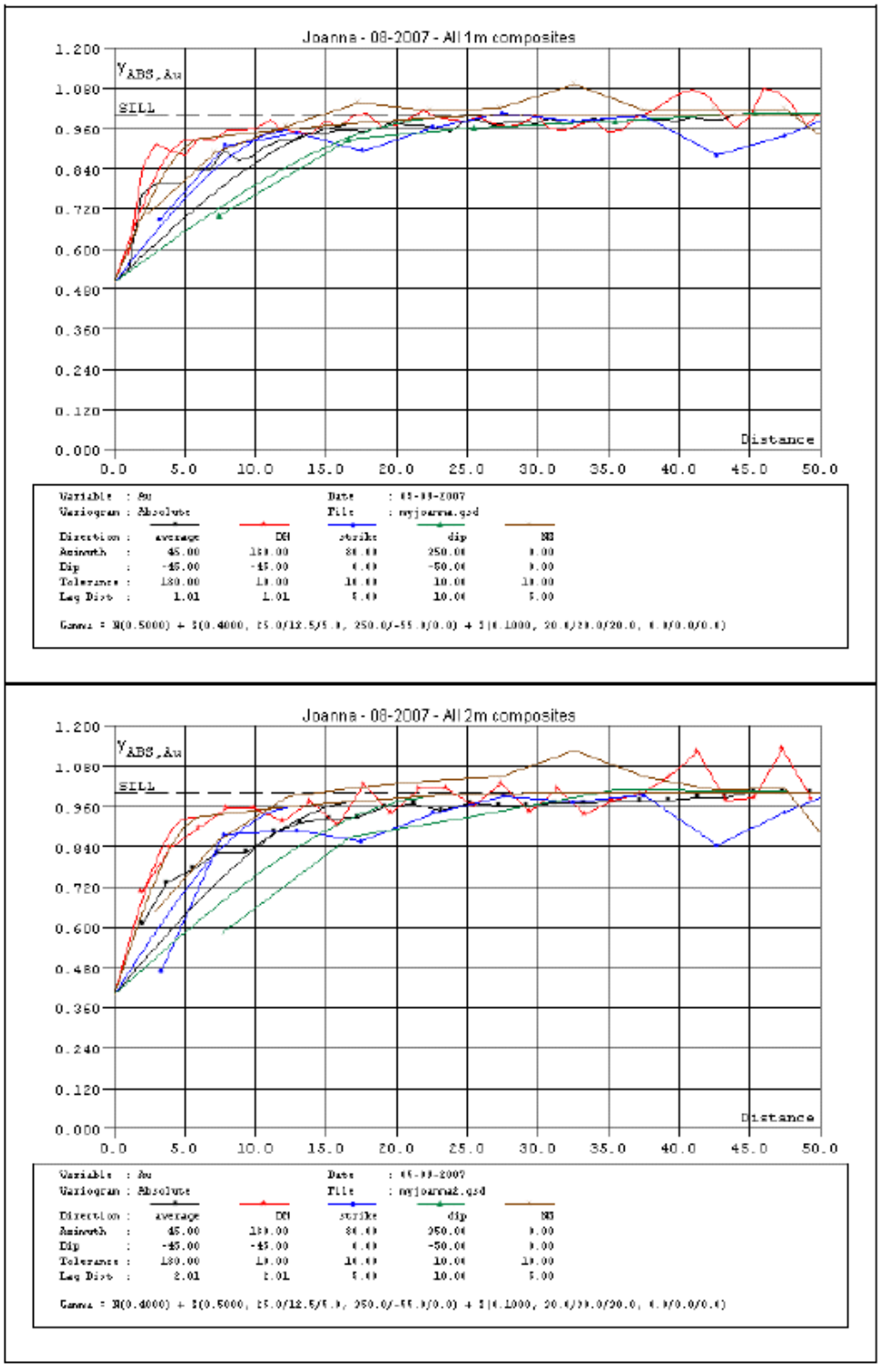
Overall correlograms (i.e. all zones together) have been computed for the cut grade of 1m and 2m composites. They are computed in all directions together (average variogram with (distance)lag of 1m or 2m depending of composite size) as well as along the principal directions of the mineralized zones i.e. (1) the average direction of surface drill holes (dip of 45° to south with lag of 1m or 2m depending of composite size) (2) the average horizontal strike (azimut N80° with 5m lags) (3) the average dip (dip of 50° to N350° with 5m lags) (4) the horizontal NS (azimut N0° with lags of 5m).

Experimental curves and fitted models are shown on Figure 17-5. Correlograms are characterized by : (1) a significant relative nugget effect (50% for 1m composites and 40% for 2m composites) (2) a maximum range of 30m (3) an anisotropy with best continuity along dip (practical range of 25m) and worst continuity along direction perpendicular to dip and strike (practical range of 5m). Practical range along horizontal strike is just 12.5m.

17.1.1.6 Specific Gravity Data

Specific gravity to convert volumes into tonnages has been measured in up to 1,255 core intervals of 6 of the new drill holes (JA-07-05, -06, -12, -17, -19 and –20). Measured values range from 2.26 to 3.07 t/m^3 with a mean of 2.66 t/m^3. Only 60 of those core intervals fall within limits of mineralized intervals. Measured values of specific gravity in those "mineralized" intervals range from 2.53 t/m^3 to 2.79 t/m^3 with the same mean of 2.66 t/m^3. Given the rather narrow range of measured data, it looks like a fixed specific gravity of 2.66 t/m^3 is a reasonable estimate to convert any mineralized volume into a mineralized tonnage. This fixed value is slightly less than the fixed 2.68 t/m^3 used in the March 2007 resource estimation.

Figure 17-5 : Correlograms of Cut Grades of 1m and 2m Composites



Graphs shown are actually 1-correlogram so as to look like variograms.

17.1.1.7 Resource Block Grade Interpolation

Resources are estimated in each block 5m(EW) x 2m(NS) x 5m(Z) of a regular matrix with up to 475 columns (EW), 281 rows (NS) and 96 benches (Z) with its center within the limits of the mineralized zones. All together, we have 251,465 such blocks with some material below the overburden/bedrock contact surface.

The average gold grade of each block is interpolated by ordinary kriging from the grades of nearby 2m composites. Kriging from 1m composites as well as inverse distance from 1m and 2m composites have also been run for sensitivity purposes.

Block interpolation is done in three successive runs with relaxed search (for nearby composites) conditions from one run to the next until all 251,465 blocks are interpolated from the 4,258 2m composites.

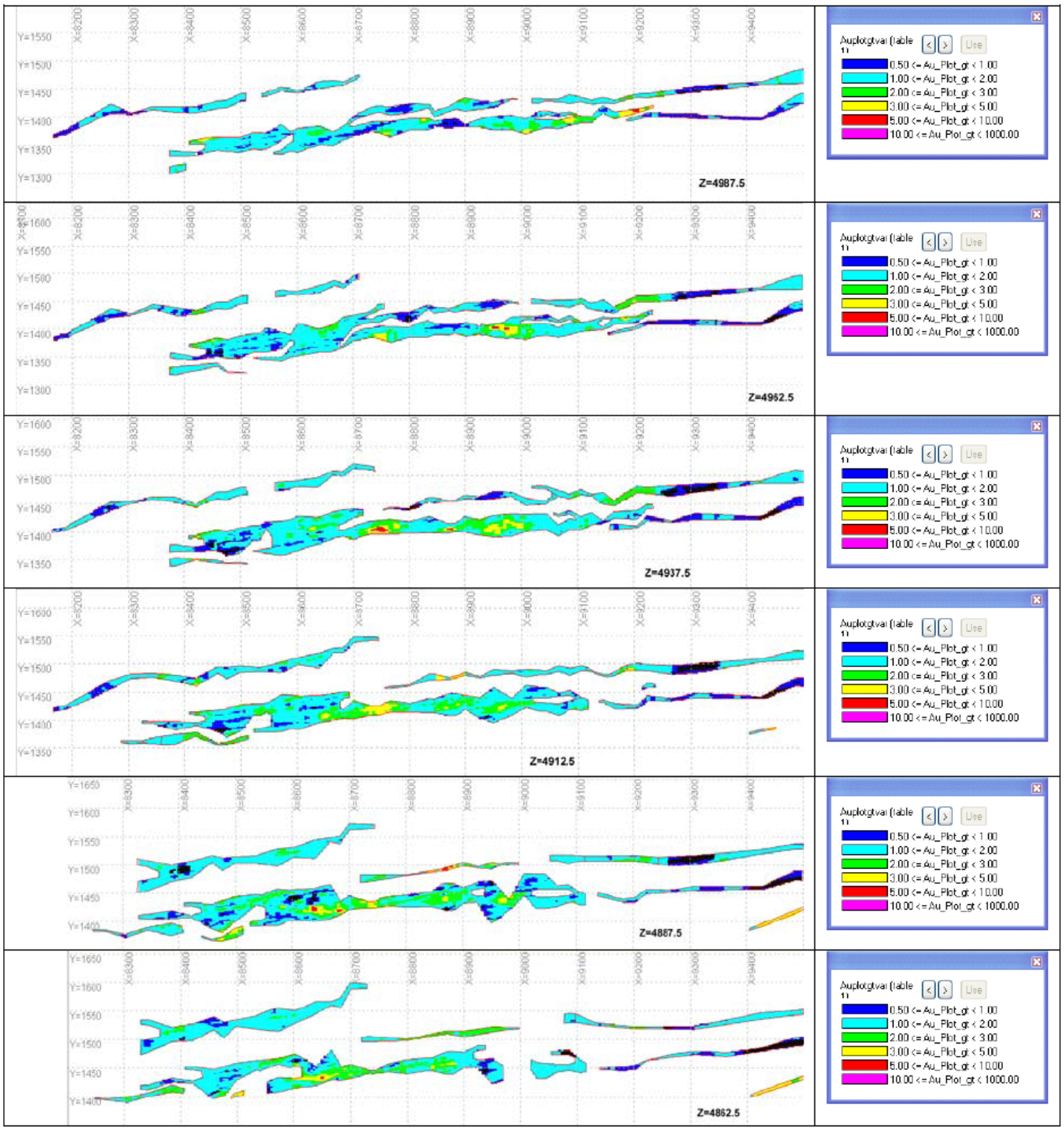
In the first interpolation run, the search ellipsoid has a long radius of 60m along dip (dip of 50˚ to N350˚ on the west side and dip of 55˚ to N350˚ on the east side), an intermediate radius of 30m along strike along horizontal strike (N80˚ azimut) and a short radius of 12m along the direction perpendicular to dip and strike. The shape of that ellipsoid corresponds to the anisotropy of the correlogram. It is also worth noticing that the long search axis is along dip whereas it was along strike in the March 2007 resource estimation. For a block to be interpolated in that first run, we need at least seven (7) 2m composites in at least 3 different holes or channel samples, with a maximum of 3 composites taken in the same drill hole or channel sample. Absolute maximum of composites retained in the ellipsoid is the 30 closest to the block. With those conditions, 78,235 blocks (31% of total) can be interpolated with interpolated grades ranging from 0.07 to 8.89 g/t and a mean of 1.58 g/t).

In the second interpolation run, the search ellipsoid keeps the same orientation but its size is increased from 60x30x12m to 120x80x40m (hence a slight reduction of the anisotropy). Minimum number of composites is reduced from 7 to 5 in at least two different holes or channel samples (maximum number of composites in the same hole or channel stays at 3) and absolute maximum number of composites retained in the search ellipsoid is increased from 30 to 40. With those conditions, 130,590 additional blocks (52% of total) can be interpolated with interpolated grade ranging from 0.06 to 8.10 g/t and averaging 1.36 g/t.

All remaining 42,640 blocks (17% of total) can be interpolated in a third and last run with a search ellipsoid of 240x180x100m size and same orientation as before, a minimum of 1 composite, a maximum of 3 composites in the same hole or channel and an absolute maximum of 50 composites. Interpolated grades for those blocks range from 0.58 to 3.35 g/t and average 1.67 g/t.

In the end, interpolated block values range from 0.07 to 8.89 g/t with a mean of 1.48 g/t. Block values on selected benches are shown on Figure 17-6.

Figure 17-6 : Interpolated Block Au Grade on Selected Benches of the Hosco Sector



Only blocks in the Principal North and South zones (i.e. east of 8200E) are shown

17.1.1.8 Resource Classification

The classification of estimated resources in the Hosco sector takes into account several factors:

1. The spacing between surface drill holes: it ranges from more than 100m on the west side down to 20m in the central part near the surface. It is clear that all estimated resources of the west part (west of 8100E i.e. the so-called Northeast zones) stay in the inferred category. It is also clear that mineralized material recognized by drill holes on a 20m grid should be at least in the indicated category. Between those two extremes, Geostat think that a 40m grid should be enough to delineate indicated resources (Figure 17-7).

2. The high concentration of underground sample data (holes and channels) in the central part of the Hosco sector, between sections 8500E and 9100E and above level 4850Z. Geostat is of the opinion that the bulk of estimated resources in this part of the deposit should be at least in the indicated category.

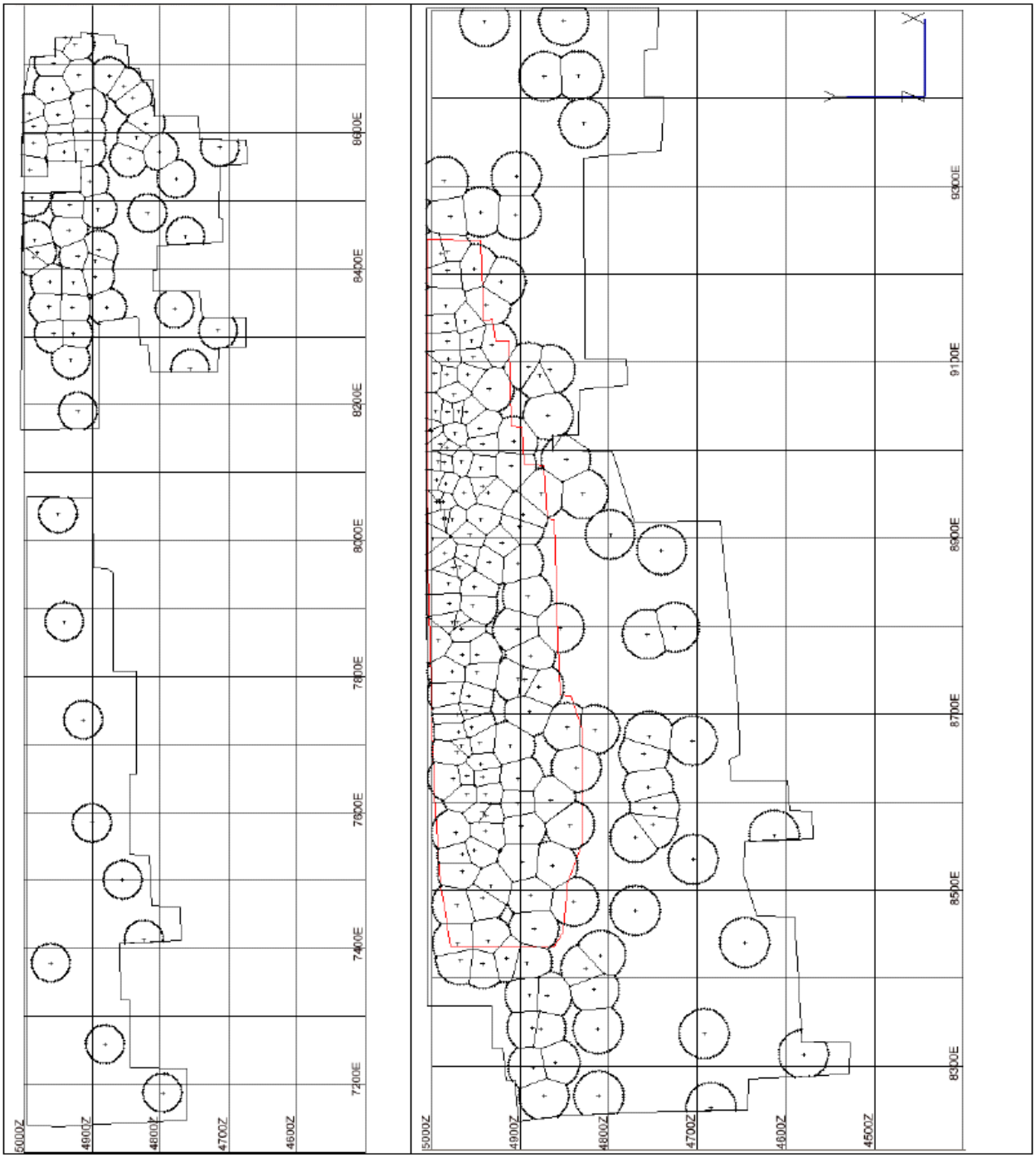
3. The continuity of mineralized zone limits ("geological continuity" as opposed to "grade continuity" measured by the correlograms) from one drill section to the next. As a rule, we keep in the inferred category the estimated resources in small structures of limited lateral extension i.e. which show on a limited number of contiguous drill sections.

4. The consistency of mineralized intercepts in the new JA-07 holes and those in historical drill holes on the same drill sections.

As a first step, Geostat classified each block of the resource model in a purely automatic manner similar to the way resources had been classified in the March 2007 resource estimation: resources of a block are tentatively put in the indicated category if there are at least seven (7) 2m composites in at least 3 different holes or channels within a 40x40x10m ellipsoid centered on the block. The search ellipsoid used for automatic classification has the same orientation as the search ellipsoids used for block grade interpolation i.e. they dip 55˚ to the N350˚. In the March 2007 resource estimation, the rule for indicated was slightly different i.e. at least eight(8) 1m composites in at least 4 different holes or channels within a 50x25x10m ellipsoid with the long axis along the N80˚ horizontal strike.

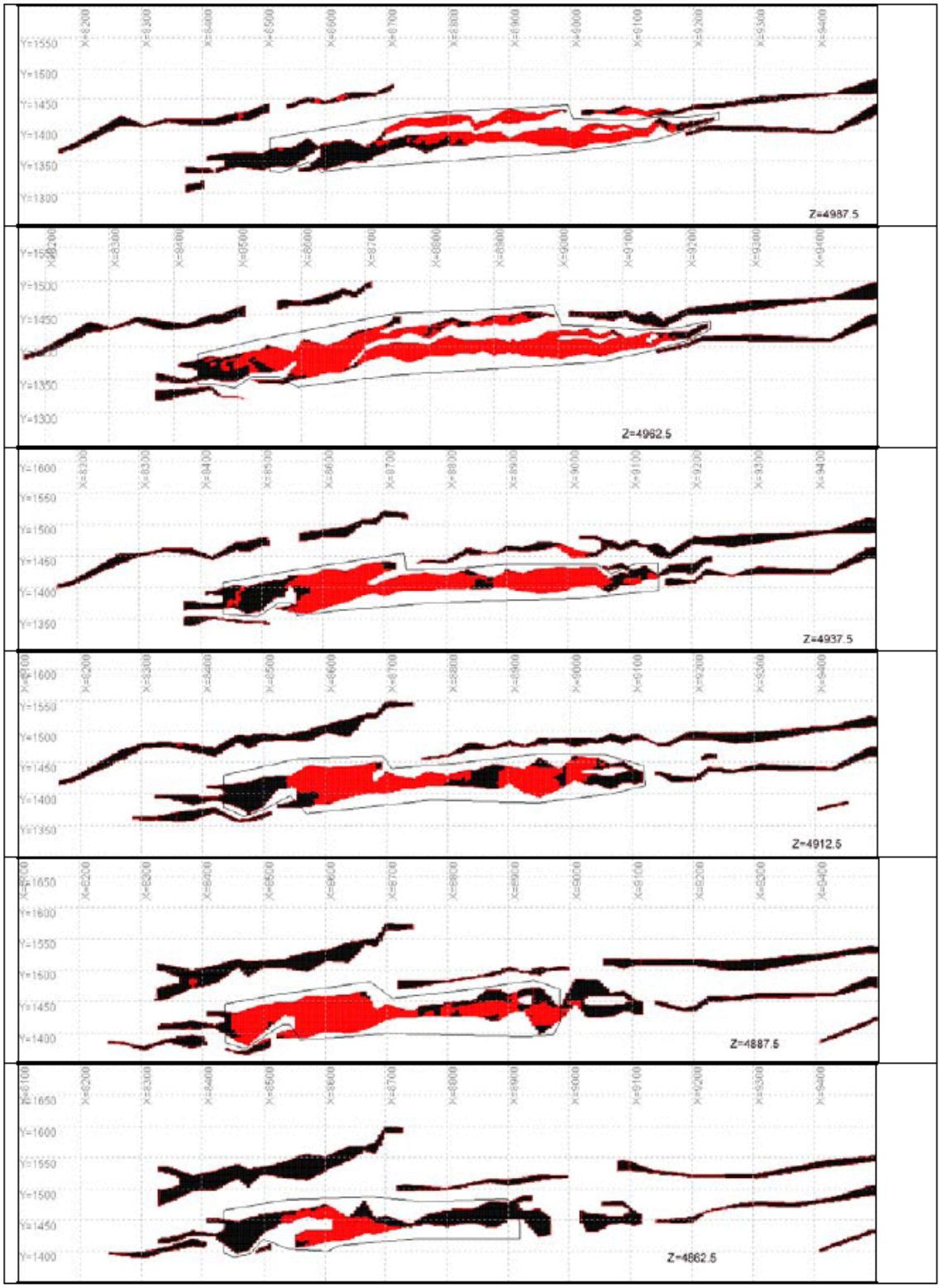
Next Geostat "edit" this automatic classification and keep in the indicated category only the block of the Principal South zone between sections 8440E and 9240E above level 4830Z. In practice, it amounts to define a new solid polygon of indicated resources with limits in each bench (Figure 17-8).

Figure 17-7 : Long Sections of North and South Zones with Surface Hole Intercepts



Left : North zone. Right : South zone. Each point represents the cumulated mineralized intercept in a surface hole. Circles/polygons around points correspond to « zones of influence » with a 28m maximum radius. With such a radius, there should not be any gap between holes on a 40m grid. The black outline corresponds to the maximum extent of mineralization according to the mineralized envelope. The red outline would be the limit of indicated resources in the South zone, just based on the 40m minimum spacing.

Figure 17-8 : Preliminary and Final Resource Classification in the Top Benches



Red blocks: indicated from preliminary automatic classification – Black outline : final indicated

17.1.1.9 Final Resources for the Hosco Sector of Joanna

New global resources for the Hosco sector are obtained by simply adding resources in each block of the new resource model with an interpolated grade above any given economic cut-off. In the next resource tables 17-5 and 17-6, the cut-off used is 0.5 g/t like in the March 2007 study but at this moment, Geostat does not have any technical/economic studies to show that it is the cut-off, which may be used at the time of mining. Tally of blocks is done separately inside (=indicated) and outside (=inferred) the indicated solid presented in the previous section of this report. As indicated before, a fixed specific gravity of 2.66t/m^3 is used to convert block volume (5x2x5 = 50m^3 except for blocks cut by the overburden/bedrock surface in the top benches) into tonnage. The “historical” production of the old Hosco mine is simply subtracted from the indicated resources.

Most of the added 110,000 ounces of indicated resources does not originate from the new drilling but rather from a re-evaluation of the limits between indicated and inferred as explained in the previous section of this report.

The added 45,000 ounces of inferred resources is more the product of additional drilling (JA-07 holes) which allowed the extension of mineralized structures to depth.

Table 17-5 : Indicated Resources of Hosco Sector Above 0.5 g/t Au

Bench	Z base	Indicated resources (>=0.5g/t) October 2007			Indicated resources (>=0.5g/t) Masrch 2007			Difference
		Tonnes	g/t Au	Oz Au	Tonnes	g/t Au	Oz Au	Oz Au
1	5005	0	0.00	0	0	0.00	0	0
2	5000	57,209	1.65	3,038	36,322	1.06	1,239	1,799
3	4995	133,752	1.44	6,194	78,055	1.40	3,515	2,679
4	4990	197,626	1.42	9,045	96,607	1.52	4,727	4,318
5	4985	242,060	1.44	11,242	114,302	1.59	5,841	5,401
6	4980	270,655	1.46	12,681	140,432	1.83	8,240	4,441
7	4975	299,516	1.46	14,061	179,024	1.67	9,625	4,436
8	4970	308,826	1.48	14,719	216,142	1.61	11,218	3,501
9	4965	320,796	1.49	15,371	247,096	1.56	12,404	2,966
10	4960	330,505	1.48	15,756	258,486	1.57	13,044	2,712
11	4955	334,761	1.49	16,044	248,168	1.62	12,900	3,145
12	4950	333,298	1.54	16,503	233,696	1.66	12,453	4,049
13	4945	337,820	1.60	17,325	234,500	1.75	13,180	4,144
14	4940	292,068	1.71	16,026	246,962	1.86	14,766	1,259
15	4935	303,373	1.71	16,655	236,510	1.96	14,938	1,716
16	4930	307,762	1.70	16,836	219,224	2.03	14,295	2,542
17	4925	311,885	1.69	16,938	191,754	1.96	12,086	4,853
18	4920	316,806	1.65	16,816	184,920	1.94	11,519	5,297
19	4915	316,673	1.64	16,697	177,818	1.98	11,314	5,382
20	4910	317,072	1.64	16,749	172,324	1.94	10,754	5,995
21	4905	285,019	1.69	15,486	151,420	2.00	9,747	5,739
22	4900	280,763	1.70	15,303	189,208	2.08	12,674	2,629
23	4895	279,034	1.70	15,237	225,388	2.02	14,626	611
24	4890	272,916	1.68	14,715	248,034	1.97	15,672	-957
25	4885	267,862	1.66	14,312	250,714	1.92	15,484	-1,172
26	4880	245,385	1.68	13,217	237,046	1.90	14,464	-1,247
27	4875	235,676	1.66	12,612	195,506	1.81	11,375	1,238
28	4870	230,755	1.69	12,501	132,526	1.81	7,694	4,807
29	4865	197,505	1.75	11,121	80,534	1.82	4,709	6,413
30	4860	189,791	1.75	10,657	61,640	1.79	3,538	7,119
31	4855	123,557	1.76	7,007	43,952	1.99	2,814	4,193
32	4850	107,198	1.82	6,258	28,274	2.13	1,934	4,324
33	4845	78,869	1.97	4,991	27,738	3.68	3,284	1,707
34	4840	64,904	1.96	4,089	26,130	1.74	1,463	2,626
35	4835	51,870	1.94	3,236	18,760	1.62	976	2,261
36	4830	30,324	2.13	2,076	9,112	1.43	418	1,658
37	4825	0	0.00	0	4,020	1.18	152	-152
38	4820	0	0.00	0	2,010	1.11	71	-71
39	4815	0	0.00	0	0	0.00	0	0
TOTAL		8,273,891	1.62	431,504	5,444,354	1.82	319,155	112,349
EXTRACTED		-46,000	6.58	-9,732	-46,000	6.58	-9,732	
FINAL calculated		**8,227,891**	**1.59**	**421,773**	**5,398,354**	**1.78**	**309,424**	**112,349**
FINAL rounded		**8.2M**	**1.6**	**420koz**				

Table 17-6 : Inferred Resources of Hosco Sector Above 0.5 g/t Au

Bench	Z base	Inferred resources (>=0.5g/t) October 2007			Inferred resources (>=0.5g/t) March 2007			Difference
		Tonnes	g/t Au	Oz Au	Tonnes	g/t Au	Oz Au	Oz Au
1	5005	0	0.00	0	0	0.00	0	0
2	5000	40,397	1.45	1,887	39,614	1.97	2,515	-628
3	4995	158,797	1.30	6,655	205,997	1.59	10,538	-3,883
4	4990	261,749	1.38	11,589	285,879	1.52	13,931	-2,342
5	4985	303,079	1.42	13,840	324,323	1.43	14,904	-1,064
6	4980	313,142	1.43	14,430	324,524	1.42	14,767	-337
7	4975	303,506	1.44	14,055	299,088	1.46	14,045	9
8	4970	315,210	1.45	14,651	278,988	1.49	13,376	1,276
9	4965	325,185	1.45	15,205	278,050	1.54	13,755	1,450
10	4960	327,712	1.46	15,358	279,122	1.57	14,066	1,292
11	4955	327,446	1.49	15,681	302,572	1.60	15,555	126
12	4950	331,170	1.50	16,016	315,570	1.60	16,264	-248
13	4945	332,633	1.51	16,167	332,588	1.57	16,804	-637
14	4940	379,582	1.49	18,140	348,132	1.54	17,212	928
15	4935	377,188	1.49	18,063	388,600	1.46	18,296	-233
16	4930	380,912	1.51	18,446	422,100	1.45	19,690	-1,244
17	4925	384,902	1.51	18,679	447,694	1.45	20,881	-2,202
18	4920	375,725	1.52	18,380	475,298	1.45	22,135	-3,755
19	4915	376,922	1.54	18,630	467,928	1.50	22,514	-3,884
20	4910	395,675	1.53	19,465	486,286	1.56	24,376	-4,911
21	4905	445,683	1.51	21,639	512,550	1.62	26,754	-5,115
22	4900	453,929	1.50	21,824	499,150	1.52	24,443	-2,619
23	4895	448,210	1.50	21,681	466,320	1.54	23,029	-1,348
24	4890	467,894	1.53	22,977	436,974	1.56	21,928	1,049
25	4885	468,293	1.54	23,217	435,098	1.67	23,385	-169
26	4880	450,471	1.55	22,481	457,744	1.65	24,298	-1,817
27	4875	436,107	1.56	21,872	503,572	1.59	25,759	-3,887
28	4870	411,369	1.57	20,730	493,790	1.65	26,203	-5,473
29	4865	396,473	1.53	19,555	553,554	1.62	28,848	-9,293
30	4860	366,282	1.53	18,066	546,586	1.61	28,372	-10,306
31	4855	414,827	1.57	20,903	548,194	1.64	28,955	-8,051
32	4850	411,236	1.55	20,555	533,588	1.73	29,712	-9,157
33	4845	425,866	1.52	20,875	504,644	1.81	29,393	-8,518
34	4840	406,581	1.51	19,739	472,082	1.79	27,096	-7,357
35	4835	420,280	1.52	20,474	427,996	1.71	23,587	-3,113
36	4830	393,148	1.55	19,615	391,414	1.67	21,076	-1,461
37	4825	417,753	1.59	21,388	340,360	1.53	16,776	4,612
38	4820	420,679	1.61	21,791	331,114	1.45	15,417	6,374
39	4815	419,349	1.62	21,774	315,838	1.40	14,232	7,543
40	4810	416,822	1.62	21,769	293,728	1.43	13,479	8,290
41	4805	404,320	1.61	20,975	316,642	1.48	15,048	5,927
42	4800	401,660	1.57	20,330	314,364	1.48	14,910	5,420
43	4795	396,473	1.54	19,571	298,284	1.54	14,791	4,780
44	4790	384,104	1.49	18,412	283,544	1.59	14,532	3,879
45	4785	372,267	1.44	17,203	264,114	1.54	13,062	4,141
46	4780	367,080	1.42	16,813	254,868	1.53	12,538	4,275
47	4775	358,834	1.42	16,357	246,158	1.52	12,004	4,353
48	4770	355,243	1.41	16,097	250,446	1.47	11,829	4,269
49	4765	359,233	1.38	15,990	229,140	1.40	10,318	5,671
50	4760	344,470	1.34	14,884	224,718	1.34	9,713	5,171
51	4755	328,111	1.31	13,774	216,544	1.36	9,448	4,326
52	4750	321,062	1.29	13,318	195,506	1.37	8,613	4,705
53	4745	309,092	1.28	12,765	220,028	1.31	9,301	3,464

54	4740	295,792	1.27	12,075	217,214	1.36	9,464	2,611
55	4735	288,610	1.27	11,751	224,316	1.39	10,059	1,693
56	4730	281,561	1.27	11,502	208,236	1.38	9,241	2,262
57	4725	273,182	1.27	11,182	198,990	1.39	8,880	2,302
58	4720	269,059	1.28	11,110	180,766	1.48	8,596	2,514
59	4715	256,956	1.29	10,675	166,428	1.69	9,058	1,617
60	4710	240,464	1.29	9,972	180,364	1.83	10,591	-619
61	4705	246,848	1.30	10,298	178,890	1.79	10,277	22
62	4700	249,508	1.31	10,522	164,418	1.74	9,223	1,298
63	4695	243,656	1.31	10,297	156,244	1.62	8,138	2,158
64	4690	230,090	1.34	9,925	151,152	1.50	7,281	2,644
65	4685	220,381	1.36	9,663	137,484	1.48	6,527	3,136
66	4680	214,662	1.38	9,515	116,044	1.54	5,741	3,773
67	4675	191,387	1.42	8,708	96,078	1.73	5,342	3,365
68	4670	173,432	1.45	8,111	107,870	1.78	6,180	1,931
69	4665	157,738	1.53	7,761	107,602	1.89	6,550	1,211
70	4660	134,197	1.59	6,846	97,284	1.97	6,170	677
71	4655	119,035	1.58	6,054	88,440	2.04	5,796	258
72	4650	104,937	1.54	5,182	75,442	2.08	5,046	136
73	4645	90,573	1.47	4,267	66,732	2.09	4,493	-226
74	4640	76,342	1.45	3,553	54,002	2.16	3,747	-193
75	4635	70,756	1.46	3,313	41,942	2.09	2,824	489
76	4630	67,165	1.48	3,189	35,510	2.11	2,413	776
77	4625	67,431	1.49	3,233	31,222	2.06	2,065	1,168
78	4620	66,234	1.46	3,118	28,006	2.04	1,837	1,282
79	4615	63,042	1.45	2,932	24,522	1.95	1,541	1,391
80	4610	61,313	1.39	2,745	20,502	1.50	986	1,759
81	4605	57,722	1.37	2,538	0	0.00	0	2,538
82	4600	51,072	1.33	2,186	0	0.00	0	2,186
83	4595	48,279	1.29	2,006	0	0.00	0	2,006
84	4590	39,634	1.21	1,536	0	0.00	0	1,536
85	4585	31,122	1.11	1,107	0	0.00	0	1,107
86	4580	21,546	1.13	782	0	0.00	0	782
87	4575	19,817	1.13	718	0	0.00	0	718
88	4570	16,625	1.15	613	0	0.00	0	613
89	4565	14,896	1.20	576	0	0.00	0	576
90	4560	14,497	1.21	564	0	0.00	0	564
91	4555	14,231	1.21	553	0	0.00	0	553
92	4550	12,901	1.19	495	0	0.00	0	495
93	4545	9,576	1.18	363	0	0.00	0	363
94	4540	7,182	1.16	268	0	0.00	0	268
95	4535	3,325	1.18	126	0	0.00	0	126
96	4530	798	1.23	32	0	0.00	0	32
TOTAL		24,321,708	1.47	1,146,685	21,836,706	1.57	1,102,542	44,143
EXTRACTED		0	0.00	0	0	0.00	0	
FINAL calculated		**24,321,708**	**1.47**	**1,146,685**	**21,836,706**	**1.57**	**1,102,542**	**44,143**
FINAL rounded		**24.3M**	**1.5**	**1150koz**				

17.1.1.10 Sensitivity of Estimated Resources for the Hosco Sector

In the course of the resource estimation for the Hosco sector of Joanna, several resource models and classification schemes have been built. Table 17-7 shows the results of some of those models in terms of calculated indicated and inferred resources above the usual cut-off of 0.5 g/t. Top line shows the estimated resources of March 2007 when block interpolation was done by inverse distance from 1m composites and block resources were classified in an automatic manner. Bottom line shows the current estimate with interpolation by ordinary kriging from 2m composites and classification using an indicated solid with limits on each bench.

From that table, it appears that we have little difference between global estimates when we switch from inverse distance to ordinary kriging or when we switch from 1m composites to 2m composites.

Table 17-7 : Comparison of Various Resources Estimates Above 0.5 g/t for the Hosco Sector

Date	Int.	Class.	Indicated resources			Inferred resources		
			Tonnes	g/tAu	OzAu	Tonnes	g/tAu	OzAu
03-07	**ID1**	**Auto**	**5,398,354**	**1.78**	**309,424**	**21,836,706**	**1.57**	**1,102,542**
10-07	ID1	Auto	5,730,782	1.68	309,484	25,703,842	1.58	1,307,216
10-07	OK1	Auto	5,865,347	1.70	319,809	26,337,463	1.51	1,275,254
10-07	ID1	Solid	7,933,295	1.63	416,005	23,518,156	1.59	1,202,185
10-07	OK1	Solid	8,169,619	1.63	428,508	24,224,186	1.52	1,181,261
10-07	**OK2**	**Solid**	**8,273,891**	**1.59**	**421,773**	**24,321,708**	**1.47**	**1,146,385**

Date : 03-07 = March 2007 estimation; 10-07 = October 2007 estimation.

Int. = grade interpolation method. ID1 = inverse distance from 1m composites, OK1 = ordinary kriging from 1m composites, OK2 = ordinary kriging from 2m composites.

Class. = classification method. Auto. = automatic with search conditions around each block. Solid = through a solid of indicated with limits on each bench.

17.1.2 Resources of the Heva Sector – West Block Including Vantex

For resource computation purposes, the Heva sector corresponds to that part of the property between coordinates 4660E and 6575E of the local grid.

17.1.2.1 Data Used

The drill hole database used for resource estimation of the Heva sector of Joanna is in *file JoannaHeva_update_Geostat_04_06_07.mdb* dated June 4th, 2007. That database has information for 838 drill holes and channel samples from all over Joanna. For the Heva sector, we can extract from that database 458 drill holes and underground channel samples with a collar between coordinates 4660E and 6575E of the local grid. It is important to mention that holes drilled in 2005 on Vantex claims are not include into the current resource estimate.

17.1.2.2 Mineralized Envelope

Similar to the March 2007 resource estimation of the Hosco sector, resources in the Heva sector are limited to mineralized solids, the limits of which are defined at a low cut-off (from 0.5 to 1.0 g/t) on drill sections. Limits on drill sections are then connected through limits on level maps at 10m vertical intervals from elevation 5,007.5 down to elevation 4,687.5 (maximum of thirty two (32) 10m-benches i.e. a 320m maximum depth). The mineralized zones are disseminated sulfide corridors with thin quartz veins varying continuous laterally and at depth.

The interpretation of the mineralized structures has started from well documented levels with underground works at 121m (4882mZ) and 201m (4802mZ) below surface, other levels exist but are not document with assay data. Surface elevation of the swamp GML mining grid is at 5,003m. The general strike orientation of the zones is Azimuth 260° with a dip of 63° to the northwest. Some of the zones are connected and disconnected depending of the elevation with respect to the Cadillac fault, which the zones never cross.

The presence of underground openings from the former exploration work has been taken into account during the mineral resource estimation. Production records have been excluded of tonnage from the final resources estimation instead of cutting the underground volumes.

The mineralization of the west block(Heva) at Joanna property is divided into three sectors which are ZP principal zone, ZE east zone and ZW these mineralized corridors are South of the Cadillac fault and the old Heva shaft in terms of East and West. Many zones or limbs exist in the modeling. Figure 17-9 presents the zones at 4,925m elevation.

Figure 17-9 : Plan View of the Zones at 4,925 Elevation

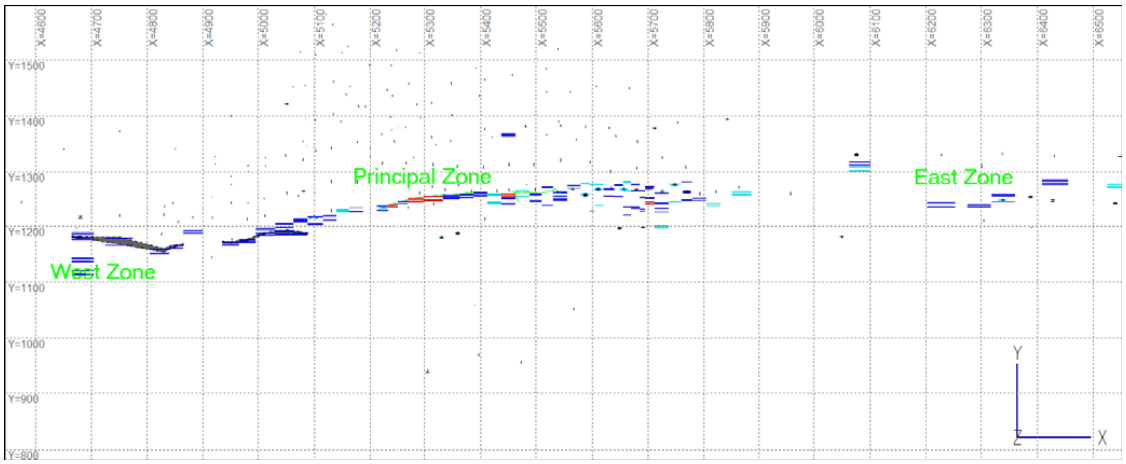
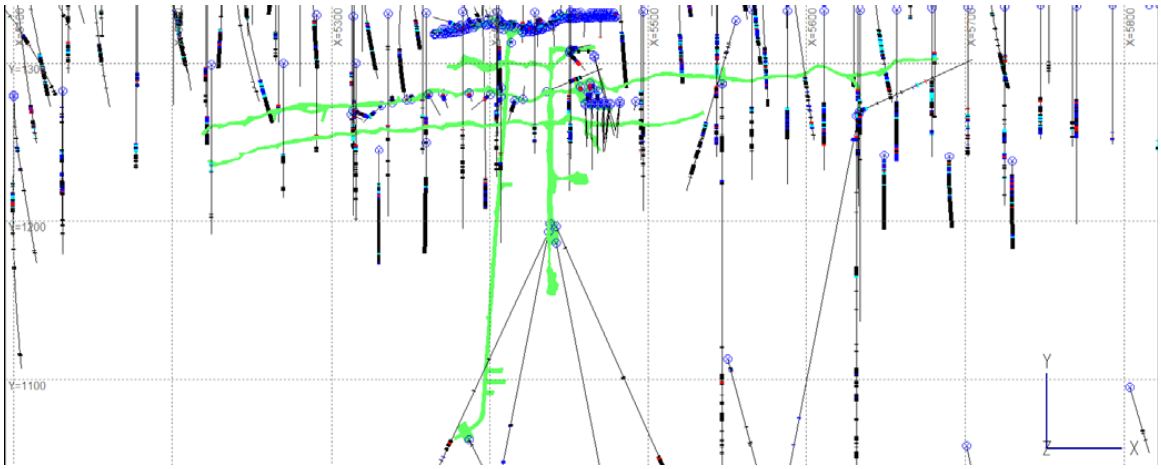


Figure 17-10 illustrates the existing underground openings of the old Heva mine.

Figure 17-10 : Old Underground Workings and Drill Holes in the Heva Sector of Joanna



In the figures, X is east, Y is north and Z is elevation (coordinates in meters). Figures 17-11 and 17-12 illustrate the interpreted mineralized zone limits on sections.

Figure 17-11 : Typical Mineralized Zone Limits on Section 5315E with Drill Holes (Heva sector)

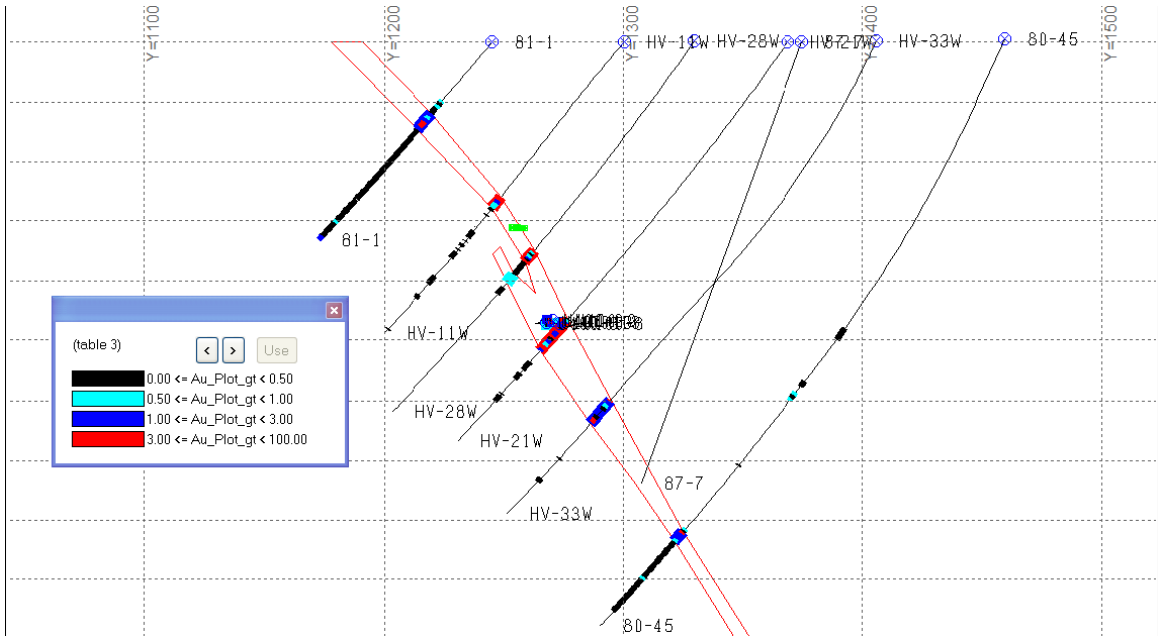
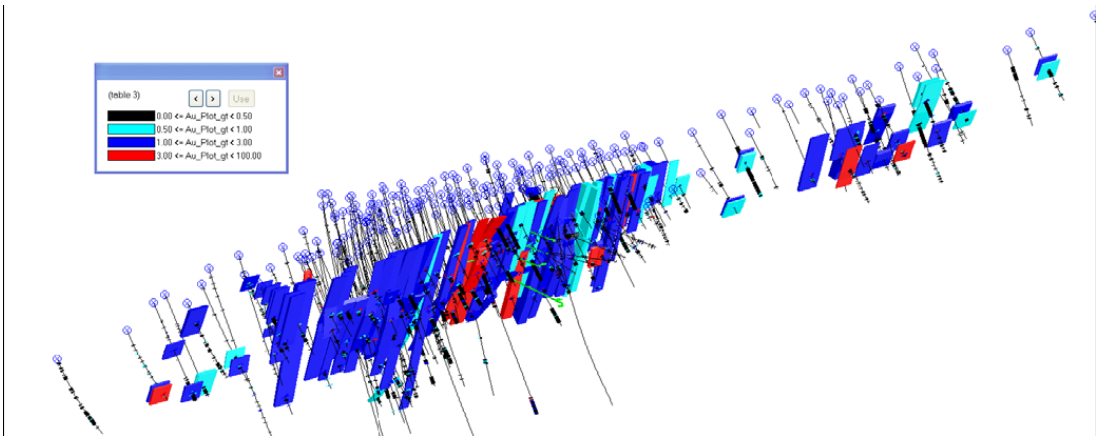


Figure 17-12 : Isometric View Looking North-East of Interpretation on Sections



17.1.2.3 Mineralized Intercepts

Mineralized intercepts are that part of drill holes or channel samples inside the interpreted limits of mineralized zones. Most intercepts in drill holes are complete (start and end points at zone limits) while most intercepts in old channel samples are incomplete since they do not cross the whole mineralized zones. There are 454 from-to limits. Table 17-8 is a sample of the intercept limit file which is in appendix on Geostat's Technical Report.

Table 17-8 : Sample of the Mineralized Zone Limit File

Hole Name	From	To	tag	Au gr/t
10E	196.52	199.03	1	1.72
10E	202.74	205.74	1	0.68
13E	187.45	194.61	ore	1.48
1E	138.68	144.78	ore	3.29
1E	138.68	144.78	ore	3.29
1E	117.35	126.49	ore	0.97
1E	109.15	126.49	1	0.84
2E	88.39	121.92	1	1.64
3E	140.97	144.78	1	3.93
3E	170.68	175.26	3	1.37
3E	129.02	134.84	1	1.26
4E	109.73	114.30	1	0.80
5E	127.71	137.16	ore	3.75
5E	127.71	137.16	ore	3.75
5E	152.40	158.49	1	0.94
6E	126.49	130.45	ore	4.66
6E	126.49	130.45	ore	4.66
6E	109.42	120.70	ore	1.20
6E	99.21	120.70	1	1.16
80-41	232.90	236.70	2	3.62
80-41	214.10	225.80	2	1.43
80-41	175.40	199.00	1	0.78
80-41	169.00	172.35	1	0.70
80-42	171.20	213.20	1	1.62
80-43	246.50	266.00	1	1.91
80-43	275.00	296.00	2	1.84
80-44	195.20	206.40	1	0.95
80-45	248.20	253.70	orez1	2.49
80-45	248.20	253.70	orez1	2.49
80-46	191.80	209.80	1	1.24
80-48	267.40	280.90	2	2.99
81-13	4.50	20.50	ore	2.45
81-13	4.50	25.00	1	2.07
81-14	261.50	298.00	1	2.70
81-15	338.00	342.80	1	1.48

Overall length weighted average of the mineralized intercept is 1.83 g/t Au (uncut).

17.1.2.4 Compositing of Assay Intervals within Mineralized Intercepts

Since original assay intervals do not have the same length and higher assays tend to apply to rather short intervals, it is necessary to standardize the length of the grade “support” through numerical compositing before assigning grade to dimensionless “points” in the 3D space (the composite centers) in the block grade interpolation.

Since a majority of assay intervals in the previous operator drill holes have a length of 1m or close to it, this is naturally the composite length that comes to mind and it is actually the composite length which has been used in the March 2007 resource study for Hosco sector and which will be used in the Heva sector (west block Joanna).

Compositing is done down hole from the start of mineralized intercepts. Any missing assay is assumed to be zero grade. At the end of the mineralized intercepts, the last composite kept is the one with at least a 0.5m length. A total of 2,681 valid 1m composites are defined in this manner.

Figures 17-13 and 17-14 are showing the histogram and cumulative frequency plot of the calculated grade of those 1m composites. The 25 g/t cap limit for the grade of those 1m composites corresponds quite clearly to the first important gap of grade data in the top end of the distribution.

Table 17-9 presents statistics of 1m composite grades in the Heva sector.

Table 17-9 : Statistics of 1m Composite Grades in the Heva Sector

STATISTICS FOR Augt

	Regular	Log
Minimum Value	0.0000	-4.6052
Percentile 5%	0.0000	-1.3093
16%	0.2700	-0.6733
50%	1.0300	0.2151
84%	2.8700	1.1282
95%	5.8300	1.8213
Maximum Value	83.0000	4.4188

#Samples	2681
Average	1.9831
Variance	16.6508
Std. Dev.	4.0805
Coef of Var.	2.0577
Skewness	8.8376
Kurtosis	119.7067

#Log Samples	2370
Log Average	0.2242
Log Variance	1.0424
Log Std. Dev.	1.0210
Log Mean	2.1072
Log Skewness	0.0087
Log Kurtosis	4.6931

Figure 17-13 : Histograms of the Uncut Grade of 1m Composites in Heva Sector

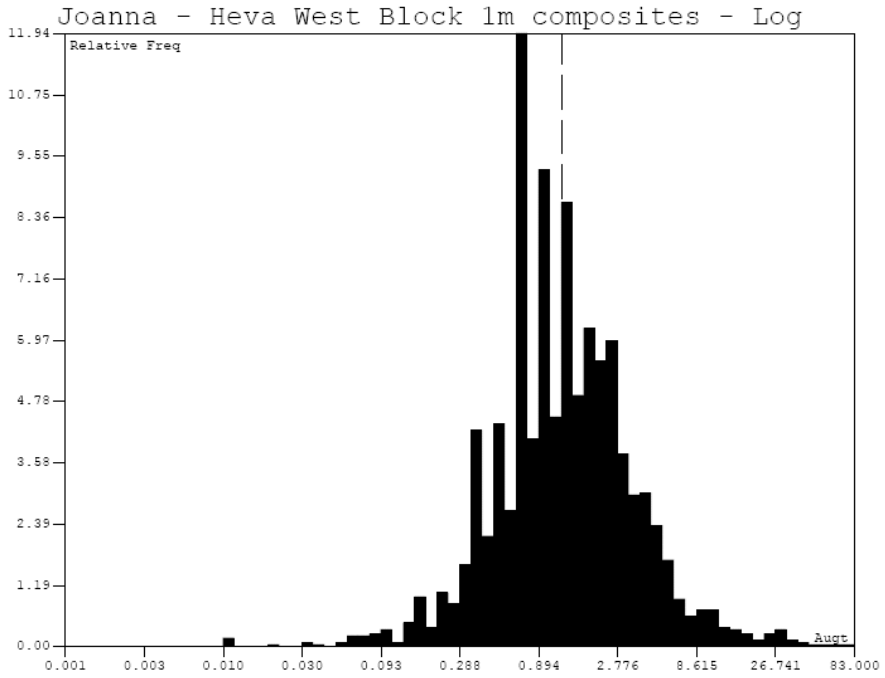
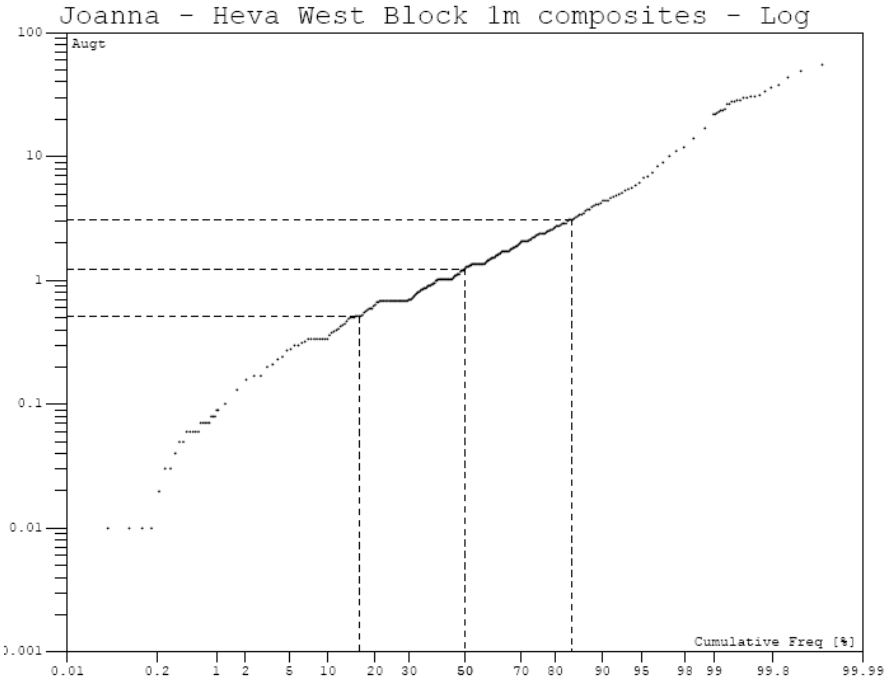


Figure 17-14 : Cumulative Frequency of the Uncut Grade of 1m Composites in Heva Sector



The cap limit of 25 g/t corresponds to the first inflexion of the line in the top end of grade data.

17.1.2.5 Spatial Continuity of Composite Grades

Overall correlograms have not been computed for the 1m composites for this sector.

17.1.2.6 Specific Gravity Data

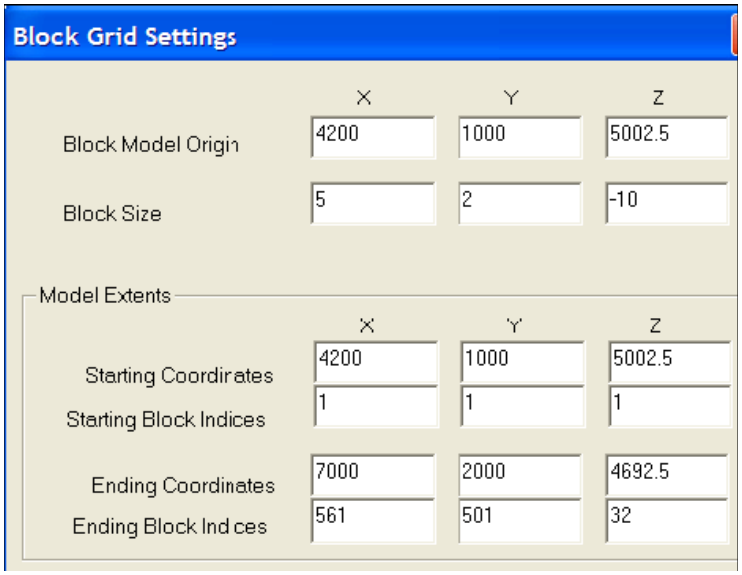
Specific gravity to convert volumes into tonnages is a fixed value of 2.68 t/m^3 similar to the one used in the March 2007 resource estimation for the Hosco sector.

17.1.2.7 Resource Block Grade Interpolation

Resources are estimated in each block 5m(EW) x 2m(NS) x 10m(Z) of a regular matrix with up to 561 columns (EW), 501 rows (NS) and 32 benches (Z) with its center within the limits of the mineralized zones. All together, we have 251,465 such blocks with some material below the contact surface. The block model is cut by the topography.

The average gold grade of each block is interpolated by inverse of the distance from the grades of nearby 1m composites. Since it is the first model, we have used similar parameters and method of interpolation of grades like in the first estimates of the Eastern Hosco block.

Table 17-10 : West Block (Heva) Block Model Grid Configuration

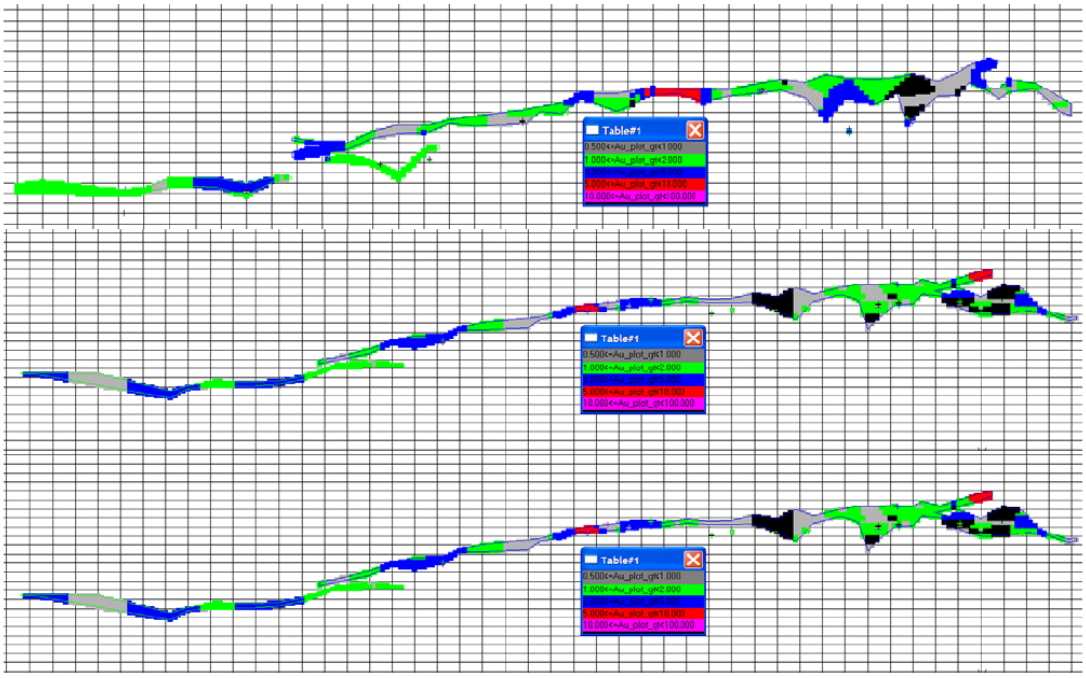


A single interpolation run was done. The search ellipsoid has a long radius of 250m along strike (axis 260- 80 degrees north horizontal), an intermediate radius of 150m along the dip at 58 degrees north(axis 350- 170 degrees north dipping 58 to the north) and a short radius of 20m along the direction perpendicular to dip and strike. The shape of that ellipsoid corresponds to the anisotropy of the geometry of the zone. It is also worth noticing that the long search is along strike similar to the first Hosco March 2007 resource estimation report. Future exploration drilling could provide sufficient data to change the main axis as in the latest estimation of Hosco.

For a block to be interpolated, we need at least one (1) 1m composites, with a maximum of 2 composites taken in the same drill hole or channel sample. Absolute maximum of composites retained in the ellipsoid is the 8 closest to the block. With those conditions, 37 981 blocks can be interpolated.

Block values on selected benches are shown on Figure 17-15.

Figure 17-15 : Interpolated Block Au Grade on Selected Benches of the Heva Sector



Only blocks in the Principal and West zones (i.e. east of 5850E) are shown from top to bottom the bench elevation shown are 4862.5, 4912.5 and 4962.5mZ.

17.1.2.8 Resource Classification

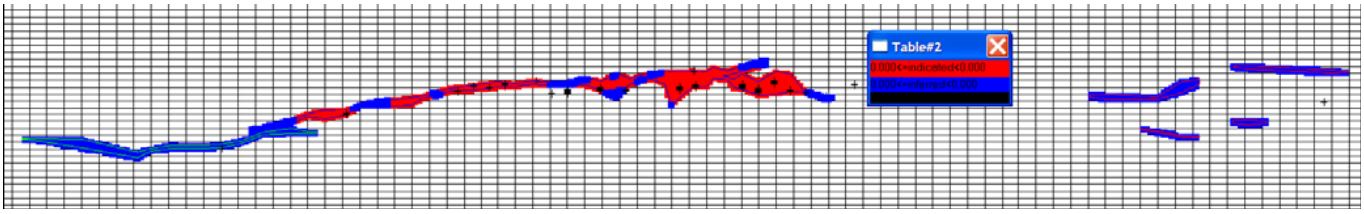
The classification of estimated resources in the Heva sector is based on sample proximity factor and geological continuity.

We classified each block of the resource model in a purely automatic manner. This is similar to the way resources had been classified in the March 2007 resource estimation: resources of a block are put in the indicated category if there are at least eight (8) 1m composites in at least 4 different holes or channels within a 150x50x15m ellipsoid centered on the block.

The search ellipsoid used for automatic classification has the similar orientation as the search ellipsoids used for block grade interpolation but we have had a light dip to the strike 15 degrees west and the dip of the ellipsoid changes from 58 to 55 degrees.

Figure 17-16 shows the resource classification of the 4912.5m bench.

Figure 17-16 : Resource Classification of the 4912.5mZ Bench



Red blocks: indicated resources – Blue blocks : Inferred

17.1.2.9 Resources for the Heva Sector of Joanna

Resources for the Heva sector are obtained by simply adding resources in each block model with an interpolated grade above any given economic cut-off. In Table 17-11, the resources are tabulated by sectors within the west sector since the deal with Vantex was not completed at the moment of processing the resources of existing Aurizon mining claims in the west block. Now with the agreement with Vantex, 75% of the Vantex claims block and 25% to Stellar the tabulation may now show the total resources of the western block Heva sector.

Table 17-11 : Resources Tables Joanna (Western Block-Heva)

	Joanna-HEVA All properties including Vantex			
	RESOURCE ESTIMATION HISTORICAL DATA- Classified Au Capping at 25g/t			
	July 15th 2007		C.Duplessis	
	From 4660East to 6575East GML		Surface to 150m deep 0.5g/t cut-off	
			150 to 300m deep 1.5 g/t cut-off	
	FOR PUBLIC DISCLOSURE		SG 2.68	
				31.103
Class	Cut-off	Tonnes	Au g/t	Onces
Indicated	0.5	1 882 164	1.82	110 135
Inferred	0.5	2 808 104	1.68	151 677
Indicated	1.5	1 215 916	2.54	99 297
Inferred	1.5	1 457 116	2.37	111 030
Tot.Indicated	combined	3 098 080	2.10	209 432
Tot Inferred	combined	4 265 220	1.92	262 707
	Historic mining not excluded from these numbers.			

	Joanna-HEVA VANTEX PROPERTY ONLY			
	RESOURCE ESTIMATION HISTORICAL DATA- Classified Au Capping at 25g/t			
	July 15th 2007		C.Duplessis	
	From 5000East to 5520East GML		Surface to 150m deep 0.5g/t cut-off	
			150 to 300m deep 1.5 g/t cut-off	
	FOR PUBLIC DISCLOSURE			
				31.103
Class	Cut-off	Tonnes	Au g/t	Onces
Indicated	0.5	684 204	2.03	44 656
Inferred	0.5	818 472	1.49	39 209
Indicated	1.5	743 968	2.60	62 191
Inferred	1.5	757 100	2.57	62 558
Tot.Indicated	combined	1 428 172	2.33	106 847
Tot Inferred	combined	1 575 572	2.01	101 767
	Historic mining not excluded from these numbers.			

	Joanna-HEVA AURIZON PROPERTY (excluding Vantex)			
	RESOURCE ESTIMATION HISTORICAL DATA- Classified Au Capping at 25g/t			
	July 15th 2007		C.Duplessis	
	From 4660East to 5000East GML		Surface to 150m deep 0.5g/t cut-off	
	From 5000East to 6575East GML		150 to 300m deep 1.5 g/t cut-off	
	FOR PUBLIC DISCLOSURE			
				31.103
Class	Cut-off	Tonnes	Au g/t	Onces
Indicated	0.5	1 197 960	1.70	65 479
Inferred	0.5	1 989 632	1.76	112 468
Indicated	1.5	471 948	2.45	37 106
Inferred	1.5	700 016	2.15	48 472
Tot.Indicated	combined	1 669 908	1.91	102 585
Tot Inferred	combined	2 689 648	1.86	160 940

A fixed specific gravity of 2.68t/m^3 is used to convert block volume (5x2x10 = 100m^3 except for blocks cut by the topographic surface in the top benches) into tonnage. The "historical" production of the old Heva mine is not subtracted from the indicated resources in the above tables.

17.1.3 Mineral Resources of the Whole Property East+West Block

In order to summit the global updated resource of the Joanna property all the sectors have been added together according to their respective classification.

Table 17-12 presents the results of the updated estimate.

Table 17-12 : Joanna Total Updated Mineral Resources Classified

		Sep-07			August, 2007		
		Tonnes	Grade Grams/tonne	Gold Ounces	Tonnes	Grade Grams/tonne	Gold Ounces
Mineral Indicated Resources	East block	8,200,000	1.6	420,000	5,398,000	1.8	309,000
	West block	1,670,000	1.9	103,000	1,669,908	1.9	103,000
	Heva	1,428,000	2.3	107,000	-	-	-
	Total	11,298,000	1.7	630,000	7,067,908	1.8	412,000
Mineral Inferred Resources	East block	24,300,000	1.5	1,150,000	21,838,000	1.6	1,100,000
	West block	2,689,000	1.9	161,000	2,689,000	1.9	161,000
	Heva	1,576,000	2	102,000	-	-	-
	Total	28,565,000	1.6	1,413,000	24,527,000	1.6	1,261,000

Since the preparation of the Technical report on the resources by Geostat in September 2007 to May 31, 2008, a total of 76,494 meters of drilling in 229 holes was drilled on the property. The results of the drilling will be used to update the resource block model and attempt to increase the level of resources as well as to improve the Inferred resource category material to Indicated or Measured resource.

18. ADDITIONAL REQUIREMENTS FOR TECHNICAL REPORTS ON DEVELOPMENT PROPERTIES AND PRODUCTION PROPERTIES

18.1 General Description

This section deals with the development of the Joanna gold project using a stand-alone open-pit mining approach since the mineralization is generally considered near surface and amenable for open-pit mining. In a stand-alone open-pit approach, the evaluation is carried out with no consideration for an economic analysis to define the interface between the open-pit mine and the underground mine.

The objective of pit optimization and mine design is to convert the resource in the block model into “in-pit resources” to serve as a basis in a preliminary economic analysis of mining the deposit.

18.1.1 Pit Optimization

Given the operating costs, recoveries, gold price and other design parameters, the pit optimization is used to generate an optimal pit shell to maximize the recovery of the mineral resources in the resource model. BBA has used the MineSight Lerchs-Grossman 3D (LG 3D) routine – a widely accepted standard in the mining industry - to generate the pit shell for Joanna. The LG 3D is a true pit optimizer based on dynamic programming of graph theory to generate an optimized pit shell from a 3D block model. The basic optimization principle of the algorithm operates on a net value calculation for each ore block in the model, i.e. revenue from sales less total operating cost, i.e. mining, crushing, processing, G&A and other costs.

In accordance with the regulations governing the preparation of the technical report for a Preliminary Assessment, the pit optimization has used all ore blocks classified in the measured, indicated and inferred categories in the model. Based on current drilling data, there is no measured resource defined in the Joanna property.

18.1.1.1 Pit Optimization Criteria and Parameters

Operating costs and design parameters used for the LG 3D shell were developed by BBA based on information on similar types of projects.

The average gold recovery was taken from the URSTM report entitled “Essais métallurgiques sur le minerai de Joanna, Rapport d’étape, 27 avril 2007”. Based on preliminary metallurgical testwork, two potential flowsheets were identified to process the Joanna auriferous ores with and without concentrate pressure oxidation (concentrate POX). The estimated gold recovery is 87% and 77% for the flowsheet with and without pressure oxidation, respectively. For the initial pit optimization, a gold recovery of 87% was used.

The overall pit slope angle used is 48° and is based on similar rock conditions in the Abitibi mines. It includes allowances for in-pit haulage ramp, pit slope design as well as benching arrangement.

The technical and economic parameters used to conduct the pit optimization are outlined in Table 18-1.

Table 18-1 : Pit Optimization Parameters for LG 3D

Parameter		
SALE REVENUE		
Gold Price	600	$/oz
CDN$/US$	1.00	CDN$/US$
OPERATING COST		
Ore Mining	1.65	$/t
Overburden Removal	2.00	$/t
Waste Mining	1.65	$/t
Crushing and Processing	7.00	$/t
G/A	1.00	$/t
Royalties	Not Used	
Incremental Cost per Bench	0	$/t/bench
METALLURGY		
Gold Recovery	87	%
PIT PARAMETERS		
Overall Pit Slope	48°	

18.1.1.2 Cut-off Grade Calculation (CoG)

The breakeven cut-off grade or the milling cut-off grade is used to classify the material inside the pit limits as ore or waste. Since the material is located inside the pit, the breakeven cut-off is the grade required to cover the costs for processing, GA and other costs related to gold refining and transport. BBA has calculated the mill cut-off grade using economical and technical parameters used for the optimization resulting in a CoG of approximately 0.5g/t Au.

Using the economic parameters shown in Table 18-2, the milling cut-off was calculated at 0.50 g/t Au, including an average dilution rate of 10% (see Section 18.1.3)

Table 18-2 : Cut-off Grade Calculation

SINGLE METAL CUT-OFF: Au g/t	
Items	
Mining Cost [(1)]	
Processing Cost ($/t)	**$7.00**
GA ($/t)	**$1.00**
Total Operating Cost ($/t)	**$8.00**
Price of Gold ($US/oz)	**$600.00**
Exchange rate	**$1.00**
Price of Gold ($/oz)	**$600.00**
Recovery	**87%**
Gross $ ($/oz)	**$522.00**
Royalty ($/g)	**$0.00**
Au Payment	**100%**
Net $($/oz)	**$522.00**
Undiluted cut-off grade (Au g/t)	**0.48**
Dilution (%)	**10%**
NET Mill Cut-off Grade Au g/t	**0.52**

Note:
[(1)] Not used in mill feed cut-off calculation

18.1.1.3 Theoretical Pit Shells

Using the technical and economical parameters presented in Table 18-1, the LG 3D pit optimizer was carried out to generate an optimum pit shell having the highest undiscounted cash flow. The pit optimization process defined one main mining area and a smaller mining area;

- The main area is Hosco and is located on the East side of the deposit; it also has three small satellite pits along the main strike of the orebody;

- The small mining area is Heva and is located approximately 1.5 km West of the Hosco pit; it is comprised of a series of four small pits.

Plan views of the LG 3D pit shells for both Hosco and Heva are shown in Figures 18-1 and 18-2.

The theoretical pit shells resulting from the LG 3D optimizations are only preliminary and do not represent a practical design for mining. These optimized pit shells will be used to serve as a guide for the detailed mine design with the required operational haulage ramp, proper pit slope and benching arrangement.

Figure 18-1 : LG 3D Optimized Pit Shell for the Hosco sector

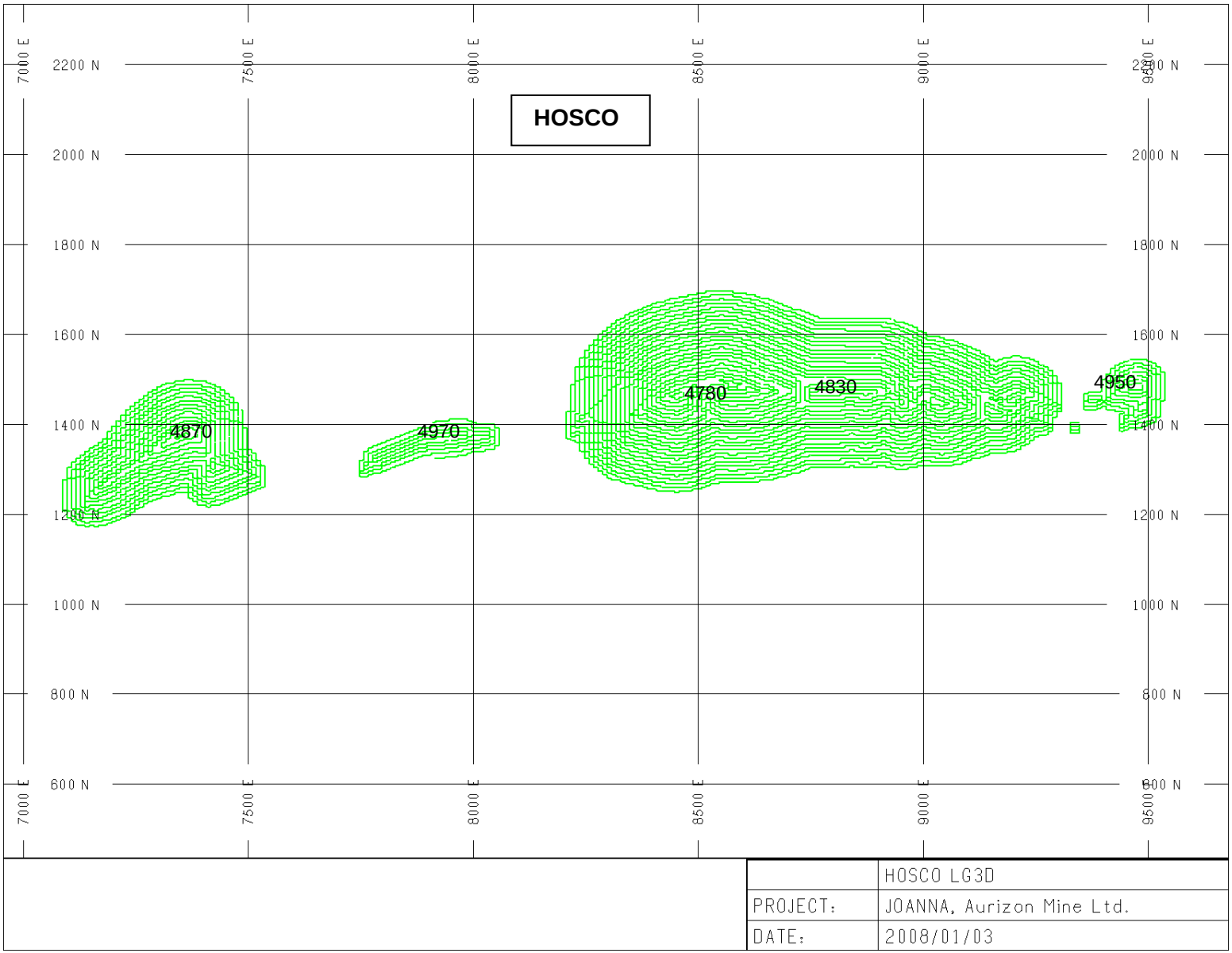
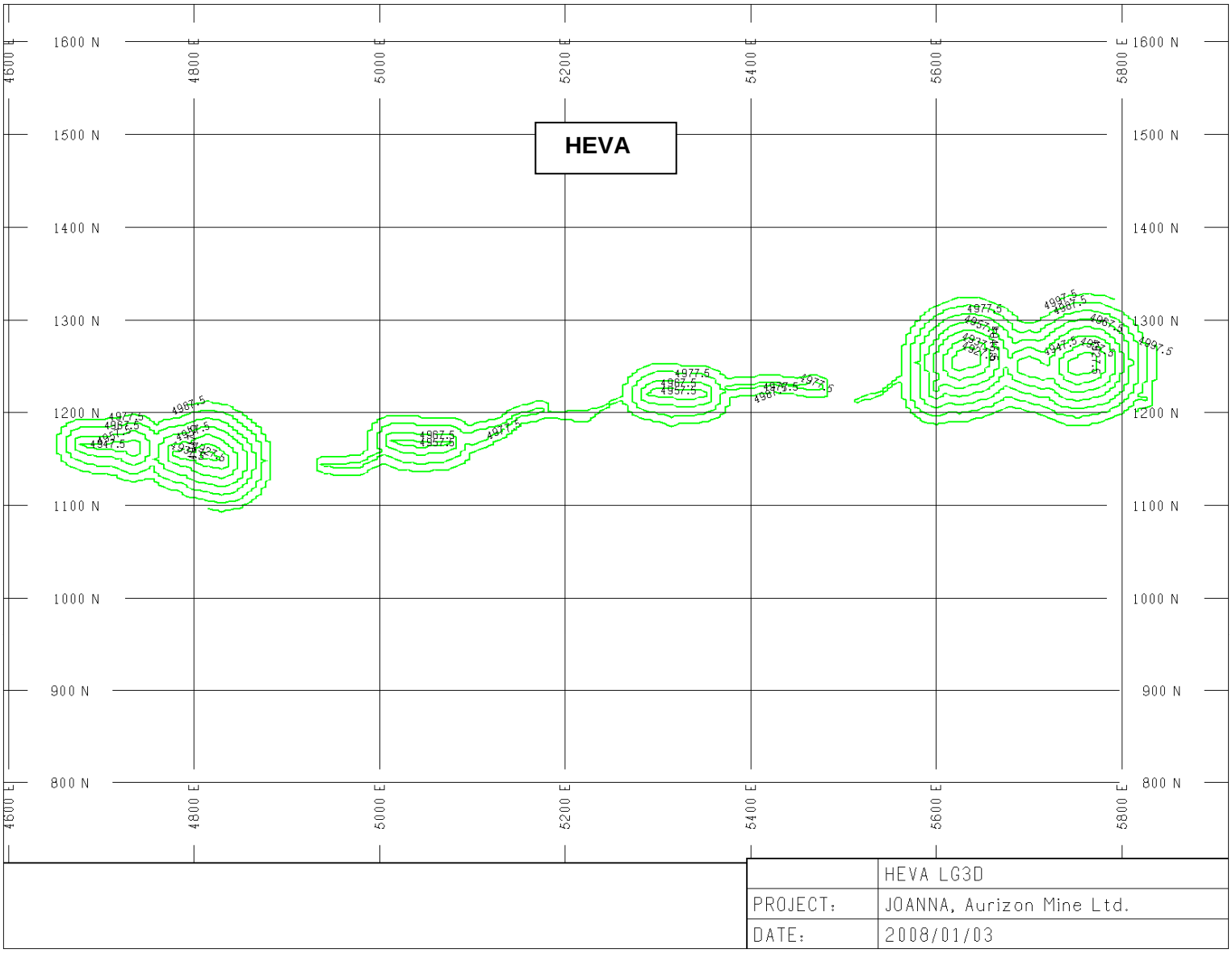


Figure 18-2 : LG 3D Optimized Pit Shell for Heva sector



The results of the optimized pit shells are shown in Table 18-3 on an undiluted basis and using a cut-off grade of 0.5 g/t Au.

Table 18-3 : Undiluted Resources within LG 3D Pit Shell (March 2008)

(CoG 0.5 g/t Au)

Material		HOSCO			HEVA			TOTAL		
		Material (tonnes)	Grade (g/t Au)	Au oz (77% rec.)	Material (tonnes)	Grade (g/t Au)	Au oz (77% rec.)	Material (tonnes)	Grade (g/t Au)	Au oz (77% rec.)
Ore	Indicated	8,256,804	1.623	331,749	329,913	2.155	17,601	8,586,717	1.643	349,349
	Inferred	7,899,691	1.577	308,404	787,269	1.850	36,056	8,686,960	1.602	344,460
Waste	Waste	66,344,760			4,196,266			70,541,026		
	Overburden	12,599,969			244,411			12,844,380		
	Total	**78,944,729**			**4,440,677**			**83,385,406**		
	S/R	**4.89**			**3.97**			**4.83**		

The total undiluted resources within the optimized pit shells for both Hosco and Heva amount to 17.27M tonnes in the indicated and inferred categories with an average grade of 1.62g/t Au using a cut-off grade of 0.5g/t Au.

18.1.2 Detailed Pit Design and Dressing

The detailed pit design work for Hosco and Heva was carried out using the LG 3D outlines described in Section 18.1.1.3. The ultimate pit designs include the entire practical geometry required in a mine including pit access and haulage ramp to all pit benches, pit slope design, benching configuration, smoothed pit walls and catch berms.

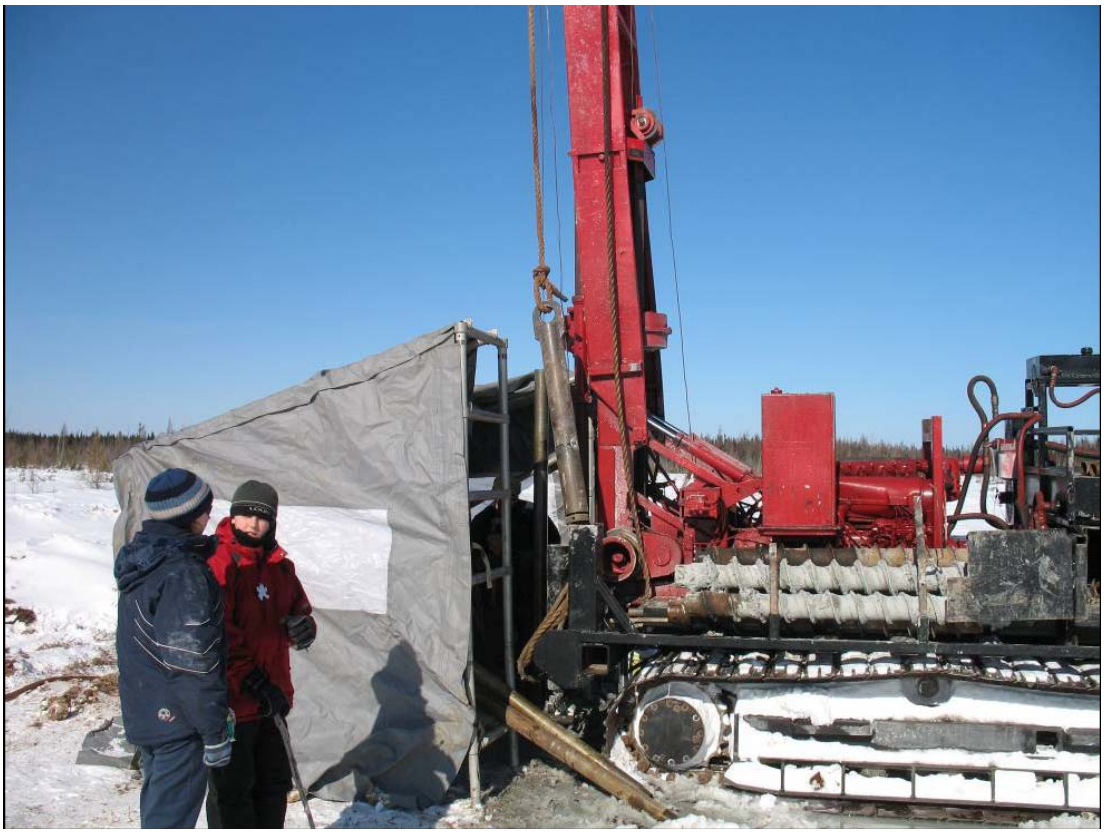
18.1.2.1 Geotechnical Characterization in Overburden

At the request of Aurizon, Geolab has carried out a geotechnical investigation program for the characterization of the overburden material only. The program's aim was to define the material behaviour and slope design in a future open-pit design in addition to providing preliminary data on the hydrogeology of the sector of interest.

During the site visit with Aurizon's geologist, Elise Bourgault, Mr. Claude Duplessis QP from Geostat also visited the diamond drilling site and geotechnical drilling site as seen in Figure 18-3. The winter conditions were extremely cold during the week of the site visit.

The geotechnical investigation was completed and Geolab Inc. has prepared a first technical assessment report in relation to overburden slope under mining conditions. The overburden recommendations are 4:1 and 5:1 in the sensitive clay layer. Investigation of underground water pressure and hydrogeology will have to be addressed prior to excavation of overburden since a saturated sand layer was observed under the clay layer in some holes.

Figure 18-3 : Geotechnical Drilling at Joanna



18.1.2.2 Geotechnical Characterization in Rock Mass

To our knowledge, no investigation work has been carried out on the geotechnical characterization of the rock. BBA has assumed normal stability conditions and used an inter-ramp slope angle of 50° in the rock.

18.1.2.3 Ultimate Pit Ramp

The final ramp width is 21 m to accommodate a 100-ton capacity off-highway dump truck, which has an operating width of approximately 5 to 6m. This ramp width is sufficient to support uninterrupted 2-way haulage cycle traffic. The final ramp width also includes an external safety berm as well as an internal drainage ditch. In order to reduce the volume of waste stripping during the final phases, the ramp width is reduced to 11 m for the last 5 benches at the bottom of the pit. The ramp gradient is 10%.

The final ramp exit for Hosco is located on the North side of the pit wall of the main pit to minimize the haulage distances towards the primary crushing and concentrator area as well as the main waste dump.

18.1.2.4 Pit Design Parameters

Table 18-4 presents the pit design criteria summary for the detailed pit design.

Table 18-4 : Main Pit Design Parameters

Parameter	
BENCH/SLOPE	
Bench Height	10m
Face Angle	75˚
Berm Width	5.71m
Interamp Slope	50°
ROAD WIDTH	
2 LANES	21m
1 LANE	11m
Grade	10%

At this stage of the study, the detailed pit designs have been carried out only for the main pits for Hosco and Heva, excluding the satellite deposits.

The general layout of the detailed mine design for Hosco and Heva is shown in Figures 18-4 and 18-5, respectively. A series of typical cross sections, showing the optimized and the detailed mine designs as well as the ore blocks by grade intervals are presented in Figures 18-6 to 18-13.

Figure 18-4 : Detailed Open-pit Design – Hosco Sector

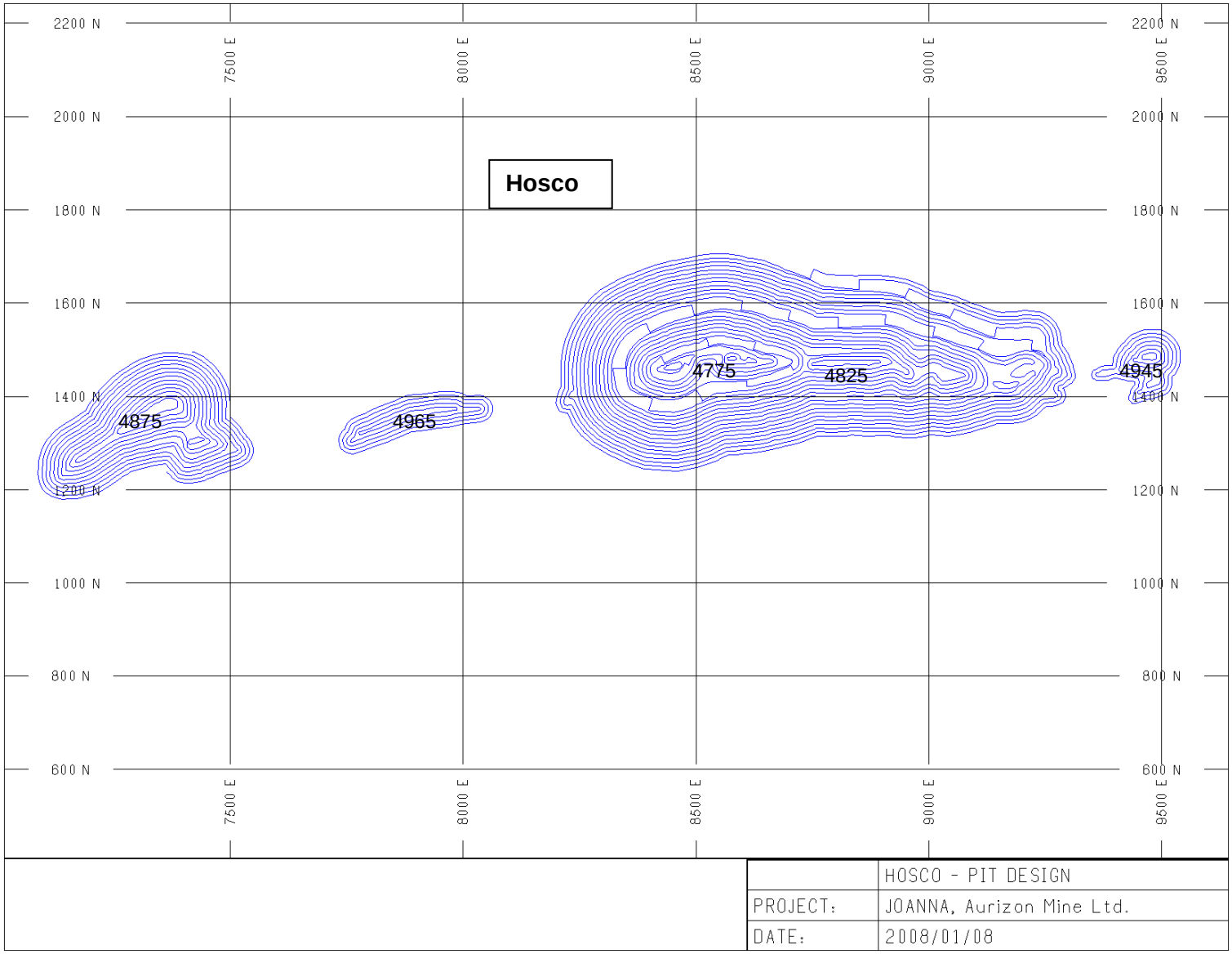


Figure 18-5 : Detailed Open-pit Design – Heva Sector

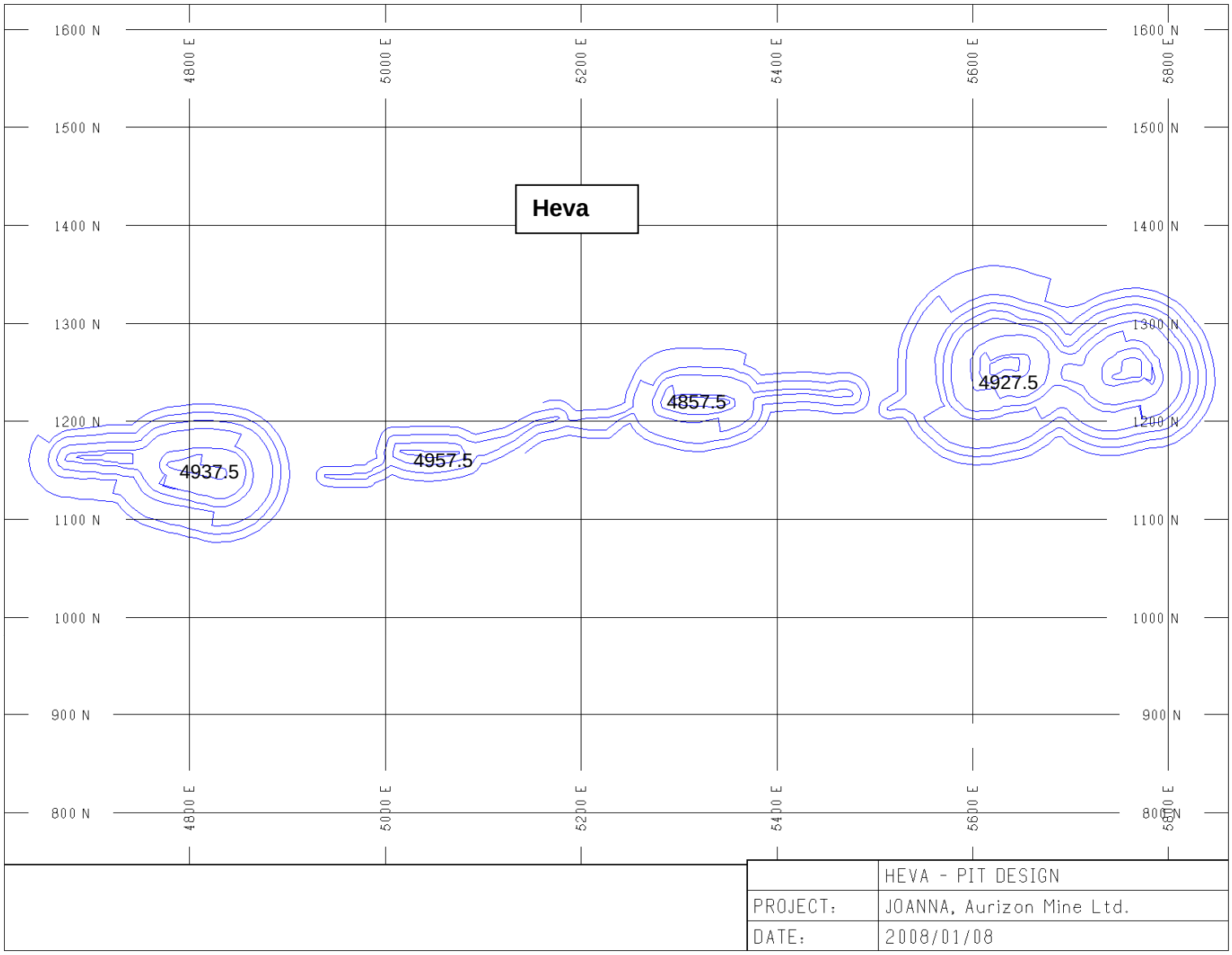


Figure 18-6 : Cross Section E 8450 (Looking West) – Hosco Sector

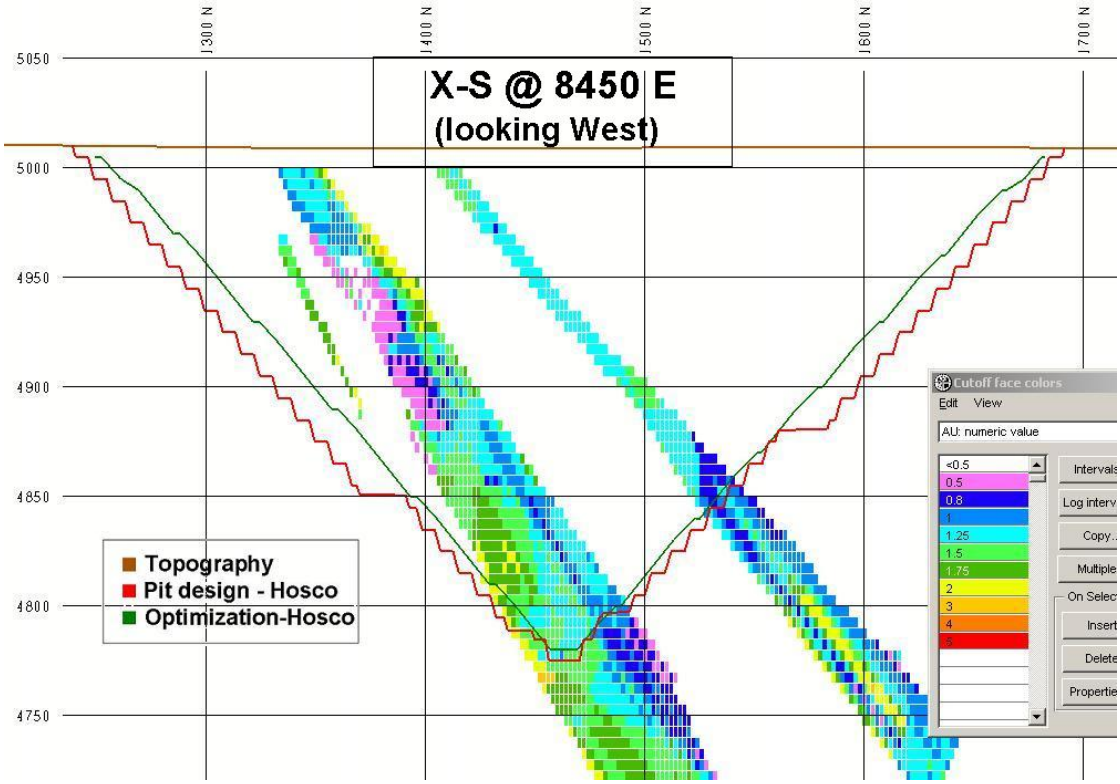


Figure 18-7 : Cross Section E 8650 (Looking West) – Hosco Sector

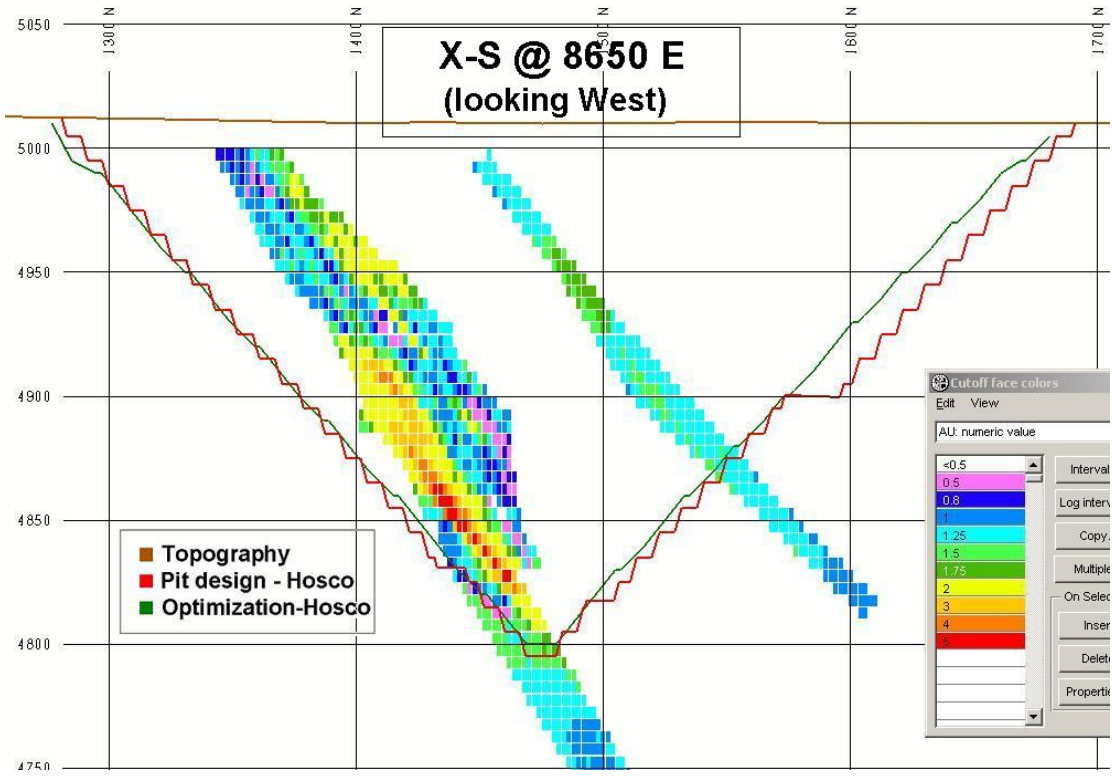


Figure 18-8 : Cross Section E 8850 (looking West) – Hosco Sector

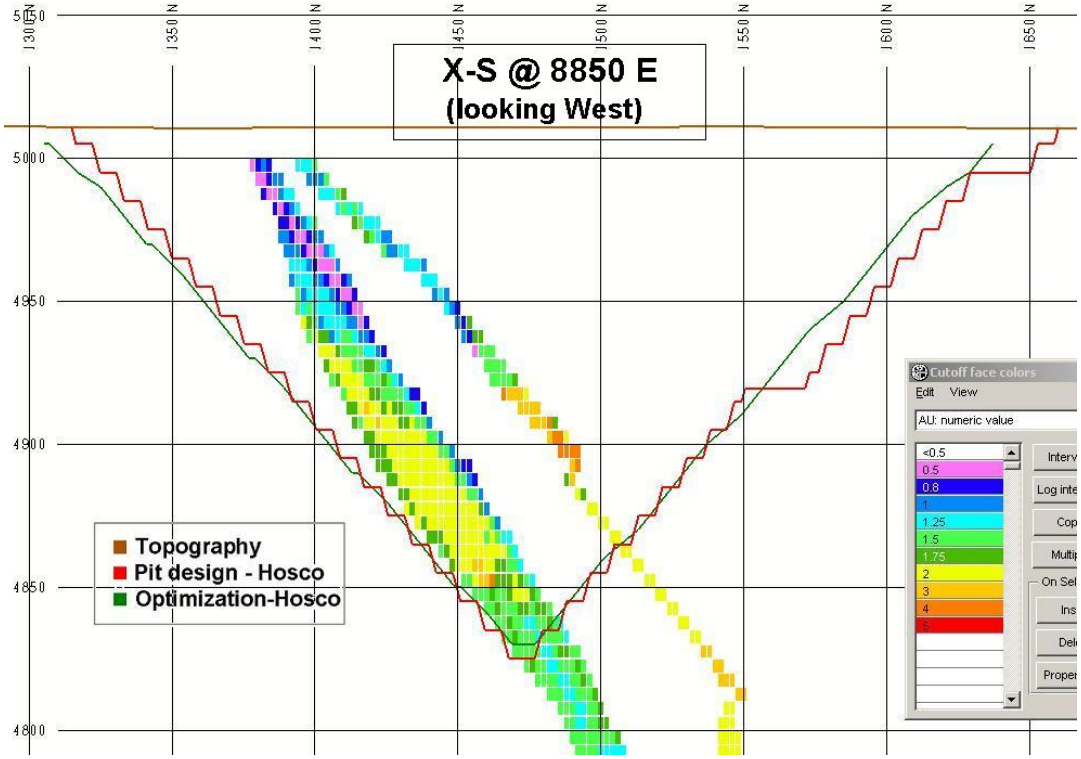


Figure 18-9 : Cross Section E 9050 (looking West) – Hosco Sector

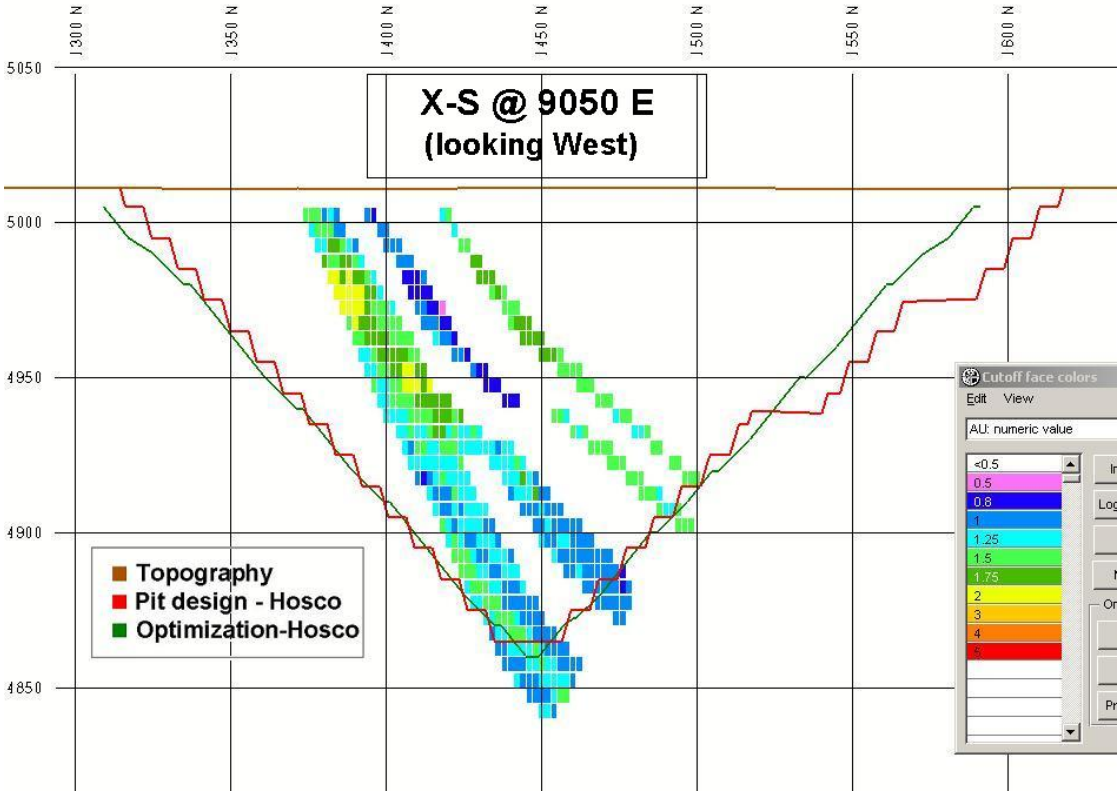


Figure 18-10 : Cross Section E 4800 (looking West) – Heva Sector

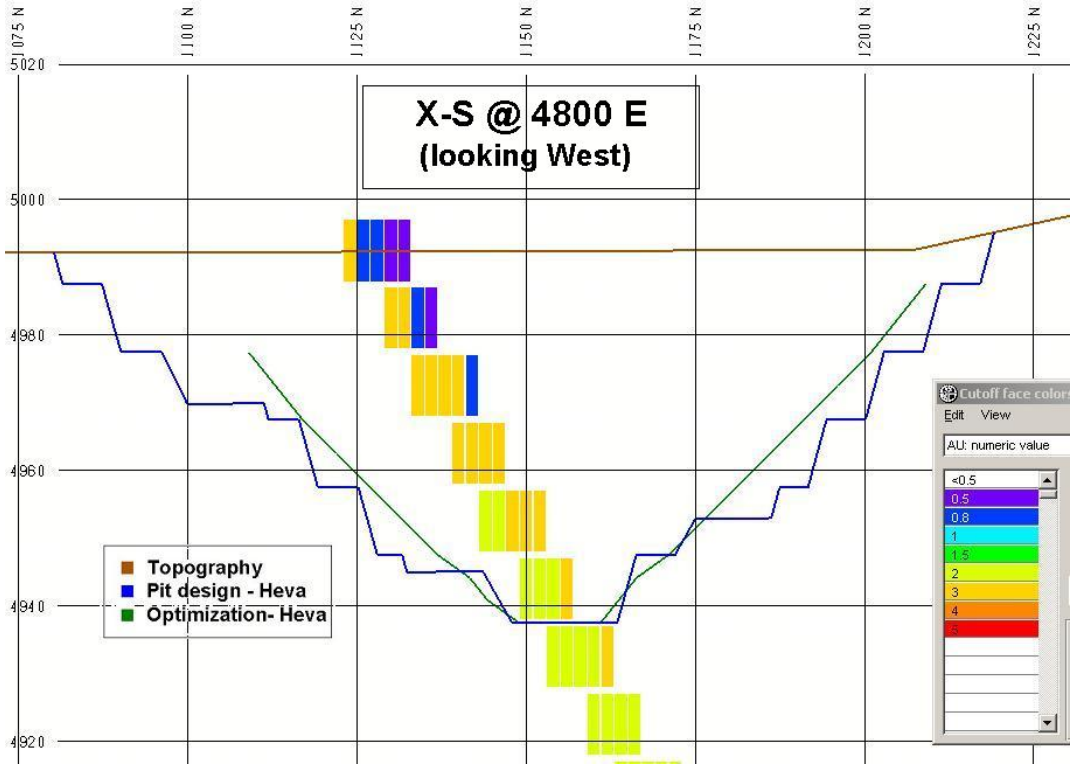


Figure 18-11 : Cross Section E 5300 (looking West) – Heva Sector

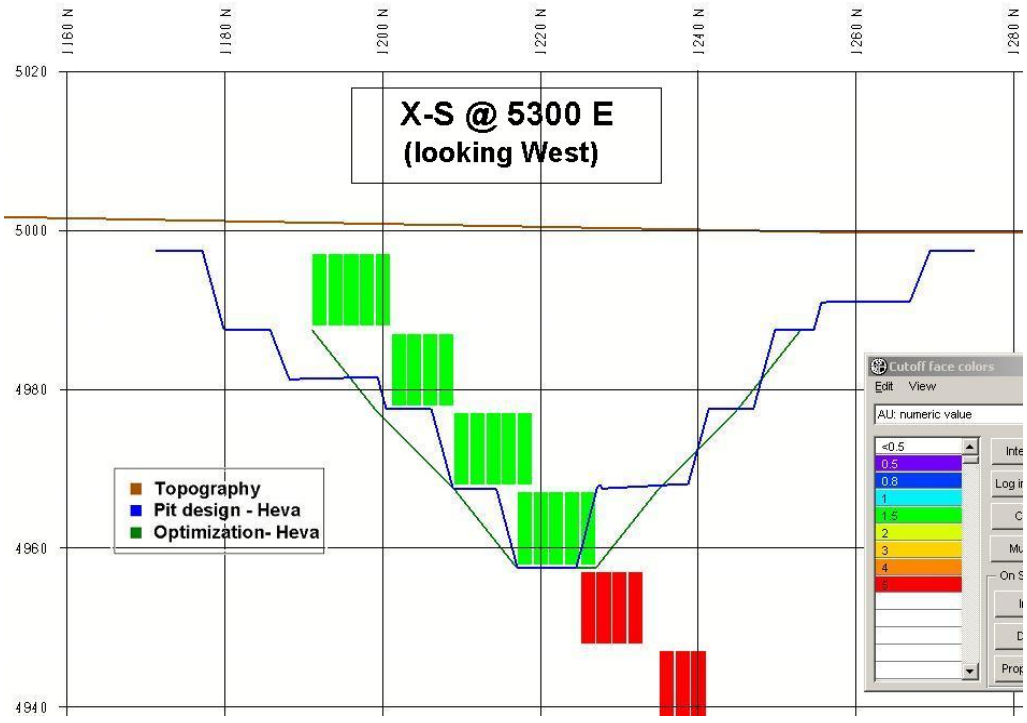


Figure 18-12 : Cross Section E 5625 (looking West) – Heva Sector

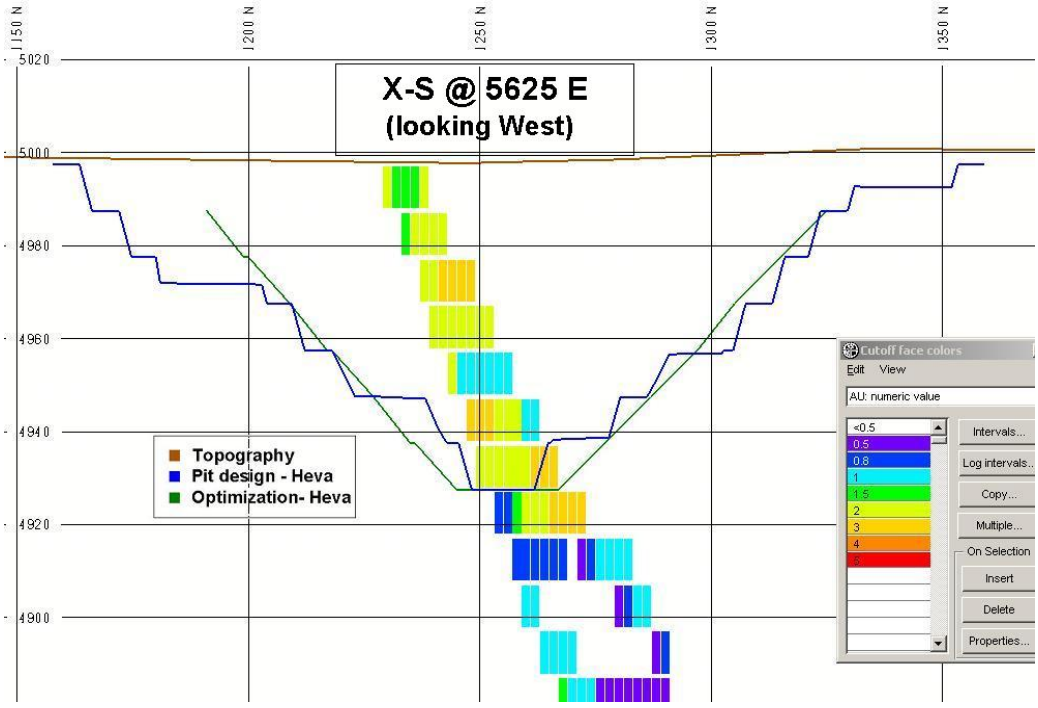
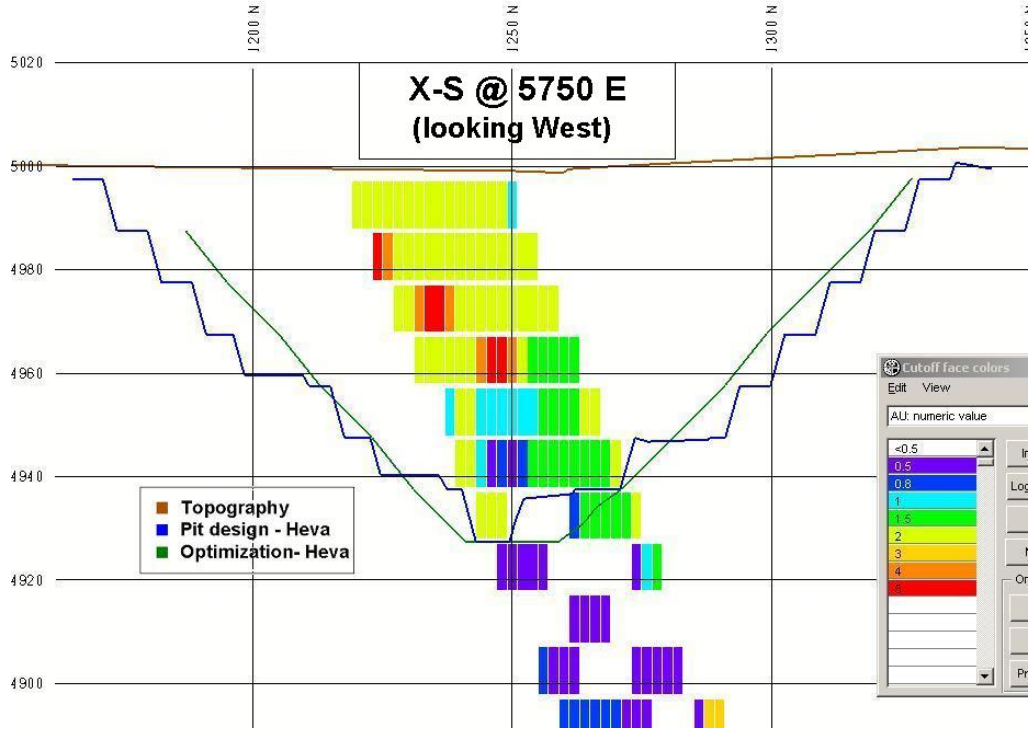


Figure 18-13 : Cross Section E 5750 (looking West) – Heva Sector



18.1.3 Dilution

Using the resource block model, the dilution rate was estimated for both Hosco and Heva open-pit mines. In the dilution estimation, it was assumed that the mining method chosen will be optimum, i.e. good blasting practice, backhoe loading mode as well as a good practice of dilution control will take place. Under this best case scenario, it was assumed that the main source of dilution came from the contact between the mineable ore and waste using the following parameters:

- The minimum mining width is 5 m;
- Contact dilution of 0.65 m at the ore/waste contact.

The estimation of the contact dilution was carried out on 8 selected benches, where 5 benches were taken from Hosco and 3 benches from Heva. The results of the estimation are as follows:

- A dilution rate of 9% at an average grade of 0.17g/t Au can be expected for Hosco;
- A dilution of 13% at an average grade of 0.06g/t Au is expected for Heva.

The details of the estimation results cab be seen in Table 18-5 located below.

For the purpose of this study, an average dilution factor of 10% at a grade of 0 g/t Au is assumed for the project.

Table 18-5 : Estimation of In-pit Dilution

Hosco

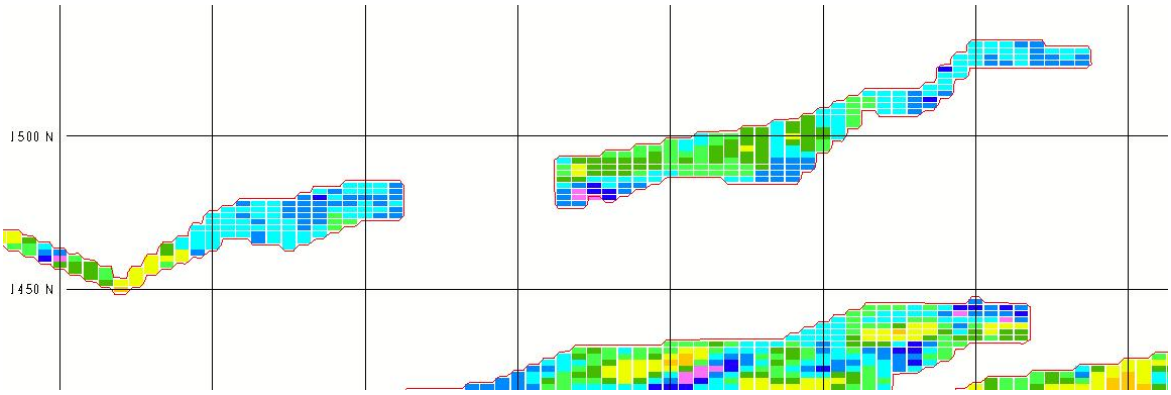
Bench	Ore (tonnes)	Ore Grade (g/t)	Waste (tonnes)	Waste Grade (g/t)	Dilution	Dilution Grade
4975	455,730	1.56	48,389	0.15	11%	0.15
4950	492,134	1.61	41,993	0.14	9%	0.14
4925	468,444	1.68	38,426	0.18	8%	0.18
4900	427,447	1.67	33,870	0.19	8%	0.19
4875	256,842	1.75	18,694	0.20	7%	0.20
Total	**2,100,597**	**1.64**	**181,372**	**0.17**	**9%**	**0.17**

Heva

Bench	Ore (tonnes)	Ore Grade (g/t)	Waste (tonnes)	Waste Grade (g/t)	Dilution	Dilution Grade
4987.5	172,563	1.92	27,171	0.01	16%	0.01
4967.5	171,707	2.48	21,695	0.03	13%	0.03
4947.5	106,801	1.86	11,465	0.23	11%	0.23
Total	**451,071**	**2.12**	**60,331**	**0.06**	**13%**	**0.06**

Figure 18-14 shows a typical mining cut used to estimate the dilution for bench 4925m for Hosco main pit.

Figure 18-14 : Estimation of In-pit Dilution for the Hosco Main Pit on Bench 4925m



18.1.4 In-pit resources

The in-pit resources for the detailed pit design for Hosco and Heva have been calculated by BBA in accordance with the definitions and guidelines adopted by the Canadian Institute of Mining, Metallurgy, and Petroleum (CIM Standards on Mineral Resources and Reserves) in August, 2000. The in-pit resources were calculated with and without a 10% dilution at 0 g/t Au with a cut-off grade of 0.5 g/t Au. Table 18-6 presents the undiluted in-pit resources and Table 18-7 presents the diluted in-pit resources.

Table 18-6 : Undiluted In-pit Resources for Hosco and Heva (cut-off 0.5g/t Au)

		Hosco			Heva			TOTAL		
Material Type		Material (tonnes)	Grade (Au g/t)	Au oz (77% rec.)	Material (tonnes)	Grade (Au g/t)	Au oz (77% rec.)	Material (tonnes)	Grade (Au g/t)	Au oz (77% rec.)
Ore	Indicated	8,256,423	1.623	331,733	316,773	2.190	17,174	8,573,196	1.644	348,907
	Inferred	8,238,664	1.576	321,434	790,688	1.829	35,801	9,029,352	1.598	357,235
Waste										
	Waste	73,046,058			5,381,839			78,427,897		
	Overburden	12,395,374			348,220			12,743,594		
	Total	**85,441,432**			**5,730,059**			**91,171,491**		
	S/R	5.18			5.17			5.18		

Table 18-7 : Diluted In-pit Resources for Hosco and Heva (Cut-off 0.5g/t Au)

Material Type		Hosco Material (tonnes)	Hosco Grade (Au g/t)	Hosco Au oz (77% rec.)	Heva Material (tonnes)	Heva Grade (Au g/t)	Heva Au oz (77% rec.)	TOTAL Material (tonnes)	TOTAL Grade (Au g/t)	TOTAL Au oz (77% rec.)
Ore	Indicated	9,082,065	1.475	331,733	348,450	1.991	17,174	9,430,516	1.495	348,907
	Inferred	9,062,530	1.433	321,434	869,757	1.663	35,801	9,932,287	1.453	357,235
Waste										
	Waste	71,397,197			5,271,093			76,668,290		
	Overburden	12,395,374			348,220			12,743,594		
	Total	**83,792,571**			**5,619,313**			**89,411,884**		
	S/R	4.62			4.61			4.62		

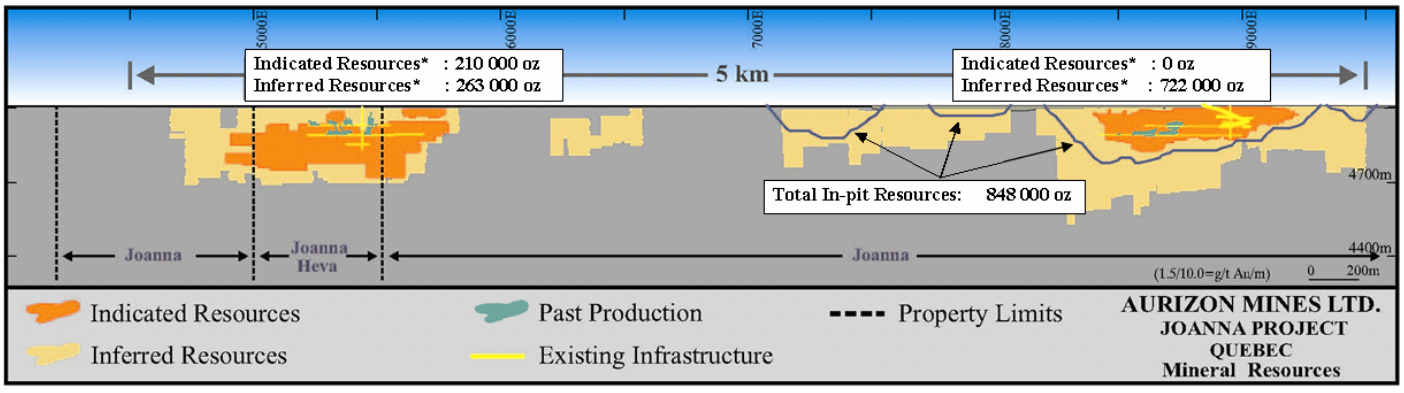
The diluted in-pit resources contained in the detailed pit designs amount to 19.36M tonnes of ore at a grade of 1.47 g/t Au based on a cut-off grade of 0.5g/t Au. The amount of stripping required is 89.41M tonnes for an overall mine-life strip ratio of 4.62 tonnes of waste per tonne of ore.

The total metal recovered is 706,142 ounces of gold using a mill process recovery of 77%. For the Hosco sector only, the total metal recovered is 653,167 ounces of gold, representing 93% of the total metal.

Figure 18-15 shows a typical longitudinal section on the Joanna gold project with the pit profiles and total resources as well as in-pit resources for Hosco pit only.

The in-pit resources by bench are summarized in Table 18-7 and 18-8 for Hosco and Heva, respectively.

Figure 18-15 : Longitudinal Section of the Joanna gold project



* Excluding in-pit resources.

Table 18-8 : Diluted In-pit Resources by Bench for Hosco (Cut-off Grade at 0.5g/t Au)

Bench	Ore (tonnes)	Au Grade (g/t)	Waste (tonnes)	Overburden (tonnes)	S/R	Au oz (77% rec.)
5010	0	0.000	0	547,000		0
5005	0	0.000	7,000	3,856,000	-	0
5000	99,000	1.482	383,000	4,320,000	47.51	3,632
4995	303,000	1.273	2,434,000	2,706,000	16.96	9,547
4990	464,000	1.308	4,261,000	804,000	10.92	15,027
4985	551,000	1.339	4,891,000	156,000	9.16	18,266
4980	582,000	1.359	4,595,000	7,000	7.91	19,582
4975	605,000	1.363	4,482,000	0	7.41	20,410
4970	607,000	1.380	4,051,000	0	6.67	20,737
4965	628,000	1.386	3,940,000		6.27	21,554
4960	615,000	1.384	3,568,000		5.80	21,066
4955	625,000	1.399	3,477,000		5.56	21,647
4950	614,000	1.434	3,151,000		5.13	21,792
4945	616,000	1.469	3,070,000		4.98	22,403
4940	605,000	1.501	2,758,000		4.56	22,480
4935	613,000	1.509	2,678,000		4.37	22,901
4930	602,000	1.518	2,373,000		3.94	22,626
4925	611,000	1.512	2,293,000		3.75	22,868
4920	584,000	1.497	1,989,000		3.41	21,647
4915	595,000	1.496	1,914,000		3.22	22,041
4910	594,000	1.494	1,644,000		2.77	21,964
4905	610,000	1.491	1,567,000		2.57	22,515
4900	594,000	1.475	1,341,000		2.26	21,683
4895	596,000	1.477	1,284,000		2.15	21,797
4890	583,000	1.467	1,079,000		1.85	21,177
4885	577,000	1.459	1,034,000		1.79	20,842
4880	511,000	1.477	898,000		1.76	18,688
4875	484,000	1.481	877,000		1.81	17,744
4870	441,000	1.491	729,000		1.65	16,277
4865	412,000	1.486	712,000		1.73	15,160
4860	360,000	1.485	591,000		1.64	13,239
4855	332,000	1.491	576,000		1.73	12,254
4850	288,000	1.508	475,000		1.65	10,753
4845	277,000	1.503	445,000		1.61	10,305
4840	230,000	1.540	364,000		1.58	8,769
4835	218,000	1.552	341,000		1.56	8,375
4830	176,000	1.583	261,000		1.48	6,896
4825	162,000	1.587	247,000		1.52	6,366
4820	135,000	1.569	177,000		1.31	5,244
4815	125,000	1.515	166,000		1.33	4,690
4810	115,000	1.508	105,000		0.91	4,294
4805	114,000	1.433	86,000		0.75	4,043
4800	103,000	1.374	36,000		0.35	3,503
4795	93,000	1.344	26,000		0.28	3,093
4790	42,000	1.358	15,000		0.36	1,412
4785	32,000	1.379	9,000		0.28	1,093
4780	11,000	1.383	0		0.00	377
4775	10,000	1.440	0		0.00	356
Total	**18,144,000**	**1.454**	**71,400,000**	**12,396,000**	**4.62**	**653,131**
Indicated	9,082,000	1.475				331,733
Inferred	9,063,000	1.433				321,453
Total	**18,145,000**	**1.454**				**653,186**

Table 18-9 : Diluted In-pit Resources by Bench for Heva (Cut-off Grade at 0.5g/t Au)

Bench	Ore (tonnes)	Au Grade (g/t)	Waste (tonnes)	Overburden (tonnes)	S/R	Au oz (77% rec.)
4997.5	0	0	0	348,000	-	0
4987.5	249,000	1.616	1,798,000	0	7.22	9,964
4977.5	270,000	1.869	1,528,000	0	5.66	12,493
4967.5	222,000	2.038	988,000	0	4.45	11,202
4957.5	203,000	1.855	592,000	0	2.92	9,325
4947.5	155,000	1.448	292,000	0	1.88	5,557
4937.5	92,000	1.414	71,000	0	0.77	3,220
4927.5	27,000	1.801	1,000	0	0.04	1,204
Total	**1,218,000**	**1.756**	**5,270,000**	**348,000**	**4.61**	**52,963**
Indicated	348,000	1.991				17,152
Infered	870,000	1.663				35,811
Total	**1,218,000**	**1.756**				**52,963**

18.1.5 Priority Mine Planning

The objective of the mine planning is to prepare a life-of-mine plan for the orderly development of the mine and to provide sufficient data for cash flow analysis. Due to the relatively small amount of resources in Heva (less than 53,000 oz Au metal vs. over 653,000 for Hosco) as well as the distance of 3 km to the primary crushing plan, the Hosco pit has been selected as the main target for initial development. At this stage of the PA, the Heva pit will not be included in the mining plan.

18.1.5.1 Mining Method

Mining Hosco ore will follow the standard practice of an open-pit operation with conventional drill and blast, load and haul cycle using drill/truck/shovel mining fleet. The overburden and waste rock material will be hauled to the overburden and waste disposal areas near the pit. The run-of-mine ore will be drilled, blasted and loaded by hydraulic shovels and delivered by trucks to the primary crusher or stockpiles near the crusher.

Owner's mining is envisaged for the development of Joanna project while the removal of overburden will be carried out by contract mining

18.1.5.2 Scheduling Criteria

A pre-production period of one (1) year will be sufficient to give access to ore and to provide material for the preparation of the site. Mining of ore will start in the Hosco sector during Year 1 and will continue until the Hosco pit and the auxiliary pits are depleted. As a base case, the Heva sector is not included in the mine planning.

For the purpose of the PA study, it is assumed that the Hosco pit will be mined on a bench by bench basis using a pushback technique, with each bench being mined out in a period of 1 to a maximum of 3 years.

Table 18-10 is an example of the percentage mined on each bench per year for the Hosco sector, based on a 5,500 tpd production rate.

Table 18-10 : Example of Percentage Mined on Each Bench per Year – Hosco Sector at 5,500 tpd

Bench	Ore				Waste				Overburden	Year color code
	(tonnes)	% mined per year			(tonnes)	% mined per year			(tonnes)	
5010									547,000	0
5005					7,000	100%			3,856,000	1
5000	99,000	100%			383,000	100%			4,320,000	2
4995	303,000	50%	50%		2,434,000	50%	25%	25%	2,706,000	3
4990	464,000	45%	55%		4,261,000	40%	35%	25%	804,000	4
4985	551,000	35%	45%	20%	4,891,000	25%	45%	30%	156,000	5
4980	582,000	25%	55%	20%	4,595,000	60%	25%	15%	7,000	6
4975	605,000	60%	40%		4,482,000	60%	40%		0	7
4970	607,000	55%	45%		4,051,000	60%	40%		0	8
4965	628,000	30%	45%	25%	3,940,000	40%	45%	15%		9
4960	615,000	25%	45%	30%	3,568,000	30%	45%	25%		10
4955	625,000	65%	35%		3,477,000	70%	30%			
4950	614,000	50%	30%	20%	3,151,000	60%	20%	20%		
4945	616,000	50%	50%		3,070,000	50%	50%			
4940	605,000	50%	50%		2,758,000	50%	50%			
4935	613,000	45%	35%	20%	2,678,000	45%	35%	20%		
4930	602,000	35%	35%	30%	2,373,000	40%	35%	25%		
4925	611,000	25%	30%	45%	2,293,000	30%	30%	40%		
4920	584,000	45%	40%	15%	1,989,000	45%	40%	15%		
4915	595,000	45%	40%	15%	1,914,000	45%	40%	15%		
4910	594,000	25%	50%	25%	1,644,000	25%	50%	25%		
4905	610,000	40%	40%	20%	1,567,000	40%	40%	20%		
4900	594,000	40%	40%	20%	1,341,000	40%	40%	20%		
4895	596,000	25%	50%	25%	1,284,000	25%	50%	25%		
4890	583,000	20%	50%	30%	1,079,000	20%	50%	30%		
4885	577,000	40%	60%		1,034,000	40%	60%			
4880	511,000	40%	60%		898,000	40%	60%			
4875	484,000	35%	40%	25%	877,000	35%	40%	25%		
4870	441,000	60%	40%		729,000	60%	40%			
4865	412,000	35%	65%		712,000	35%	65%			
4860	360,000	30%	70%		591,000	30%	70%			
4855	332,000	25%	75%		576,000	25%	75%			
4850	288,000	80%	20%		475,000	80%	20%			
4845	277,000	80%	20%		445,000	80%	20%			
4840	230,000	70%	30%		364,000	70%	30%			
4835	218,000	70%	30%		341,000	70%	30%			
4830	176,000	60%	40%		261,000	60%	40%			
4825	162,000	40%	60%		247,000	40%	60%			
4820	135,000	100%			177,000	100%				
4815	125,000	100%			166,000	100%				
4810	115,000	100%			105,000	100%				
4805	114,000	100%			86,000	100%				
4800	103,000	100%			36,000	100%				
4795	93,000	100%			26,000	100%				
4790	42,000	100%			15,000	100%				
4785	32,000	100%			9,000	100%				
4780	11,000	100%			0	100%				
4775	10,000	100%			0	100%				
Total	**18,144,000**				**71,400,000**				**12,396,000**	

18.1.5.3 Mining Plan

Based on the guidelines mentioned above, a 5,500 tpd mine production plan has been envisaged for mining the Joanna project and is presented in Table 18-11.

In terms of mill throughput, BBA has envisaged that the resources should be mined in a period of 8 to 10 years. Based on a mining rate of 5 500 tpd for the Hosco sector only, the mine life is approximately 9 years. If the exploration drilling increases the mineral resources, a higher production rate could be considered.

Table 18-11 : 5,500 tpd Production Schedule (Hosco only) (CoG at 0.5g/t Au)

Year	Period	Ore (tonnes)	Au Grade (g/t)	Waste (tonnes)	Overburden (tonnes)	S/R	Au oz (77% rec.)	Tonne mined
0	1 year	0	0.000	4,534,000	6,562,000	--	0	11,096,000
1	1 year	1,992,000	1.429	7,058,000	5,833,000	6.47	70,470	14,883,000
2	1 year	2,014,000	1.352	12,056,000	0	5.99	67,420	14,070,000
3	1 year	2,014,000	1.388	11,805,000	0	5.86	69,199	13,819,000
4	1 year	1,994,000	1.463	8,913,000	0	4.47	72,196	10,907,000
5	1 year	2,021,000	1.494	8,167,000	0	4.04	74,749	10,188,000
6	1 year	2,094,000	1.495	6,129,000	0	2.93	77,481	8,223,000
7	1 year	2,002,000	1.478	4,420,000	0	2.21	73,267	6,422,000
8	1 year	2,011,000	1.478	4,443,000	0	2.21	73,568	6,454,000
9	1 year	2,002,000	1.509	3,872,000	0	1.93	74,780	5,874,000
TOTAL	**9 years**	**18,144,000**	**1.454**	**71,397,000**	**12,395,000**	**4.62**	**653,130**	**101,936,000**

18.2 Waste Rock Management

Overburden material will be stock piled at a nearby dump site. A significant portion of the overburden would be used to build the dam for the tailings pond and also as a cover for the reclamation of the tailings pond.

The waste dump and overburden dump have been designed according to the waste and overburden requirements from the pits and are located around the periphery of the mine to minimize the haulage distance and to reduce costs.

Two (2) waste disposal dumps will be constructed for the Joanna mine operation:

- The Hosco waste dump, located along the north-west side of the main pit with a total capacity of 34 million m^3 (70 million tonnes);
- The Hosco overburden dump, located north-east of the main pit with a capacity of 8 million m^3 (12.3 million tonnes);

The capacity of the dumps has been estimated using a swell factor of 30%. The design parameters are as follows:

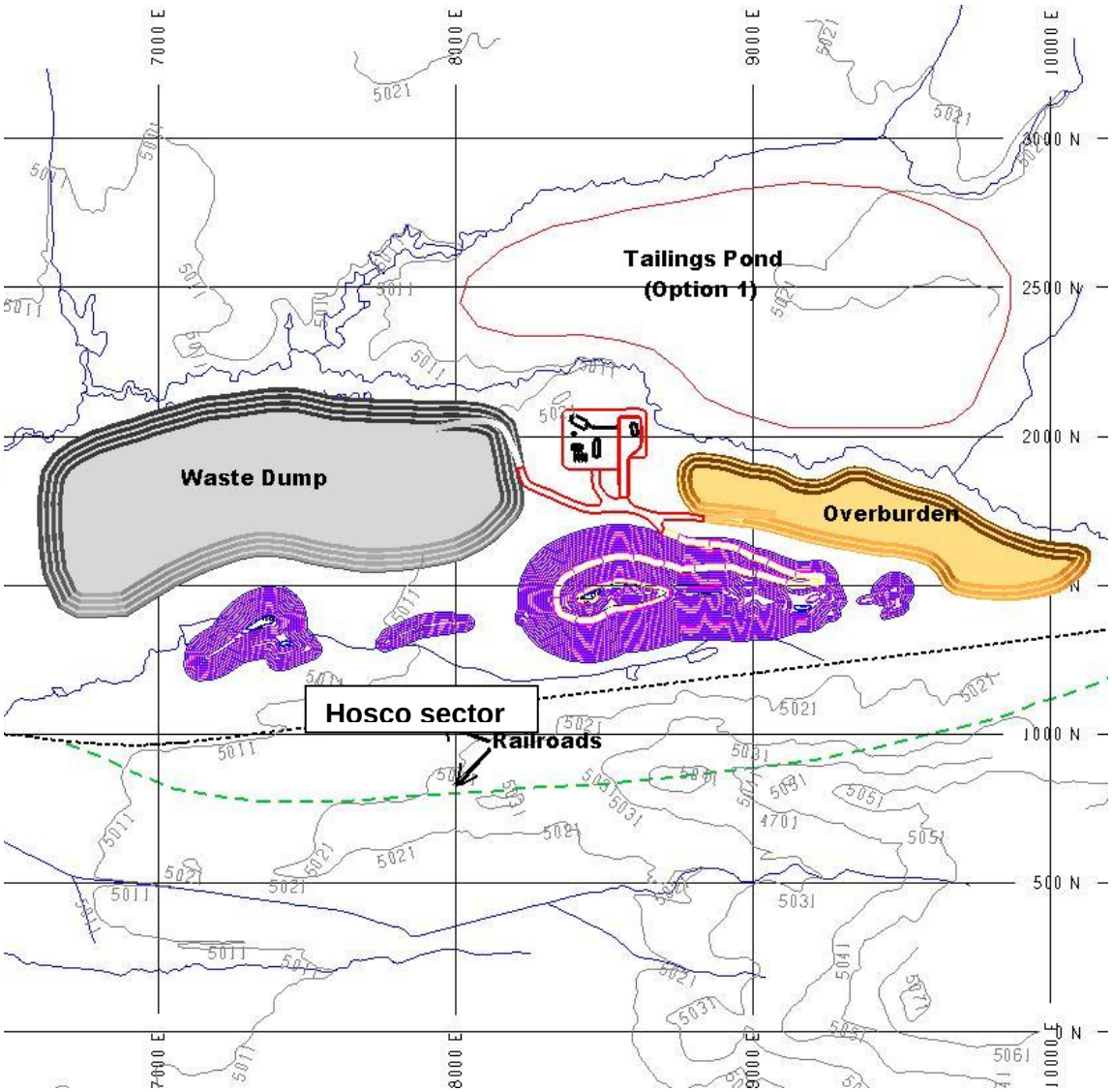
- Face angle: 35°;
- Bench height: 10m;
- Berm width: 8m;

- Minimum distance from Stitchman Stream = 50m.

Figure 18-16 shows the overall site layout.

In order to reduce the waste dump's footprint, the possibility of backfilling the auxiliary pits should be considered.

Figure 18-16: Overall Site Layout



18.3 Mining Operation

The Hosco ore deposit will be mined using conventional open pit mining methods based on a truck/shovel operation. All equipment will be diesel powered.

18.3.1 Mining Equipment

The production plan presented in Table 18-11 was used as the basis in determining the fleet requirements.

The selection of the mine equipments is carried out using the following criteria:

- The main loading equipment is the hydraulic O&K front shovel RH-90C (or equivalent) with a rated bucket capacity of 10 m^3;
- A secondary loading equipment is the front loader 992G with a bucket capacity of 10 m^3;
- The trucks are Caterpillar 777 (or equivalent) with a capacity of 91 metric tonnes (100 short tons);
- The drills are DM45 Atlas Copco or similar with a hole diameter of 6.5 inches.

The average cycle time for ore, waste and overburden was estimated based on the mine site plan using different speeds depending on the grade and the loading capacity of the trucks.

The equipment fleet has been calculated using the following parameters:

- Mine Schedule (shifts/day): 2;
- Hrs/shift: 12 ;
- Scheduled Shifts/year: 730;
- Production delays: as per Table 18-12.

Table 18-12 : Equipment Operating Time

Category	Time/Shift (minutes)
Scheduled time per shift (12hrs)	720
Scheduled Delays	
Shift Change	15
Inspection	15
Coffe Break	15
Lunch	30
Net scheduled time	645
Job Efficiency (83% or 50 min-hr)	107.5
Operating minutes per shift	537.5
Operating hours per shift	**8.96**

In order to perform routine road maintenance and various other functions within the mine, the following service equipment has been selected.

- Two (2) track dozer are used to maintain waste dumps as well as to perform general work within the mine;
- One (1) wheel dozer is used for general work within the mine;
- One (1) grader is used for road maintenance;
- One (1) water truck is used to carry water for dust control;
- One (1) compactor is used for ground preparation;
- One (1) small excavator is used to excavate and maintain ditches around the pits.
- One (1) fuel truck, one (1) service truck, one (1) mechanics truck, one (1) tire handler and one (1) crane.

Table 18-13 shows the list of mining and support equipment required over the life-of-mine.

Table 18-13 : Major Mine Equipment List for 5,500 tpd

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Type	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9
Front Shovel (RH90)	1	1	1	1	1	1	1	1	1
Haulage Truck (777)	6	6	6	6	6	5	5	5	5
Wheel Loader (992G)	1	1	1	1	1	1	1	1	1
Wheel Dozer (824H)	1	1	1	1	1	1	1	1	1
Track Dozer (D9T)	2	2	2	2	2	1	1	1	1
Motor Grader (16H)	1	1	1	1	1	1	1	1	1
Water Truck (10,000 liters)	1	1	1	1	1	1	1	1	1
Compactor	1	1	1	1	1	1	1	1	1
Small Excavator (324D)	1	1	1	1	1	1	1	1	1
Utility Trucks [1]	5	5	5	5	5	5	5	5	5
Drill (DM45 or equivalent)	1	2	2	2	2	1	1	1	1
Total Fleet	21	22	22	22	22	19	19	19	19

18.3.2 Drilling and Blasting

Two DM45 drills will be used to drill 6.5-in diameter blastholes on a 5m by 5.5m pattern.

Considering the possibility of water in the blastholes, a blend of emulsion explosives and ANFO will be used for blasting. The blend will be adjustable, but the current design is based on 100% ANFO. The design powder factor is 0.2 kg of explosives per tonne of rock. After mining commences, fragmentations will be evaluated and the drill and blast parameters may be further refined to optimize results.

18.3.3 Dewatering

The mine is located on a swampy area, therefore it is recommended to dig a drainage ditch all around the pit to collect run off water. In addition, a suitable pumping system must be included in the design for the dewatering of the pit.

18.4 Manpower and Salaries

18.4.1 Mine Labour and Salaries

The mine hourly labour and salaried staff for a production rate of 5,500 tpd is shown in Tables 18-14 and 18-15.

Table 18-14 : Mine Hourly Labour – 5,500 tpd

Mine Hourly Staff	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9
Crew 4									
Open pit operations									
Shovel / Loader Operator	7	6	6	5	4	4	4	4	4
Haul Truck Operator	23	22	24	23	23	20	17	18	17
Drill Operator	4	7	7	5	5	4	3	3	3
Wheel Dozer Operator	4	4	4	4	4	4	4	4	4
Dozer D9 Operator	6	6	6	6	6	4	4	4	4
Grader Operator	4	4	4	4	4	4	4	4	4
Water Truck Operator	4	4	4	4	4	4	4	4	4
Compactor Operator	2	2	2	2	2	2	2	2	2
Small Excavator Oper.	2	2	2	2	2	2	2	2	2
Utility Truck Operator	8	8	8	8	8	6	6	6	6
Pumping Operator	2	2	2	2	2	2	2	2	2
General Labour	6	6	6	6	6	4	4	4	4
Subtotal	72	73	75	71	70	60	56	57	56
Mine Maintenance									
Field Gen Mechanics	2	2	2	2	2	2	2	2	2
Field Welder	2	2	2	2	2	2	2	2	2
Field electrician	2	2	2	2	2	2	2	2	2
Shovel mechanics	2	2	2	2	2	2	2	2	2
General Labour	4	4	4	4	4	4	4	4	4
Shop Mechanic	2	2	2	2	2	2	2	2	2
Welder-machinist	2	2	2	2	2	2	2	2	2
Electrician	2	2	2	2	2	2	2	2	2
Janitor	2	2	2	2	2	2	2	2	2
Subtotal	20	20	20	20	20	20	20	20	20
Total Hourly Labor	92	93	95	91	90	80	76	77	76

Table 18-15 : Mine Salaried Staff – 5,500 tpd

Mine Salaried Staff	Yr 1-9
Open pit operations	
Mine Superintendent	1
Mine Shift Foreman	4
Dispatcher	2
Production / Mine Clerk	1
Secretary	1
Sub-total	9
Mine Maintenance	
Planner	1
Maintenance Supt	1
Maint shop foreman	4
Maint, clerk	1
Sub-total	7
Mine Engineering	
Chief engineer	1
Senior mine planning engineer	1
Mine eng. (dewat., getech.)	1
Env. / Water management eng.	1
Technician (mining software)	1
Surveyor	2
Clerk	1
Sub-total	8
Geology	
Chief Geologist	1
Geologist / Grade Control	1
Technician	1
Sampler	1
Clerk	1
Sub-total	5
Total Salaried Staff	29

Table 18-16 presents the annual salary based on year 4. Based on operation in similar condition, an average burden rate of 35% was applied to all salaries.

Table 18-16 : Salaries Based on Year 4 at 5,500 tpd

Operator	Average hourly rate	Rate per year	Required day shift	Total required	Hours per year	Yearly salary per operator	Fringe benefits (35%)	Total cost
Mine Hourly Staff								
Open pit operations								
Shovel / Loader Operator	31.25		3	5	2190	$68,438	$23,953	$461,953
Haul Truck Operator	28.30		6	23	2190	$61,977	$21,692	$1,924,386
Drill Operator	28.30		2	5	2190	$61,977	$21,692	$418,345
Wheel Dozer Operator	28.30		1	4	2190	$61,977	$21,692	$334,676
Dozer D9 Operator	28.30		2	6	2190	$61,977	$21,692	$502,014
Grader Operator	28.30		1	4	2190	$61,977	$21,692	$334,676
Water Truck Operator	28.30		1	4	2190	$61,977	$21,692	$334,676
Compactor Operator	26.90		1	2	2190	$58,911	$20,619	$159,060
Small Excavator Oper.	28.30		1	2	2190	$61,977	$21,692	$167,338
Utility Truck Operator	26.90		2	8	2190	$58,911	$20,619	$636,239
Pumping Operator	24.00		1	2	2190	$52,560	$18,396	$141,912
General Labour	21.75		2	6	2190	$47,633	$16,671	$385,823
Mine Maintenance								
Field Gen Mechanics	32.70		1	2	2190	$71,613	$25,065	$193,355
Field Welder	22.25		1	2	2190	$48,728	$17,055	$131,564
Field electrician	32.70		1	2	2190	$71,613	$25,065	$193,355
Shovel mechanics	32.70		1	2	2190	$71,613	$25,065	$193,355
General Labour	21.75		2	4	2190	$47,633	$16,671	$257,216
Shop Mechanic	32.70		1	2	2190	$71,613	$25,065	$193,355
Welder-machinist	32.70		1	2	2190	$71,613	$25,065	$193,355
Electrician	32.70		1	2	2190	$71,613	$25,065	$193,355
Janitor	21.75		1	2	2190	$47,633	$16,671	$128,608
Total Hourly Labor				**91**				**$7,478,615**
Mine Salaried Staff								
Open pit operations								
Mine Superintendent		$95,000	1	1	2080	$95,000	$33,250	$128,250
Mine Shift Foreman		$75,000	1	4	2080	$75,000	$26,250	$405,000
Dispatcher		$65,000	1	2	2080	$65,000	$22,750	$175,500
Production / Mine Clerk		$40,000	1	1	2080	$40,000	$14,000	$54,000
Secretary		$35,000	1	1	2080	$35,000	$12,250	$47,250
Mine Maintenance								
Planner		$50,000	1	1	2080	$50,000	$17,500	$67,500
Maintenance Supt		$80,000	1	1	2080	$80,000	$28,000	$108,000
Maint shop foreman		$75,000	1	4	2080	$75,000	$26,250	$405,000
Maint, clerk		$40,000	1	1	2080	$40,000	$14,000	$54,000
Mine Engineering								
Chief engineer		$85,000	1	1	2080	$85,000	$29,750	$114,750
Senior mine planning engineer		$75,000	1	1	2080	$75,000	$26,250	$101,250
Mine eng. (dewat., getech.)		$75,000	1	1	2080	$75,000	$26,250	$101,250
Env. / Water management eng.		$75,000	1	1	2080	$75,000	$26,250	$101,250
Technician (mining software)		$55,000	1	1	2080	$55,000	$19,250	$74,250
Surveyor		$55,000	2	2	2080	$55,000	$19,250	$148,500
Clerk		$40,000	1	1	2080	$40,000	$14,000	$54,000
Geology								
Chief Geologist		$85,000	1	1	2080	$85,000	$29,750	$114,750
Geologist / Grade Control		$75,000	1	1	2080	$75,000	$26,250	$101,250
Technician		$55,000	1	1	2080	$55,000	$19,250	$74,250
Sampler		$35,000	1	1	2080	$35,000	$12,250	$47,250
Clerk		$40,000	1	1	2080	$40,000	$14,000	$54,000
Total Salaried Staff				**29**				**$2,531,250**
TOTAL				**120**				**$10,009,865**

18.4.2 Mill Labour and Salaries

The mill labour and salaries for concentrator operations with and without pressure oxidation plant are shown in Tables 18-17 and 18-18, respectively.

Table 18-17 : Mill Labour and Salaries – Option With Pressure Oxidation

Manpower	no.	Salary Including Benefits $/yr	Total $/yr	Yearly Salary $/yr	Benefits (35%) $/yr	Total $/yr
Labor -staff						
Process Manager	1	127,300	127,300	95,000	33,250	128,250
Cheif metallurgist	1	107,200	107,200	85,000	29,750	114,750
Process General Foreman	1	107,200	107,200	85,000	29,750	114,750
shift foreman	3	80,400	241,200	78,621	27,517	318,415
chief assayer	1	67,000	67,000	55,000	19,250	74,250
Refiner	1	63,650	63,650	55,000	19,250	74,250
sub-total	**8**		**713,550**			**824,665**
Labor - Hourly						
crushing operator	2	60,750	121,500	47,633	16,672	128,609
mill control room operator	4	64,125	256,500	47,633	16,672	257,218
leach/cip operator	4	63,788	255,152	47,633	16,672	257,218
pressure oxidation operator	4	63,788	255,152	47,633	16,672	257,218
O2 plant operator	4	63,788	255,152	47,633	16,672	257,218
flotation operator	4	63,788	255,152	47,633	16,672	257,218
tailings operator	4	60,750	243,000	47,633	16,672	257,218
assayer	4	56,700	226,800	47,633	16,672	257,218
maintenance	8	67,500	540,000	71,613	25,065	773,420
sub total	**38**		**2,408,408**			**2,702,557**
total labor	**46**		**3,121,958**			**3,527,222**

Table 18-18 : Mill Labour and Salaries – Option Without Pressure Oxidation

Manpower	no.	Salary Including Benefits $/yr	Total $/yr	Yearly Salary $/yr	Benefits (35%) $/yr	Total $/yr
Labor -staff						
Process Manager	1	127,300	127,300	95,000	33,250	128,250
Cheif metallurgist	1	107,200	107,200	85,000	29,750	114,750
Process General Foreman	1	107,200	107,200	85,000	29,750	114,750
shift foreman	3	80,400	241,200	78,621	27,517	318,415
chief assayer	1	67,000	67,000	55,000	19,250	74,250
Refiner	1	63,650	63,650	55,000	19,250	74,250
sub-total	**8**		**713,550**			**824,665**
Labor - Hourly						
crushing operator	2	60,750	121,500	47,633	16,672	128,609
mill control room operator	4	64,125	256,500	47,633	16,672	257,218
leach/cip operator	4	63,788	255,152	47,633	16,672	257,218
flotation operator	4	63,788	255,152	47,633	16,672	257,218
tailings operator	4	60,750	243,000	47,633	16,672	257,218
assayer	4	56,700	226,800	47,633	16,672	257,218
maintenance	8	67,500	540,000	71,613	25,065	773,420
sub total	**30**		**1,898,104**			**2,188,121**
total labor	**38**		**2,611,654**			**3,012,786**

18.4.3 Administrative Manpower and Salaries

The manpower and salaries for administrative staff is shown in Table 18-19.

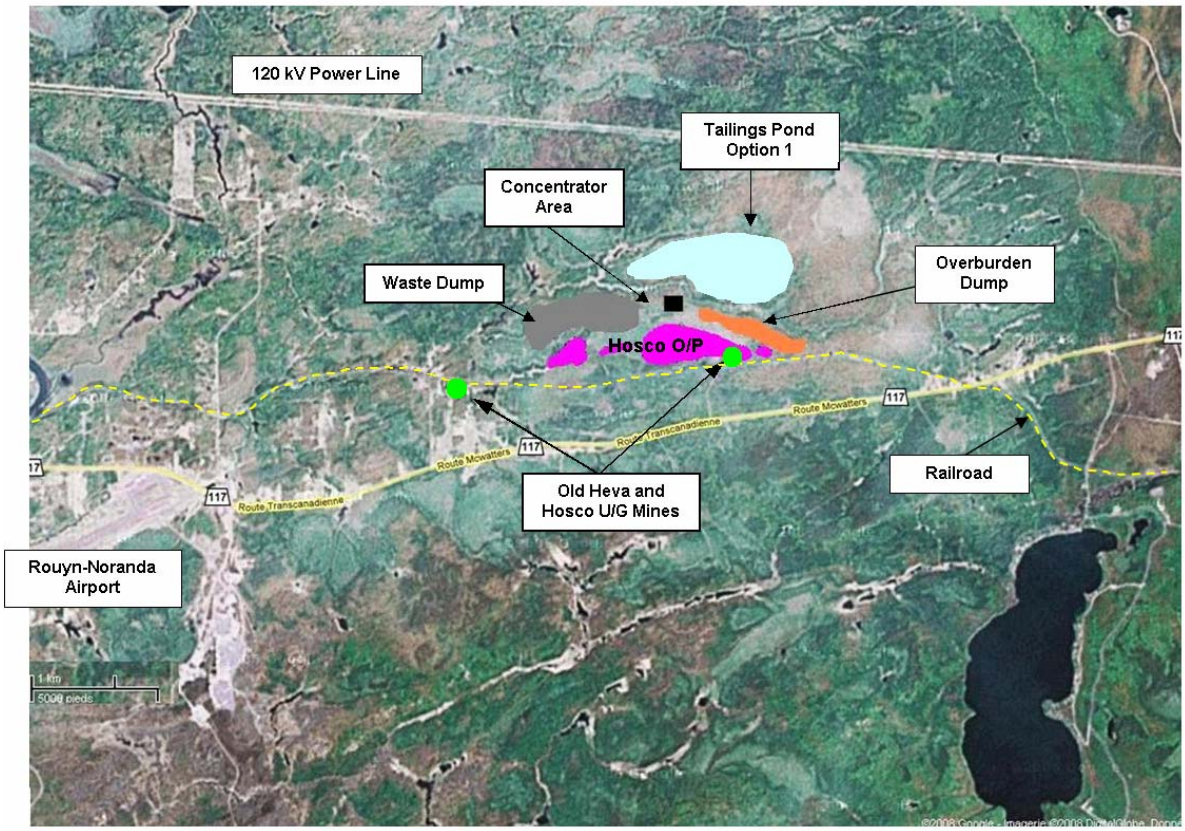
Table 18-19 : Administrative Staff Requirement and Salaries

Operator	Average hourly rate	Rate per year	Required day shift	Total required	Hours per year	Yearly salary per operator	Fringe benefits (35%)	Total cost
Administration								
General manager		$130,000	1	1	2080	$130,000	$45,500	$175,500
Purchasing manager		$65,000	1	1	2080	$65,000	$22,750	$87,750
Expediting		$50,000	1	1	2080	$50,000	$17,500	$67,500
Acconting manager		$65,000	1	1	2080	$65,000	$22,750	$87,750
Personnel manager		$65,000	1	1	2080	$65,000	$22,750	$87,750
Store keeper		$60,000	1	2	2080	$60,000	$21,000	$162,000
Clerical		$40,000	5	5	2080	$40,000	$14,000	$270,000
Secretary		$35,000	2	2	2080	$35,000	$12,250	$94,500
Security agent		$35,000	1	2	2080	$35,000	$12,250	$94,500
Training and safety		$55,000	1	1	2080	$55,000	$19,250	$74,250
Total Administration Staff				**17**				**$1,201,500**
TOTAL				**17**				**$1,201,500**

18.5 Infrastructure

Figure 18-17 presents the general infrastructure locations for the Joanna project. The Heva sector is not shown in this Figure since it is not included in the mining plan.

Figure 18-17: General Infrastructure



18.5.1 Relocation of the Railroad

The railroad, owned by Compagnie des chemins de fer nationaux du Canada, presently crosses the site of the future Heva open-pit and near the Hosco open-pit. The railroad has to be relocated to a safe distance outside the pit limits without interruption of the railway service.

The relocation process has to be completed by the middle of the first year of mining operations.

The approximate length of the railroad to be relocated is 4 km, beginning less than 1 km west of the Hosco pit and ending 1 km from the eastern edge of the Hosco pit.

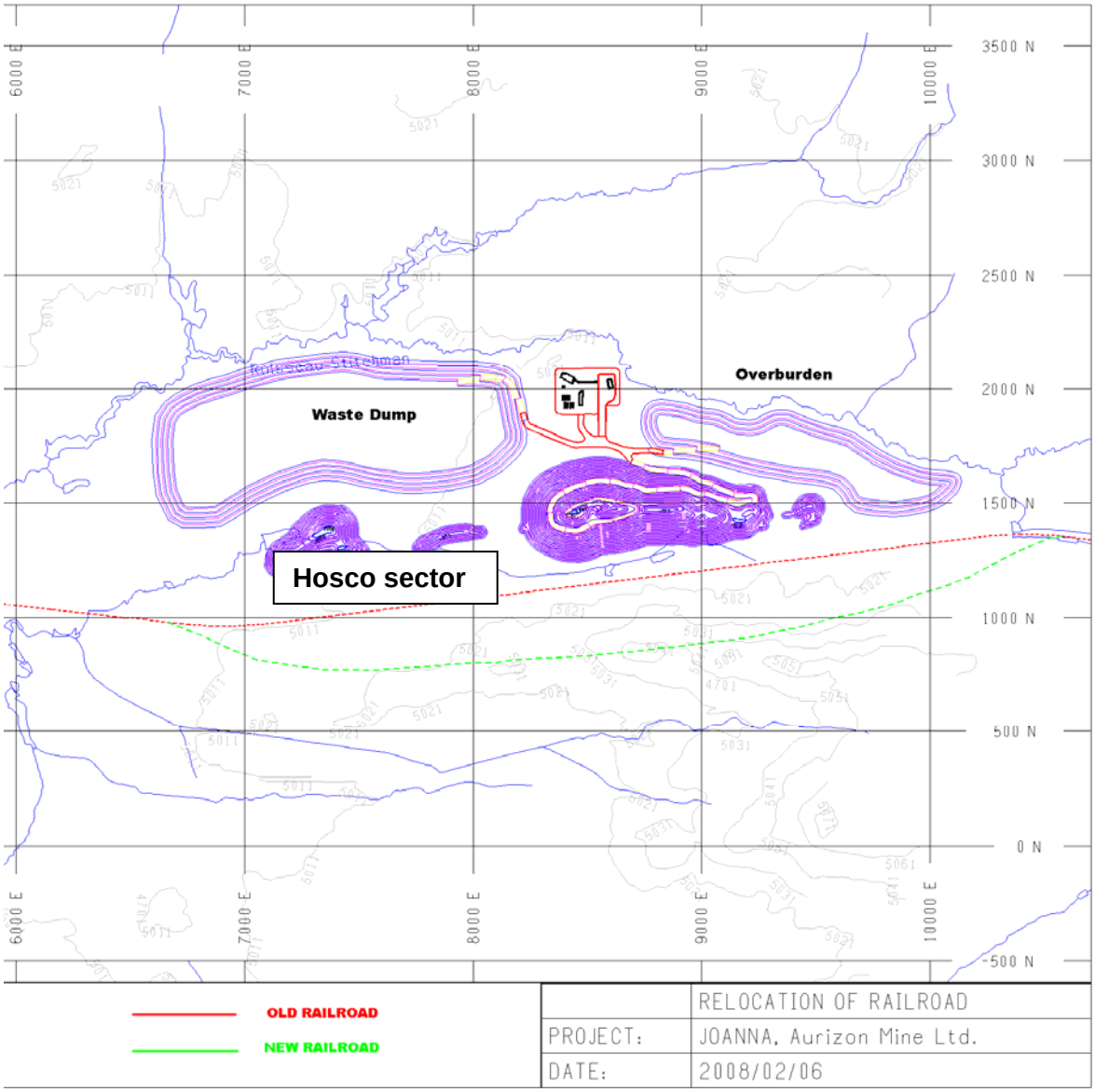
The majority of the construction material will use waste rock from the open-pit mine, mostly in construction Year 0.

The design parameters are as follows:

- Distance from dump = > 320m
- Distance from pit = > 430m

Figure 18-18 shows the relocation of the railroad.

Figure 18-18: Relocation of the Railroad



18.5.2 Electrical Power

Based on discussions with the TransEnergie planner overseeing the Abitibi region, a derivation of the 120 kV line wood posts will have to be built by Hydro-Quebec over a length of approximately 2.7 km from one of the three existing 120 kV lines, namely L1313, L1322 and L1306, going through the area. Hydro-Quebec has pointed out that the three obsolete lines have a limited capacity, but would probably have sufficient capacity to provide a new load varying from 15 to 20 MW. If a problem occurs after the mine has started, Hydro-Quebec will proceed to the reinforcement of one of these three 120 kV lines.

According to Hydro-Québec, the cost of this 2.7 km derivation is estimated at $2M, based on the most recent line projects in this area.

Provided that the mine is in operation for more than 2 years, there will be no cost for the customer. Only a banking guarantee will be required for the recovery period of this investment with the customer's electrical consumption, for one period of less than 2 years, if the new mining complex consumes 15 MW and more.

In the event of an open-pit mine exploited with electric mobile equipment, i.e. shovels and drills, the basic power requirement will include a 120-25 kV and 25-4,16 kV double transformation and in order to be able to have a 25 kV loop for the mine service road and as well as a 4,16 kV power supply for the concentrator.

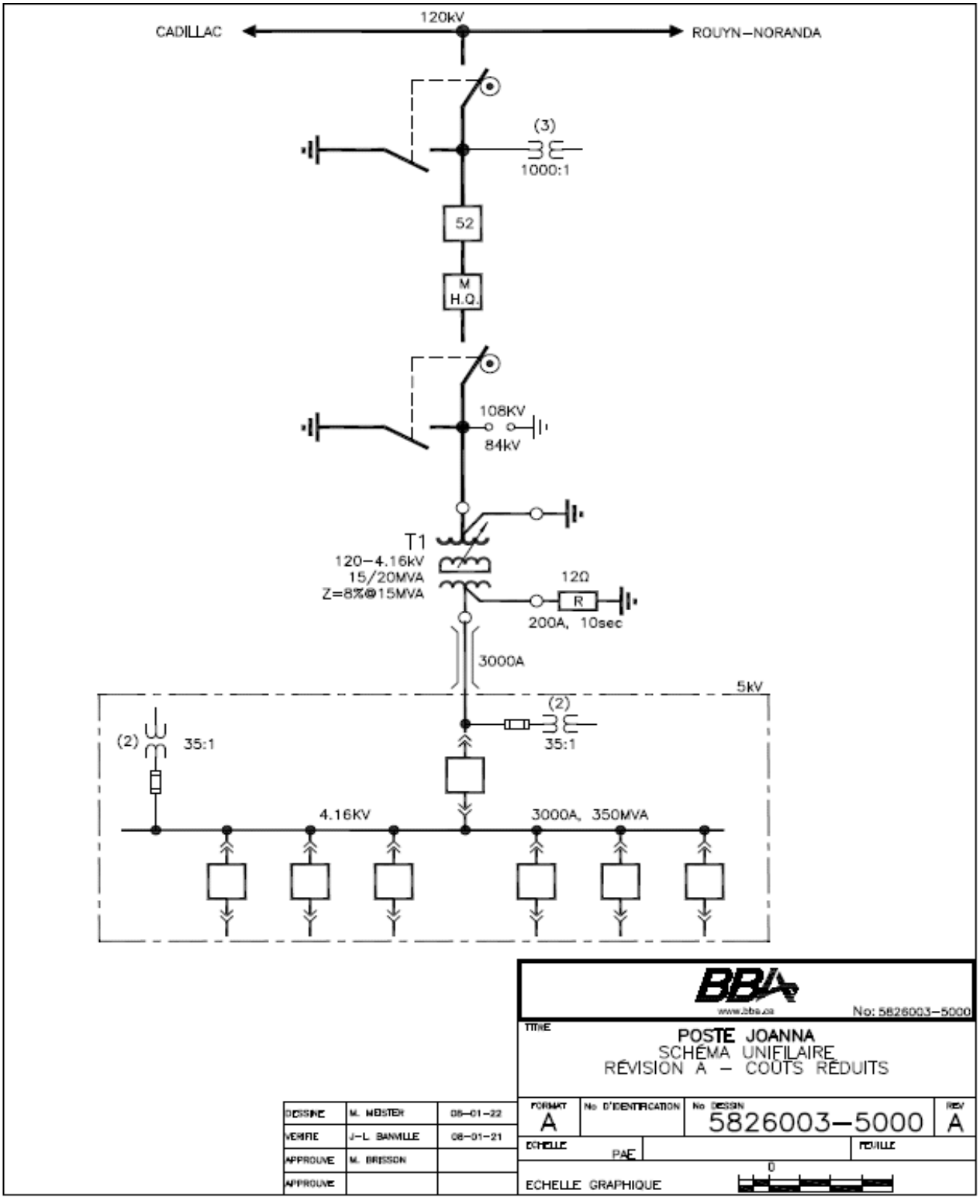
The cost of the 120-25 kV substation will be entirely under the customer's responsibility, similar to the plant's 25-4,16 kV substation, the air loop 25 kV line towards the 25-7,2 kV mine and mining substations serving the pits mobile electric equipment (shovels, drilling machines, pumping, etc).

However, if there is no electric equipment being used in the mine, the 120-25 kV and 25-4.16 kV double transformation can be eliminated and it will be more economical to have a single 120-4.16 kV of 15/20 MVA transformation (Z = 8 %). This significantly reduces the electric investments of the project. Additional studies will be required prior to proceeding with this lower cost scenario, since it will not be easy to create the unique medium voltage configuration after the 25 kV mine loop unless a more economical mine operation occurs using mobile electrical equipment (shovels and drilling machines). Moreover, it will be much more difficult to find a 120-4.16 kV replacement transformer to mitigate an unexpected damage to this unique transformer, since a direct 4.16 kV transformation is much rarer than the 120-25 kV and 25-4.16 kV double transformation. Therefore, with this lower cost option, there is a possibility that the customer's insurers will require the purchase of a 120-4.16 kV replacement transformer.

For the purpose of the Preliminary Assessment study, the single 120-4.16 kV option is considered.

Figure 18-19 presents the electrical distribution schema.

Figure 18-19: Electrical Distribution

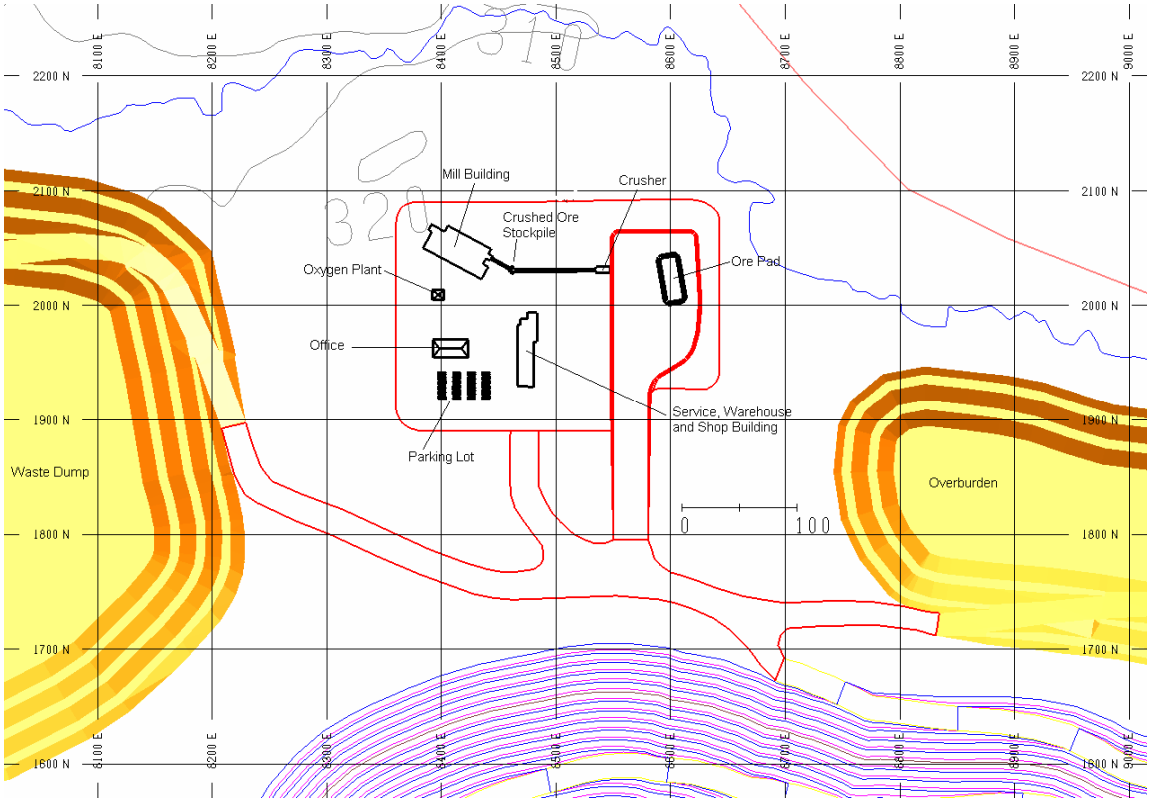


18.5.3 Civil Structure

The processing site is located near the Hosco pit entrance and includes a workshop, a warehouse, a fuelling station and an administrative office nearby.

Figure 18-20 shows the general arrangement of the facilities.

Figure 18-20: General Site View



18.5.4 Tailings Management

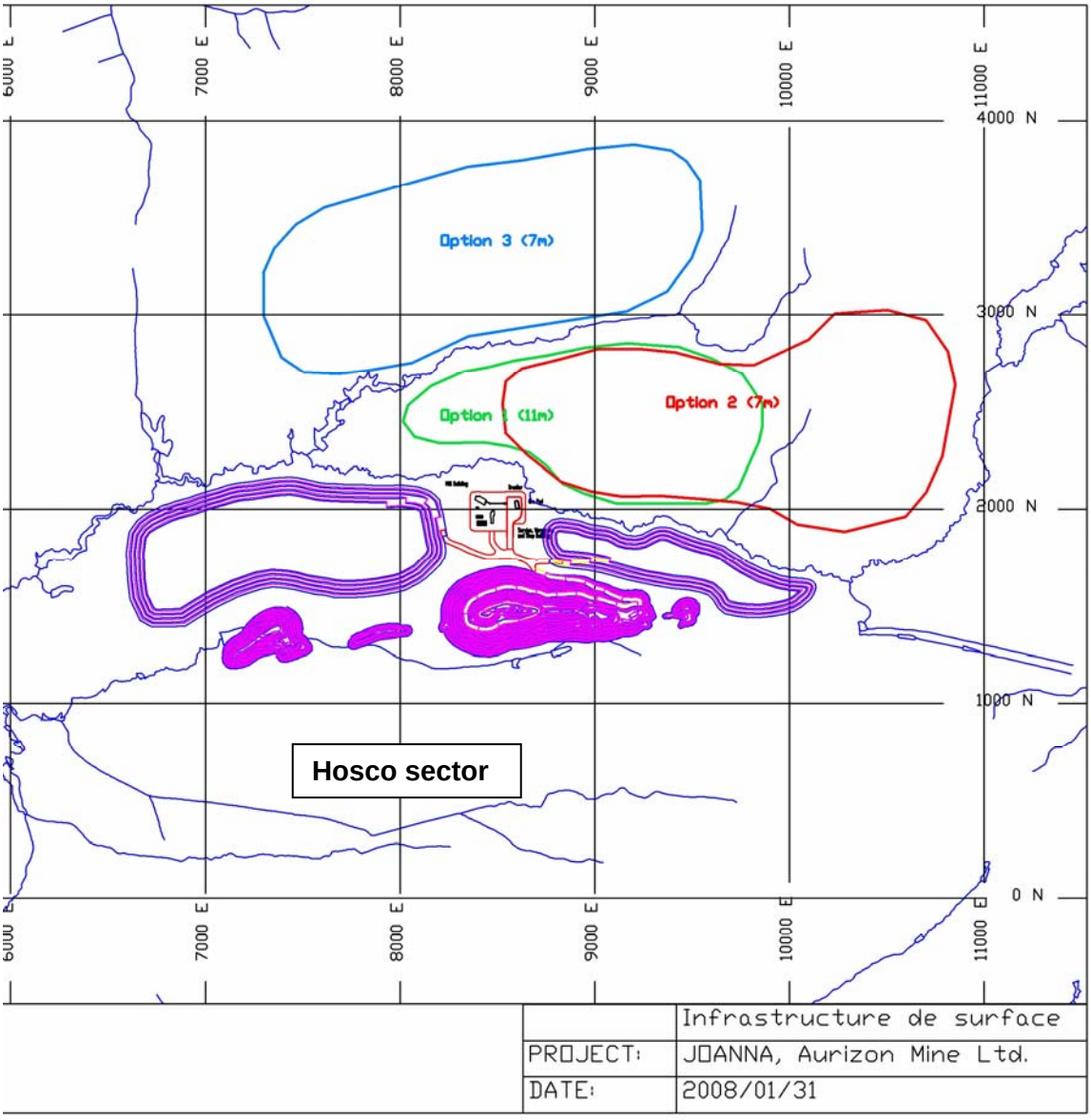
Three (3) configurations have been considered for the tailings pond. Each option represents a tailings pond with a capacity of 12 million m^3. Figure 18-21 shows these three options.

Option 1: The tailings pond is located north of the Hosco pit, between the Stitchman Stream and one of its tributaries. The average height of the dam is 11m.

Option 2: The tailings pond is located north-east of the Hosco pit and north of the Stitchman Stream. The average height of the dam is 7m.

Option 3: The tailings pond is located north of the Hosco pit, and north of the Stitchman Stream and one of its tributaries. The average height of the dam is 7m.

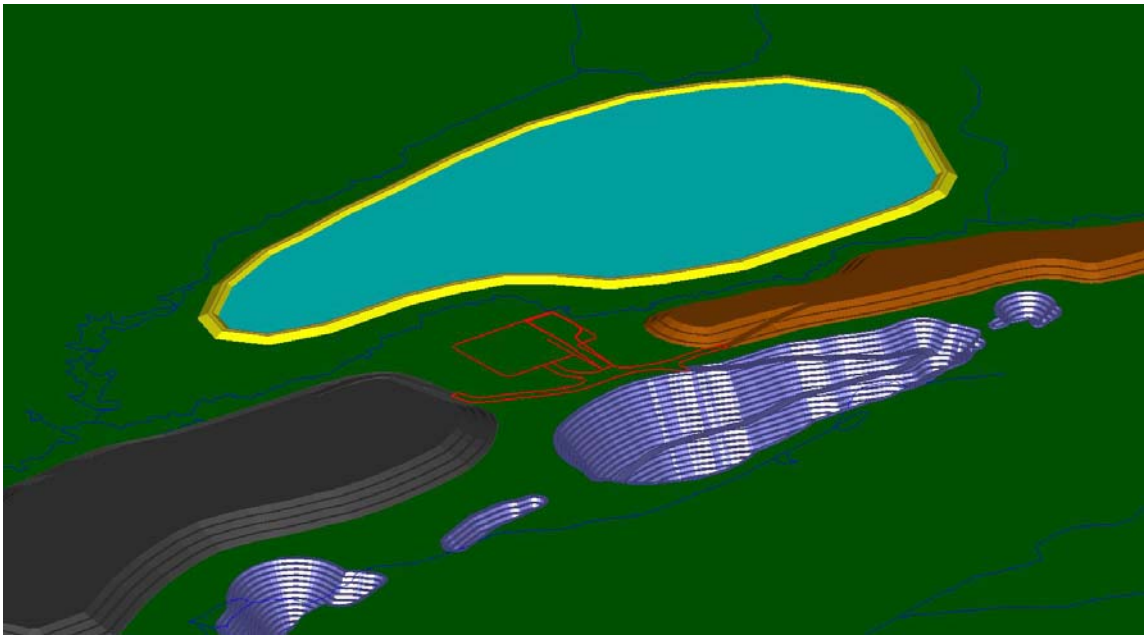
Figure 18-21: Tailings Pond



In green: option 1, In red: option 2, In blue: option 3

Figure 18-22 below shows a 3D view of the Option 1 tailings area along with the other surface infrastructures.

Figure 18-22: 3D View of the Tailings Pond: Option 1



18.6 Cost Estimate for the Base Case Scenario

The cost estimate for the Base Case scenario is based on a milling rate of 5,500 tpd or 2 million tpy as shown in Table 18-11. In summary, the following parameters have been used:

- A mining rate of 5,500 tpd;
- Mining the Hosco sector only;
- Process plant with no concentrate pressure oxidation.

All currencies are expressed in Canadian dollars (C$).

The expected accuracy range of the capital cost and operating cost estimates for the Joanna project are +/-35%.

18.6.1 Capital Cost Estimate

The capital costs include the purchase of all mining equipment, the mill, the infrastructure and indirect costs. A 20% contingency allowance is included in the cost estimate for further detailed design and investigations. The total capital cost is estimated to be $140.6 million, including pre-production stripping cost of $18.4 million. The capital expenditures have been assumed to occur during construction years -1 and 0.

The capital cost estimates are divided into three main components as follows: direct costs, indirect cost (which includes owner's costs and EPCM), and contingency.

The capital cost per activity is presented in Table 18-20. Detailed capital cost per activity is included in Appendix A.

Table 18-20 : Project Capital Cost Estimate

ACTIVITY	TOTAL COST($'000)
Mine (major, ancillary and misc. equipment)	$19,185
Crushing and processing cost (inc. tailings)	$56,587
Infrastructure (inc. civil, power, railroad)	$12,750
Total direct cost	$88,522
Total indirect cost	$13,278
TOTAL DIRECT + INDIRECT COSTS	$101,800
Contingency (20%)	$20,360
SUBTOTAL	$122,160
PRE-PRODUCTION STRIPPING COST	$18,400
TOTAL PROJECT COSTS	$140,560

18.6.1.1 Mine Capital Cost

The mine capital cost includes the cost for mining and the miscellaneous equipments needed at year 0. The estimate is based on an in-house database, on estimator's guide book and a budget cost from equipment supplier.

18.6.1.2 Processing Plant Capital Cost

The processing plant capital costs for the project were generally estimated using figures from standard estimating manuals and in-house cost data. Budget prices for some major equipment items were solicited from vendors.

To estimate the cost of an equipment of a given capacity or size when the price of a larger or smaller similar item was known a scale-up factor of 0.6 was used as below:

New cost = known cost * [(new capacity) / (known capacity)] ^0.6

Costs of mechanical installation, freight, mill civil/structure, piping, electrical, instrumentation, automation and services (partial) were estimated by factors typical of the industry and plant location.

18.6.1.3 Garage, Office and Other Facilities Capital Cost

This capital cost includes the construction of the office, the garage and other facilities. The total cost is based on historical data for similar buildings.

18.6.1.4 Railroad Capital Cost

The railway relocation capital cost was estimated based on a cost/unit length on similar railway relocation for a mining project in Quebec. The total deviation length is 4 km and the cost is estimated at $1.25 million per km.

18.6.1.5 Electrical Power Capital Cost

The capital cost estimate for the electrical distribution system is $3,250,000. As previously mentioned, Hydro-Quebec has confirmed that under certain conditions, the cost to build the 2.7 km long 120 kV electrical extension line to the mine site will be paid for by Hydro-Quebec. The 120-4.16 kV sub-station will be Aurizon's responsibility. Table 18-21 presents the detailed capital cost for the electrical distribution.

Table 18-21 : Electrical Distribution Cost Estimate

QUANT.	DESCRIPTION	MATERIAL ($'000)	INSTALLATION ($'000)
1	Incoming cable 120 kV portal structure + foundation	120	60
1	Lot of three 120 kV potential transformer + foundation	30	10
2	4.15 kV disconnecting switches, ground connections + foundation	90	50
1	145 kV Circuit-Breaker, SF6, dead tank + foundation	110	30
1	120-4.16 kV 15/20 MVA transformer, + foundation with OLTC +10 % - 15 % of 120 kV	750	160
1	Split manhole water/oil	50	40
50 m	Bus duct, 3 000 A, 4,16 kV	140	50
1	Neutral point resistor 12 ohms, 200 A-10 s	20	10
1	5 kV exterior cabin switching panel, 3 000 A, 350 MVA, 60 kV BIL, 7 circuit breakers, c/a foundation	800	100
1 lot	Grading and finishing	40	40
1 lot	MALT grid	70	40
1 lot	Fence	30	30
1 lot	Control, measure and protection, c/w control cables	120	80
1	Battery and charger	50	10
1	Diesel generator with 60 kW, 0.8 PF convey selector switch	50	10
1 lot	600/347 V & 120/208 V substation auxiliary services	40	20
	SUB-TOTAL	**2,510**	**740**
	SUB-TOTAL MATERIAL + INSTALLATION		**3,250**

18.6.1.6 Environmental and Tailings Capital Cost

The environmental and initial tailings capital cost includes initial tailings dam construction. The cost does not include any ongoing sustaining capital for tailings dam construction. These costs are estimated based on a percentage of processing capital cost and are included in the processing plant capital cost.

18.6.2 Operating Costs Estimate

The operating costs include mining costs, the crushing, processing and the administration costs.

Both actual and historic costs from other operations of similar capacity were used to estimate the total Joanna project operating costs. Other sources used for cost estimation included recent scoping studies, vendors quote and other commercial database.

Overall operating costs have been calculated and are detailed as follow:

- Mining cost: $2.00/tonne mined
- Crushing and processing cost: $6.93/tonne milled
- Administration cost: $0.60/tonne milled

18.6.2.1 Mining Costs

Mining operating costs include the equipment operating cost, the salaries, the dewatering and the cost for blasting. The detailed mining operating cost on a year by year basis is presented in Appendix B.

Mining operating costs are estimated to be $2.00/t mined.

18.6.2.2 Processing Costs

The crushing and processing operating cost estimate is $6.93/tonne milled for a 5,500 tpd production rate.

18.6.2.3 General and Administration Costs

The administration operating cost is presented in Table 18-19. The estimate for administration costs is $1.2 million per year.

18.7 Alternate Mining Scenario

As an alternate mining scenario to improve the economic potential of the Joanna deposit, a production schedule based on a mining rate of 7,500 tpd and a 6.5-year mine life was prepared using the following assumptions:

- Mining the Hosco sector using a production rate of 7,500 tpd;
- Inter-ramp pit slope angle of 55°;
- No autoclave oxidation plant;
- 30% cost reduction on purchase of used or foreign-sourced process equipment.

The Hosco in-pit resource resulting from the alternate mining scenario amounts to 9.1 millions tonnes in the indicated category at an average grade of 1.5 g/t Au for a total of 332,000 oz Au after recovery and 9.1 millions tonnes in the inferred category at an average grade of 1.4 g/t Au for a total of 321,000 oz Au after recovery. The stripping ratio is 3.4.

Under these parameters, the mine operating costs have been adjusted. The operating cost for the mine is $1.84/tonne mined, $6.23 milled for the processing and $0.43/tonne milled for the administration. The capital cost has also been adjusted to the amount of $152.0 million.

BBA is confident that the purchase of used or foreign-sourced process equipment, to lower the cost by 30%, is a realistic option. BBA is also confident that a 7,500 tpd production rate is feasible. Additional geotechnical investigation would be required to confirm the use of a 55° inter-ramp pit slope angle. However, it is considered that a 55° inter-ramp angle is reasonable in view of the rock conditions in other mining operations in the region. The alternate mining scenario demonstrates the best attractive option and is retained for the for the development of the Joanna property.

19. OTHER RELEVANT DATA AND INFORMATION

19.1 Environment

In order to minimize or eliminate green-house gas emissions and the impact of mining activities to the surrounding areas, the Joanna project will be developed with a green mining operation approach from the project design stage to the construction, operation and closure stages.

19.1.1 Green Mining

Many definitions are given to the terms “Green Mine” or “Green Mining”, but all have the common global approach and it is as follows:

- Environmental approach for the whole life cycle of the mine, from concept through closing plan;
- Emphasis on tailings management that has to be restored to a Green (forest) state or close to pre-existing environment;
- Use of recycle materials as much as possible;
- Use energy efficient process for production (solar panels, windmills, etc.);
- Minimize water consumption (recycle as much as possible);
- Commitment to implement good environmental practices;
- Need a good and green closure plan, i.e. to determine what and how the waste and tailings areas will be used for: agricultural (energy producing crops), forestry, wild life preservation, etc. ;
- Involve the surrounding communities from the early stages.

19.1.2 Sustaining Development

Green mining at Joanna involves an attachment to a corporate sustaining development policy which has to be in force on all the existing operation of the company.

Since mining resources can not be replaced, the developers of these resources need to provide the details on the economic and social impacts to the surrounding communities concerning each project.

The development should conform to the economic environment, physical environment and social environment. The policy is currently based on ten principles as follows:

Economic Environment

A. Responsible Production and consumption
B. Economic efficiency

Physical Environment

C. Environmental protection
D. Biodiversity preservation
E. Protection of cultural heritage
F. Prevention

Social Environment

G. Health and quality of life
H. Participation and commitment
I. Social equity and solidarity
J. Access to knowledge

19.1.2.1 Economic Environment

A- Responsible Production and Consumption

Production and consumption approach should avoid waste and optimizes the use of resources.

B- Economic Efficiency

As the project is located close to the Rouyn-Noranda community, decisions should be geared towards innovation and economic prosperity that is conducive to social progress and respectful of the environment.

19.1.2.2 Physical Environment

The Joanna Preliminary Assessment has been conducted so that the environmental impact is reduced as much as possible.

All surface infrastructures are constructed away from the water drainage system. In addition, these infrastructures are located close to the concentrator, near the pit entrance, to reduce the physical as well as the visual impact and the source of dust. As can be seen in Figure 1-5, the future proposed mine site is clear of trees, therefore tree cutting is unnecessary.

C- Environmental Protection

Environmental protection must constitute an integral part of the development process.

- The site is located approximately 1 km North of the Biodiversity Vaudray and Joannès Lakes Reserve (Réserve de biodiversité des Lacs-Vaudray-et-Joannès); in a swamp area, near an airport strip;

- In addition, the Heva deposit is located directly under the Stitchman Stream. However, due to the low impact of these resources on the economics of this study, the Heva deposit is not considered in the current conceptual stage of the project.

Humid area destruction

- Open-pit mining on the Joanna property will significantly disturb the swamp area. The intent is not to compensate but to provide an upgrade alternative for wildlife in line with the preservation of the main biodiversity corridor. This corridor is located east of the property. (See Figure 1-6) Discussions should be held with environmental organizations such as Action Boréale, Canard illimitée and Environmental Regional Council – CREAT.

  Figure 1-5 shows the Hosco site location, a large humid area.

Figure 19-1 : Aerial View of the Hosco Site (Humid Area)

Acid mine drainage

- In the December 2007 environmental report by ROCHE, "Étude de caractérisation environnementale", it reports the potential of acid mine drainage occurring in the ore and waste material and recommends further testwork. Waste pile management could represent a higher challenge than the tailings;

- The waste material from the surrounding ore rocks contains 1-3% sulphide material which mainly includes arsenopyrite. It does not contain carbonate. In consequence, the presence of sulphide and lack of basic carbonate could result in acid drainage and generate a long term liability. In accordance with the current ore/waste ratio, the project will generate a high volume of waste rock and the problem could then be significant. No solution is currently proposed to secure acid drainage from the totality of the waste generated by the project. Testwork should be performed on a small bulk sample to provide information on the short term impact from the weather and climate. Testwork could be performed also on existing stockpile to provide the long term impact (>20 years) of the weather and climate. A concrete pad approach could be considered to control the acid mine drainage;

- The acid mine drainage in the ore represents a lesser concern. In accordance with the flowsheet proposal, the flotation of sulphide concentrate can be condensed to an independent cell, representing around 5% of the volume. It could represent a very small volume (100m x 100M), which could be controlled by appropriate stand alone controls such as surrounding by impermeable dams on each side during the operation and capping by waste and overburden when restorated. The remaining 95% of the volume should not contain a lot of sulphide and should not be acid generating. More testwork needs to be completed in order to determine an environmental approach.

Arsenic impact

- Preliminary leaching testwork performed on waste rock material produced a lixivia with higher concentration of arsenic and nickel than allowed by the standard directive 019. As a result of oxidation, arsenide could be liberated, and discharged above the allowable limit. Arsenopyrite could provide a long term liability. In accordance with the current ore/waste ratio, the project will generate a high volume of waste rock and arsenopyrite could be considered as a long term liability. No solution is currently proposed to secure the contamination from the waste generated by the project. Additional testwork should be performed on a small bulk sample to provide the short term impact from the weather and climate. Testwork could be performed also on existing stockpile to provide the long term impact (>20 years) of the weather and climate. A concrete pad approach could be considered to prevent arsenic impact on environment ;

- To accommodate the outflow of material coming from the ore to the tailings pond, a sulphate ferric plant will be considered in order to regulate the contamination to be in accordance with the directive instrument 019. Arsenic contamination is currently a risk and concern at Aurizon's operation at Casa Berardi. Testwork is currently underway to provide the most efficient approach. The most efficient approach found will be tested on current operation prior to start up activities at Joanna.

Cyanide impact

- Destruction at the mill outflow should be considered to lower the impact on the future tailings pond;

- An alternative method that involves gold leaching without cyanide will be investigated in order to reduce the environmental impact from conventional leaching. Water will be managed as a closed system with water flow being strictly controlled and recycled to the maximum possible extent;

- The treatment of ore flotation sulphide concentrate outside of the property should be evaluated.

Dust

- Dust could be generated by the mining operation, crushing circuit and tailings pond. The major concern lies in the fact that the dominant wind would blow the dust towards the airport or towards the Vaudray-Joannès Reserve;

- Certain design components should ensure that dust will be restricted to the operation itself and not be blown by dominant wind. A dome structure over conveyor and crusher and humid stock pile should be considered;

- Appropriate infrastructure and winds coming from northwest, should lower the risk for any dust accumulation on the main power line conductor located north of the project, and on the airport infrastructure located south and west of the property.

Destruction of fish habitat

- As the option to mine the Heva block resources we need to deviated the existing stream, which could disturb or destroy this fish habitat, this option should not be considered in the start up mining operation.

Visual and acoustic impact

- Effort should be made to ensure that the infrastructure, waste pile and tailings pond dam elevations will not exceed the existing natural visual barrier provided by the hill located south of the project;

- A restoration plan for the future waste pile should be done on a continuous basis and not postponed until the end of the operation. On-going reclamation and mitigation measures will be carried out to reduce any potential adverse effects on the human and animal environment;

- Efforts should be made to ensure that noise should be lowered. An acoustic barrier on the waste pile should be considered.

Dewatering impact

- The open-pit mining operation will require dewatering which could impact the water table front. Water table monitoring during the operation, will have to be done to eliminate any damage made on the existing wells;

- In order to lower the dewatering impact on the environment, the construction of additional wells should be considered.

Railroad

- The railroad is currently located close to the future pit location. If it is necessary to move the railroad, the future site location should be chosen for its low environmental risk.

D- Biodiversity conservation

Biological diversity must be preserved for the benefit of present and future generations. The protection of species, ecosystems and natural processes that maintain life is essential if quality of human life is to be maintained.

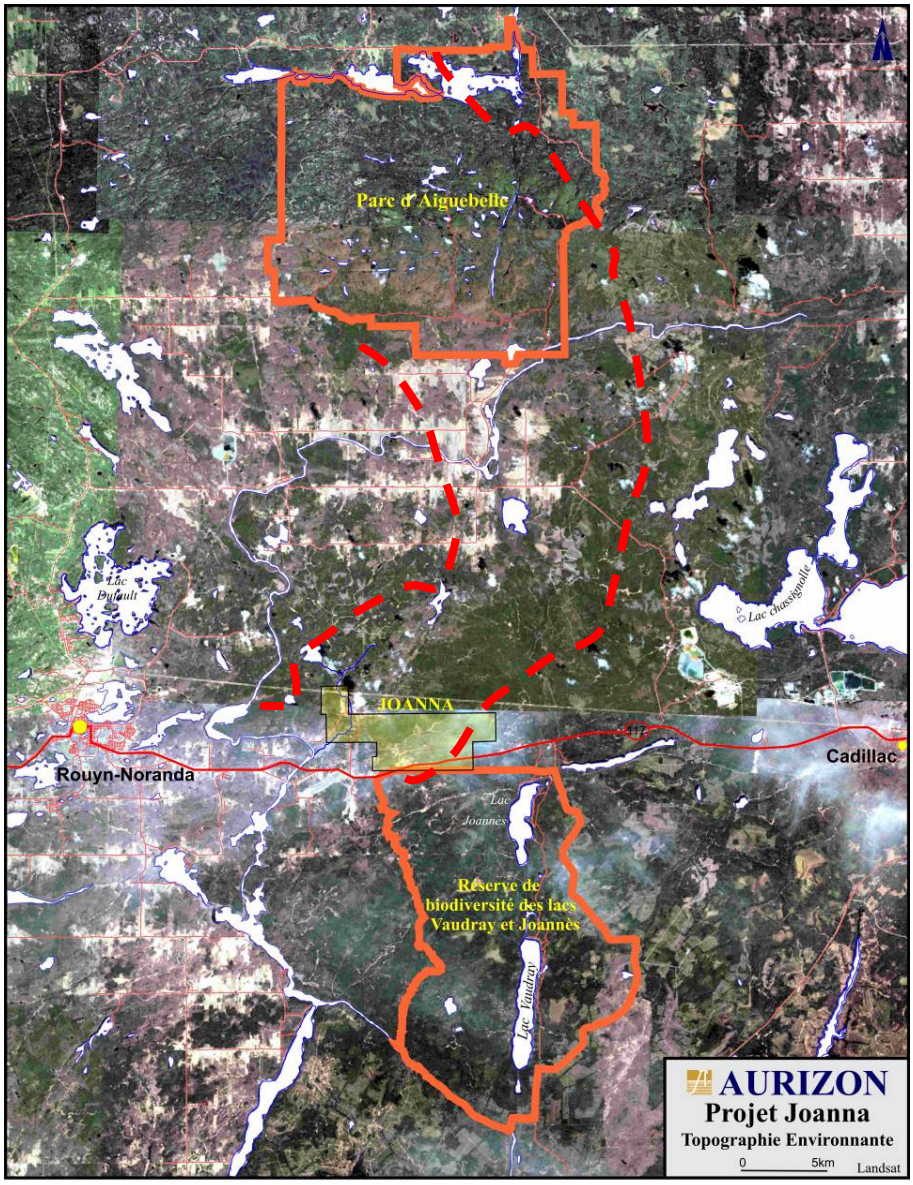
- In September 2004, an environmental organization called “Action boréale de l’Abitibi-Témiscamingue” (ABAT) provided recommendations concerning the creation of a biodiversity reserve around the Joannès and Vaudray lakes. The Quebec government finally created the biodiversity reserve “Réserve de biodiversité des Lacs-Vaudray-et-Joannès” in December 2006;

- The project is currently located north of the Vaudray-Joannes protected area and south of the Aiguebelle Park. Based on landsat imagery, a natural wildlife corridor of biodiversity currently exists east of the project, between the two protected zones. The

entire decision made on future development for the project should protect or improve the existing corridor.

Figure 1-6 presents the landsat imagery indicating the green corridor connecting the Aiguebelle provincial park to the Vaudray Joannes protected lands.

Figure 19-2 : Landsat Imagery of the Joanna Properties



E- Protection of cultural heritage

Cultural heritage components must be identified, protected and enhanced, taking their intrinsic rarity and fragility into account;

- At Joanna, no First Nation sensitive land has been identified. Additional investigation will be completed.

F- Prevention

In a presence of known risk, preventive mitigating and corrective actions must be taken, with priority given to actions at the source.

- The Joanna project can be initiated with a more environmental approach instead of a reclaimed approach. The presence of Environmental organizations such as Action Boréale, CREAT and Canard Illimitée provides the expertise needed to prepare efficient prevention guidelines and recommendations. The following are suggestions that may help Aurizon to take an initiative in helping the environment:

- An annual audit should be performed to ensure that all existing infrastructure remains an obligation for the long term plan. If not some action should be funded and taken during the operation;

- The waste dump impact area can be reduced by backfilling in mined out areas in the pit;

- The use of bio-degradable oil and fuel and/or electrical engine;

- The use of recycled or used material, whenever possible;

- The desulfuration of concentrate (AMD);

- The recycling of water in mineral process;

- The use of an alternative to cyanide;

- Alternative approach to treat the flotation sulphide concentrate outside of the property on existing mill;

- The continuous re-vegetation of the waste dumps in order to reduce erosion.

19.1.2.3 Social Environment

G- Health and quality of life

People, human health and improved quality of life are at the centre of concerns.

- The project remains sensitive to the community's needs because it is located close to the community center, cabins and educational center;

- Future mining activities at Joanna should not affect the health of the residents and land users;

- Mining will impact the current activities. Benefits should not be compensatory but rather shares that aim to improve the existing quality of life for residents and benefit land users;

- In that sense, discussions should be held with existing land owners to ensure that future mining activities be approved and remain in line with the company corporate policies, resulting in specific agreement with every one.

H- Participation and commitment

The participation and commitment of citizens and citizens' groups are needed to define a concerted vision of development and to ensure the project's environmental, social and economic sustainability.

- Should the project produce less than 7,000 tonnes per day, no public audience could be officially required by the provincial government authorities;

- Should the project remains away from the drainage system no public audience could be officially required by the federal government authorities;

- Nevertheless, consultation should be performed to provide information and discussion with local residents, local community and environmental organization such as Action Boréale, CREAT and Canard Illimitée. This is a strong opportunity for the project to ensure that future decision could be taken properly in accordance with the current principles.

    - The Environmental Regional Council - CREAT, provide guidance for the preservation and the improvement of the environment within a sustaining development approach. Members come from different environmental groups including educational, health, political and industrial sectors. In October 2007, the present a memoir on the mining Industry;

    - Canard Illimitée is mainly oriented towards the preservation of wetland area and wildlife conservation;

    - Action Boréale is mainly oriented towards the preservation of the boreal forest, wildlife conservation and biodiversity.

I- Social equity and solidarity

Development must be undertaken in a spirit of intra- and inter-generational equity and social ethics and solidarity.

J- Access to knowledge

Measures favourable to education, access to information and research must be encouraged in order to stimulate innovation, raise awareness and ensure effective participation of the public in the implementation of sustainable development.

19.2 Potential Areas for Improvement

The main area for potential improvement to the project is to complete the exploration drilling between the two proposed pits outlines in the attempt to connect them and to increase the in-pit resources.

20. INTERPRETATION AND CONCLUSIONS

1. Based on an estimate of mineral resources produced by Geostat in compliance with the National Instrument 43-101, the in-pit resources is 19.4 million tonnes at 1.47 g/t Au in the indicated and inferred categories and will be mined at a proposed mining rate ranging from 5,500 tpd to 7,500 tpd.

2. BBA carried out the review of the metallurgical testwork. Following this review, two conceptual flowsheets were considered. Typically for certain types of gold ores, pressure oxidation is required before leaching in order to achieve gold recoveries of over 85%. However, due to the scale of the project, pressure oxidation may not be economical, therefore a flowsheet without pressure oxidation and lower overall gold recovery was also considered.

   The estimated overall gold recovery, with and without pressure oxidation, are 87% and 77%, respectively. Additional test work is required to either establish or confirm some of the basic design criteria.

3. Mining ore will follow the standard practice of an open-pit operation with conventional drill and blast, load and haul cycle using drill/truck/shovel mining fleet. The overburden and the waste rock material will be hauled to the overburden and waste disposal areas near the pit.

4. BBA has calculated the mill cut-off grade from the economical and technical parameters used for the optimization resulting in a CoG of approximately 0.5g/t Au.

5. An average dilution factor of 10% at a grade of 0 g/t Au has been calculated for the project.

6. The pit optimization studies and mine design have delineated diluted in-pit resources as presented in Table 20-1.

Table 20-1 : Diluted In-pit Resources with Cut-off Grade of 0.5 g/t Au

		Hosco			Heva			TOTAL		
Material Type		Material (tonnes)	Grade (Au g/t)	Au oz (77% rec.)	Material (tonnes)	Grade (Au g/t)	Au oz (77% rec.)	Material (tonnes)	Grade (Au g/t)	Au oz (77% rec.)
Ore	Indicated	9,082,065	1.475	331,733	348,450	1.991	17,174	9,430,516	1.495	348,907
	Inferred	9,062,530	1.433	321,434	869,757	1.663	35,801	9,932,287	1.453	357,235
Waste										
	Waste	71,397,197			5,271,093			76,668,290		
	Overburden	12,395,374			348,220			12,743,594		
	Total	**83,792,571**			**5,619,313**			**89,411,884**		
	S/R	4.62			4.61			4.62		

7. Due to the relatively small amount of resources in Heva – less than 53,000 oz Au metal vs. over 653,000 for Hosco as well as the distance of 3 km to the primary crushing plan and the waste dump, Hosco pit has been selected as the main target for development in priority. At this stage of the PA, Heva pit will not be included in the mining.

8. The excavation of overburden would provide material for the tailings dam dike creation and also provides material for the final reclamation and closure plan of the tailings pond.

8. The level of accuracy of the capital and operating cost estimates is ± 35%.

9. The capital costs include the purchase of all mining equipment, the concentrator, the infrastructure needed, the railway deviation and the electrical supply. A 20% contingency allowance is used to cover for additional costs, which will be incurred as a result of more detailed design and investigations. The total capital cost for the selected scenario, including the pre-production cost, amount to $140.6 million.

10. The mine operating costs are estimated to be $2.00/t mined.

11. The mill operating costs are estimated to be $6.93/t milled using 5 500 tpd and $6.32/t milled using 7 500 tpd.

12. The general and administration operating costs are estimated to be $0.60/t of ore.

13. In recognition of the sensitivity of the area, the development of the Joanna project will be carried out being respectful to the environment and with a green mining approach. In particular, or a sustainable development for protection of the water and air quality and biodiversity, noise reduction measures, minimizing the overall project footprint of the project, reclamation planning with continuous restoration of the tailings and waste dumps, comprehensive closure plan, etc.

This Preliminary Assessment is based on mineral resources estimated as at September 2007 and is preliminary in nature. Mineral resources that are not mineral reserves do not have demonstrated economic viability. The Preliminary Assessment includes inferred mineral resources which are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. Furthermore, there is no certainty that the results projected in the Preliminary Assessment will be realized and actual results may vary substantially.

21. RECOMMENDATIONS

From the Preliminary Assessment study carried out on the Joanna gold project, BBA recommends the following:

- The preliminary assessment is based on a substantial amount of resources classified in the inferred category and consequently, the reliability of the estimate is uncertain. BBA recommends that a drilling program be carried out to increase the indicated and measured resources, as well as to convert the inferred resources into indicated or measured resources. The drilling program should focus on high grade zones in order to increase the average grade.

- Additional geotechnical work is recommended to characterize the pit slope in the hard rock.

- Further testwork to evaluate the potential for the acid mine drainage of the waste rock and the ore.

- Environmental organizations should be consulted and negotiations should start concerning the destruction of the swamp areas.

- The Compagnie des chemins de fer nationaux du Canada should be contact concerning the railway deviation.

In addition, BBA recommends the following:

- Investigate cheaper alternatives to pressure oxidation;

- Establish the optimum gold recovery that can be achieved without pressure oxidation on representative ore samples (i.e. ore samples containing about 1.7g/t Au.) This would include:

    - Whole ore cyanidation tests on representative ore samples (i.e. ore containing about 1.7g/t Au);
    - Conventional leaching tests on representative gravity and flotation concentrates, without oxidation pre-treatment;
    - Intensive leaching tests of representative gravity and flotation concentrates.

- Carry out grindability and Gravity Recoverable Gold (GRG) tests to better define the grinding circuit for the Joanna project.

The PA is preliminary in nature and includes inferred resources that are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as mineral reserves. There is no certainty that the PA will be realized.

As drilling continues on the Joanna project, BBA believes that there is potential to improve the inferred resources category material to measured or indicated resources as well as potential for the expansion of the resources. BBA recommends the project to be advanced to the next phase with the commissioning of a pre-feasibility study on the Joanna project.

The budget estimate to conduct such a pre-feasibility study on the Joanna gold project, including the current in-fill and exploration drilling program on the property, is as follows:

Table 21-1 : Cost Estimation for Pre-Feasibility Study

Cost Estimate - Pre-Feasibility Study	**Cost**
Items	($)
Diamond Drilling (44,000m @ $105/m)	4,620,000
Resource Update	60,000
Metallurgical Testwork	250,000
Pit Slope Stability - Tailings Storage	250,000
Environmental Impact Assessment	80,000
Pre-Feasibility (including consultant Fees)	300,000
Sub-total	5,560,000
Contingency - 10%	667,200
Total Pre-Feasibility	6,227,200

22. REFERENCES/SOURCES OF INFORMATION

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Les Mines Aurizon Ltée., *Description des propriétés le long de la faille Larder Lake-Cadillac-Secteur des mines Heva, Hosco et New Rouyn Merger*, January 2006.

Lakefield Research, *An Investigation of the Recovery of Gold from Hosco-Heva project samples*, Progress Report No. 1, project No. LR 3232, April 16, 1987.

Hydrochem Developments Ltd., *Oxidation, Precipitation and Cyanidation of Flotation Concentrate* #3232-16, March 1987.

Centre de Recherches Minérales, *Essai de lixiviation de l'or du minerai de Heva-Hosco*, rapport final, November 30, 1987.

Laboratoire LTM Inc., Projet Joanna, *Tests gravimétriques, rapport d'étape no. 1*, August 2007.

Laboratoire LTM Inc., Projet Joanna, *Tests gravimétriques, rapport d'étape no. 2*, October 2007.

Laboratoire LTM Inc., Projet Joanna, *Tests de flottation, rapport d'étape no. 5*, December 2007.

URSTM, *Essai de lixiviation diagnostique sur le minerai Joanna*, Rapport PU-2007-05-294, July 2007.

23. DATE AND SIGNATURES

The effective date for this Technical Report is May 22, 2008.

Patrice Live, Eng.

Enzo Palumbo, Metallurgist.

Michel Dagbert, Eng.

Claude Duplessis, Eng.

24. CERTIFICATES

CERTIFICATE OF QUALIFIED PERSON

I, Patrice Live, Eng., do hereby certify that:

1. I am currently employed as Manager – Mining in the consulting firm:

   BBA Inc.
   630 René-Lévesque blvd. W.
   Suite 2500
   Montréal, Québec
   Canada H3B1S6

2. I graduated from Laval University of Québec, Canada with a B. Sc. in Mining in 1976.

3. I am in good standing as a member of the Order of Engineers of Québec (#38991).

4. I have practiced my profession continuously since my graduation.

5. I have read the definition of "qualified person" set out in the National Instrument 43-101 ("NI 43-101") and certify that as a result of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

6. I am responsible for the sections 1 to 5, 18 to 21 and for the coordination of this Technical Report entitled "*Preliminary Assessment study for the Joanna Gold Project*" dated May 22, 2008. I have reviewed all sections of the Technical Report.

7. I have visited the property on September 12, 2007.

8. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading and I am not aware of any material fact or material change with respect to the subject matter of the Technical Report that is not reflected in the Preliminary Assessment, the omission of which would make the Preliminary Assessment misleading.

9. I am independent of the issuer applying all of the tests in Section 1.4 of National Instrument 43-101 and section 3.5 of the Companion Policy to NI 43-101.

10. I have read national Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

11. I consent to the filing of the Technical Report with any stock exchange or any regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Prepared in Montréal, Québec, May 22, 2008

Signed

Patrice Live, Eng.

CERTIFICATE OF QUALIFIED PERSON

I, Enzo Palumbo, do hereby certify that:

1. I am currently employed as Metallurgist in the consulting firm:

   BBA Inc.
   630 René-Lévesque Blvd. W
   Suite 2500
   Montréal, Québec
   Canada H3B1S6

2. I graduated from McGill University of Montreal with a B. Eng in Metallurgy in 1981, and M.Eng in 1986.

3. I am a member of the Canadian Institute of Mining, Metallurgy, and Petroleum and a member of The Minerals, Metals & Materials Society (TMS) of the American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc.

4. I have practiced my profession continuously since my graduation.

5. I have read the definition of "qualified person" set out in the National Instrument 43-101 ("NI 43-101") and certify that as a result of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

6. I am responsible for the preparation of section 16, 18.6.1.2 and 18.6.2.2.of this 43-101 F1 Technical Report entitled "*Preliminary Assessment study for the Joanna Gold Project*" dated May 22, 2008. I have reviewed all sections of the Technical Report.

7. I have not visited the property.

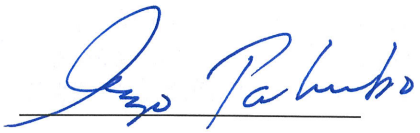
8. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading and I am not aware of any material fact or material change with respect to the subject matter of the Technical Report that is not reflected in the Preliminary Assessment, the omission of which would make the Preliminary Assessment misleading.

9. I am independent of the issuer applying all of the tests in Section 1.4 of National Instrument 43-101 and section 3.5 of the Companion Policy to NI 43-101.

10. I have read national Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

11. I consent to the filing of the Technical Report with any stock exchange or any regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Prepared in Montréal, Québec, May 22, 2008



Signed

Enzo Palumbo

Certificate of Claude Duplessis, Eng.

To Accompany the Report entitled
"Technical report – Preliminary Assessment Study for the Joanna gold project
Rouyn-Noranda Québec." By BBA
dated May 22nd, 2008

I, Claude Duplessis, eng., do hereby certify that:

1. I reside at 3 du Carabinier, Blainville, Quebec, Canada, J7C 5B8.

2. I am a graduate from the University of Quebec in Chicoutimi, Quebec in 1988 with a B.Sc.A in geological engineering and I have practised my profession continuously since that time.

3. I am a registered member of the Ordre des ingénieurs du Québec (Registration Number 45523). I am also a registered engineer in the province of Alberta. I am a Member of the Canadian Institute of Mining, Metallurgy and Petroleum and member of the Prospector and Developers Association of Canada.

4. I am a Senior Engineer and Manager of Geostat Systems International Inc.

5. I have worked as an engineer for a total of 19 years since my graduation. My relevant experience for the purpose of the Technical Report is: Over 15 years of consulting in the field of Mineral Resource estimation, orebody modelling, mineral resource auditing and geotechnical engineering.

6. I have read the definition of "qualified person" set out in the National Instrument 43-101 and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfill the requirements to be an independent qualified person for the purposes of NI 43-101.

7. I have reviewed all of the technical data provided by Aurizon Mines Ltd. regarding the October 26, 2007 Mineral Resource estimation for the Hosco sector of the Joanna property. I am responsible for Section 6 to 15 and 17 of this report entitled ' **Preliminary Assessment Study for the Joanna gold project', Dated May 22nd 2008'** . These sections are actually exactly the same section of the report 'Resource Modelling and Estimation update. Joanna Gold Deposit Aurizon Mines Ltd.' Dated October 29th 2007 which I co-authored with Michel Dagbert.

8. I have personally visited the site on March 8th 2007 for one day.

9. I have no personal knowledge as of the date of this certificate of any material fact or material change, which is not reflected in this report.

10. I am independent of Aurizon Mines Ltd. applying all of the tests set forth in section 1.4 of NI 43-101 and section 3.5 of NI 43-101 Companion Policy.

11. I have read NI 43-101 and Form 43-101F1 and have prepared the technical report in compliance with NI 43-101 and Form 43-101F1; and have prepared the report in conformity with generally accepted Canadian mining industry practice, and as of the date of this certificate, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Signed at Blainville, Quebec this 10th day of June, 2008

Claude Duplessis, Eng.

CERTIFICATE
To Accompany the Report entitled
"Preliminary Assessment Study for the Joanna Gold Project"
dated May 22, 2008

I, Michel Dagbert, do hereby certify that:

1. I reside at 35 Anse Pleureuse, Laval, Quebec, Canada, H7Y1V3.

2. I am a graduate from the Paris School of Mines with a B.Sc. Degree in Mining Engineering (1971) and McGill University of Montreal with a Dip. Grad. Studies in Geology (1972), and I have practised my profession continuously since that time.

3. I am a member of the Professional Engineers of Quebec (Membership Number 45944).

4. I am a Senior Consultant with Geostat Systems International Inc., a firm of consulting geologists and engineers, based in Blainville, Quebec, which I have co-founded in 1981.

5. I am a Qualified Person for the purposes of NI 43-101 with regard to a variety of mineral deposits and have knowledge and experience with Mineral Reserve and Mineral Resource estimation parameters and procedures and those involved in the preparation of technical studies.

6. I have reviewed all of the technical data provided by Aurizon Mines Ltd. regarding the October 29, 2007 Mineral Resource estimation for the Hosco sector of the Joanna property. I am responsible for Section 17.1.1 of this report entitled ' **Preliminary Assessment Study for the Joanna gold project', Dated May 22nd 2008'** . This section is actually an exact copy of the same section in the report "Resource Modelling and Estimation Update. Joanna Gold Deposit. Aurizon Mines Ltd." dated October 29, 2007, which I co-authored with Claude Duplessis.

7. I have not personally visited the site.

8. I am independent of Aurizon Mines Ltd. applying all of the tests set forth in section 1.4 of NI 43-101 and section 3.5 of NI 43-101 Companion Policy.

9. I have read NI 43-101 and Form 43-101F1 and have prepared the technical report in compliance with NI 43-101 and Form 43-101F1; and have prepared the report in conformity with generally accepted Canadian mining industry practice, and as of the date of the certificate, to the best of my knowledge, information and belief, the technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

signed by

Michel Dagbert, P. Eng. June 10, 2008

Appendix A

Capital Cost Estimate

CAPITAL COST ESTIMATE (BASE CASE)

PROJECT: PRELIMINARY ASSESSMENT STUDY FOR THE JOANNA GOLD PROJECT
CLIENT: Aurizon Mines Ltd.
PROJECT NB.: 5826-003

21-janv-08
Revision: 0

DESCRIPTION	UNIT	QTY	MATERIAL		EQUIPMENT		INSTALLATION			FREIGHT	TOTAL($C)
			UNIT COST	TOTAL COST	UNIT COST	TOTAL COST	MAN HRS	UNIT COST	TOTAL COST		
MINE											
01 Major Mine Equipment											
Haulage Trucks (777 ou K785))	ea	6			$1,310,400	$7,862,400					$7,862,400
Front Shovel (RH90)	ea	1			$2,139,200	$2,139,200					$2,139,200
F.E Loader (992)	ea	1			$1,937,600	$1,937,600					$1,937,600
W. Dozer (824H)	ea	1			$604,800	$604,800					$604,800
Track Dozer (D9)	ea	2			$918,400	$1,836,800					$1,836,800
Grader (16H)	ea	1			$728,000	$728,000					$728,000
Water Truck	ea	1			$33,600	$33,600					$33,600
Compactor	ea	1			$324,800	$324,800					$324,800
Small Excavator (324D)	ea	1			$638,400	$638,400					$638,400
Drill (DM45)	ea	1			$817,600	$817,600					$817,600
Total Equipment						$16,923,200					$16,923,200
02 Mine Support Equipment											
Fuel Truck	ea	1			$190,400	$190,400					$190,400
Service Truck	ea	1			$56,000	$56,000					$56,000
Mechanics Truck	ea	1			$134,400	$134,400					$134,400
Tire Handler	ea	1			$100,000	$100,000					$100,000
Crane	ea	1			$56,000	$56,000					$56,000
Total Equipment						$536,800					$536,800
03 Light Vehicules											
Pickups	ea	6			$25,000	$150,000					$150,000
Mini Bus	ea	1			$30,000	$30,000					$30,000
Total Vehicules						$180,000					$180,000
04 Misc. Equipment											
Mine Radios	lot	1			$30,000	$30,000					$30,000
Safety Equipment	lot	1			$15,000	$15,000					$15,000
Eng. Equip. (Surveying, Software…)	lot	1			$200,000	$200,000					$200,000
Maint. Shop Tools	lot	1			$300,000	$300,000					$300,000
Total Equipment						$545,000					$545,000
05 Inventory											
Spare Parts	lot	1			$1,000,000	$1,000,000					$1,000,000
Total Inventory						$1,000,000					$1,000,000
SUBTOTAL MINE						**$19,185,000**					**$19,185,000**
INFRASTRUCTURE											
06 Railway											
Railway	km	4			$1,250,000	$5,000,000					$5,000,000
Total Railway						$5,000,000					$5,000,000
07 Power											
Incoming cable 120 kV portal structure + foundation	ea	1	$120,000	$120,000					$60,000		$180,000
Lot of three 120 kV potential transformer + foundation	ea	1	$30,000	$30,000					$10,000		$40,000
4.15 kV disconnecting switches, ground connec. + found.	ea	2	$45,000	$90,000					$50,000		$140,000
145 kV Circuit-Breaker, SF6, dead tank + foundation	ea	1	$110,000	$110,000					$30,000		$140,000
120-4.16 kV 15/20 MVA transformer, + foundation	ea	1	$750,000	$750,000					$160,000		$910,000
Split manhole water/oil	ea	1	$50,000	$50,000					$40,000		$90,000
Bus duct, 3 000 A, 4,16 kV	m	50	$2,800	$140,000					$50,000		$190,000
Neutral point resistor 12 ohms, 200 A-10 s	ea	1	$20,000	$20,000					$10,000		$30,000
5 kV exterior cabin switching panel, 3 000 A, 350 MVA…	ea	1	$800,000	$800,000					$100,000		$900,000
Grading and finishing	lot	1	$40,000	$40,000					$40,000		$80,000
MALT grid	lot	1	$70,000	$70,000					$40,000		$110,000
Fence	lot	1	$30,000	$30,000					$30,000		$60,000
Control, measure and protection, c/w control cables	lot	1	$120,000	$120,000					$80,000		$200,000
Battery and charger	ea	1	$50,000	$50,000					$10,000		$60,000
Diesel generator with 60 kW, 0.8 PF convey selector swit	ea	1	$50,000	$50,000					$10,000		$60,000
600/347 V & 120/208 V substation auxiliary services	lot	1	$40,000	$40,000					$20,000		$60,000
Total Power Plant				$2,510,000					$740,000		$3,250,000
08 Garage, office, other facilities											
Total Power Plant											$4,500,000
SUBTOTAL INFRASTRUCTURE				**$2,510,000**		**$5,000,000**			**$740,000**		**$12,750,000**
CRUSHING AND PROCESSING											
60 Process Equipment											
Crushing, Grinding, Thickening											
primary crushing circuit -Jaw crusher (44"x56")	ea	1			1,232,000 $	1,232,000 $					1,232,000 $
discharge and transfer conveyor belts (36")	m	60			3,732 $	223,910 $					224,000 $
Storage silo/stockpile	ea	0				0 $					0 $
apron feeder to SAG mill (36" x 8')	ea	3			168,909 $	506,728 $					507,000 $
SAG Mill 3500 HP 24'x10'	ea	1			4,704,000 $	4,704,000 $					4,704,000 $
Ball Mill 4000 HP 16.5'x24'	ea	1			4,256,000 $	4,256,000 $					4,256,000 $
Hydrocycle (26")	ea	3			26,656 $	79,968 $					80,000 $
screens 8'x10'	ea	1			156,800 $	156,800 $					157,000 $
Knelson Concentrator	ea	2			224,000 $	448,000 $					448,000 $
Falcon Concentrator	ea	2			224,000 $	448,000 $					448,000 $
Thickener for flotation feed (37m)	ea	1			294,338 $	294,338 $					294,000 $
Flotation and pressure oxidation											
conditioning tank	ea	1				0 $					0 $
rougher flotation cells (50 m3)	ea	7			245,618 $	1,719,328 $					1,719,000 $
dewatering cyclone (10" D)	ea	1			7,280 $	7,280 $					7,000 $
oxygen plant (180-200tpd)	ea	0			10,183,711 $	0 $					0 $
Autoclove facilities	ea	0			9,094,827 $	0 $					0 $
CCD neutralization	ea	1			1,115,452 $	1,115,452 $					1,115,000 $
Tailings thickener (37m)	ea	1			294,338 $	294,338 $					294,000 $
Weir 100 HP 6x4 1200 rpm tailings pump	ea	2			21,840 $	43,680 $					44,000 $
Tailings pipeline (500m)	ea	1			212,520 $	212,520 $					213,000 $
Gekko Leach CIP-Stripping facilities											
Gekko IRL 2000 (conditioning tank included)	ea	1			347,200 $	347,200 $					347,000 $
CIP leaching	ea	1			1,359,837 $	1,359,837 $					1,360,000 $
CIP neutralization	ea	1			272,253 $	272,253 $					272,000 $
carbon stripping and reactivation	ea	1			881,626 $	881,626 $					882,000 $
cyanide destruction	ea	1			244,742 $	244,742 $					245,000 $
Electrowinning & refining	ea	1			482,618 $	482,618 $					483,000 $
Reagent equipment	ea	1			179,302 $	179,302 $					179,000 $
Lime unloading and storage	ea	1			4,076,163 $	4,076,163 $					4,076,000 $
Process water Reservoir (10m D x 10m H)	ea	1				0 $					0 $
Miscellaneous											
Tailings disposal area	ea	1			3,360,000 $	3,360,000 $					3,360,000 $
Laboratory	ea	1			0 $	0 $					0 $
Total Process Equipment						26,946,083 $					26,946,000 $
Factors applied to Crushing and Processing equipment											
MECHANICAL INSTALLATION	30%										8,083,800 $
FREIGHT	5%										1,347,300 $
CIVIL STRUCTURE	35%										9,431,100 $
PIPING	15%										4,041,900 $
ELECTRICAL	15%										4,041,900 $
INSTRUMENTATION AND CONTROL	10%										2,694,600 $
Total Factored Cost											29,640,600 $
SUBTOTAL CRUSHING AND PROCESS.						**26,946,083 $**					**56,586,600 $**
TOTAL DIRECT COSTS (exc. Pre-production)											$88,521,600
INDIRECT COSTS 15% (OWNER'S COST, EPCM…)											**13,278,000 $**
TOTAL DIRECT + INDIRECT COSTS											101,799,600 $
CONTINGENCY (20%)											**20,360,000 $**
TOTAL JOANNA PROJECT (Base Case exc. Pre-production)											**122,159,600 $**
TOTAL WITH 30% REDUCTION ON PURCHASE PRICE OF USED AND FOREIGN-SOURCED EQUIPMENT (CONCENTRATOR)											**111,004,800 $**

Appendix B

Mining Operating Cost Estimate

BBA Inc.
2008-03-25

JOANNA GOLD PROJECT
PRODUCTION SCHEDULE AND MINE OPEX

Dilution: Hosco 10%

BASE CASE

Exchange rate: 1.12

Open Pit Production & OPEX		**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
		Yr 0	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**	**Yr 7**	**Yr 8**	**Yr 9**	**Yr 10**
Hosco												
Production Ore Tonnes	tonnes	0	1,991,962	2,014,022	2,014,437	1,994,243	2,020,713	2,094,284	2,001,739	2,011,335	2,001,858	
Gold Grade	Au (g/t)	0.000	1.429	1.352	1.388	1.463	1.494	1.495	1.478	1.478	1.509	
Waste	tonnes	4,534,453	7,057,605	12,055,825	11,805,375	8,912,672	8,167,286	6,128,669	4,419,914	4,443,334	3,872,064	
OB		6,562,486	5,832,888	0	0	0	0	0	0	0	0	
	oz @77%rec.	0	70469	67421	69214	72205	74738	77492	73258	73581	74775	
Heva												
Production Ore Tonnes	tonnes	0	0									
Gold Grade	Au (g/t)	0.000	0.000									
Waste	tonnes	0	0									
OB		0	0									
	oz @77%rec.	0	0									
Total												
Production Ore Tonnes	tonnes	0	1,991,962	2,014,022	2,014,437	1,994,243	2,020,713	2,094,284	2,001,739	2,011,335	2,001,858	
Gold Grade	Au (g/t)	0.000	1.429	1.352	1.388	1.463	1.494	1.495	1.478	1.478	1.509	
Waste	tonnes	4,534,453	7,057,605	12,055,825	11,805,375	8,912,672	8,167,286	6,128,669	4,419,914	4,443,334	3,872,064	
OB		6,562,486	5,832,888									
Stripping Ratio		-	6.47	5.99	5.86	4.47	4.04	2.93	2.21	2.21	1.93	
Tonne mined		##########	14,882,455	14,069,847	13,819,812	10,906,915	10,187,999	8,222,954	6,421,653	6,454,669	5,873,922	
	oz @77%rec.	0	70469	67421	69214	72205	74738	77492	73258	73581	74775	
12	hrs/shift											
Equipment operating cost												
	$/hr											
Shovel	237.00		2,076,043	1,760,483	1,729,197	1,364,722	1,274,768	1,028,893	803,506	807,637	734,972	
Loader	199.61		582,840	494,247	485,464	383,140	357,885	288,857	225,581	226,740	206,340	
Trucks	87.44		3,474,934	3,319,777	3,827,874	3,468,609	3,449,011	2,952,484	2,569,231	2,714,873	2,591,125	
Drill	91.50		679,532	1,056,506	1,037,730	819,001	765,017	617,462	482,202	484,681	441,073	
Wheel Dozer (1)	83.34		463,258	463,258	463,258	463,258	463,258	463,258	463,258	463,258	463,258	
Dozer D9 (2)	99.07		1,101,390	1,101,390	1,101,390	1,101,390	1,101,390	550,695	550,695	550,695	550,695	
Grader	81.53		453,196	453,196	453,196	453,196	453,196	453,196	453,196	453,196	453,196	
Water truck	77.83		432,629	432,629	432,629	432,629	432,629	432,629	432,629	432,629	432,629	
Compactor (70%)	32.57		85,198	85,198	85,198	85,198	85,198	85,198	85,198	85,198	85,198	
Small Excavator (70%)	37.55		98,225	98,225	98,225	98,225	98,225	98,225	98,225	98,225	98,225	
Utility Truck (5) (70%)	43.55		498,398	498,398	498,398	498,398	498,398	498,398	498,398	498,398	498,398	
Sub total			**9,945,643**	**9,763,306**	**10,212,559**	**9,167,765**	**8,978,975**	**7,469,295**	**6,662,119**	**6,815,531**	**6,555,108**	
Mine Salaried Staff												
Open pit operations	$/year											
Mine Superintendent	128,250		128,250	128,250	128,250	128,250	128,250	128,250	128,250	128,250	128,250	
Mine Shift Foreman	101,250		405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	
Dispatcher	87,750		175,500	175,500	175,500	175,500	175,500	175,500	175,500	175,500	175,500	
Production / Mine Clerk	54,000		54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000	
Secretary	47,250		47,250	47,250	47,250	47,250	47,250	47,250	47,250	47,250	47,250	
Mine Maintenance												
Planner	67,500		67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	67,500	
Maintenance Supt	108,000		108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	
Maint shop foreman	101,250		405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	
Maint, clerk	54,000		54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000	
Mine Engineering												
Chief engineer	114,750		114,750	114,750	114,750	114,750	114,750	114,750	114,750	114,750	114,750	
Senior mine planning engin	101,250		101,250	101,250	101,250	101,250	101,250	101,250	101,250	101,250	101,250	
Mine eng. (dewat., getech.)	101,250		101,250	101,250	101,250	101,250	101,250	101,250	101,250	101,250	101,250	
Env. / Water management e	101,250		101,250	101,250	101,250	101,250	101,250	101,250	101,250	101,250	101,250	
Technician (mining software	74,250		74,250	74,250	74,250	74,250	74,250	74,250	74,250	74,250	74,250	
Surveyor	74,250		148,500	148,500	148,500	148,500	148,500	148,500	148,500	148,500	148,500	
Clerk	54,000		54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000	
Geology												
Chief Geologist	114,750		114,750	114,750	114,750	114,750	114,750	114,750	114,750	114,750	114,750	
Geologist / Grade Control	101,250		101,250	101,250	101,250	101,250	101,250	101,250	101,250	101,250	101,250	
Technician	74,250		74,250	74,250	74,250	74,250	74,250	74,250	74,250	74,250	74,250	
Sampler	47,250		47,250	47,250	47,250	47,250	47,250	47,250	47,250	47,250	47,250	
Clerk	54,000		54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000	
Sub total			**2,531,250**	**2,531,250**	**2,531,250**	**2,531,250**	**2,531,250**	**2,531,250**	**2,531,250**	**2,531,250**	**2,531,250**	
Mine Hourly Labor												
Open pit operations												
Shovel / Loader Operator	92,391		646,734	554,344	554,344	461,953	369,563	369,563	369,563	369,563	369,563	
Haul Truck Operator	83,669		1,924,386	1,840,717	2,008,055	1,924,386	1,924,386	1,673,379	1,422,372	1,506,041	1,422,372	
Drill Operator	83,669		334,676	585,683	585,683	418,345	418,345	334,676	251,007	251,007	251,007	
Wheel Dozer Operator	83,669		334,676	334,676	334,676	334,676	334,676	334,676	334,676	334,676	334,676	
Dozer D9 Operator	83,669		502,014	502,014	502,014	502,014	502,014	334,676	334,676	334,676	334,676	
Grader Operator	83,669		334,676	334,676	334,676	334,676	334,676	334,676	334,676	334,676	334,676	
Water Truck Operator	83,669		334,676	334,676	334,676	334,676	334,676	334,676	334,676	334,676	334,676	
Compactor Operator	79,530		159,060	159,060	159,060	159,060	159,060	159,060	159,060	159,060	159,060	
Small Excavator Oper.	83,669		167,338	167,338	167,338	167,338	167,338	167,338	167,338	167,338	167,338	
Utility Truck Operator	79,530		636,239	636,239	636,239	636,239	636,239	477,179	477,179	477,179	477,179	
Pumping Operator	70,956		141,912	141,912	141,912	141,912	141,912	141,912	141,912	141,912	141,912	
General Labour	64,304		385,823	385,823	385,823	385,823	385,823	257,216	257,216	257,216	257,216	
Mine Maintenance												
Field Gen Mechanics	96,678		193,355	193,355	193,355	193,355	193,355	193,355	193,355	193,355	193,355	
Field Welder	65,782		131,564	131,564	131,564	131,564	131,564	131,564	131,564	131,564	131,564	
Field electrician	96,678		193,355	193,355	193,355	193,355	193,355	193,355	193,355	193,355	193,355	
Shovel mechanics	96,678		193,355	193,355	193,355	193,355	193,355	193,355	193,355	193,355	193,355	
General Labour	64,304		257,216	257,216	257,216	257,216	257,216	257,216	257,216	257,216	257,216	
Shop Mechanic	96,678		193,355	193,355	193,355	193,355	193,355	193,355	193,355	193,355	193,355	
Welder-machinist	96,678		193,355	193,355	193,355	193,355	193,355	193,355	193,355	193,355	193,355	
Electrician	96,678		193,355	193,355	193,355	193,355	193,355	193,355	193,355	193,355	193,355	
Janitor	64,304		128,608	128,608	128,608	128,608	128,608	128,608	128,608	128,608	128,608	
Sub total			**7,579,727**	**7,654,674**	**7,822,012**	**7,478,615**	**7,386,224**	**6,596,543**	**6,261,867**	**6,345,536**	**6,261,867**	
Blasting												
	kg/tonne											
Powder Factor	0.196											
	$/tonne											
Roc Hosco	0.190		1,723,580	2,679,742	2,632,120	2,077,330	1,940,405	1,566,143	1,223,068	1,229,356	1,118,747	
Roc Heva	0.189		0	0	0	0	0	0	0	0	0	
Sub total			1,723,580	2,679,742	2,632,120	2,077,330	1,940,405	1,566,143	1,223,068	1,229,356	1,118,747	
Freight Cost ($C/tonne)	0.036		325,784	506,514	497,513	392,649	366,768	296,026	231,180	232,368	211,461	
Down the hole serv. ($C/mon	0		0	0	0	0	0	0	0	0	0	
Sub total			**2,049,364**	**3,186,256**	**3,129,634**	**2,469,979**	**2,307,173**	**1,862,169**	**1,454,247**	**1,461,724**	**1,330,208**	
Services												
	$/yr											
Dewatering	50,000		50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	
Sub total			**50,000**	**50,000**	**50,000**	**50,000**	**50,000**	**50,000**	**50,000**	**50,000**	**50,000**	
Total Fixed Cost	$/yr		2,581,250	2,581,250	2,581,250	2,581,250	2,581,250	2,581,250	2,581,250	2,581,250	2,581,250	
Total Variable Cost	$/yr		19,574,734	20,604,237	21,164,205	19,116,359	18,672,373	15,928,007	14,378,233	14,622,790	14,147,183	
Fixed Cost/Total	%		12%	11%	11%	12%	12%	14%	15%	15%	15%	
Total	$C/yr		**22,155,984**	**23,185,487**	**23,745,455**	**21,697,609**	**21,253,623**	**18,509,257**	**16,959,483**	**17,204,040**	**16,728,433**	
	$C/tonne		**1.489**	**1.648**	**1.718**	**1.989**	**2.086**	**2.251**	**2.641**	**2.665**	**2.848**	

9 years

Average $C/tonne	**2.00**