Report to:

Nevada Clean Magnesium, Inc.

Preliminary Economic Assessment and Technical Report of the Tami-Mosi Magnesium Project, Nevada

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TETRA TECH

Report to:

NEVADA CLEAN MAGNESIUM, INC.

PRELIMINARY ECONOMIC ASSESSMENT AND TECHNICAL REPORT OF THE TAMI-MOSI MAGNESIUM PROJECT, NEVADA

EFFECTIVE DATE: SEPTEMBER 15, 2011
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TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

GLOSSARY

UNITS OF MEASURE

above mean sea level	amsl
acre	ac
ampere	A
annum (year)	a
billion	B
billion tonnes	Bt
billion years ago	Ga
British thermal unit	BTU
centimetre	cm
cubic centimetre	cm^3
cubic feet per minute	cfm
cubic feet per second	ft^3/s
cubic foot	ft^3
cubic inch	in^3
cubic metre	m^3
cubic yard	yd^3
Coefficients of Variation	CVs
day	d
days per week	d/wk
days per year (annum)	d/a
dead weight tonnes	DWT
decibel adjusted	dBa
decibel	dB
degree	°
degrees Celsius	°C

diameter	ø
dollar (American)	US$
dollar (Canadian)	Cdn$
dry metric ton	dmt
foot	ft
gallon	gal
gallons per minute (US)	gpm
Gigajoule	GJ
gigapascal	GPa
gigawatt	GW
gram	g
grams per litre	g/L
grams per tonne	g/t
greater than	>
hectare (10,000 m^2)	ha
hertz	Hz
horsepower	hp
hour	h
hours per day	h/d
hours per week	h/wk
hours per year	h/a
inch	in
kilo (thousand)	k
kilogram	kg
kilograms per cubic metre	kg/m^3
kilograms per hour	kg/h
kilograms per square metre	kg/m^2
kilometre	km
kilometres per hour	km/h
kilopascal	kPa
kilotonne	kt
kilovolt	kV
kilovolt-ampere	kVA
kilovolts	kV
kilowatt	kW
kilowatt hour	kWh
kilowatt hours per tonne	kWh/t
kilowatt hours per year	kWh/a
less than	<
litre	L
litres per minute	L/m
megabytes per second	Mb/s
megapascal	MPa
megavolt-ampere	MVA
megawatt	MW

metre	m
metres above sea level	masl
metres Baltic sea level	mbsl
metres per minute	m/min
metres per second	m/s
microns	µm
milligram	mg
milligrams per litre	mg/L
millilitre	mL
millimetre	mm
million	M
million bank cubic metres	Mbm^3
million bank cubic metres per annum	Mbm^3/a
million tonnes	Mt
millivolt	mV
minute (plane angle)	'
minute (time)	min
month	mo
ounce	oz
pascal	Pa
centipoise	mPa·s
parts per million	ppm
parts per billion	ppb
percent	%
pound(s)	lb
pounds per square inch	psi
revolutions per minute	rpm
second (plane angle)	"
second (time)	s
short ton (2,000 lb)	st
short tons per day	st/d
short tons per year	st/y
specific gravity	SG
square centimetre	cm^2
square foot	ft^2
square inch	in^2
square kilometre	km^2
square metre	m^2
three-dimensional	3D
tonne (1,000 kg) (metric ton)	t
tonnes per day	t/d
tonnes per hour	t/h
tonnes per year	t/a
tonnes seconds per hour metre cubed	ts/hm^3
volt	V

week	wk
weight/weight	w/w
wet metric ton	wmt

ABBREVIATIONS AND ACRONYMS

ALS Chemex	ALS
alternating current	AC
aluminum oxide	Al_2O_3
aluminum	Al
ammonium nitrate/fuel oil	ANFO
Association for the Advancement of Cost Engineering	AACE
Bureau of Alcohol, Tobacco and Firearms	BATF
Bureau of Land Management	BLM
Bureau of Mining Regulation and Reclamation	BMRR
Burlington Northern Santa Fe Railroad	BNSFR
calcium carbonate	$CaCO_3$
calcium chloride	$CaCl_2$
calcium oxide	CaO
carbon dioxide	CO_2
copper	Cu
differential thermal analysis	DTA
direct current	DC
Distributed Control System	DCS
engineering, procurement and construction management	EPCM
environmental assessment	EA
environmental impact statement	EIS
Environmental Information Document	EID
EPIC Clean Technologies Corporation	EPIC
ferrosilicon	FeSi
Finding of No Significant Impact	FONSI
fluorspar	CaF_2
free board marine	FOB
free carrier	FCA
general and administrative	G&A
Ghalsasi Engineering Systems Pvt. Ltd.	GESPL
gold	Au
Hazen Research Inc.	Hazen
heat recovery steam generator	HRSG
heating, ventilation and air conditioning	HVAC
induced draft	ID
inductively coupled plasma	ICP

internal rate of return	IRR
International Organization for Standardization	ISO
International Electrotechnical Commission	IEC
life-of-mine	LOM
magnesium carbonate	$MgCO_3$
magnesium chloride	$MgCl_2$
magnesium oxide	MgO
magnesium	Mg
Memorandum of Understanding	MOU
mercury	Hg
Minerals, Metals and Materials Survey	TMS
Mintek Thermal Magnesium Process	MTMP
Molycor Gold Corp.	Molycor
Multi-element Inductive Couple Plasma Mass Spectrometry	ME-ICP41
National Environmental Policy Act	NEPA
net present value	NPV
Nevada Administrative Code	NAC
Nevada Clean Magnesium, Inc.	NVM
Nevada Department of Wildlife	NDOW
Nevada Division of Environmental Protection	NDEP
Nevada Net Proceeds Tax	NNPT
Norm Tribe and Associates	NTA
Operator Interface Station	OIS
Powder River Basin	PRB
preliminary economic assessment	PEA
qualified person	QP
Quality Management System	QMS
reasonably foreseeable future actions	RFFA
record of decision	ROD
silicon dioxide	SiO_2
silicon	Si
silver	Ag
sodium chloride	NaCl
Standards Council of Canada	SCC
State Historic Preservation Office	SHPO
sulfur dioxide	SO_2
sulfur hexafluoride	SF_6
Tami-Mosi property	the Property
Tenova Group, South Africa	Tenova
thermogravimetric analysis	TGA
Title 43, Code of Federal Regulations, Part 3809	43 CFR 3809

ultraviolet	UV
United States Geological Survey	USGS
US Army Corps of Engineers	USCOE
US Fish and Wildlife Service	USFWS
Water Pollution Control Permit	WPCP
work breakdown structure	WBS
X-ray diffraction	XRD

1.0 SUMMARY

1.1 INTRODUCTION

Nevada Clean Magnesium Inc. (NVM) (formerly Molycor Gold Corp.) retained Tetra Tech (formerly Wardrop, a Tetra Tech Company), together with a number of specialists with expertise in the magnesium, ferrosilicon and power generation industries to complete this preliminary economic assessment (PEA) for a proposed 30,000 t/a magnesium (Mg) project. The Tami-Mosi Project (the Project) consists of a proposed 300,000 t/a dolomite quarry located 10 km south of the City of Ely, Nevada, USA and a proposed vertically integrated 30,000 t/a magnesium processing facility located in Elko County, east of Wells, Nevada, USA.

This amended report is being filed in order to disclose additional required information. The effective date of the report is unchanged at September 15, 2011, and has an amended date of July 4, 2014. Both NVM and Tetra Tech have changed their company names between the effective date and the amended date.

This study has been prepared to an Association for the Advancement of Cost Engineering (AACE) Class 5 estimate level providing an accuracy of +50% /-25%. This study builds upon the following reports:

- Initial Resource Estimate by N. Tribe & Associates Ltd. (NTA) (May 1, 2009)
- Phase 1 Process Development Study for Exploitation of the Tami-Mosi Project, Hazen Research, Inc. (June 11, 2010)
- Updated resource estimate by Tetra Tech (August 3, 2011).

This study is intended to assist NVM in determining potential future plans for the Tami-Mosi Property (the Property) and the approach to magnesium production. Opportunities and possibilities for further investigation in the next study stage are provided in Section 26 Recommendations. These **opportunities and possibilities have not been included in the base case** presented in this report. Further investigation of these opportunities and possibilities in subsequent studies is recommended to determine their potential for lowering the overall operating cost and increasing revenues.

The primary purpose of this study is to prepare a PEA for the base case of 294,000 t/a of dolomite from the dolomite quarry at an average grade of 12.6% Mg to produce 30,000 t/a of 99.9% Mg ingot. The dolomite quarry is capable of generating a production rate of 1500 t/d of dolomite. The quarry design allows for a total production of 8.8 Mt over the 30-year life-of-mine (LOM).

This study, completed by Tetra Tech, also includes significant contribution from the following sources:

- Mr. James Sever, B.S., M.S., M.B.A. – providing concept of the overall facility and the technical process for magnesium production, the costs and opportunities
- Mr. Robert E. Brown, P.E. – providing input on process operations and responsible for markets and contracts
- Mr. Ralph Carter, B.S. – providing input on ferrosilicon production and the production costs
- Dr. Fred P. Buckingham, Ph.D., P.E. – responsible for coal gasification technology, operations and costs
- Dr. Neale Neelameggham, Ph.D. – providing input for technical review, research and patent development.
- Mr. Norm L. Tribe, P.Eng. – responsible for the initial resource estimate and associated geological information.

1.2 PROPERTY DESCRIPTION AND OWNERSHIP

The Tami-Mosi dolomite property is located in east-central Nevada, near the municipality of Ely, 402 km north of Las Vegas. A property location map is provided in Figure 1.1. The Property is accessible 10 km from Ely on Highway 6/50 and by 2 km of dirt road.

Vegetation and wildlife are typical of the high basin and range with elevations around 2,100 m (7,000 ft).

The Property consists of 81 claims and three fractions covering for a total of 667.5 ha (1,637 acres).

The claims are staked in the name of Nevada Moray, Inc. On October 9, 2006, the claims were purchased by Molycor Gold Corp. (now NVM) from James Marin and Tim Neal, principals of Nevada Moray, Inc., for $12,525 in costs plus a 2% net smelter return (NSR). Half the NSR, or 1%, can be purchased by NVM for $1,000,000.

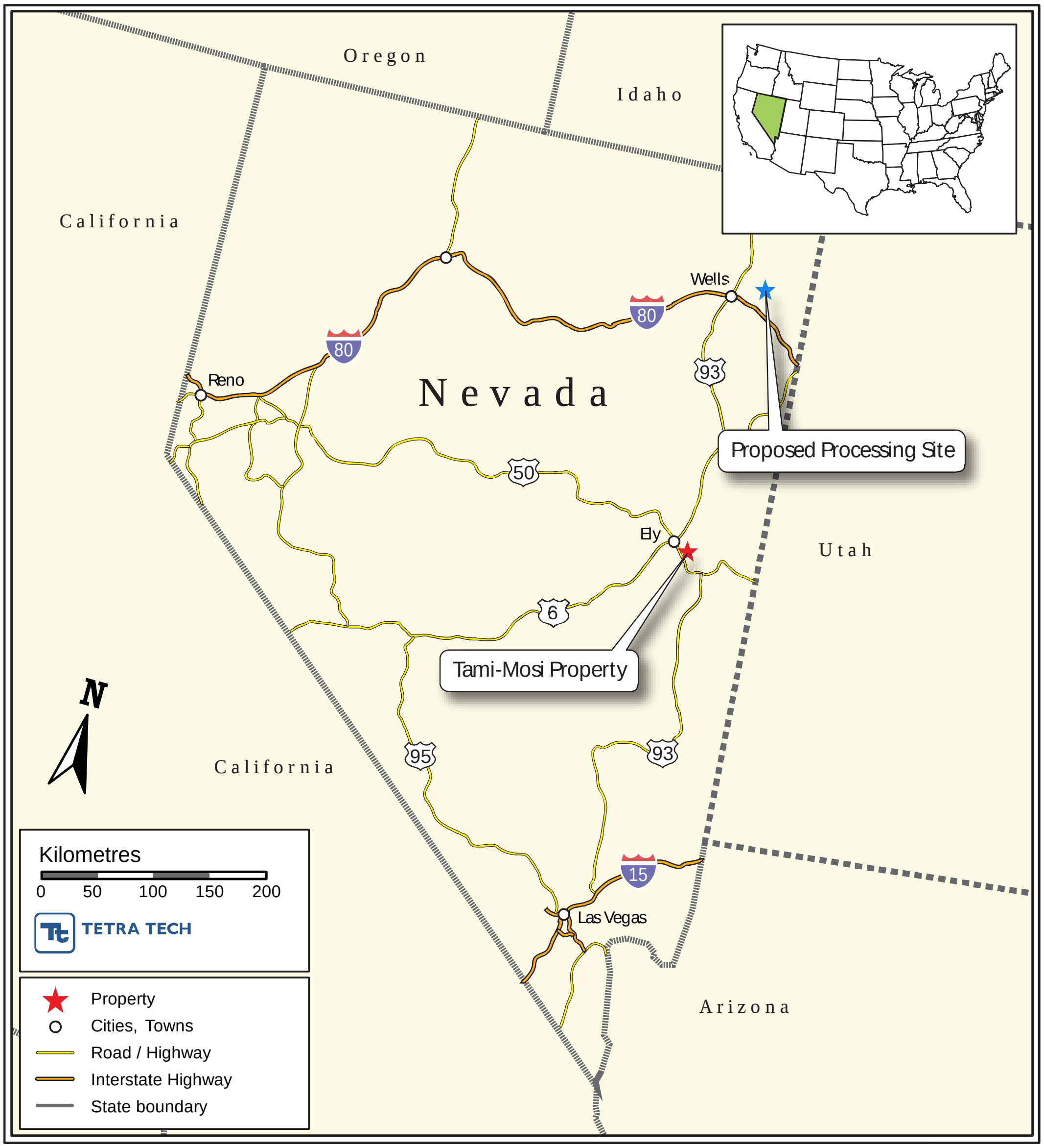
1.3 GEOLOGY

The Tami-Mosi area is located in the Duck Creek Range of central Nevada. The area is underlain by more than 3,350 m of miogeoclinal clastic and carbonate rocks, including the Devonian Guilmette Formation, upward through the Mississippian Pilot Shale, the Joanna Limestone, Chainman Shales and into the Tertiary rhyolites. Bands within the Guilmette Limestone, referred to as the Simonson dolomite unit, are altered to a premium quality dolomite. Sedimentary rocks on the Property dip moderately to the west with block faulting disrupting the beds, resulting in steepening or even locally east-dipping beds.

This dolomite is believed to have potential for an industrial source of magnesium. There are no other dolomite projects currently active in the area.

Surface sampling and drilling was completed to test the dolomite. The samples were prepared by ALS Chemex (ALS) in Sparks, Nevada and analyzed by ALS Chemex Laboratories in North Vancouver, BC, using a 34-element inductively coupled plasma (ICP) method. Data verification of both surface sample and drillhole data was completed by Tetra Tech, and no irregularities were found.

Figure 1.1 Tami-Mosi Dolomite Property Location Map



1.4 MINERAL RESOURCE ESTIMATE

The mineral resource estimate analysis generated by Klaus Triebel, P.Geo. (2011), shows an Inferred Resource of 412 Mt with an average grade of 12.3% Mg for a contained metal content of 111 billion pounds of magnesium using a 12% cut-off grade. No dilution was incorporated in the estimate. The increase over the initial estimate by NTA in May of 2009 is a result of the inclusion of 13 additional contiguous claims and the application of block modeling and surface sampling in the analysis. At this time, all resources are in the Inferred category, and therefore are too speculative in nature to be considered as a mineral reserve.

1.5 METALLURGICAL TESTING AND MINERAL PROCESSING

1.5.1 METALLURGICAL TESTING

In 2010, Hazen Research Inc. (Hazen) conducted preliminary test work to determine mineralogy and study process technology for the Tami-Mosi mineralization. The chemical analysis and X-ray diffraction (XRD) analysis on the drill core samples showed that the main component of the samples is dolomite with magnesium oxide (MgO) content ranging from 19.8% to 21.6%. The preliminary thermogravimetric analysis (TGA), differential thermal analysis (DTA) and differential calcination tests were conducted to determine whether there is a distinct transition between the decompositions of magnesium carbonate ($MgCO_3$) and calcium carbonate ($CaCO_3$). The test results showed that the $MgCO_3$ of the dolomite could be differentially decomposed at approximately 800°C. The results appear to indicate that the chemical composition of the Tami-Mosi dolomite is favourable to magnesium recovery by conventional processes.

1.5.2 MINERAL PROCESSING

In selection of recovery method technology, consideration was given to the known industrially established reduction methods. The thermo reduction process using resistance heating (modified Bolzano Process) was selected based upon the following:

- The Bolzano Process is proven and a modified version is currently in operation.
- This process is suited to the characteristics of the mineralization.
- This over all process would have the lowest environmental impact of those considered.

1.6 MINING METHOD

An open pit was designed containing 8.8 Mt of Inferred Resource. A large amount of resource at or near the surface led to a 3-sided pit design. The pit design was located in the side of a hill containing an average grade of 12.59% Mg and an average strip ratio is 0.04:1. There can be no certainty that the resources listed here will be realized.

1.7 ANCILLARY INFRASTRUCTURE

The proposed dolomite quarry includes one mobile crushing plant, two front end loaders, one truck shop, 1.5 km of gravel access roads and gravel site roads, bottled fresh water supply, sewerage holding tank, power supply and distribution and site services and utilities. Highway trucks will transport primary crushed dolomite 225 km from the dolomite quarry to the proposed processing site.

The proposed processing site will include magnesium plant, ferrosilicon plant, power plant and related infrastructures, including paved access road, paved parking, gravel site roads, water supply, communication system, administration building, 1.5 km rail spur loop complete with coal off-loading and process materials off-loading facilities, and site services and utilities. The various facilities have been incorporated into a vertically integrated processing site conceptual design.

1.8 MARKETS, STUDIES, AND CONTRACTS

Magnesium is a metal with many important and vital uses, either by itself or as an alloying element. Its production and consumption has been growing steadily for over 10 years. Magnesium is the lightest structural metal and interest is growing in its use in many areas. In particular, the automotive industry that is struggling to achieve higher miles per gallon performance has been very interested in making cars lighter weight. To that end magnesium is an answer provided a stable producer is capable of delivering product at a consistent price.

The main impetus behind the development of a primary magnesium plant in Nevada is that the domestically produced magnesium metal is not subject to the US antidumping or import duties. US Magnesium LLC is the only primary magnesium producer in the United States. The North American Die Casting Association indicates that the sustained use of magnesium in automotive production may depend on its availability from multiple sources.

1.9 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

Considerable up front attention has been paid to the environmental study, permitting, and potential social or community impacts of the project. A multi-agency regulatory process will need to be completed to obtain all required federal, state and local agency permits and approvals necessary to construct, operate and ultimately close the Tami-Mosi dolomite quarry and magnesium processing operations. The quarry site is located on federal public lands managed by the US Department of the Interior, Bureau of Land Management (BLM). The process site is located on a combination of federal public lands managed by the BLM which are adjacent to private lands owned by the Burlington Northern Santa Fe Railroad (BNSFR). BLM will be the lead agency for the overall project permitting and approval process, and would ensure all required federal, state and local permits and approvals are obtained for quarry and magnesium processing operations. BLM would issue federal approval for the Plan of Operations and Reclamation Plan in accordance with their Surface Management Regulations contained in Title 43 of the Code of Federal Regulations, Part 3809 (43 CFR 3809). The Nevada Division of Environmental Protection (NDEP), Bureau of Mining Regulation and Reclamation (BMRR) will be the primary cooperating agency for the overall quarry and magnesium processing permitting and approval process. The Regulation Branch of the BMRR will issue the State of Nevada Water Pollution Control Permit (WPCP) for the mine and magnesium processing operations in accordance with Nevada Administrative Code (NAC) 445A.350 through NAC 445A.447. The Reclamation Branch of the BMRR will issue the State of Nevada reclamation permit for the project in accordance with NAC 519A, inclusive.

The BLM and the BMRR will also require the placement of a jointly approved financial guarantee (reclamation bond) to ensure quarry and process site reclamation and closure is completed in accordance with the approved Plan of Operations. As lead regulatory agency, the BLM will hold the reclamation bond.

Other Federal, State and County agencies will issue appropriate permits, approvals or concurrences for various mine operations and activities in accordance with applicable Federal, State and County ordinances, guidelines, regulations and laws. The timing of these permits will be aligned with the progressing of the Project.

The proposed Project constitutes a federal action that will be assessed for potential environmental impacts as required by the National Environmental Policy Act of 1969 (NEPA). The NEPA analysis will be managed by the BLM. A multi-resource baseline study program would be implemented to collect the data required to support the completion of the NEPA analysis. The results of the analysis are used by the BLM as part of their 43 CFR 3809 decision making process. The timing of the NEPA analysis will be aligned with the progression of the Project.

1.10 CAPITAL COST ESTIMATE

The capital cost estimate was developed for the Tami-Mosi Magnesium Project with an accuracy of +50% /-25% and prepared in Q2 2011 US dollars. A total capital cost of $424.06 M is estimated for the initial development of the facilities as described in this report including dolomite quarry, processing, and infrastructure. Reclamation has been provided for in the capital cost as an allowance to be held for the LOM for the project.

1.11 OPERATING COST ESTIMATE

The operating cost estimate was developed for the Tami-Mosi Magnesium Project with an accuracy of +50% /-25% and prepared in Q2 2011 US dollars. Total operating cost is estimated at $1.281/lb 99.9% Mg ingot based on a vertically integrated processing site including onsite power generation.

1.12 ECONOMIC ANALYSIS

Tetra Tech prepared an economic evaluation of the Tami-Mosi Magnesium Project by incorporating all the relevant capital, operating, working and sustaining capital costs per year for the LOM. The evaluation was based on a pre-tax financial model. The US spot price has averaged $2.50 over the past 4 years. For the 30-year LOM and 8.8 Mt dolomite inventory, the following pre-tax financial parameters were calculated using the lower limit of the July 2011 magnesium US spot price contracts range, $2.45/lb, as the base case:

- 16.1% internal rate of return (IRR)
- 5.9-year payback on $424 M capital
- $547 M net present value (NPV) at 6% discount value.

NVM engaged PricewaterhouseCoopers (PwC) to perform a federal income tax and Nevada Net Proceeds Tax (NNPT) analysis of the Project.

The following post-tax financial parameters were calculated:

- 13.4% IRR
- 6.6-year payback on US$424 M capital
- US$335 M NPV at 6% discount rate.

It should be noted that the data used in the financial analysis incorporates Inferred Mineral Resources, which are considered too geologically speculative to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. Therefore, there can be no certainty that the estimates contained in the PEA will be realized.

2.0 INTRODUCTION

NVM has retained Tetra Tech, together with a number of specialists who have expertise in magnesium, ferrosilicon and power generation industries to complete this PEA for a proposed 300,000 t/a dolomite quarry located in the Tami-Mosi area of Nevada, USA. The project also includes a proposed 30,000 t/a magnesium processing facility located east of Wells, Nevada, USA.

This amended report is being filed in order to disclose additional required information. The effective date of the report is unchanged at September 15, 2011, and has an amended date of July 4, 2014.

This study has been prepared to an AACE Class 5 Estimate level providing an accuracy of +50% /-25%.

The primary purpose of this study is to prepare an economic evaluation for the base case of producing 30,000 t/a 99.9% Mg from 300,000 t/a of dolomite. This study is intended to assist NVM in determining potential future plans for the Tami-Mosi property and the approach to potential magnesium production.

A list of Qualified Persons (QPs) and responsibility is provided here:

- Mr. Norm L. Tribe, P.Eng. – responsible for Sections 1.2, 1.3, 4, 5, 6, 7, 8, 9, 10, 11, 23 (N. Tribe & Associates Ltd.)
- Mr. Klaus Triebel, CPG – responsible for Sections 1.4, 12, 14, 25.2, and 26.1.2 (formerly of Tetra Tech)
- Dr. Jianhui (John) Huang, Ph.D., P.Eng. – responsible for Sections 1.5, 1.11, 13, 17, 21.1.7 (magnesium plant costs only), 21.2.1, 25.4, and 26.1.4 (Tetra Tech)
- Mr. Sabry Abdel Hafez, Ph.D., P.Eng. – responsible for Sections 1.12 (post-tax portion only), 15, 22.4, 22.6 (post-tax portion only), and 25.1 (post-tax portion only) (Tetra Tech)
- Mr. Tysen Hantelmann, P.Eng., M.Eng. – responsible for Sections 1.6, 1.12, 16, 21.2 (dolomite quarry costs only), 22 (except 22.4), 25.1, 25.3, 26.1.1, 26.1.3 (formerly of Tetra Tech)
- Dr. Fred P. Buckingham, Ph.D., P.E. – responsible for Sections 18.4, 21.1.7 (power plant only), and 21.2.2 (MPR Associates, Inc.)
- Mr. Hassan Ghaffari, P. Eng. – responsible for Sections 1.1, 1.7, 1.8, 1.9, 1.10, 2, 3, 18.0, 19, 20, 21.1, 21.1.7 (ferrosilicon plant only), 21.2.3, 24, 25 (introduction), 25.5, 25.6, 26.1.5, 26.1.6, 26.1.7, 26.2, and 27 (Tetra Tech).

3.0 RELIANCE ON OTHER EXPERTS

Hassan Ghaffari, P.Eng., has relied on an expert who is not a QP for environmental matters relevant to this Technical Report. This reliance applies to Sections 1.9, 20.0, 25.6, and 26.1.6 of the Technical Report.

Sections 1.9, 20.0, 25.6, and 26.1.6 of the Technical Report were prepared by Doug Ramsey. Mr. Ramsey does not meet the definition of a qualified person as defined in NI 43-101, but Mr. Ghaffari believes that it is reasonable to rely on Mr. Ramsey for the above-mentioned sections, based on Mr. Ramsey's education, professional designation, and relevant experience, described below.

Mr. Ramsey was Manager of Environmental Assessment, Permitting and Natural Resources with Tetra Tech at the effective date of the Technical Report. He is a graduate of the University of Manitoba, Winnipeg, Manitoba (B.Sc. (Hons.), Zoology, 1979, and M.Sc. Zoology, 1985), was a member in good standing of the College of Applied Biology, British Columbia, as a Registered Professional Biologist (License #1581) at the effective date of the Technical Report. Mr. Ramsey has 29+ years of experience as an environmental consultant working in environmental permitting, and 23 years of experience in the environmental permitting monitoring and closure of mining projects.

Hassan Ghaffari, P.Eng., has also relied on an expert who is not a QP for matters relating to market studies and contracts relevant to this Technical Report. This reliance applies to Sections 1.8, 19.0, and 25.5 of the Technical Report.

Sections 1.8, 19.0, and 25.5 of the Technical Report were prepared by Robert E. Brown. Mr. Brown does not meet the definition of a qualified person as defined in NI 43-101, but Mr. Ghaffari believes that it is reasonable to rely on Mr. Brown for the above-mentioned sections, based on Mr. Brown's education, professional designation, and relevant experience, described below.

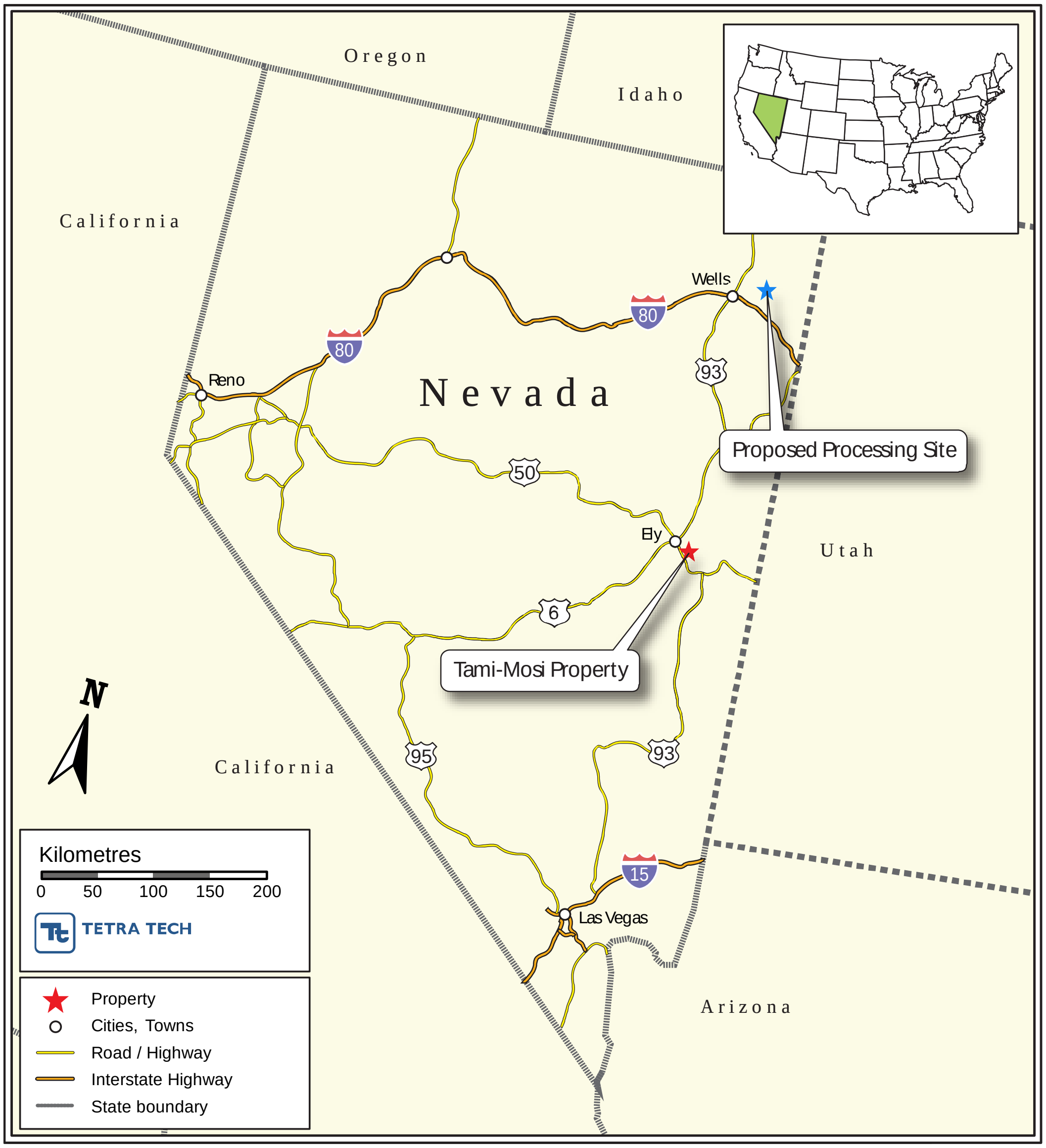
Mr. Brown has 50 years of varied metals industry experience in both ferrous and non-ferrous materials, and 20 years in the technical management areas of light metal foundries or reduction plants. He is a graduate of Michigan Technological University with a Bachelor of Science in Metallurgical engineering, 1953. Mr. Brown is a member in good standing of the American Institute of Mining and Metallurgical Engineers, License #35443.

Sabry Abdel Hafez, Ph.D., P.Eng., relied on PwC on matters relating to taxes included in the economic modelling. The reliance is based on a letter to NVM titled "Assistance with the calculation and review of the U.S. Federal income tax and Nevada Net Proceeds tax portions of the economic analysis prepared by management in connection with the preliminary Economic Assessment Report (the "Report") on Nevada Clean Magnesium, Inc.'s ("NCMI") Tami-Mosi mining project (the "Project")" dated June 26, 2014.

4.0 PROPERTY DESCRIPTION AND LOCATION

The Tami-Mosi property is located 10 km southeast of the town of Ely, in White Pine County, in east-central Nevada (Figure 4.1).

Figure 4.1 Tami-Mosi Dolomite Property Location Map



The Property consists of 81 claims and three fractions covering a total of 667.5 ha (1,637 acres).

The claims are staked in the name of Nevada Moray, Inc. On October 9, 2006, the claims were purchased by Molycor Gold Corp. (now NVM) from James Marin and Tim Neal, principals of Nevada Moray, Inc., for $12,525 in costs plus a 2% net smelter return (NSR). Half the NSR, or 1%, can be purchased by NVM for $1,000,000.

Table 4.1 lists the claims and county document serial numbers for 22 unpatented lode mining claims known as the Tami Nos. 1-4, 7-12, 70, 71, 80-89. These claims are located and situated in White Pine County, Nevada. The claims are cadastrally described as being positioned within Sections 2, 3, 4, 10, 11, Township 15 North, Range 64 East and Sections 32, 33, 34, 35, Township 16 North, Range 64 East, Mount Diablo Baseline and Meridian.

Table 4.1 Tami-Mosi Property – Tami Claims

Claim Name	Country Document #	NMC Serial #
Tami # 1	335925	944011
Tami # 2	335926	944012
Tami # 3	335927	944013
Tami # 4	335928	944014
Tami # 7	335931	944017
Tami # 8	335932	944018
Tami # 9	335933	944019
Tami # 10	335934	9440120
Tami # 11	335935	9440121
Tami # 12	335936	9440122
Tami # 71	335972	944058
Tami # 80	335981	944067
Tami # 81	335982	944068
Tami # 82	335983	944069
Tami # 83	335984	944070
Tami # 84	335985	944071
Tami # 85	335986	944072
Tami # 86	335987	944073
Tami # 87	335988	944074
Tami # 88	335989	944075
Tami # 89	335990	944076
Tami # 70	336001	944087

Table 4.2 lists the claims and county document serial numbers for 59 unpatented lode mining claims known as the Mosi Nos. 2-30, 32-34, 36-39, 45-54, 71, 72, 75, 76, 94, 95, 300-303, Frac 1, 3, 4. These claims are located and situated in White Pine County, Nevada. The claims are cadastrally described as being positioned within Sections 22,

28, 33, 34, Township 16 North, Range 64 East and Section 3, 4, Township 15 North, Range 64 East, Mount Diablo Baseline and Meridian.

Table 4.2 Tami-Mosi Property – Mosi Claims

Claim Name	Country Document #	NMC Serial
Mosi # 3	333928	932963
Mosi # 4	333929	932964
Mosi # 5	333930	932965
Mosi # 6	333931	932966
Mosi # 7	333932	932967
Mosi # 8	333933	932968
Mosi # 9	333934	932969
Mosi # 10	333935	932970
Mosi # 12	333936	932971
Mosi # 13	333937	932972
Mosi # 15	333938	932973
Mosi # 16	333939	932974
Mosi # 17	333940	932975
Mosi # 18	333941	932976
Mosi # 19	333942	932977
Mosi # 20	333943	932978
Mosi # 51	333944	932979
Mosi # 52	333945	932980
Mosi # 53	333946	932981
Mosi # 54	333947	932982
Mosi Frac1	337750	956527
Mosi # 11	337752	956529
Mosi # 34	337753	956530
Mosi # 71	337754	956531
Mosi # 72	337755	956532
Mosi # 75	337758	956535
Mosi # 14	338336	961758
Mosi # 32	338337	961759
Mosi # 33	338338	961760
Mosi # 76	338339	961762
Mosi Frac 3	338348	961768
Mosi Frac 4	338349	961769
Mosi # 21	350182	1034469
Mosi # 22	350183	1034470
Mosi # 25	350184	1034471
Mosi # 26	350185	1034472
Mosi # 27	350186	1034473
Mosi # 28	350187	1034474
Mosi # 29	350188	1034475

table continues...

Claim Name	Country Document #	NMC Serial
Mosi # 30	350189	1034476
Mosi # 36	350190	1034477
Mosi # 37	350191	1034478
Mosi # 38	350192	1034479
Mosi # 39	350193	1034480
Mosi # 45	350194	1034481
Mosi # 46	350195	1034482
Mosi # 2	pending	1048844
Mosi # 23	pending	1048845
Mosi # 24	pending	1048846
Mosi # 47	pending	1048847
Mosi # 48	pending	1048848
Mosi # 49	pending	1048849
Mosi # 50	pending	1048850
Mosi # 94	pending	1048851
Mosi # 95	pending	1048852
Mosi # 300	pending	1048853
Mosi # 301	pending	1048854
Mosi # 302	pending	1048855
Mosi # 303	pending	1048856

The coordinates of the claim area are presented in Figure 4.2. Figure 4.3 shows the relative location of the various claims by number making up the Property.

On April 16, 2012, Molycor announced that the company name changed to Nevada Clean Magnesium Inc.

For information regarding environmental liabilities and permitting requirements, refer to Section 20.0 Environmental Studies, Permitting, and Social or Community Impact.

Figure 4.2 Tami-Mosi Claim Map (Corner Coordinates)

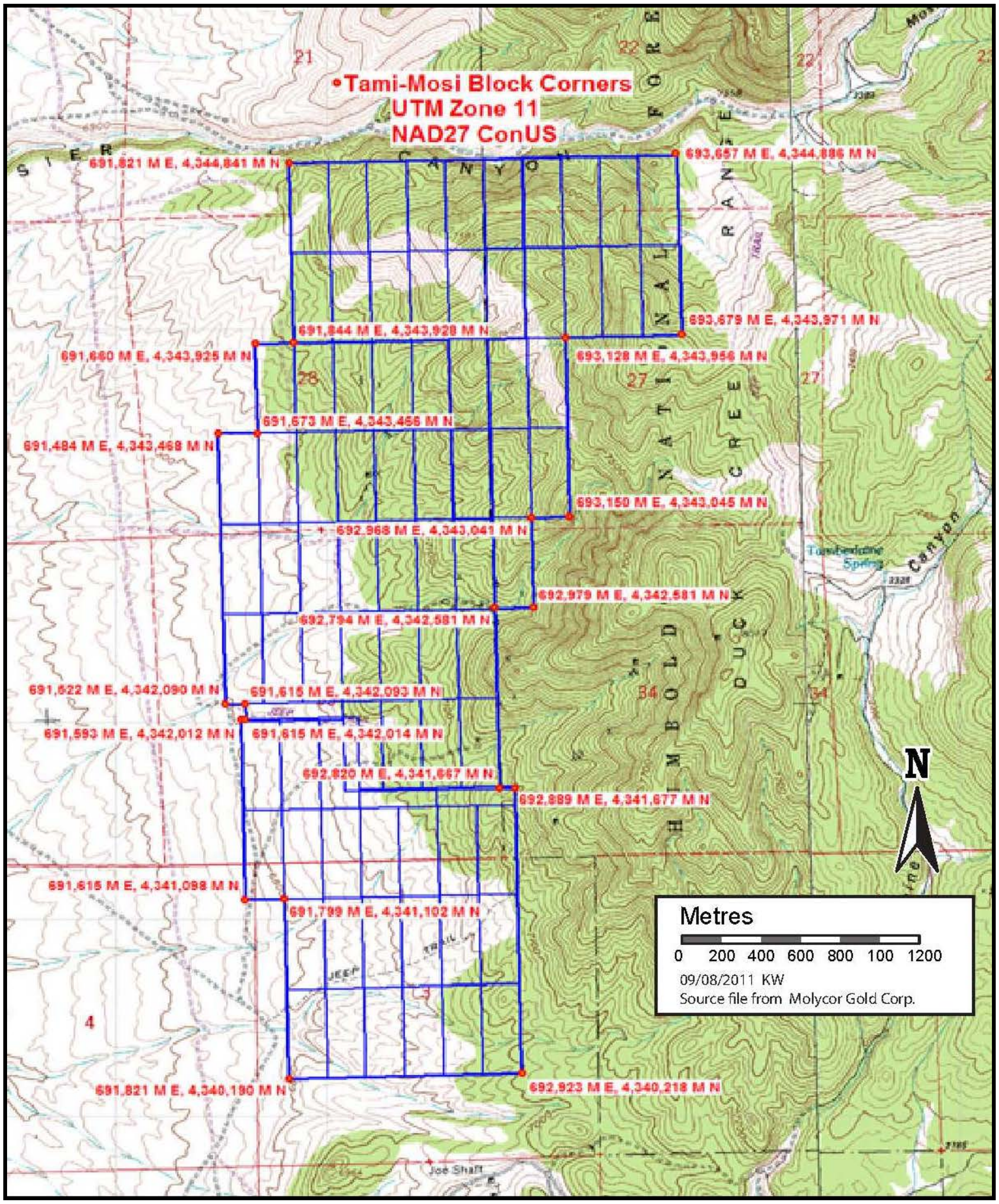
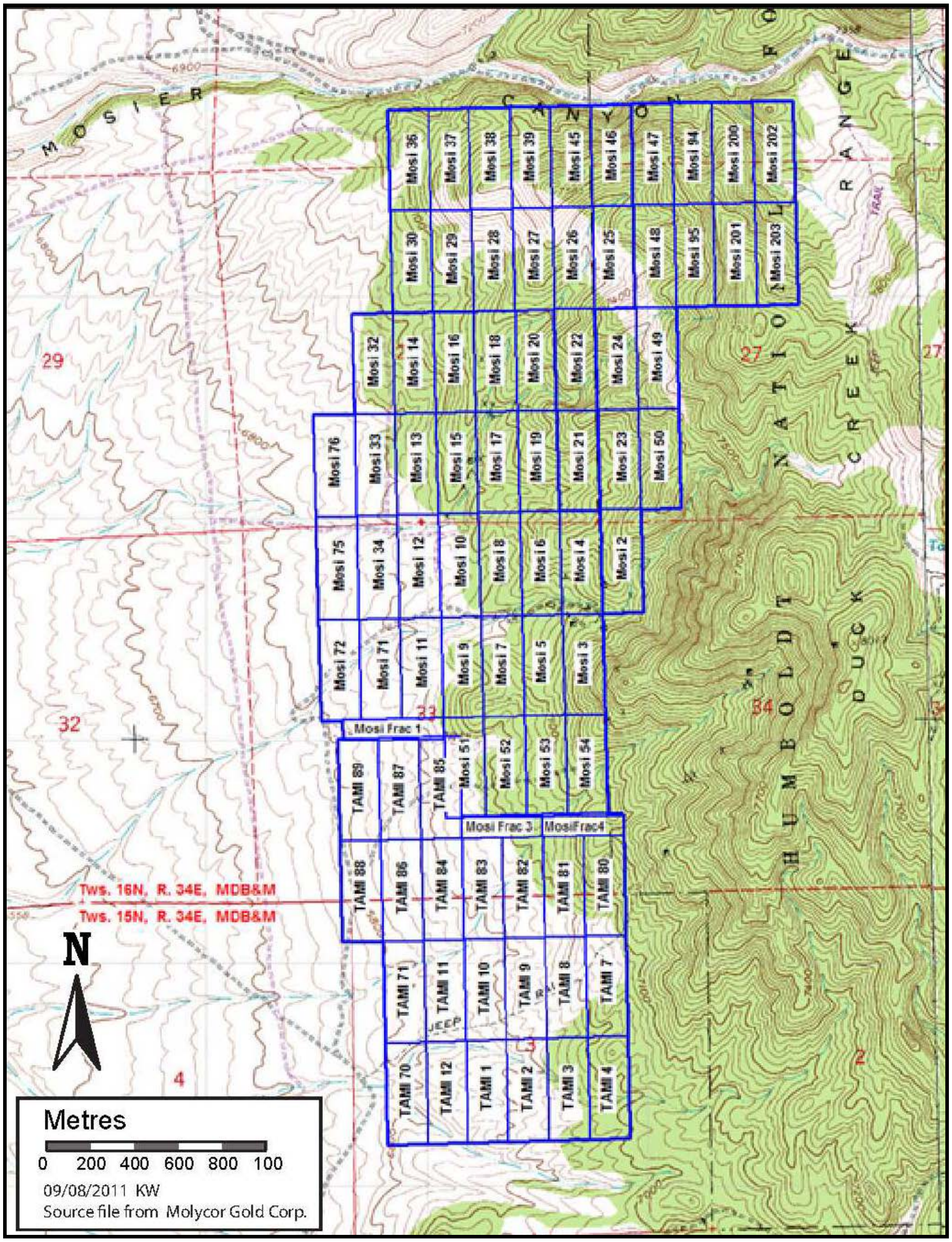


Figure 4.33 Tami-Mosi Claim Map (Claim Numbers)



5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPH

5.1 ACCESSIBILITY

The community closest to the dolomite quarry property is Ely, Nevada, which can be accessed from Reno via Interstate I-80 to Fernley (50 km), and then Highway 50A to Fallon (27 km), and then via Highway 50 to Ely (400 km).

Several dirt roads, located 10 km from Ely, lead off Highway 6/50 to the Property. The western boundary and certain other portions of the Property can be accessed by two-wheel-drive vehicle; some areas require a four-wheel-drive vehicle.

5.2 CLIMATE

The regional climate is typical of central Nevada. Basins receive less than 10” of rain per year; ranges receive up to 20” of rain per year, and less than 24” per annum of snow.

5.3 VEGETATION AND LAND USE

The terrain is typical of central Nevada’s basin and range topography. The Steptoe Basin is located between the Schell Creek Range on the east, and the Egan Range on the west. The elevation in the valley bottom is 2,072 masl and the top of the Schell Creek Range is 2,865 masl at the top of Taylor Peak.

The basin is vegetated with sagebrush and grasses, while the ranges are sparsely forested with pine, juniper and mountain mahogany. Large fauna consist of elk, mule deer, pronghorn antelope, coyote, mountain lion, and a small number of wild-horses and black bears. There are also a number of small animals in the area, including squirrels, jack rabbits, grouse, partridges, crows, raptors and numerous birds.

There are a number of hay meadows in the basin, near the center of the Steptoe Valley, and Comins Lake, where irrigation is available.

5.4 Local Resources

Ely has a full range of industrial and business supplies. The area infrastructure surrounding Ely features high-quality roads, major power lines that cross the Property, and cell phone service that reaches most areas of the Property. An industrial process water supply is not required for dolomite quarry operations.

5.5 Environmental Protection Measures used During the Exploration

There was minimal impact on air quality during the initial drilling program. In keeping with best management practices, contractors and employees were encouraged to minimize the use of the roads in order to keep the dust to a minimum.

Drilling water, estimated at 5,700 L/d, was obtained from a local rancher. Best management practices were used in the construction, operation and reclamation of the drill sites in order to minimize sedimentation from disturbed areas. Sediment traps were constructed adjacent to the drill sites to catch the drill cuttings and prevent their release. Weed-free straw bales were used in the drainages to control erosion from the disturbed areas and prevent the release of drill cuttings. Water bars were constructed in roadways where deemed necessary.

No chemicals, equipment or drill cuttings were left on site. All drillholes were plugged.

Reclamation, including re-contouring, ground preparation, and reseeding was completed to the satisfaction of BLM, which initiated the return of the bond monies to NVM.

6.0 HISTORY

To the author's knowledge, no previous magnesium exploration has been conducted on the Property by prior operators.

The previous owners of claims that now comprise the Property were James Marin and Tim Neal, who sold the claims to NVM's predecessor company, Molycor, in 2006.

7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 REGIONAL GEOLOGY

The Tami-Mosi area is located in the Duck Creek Range of central Nevada. The area is underlain by more than 3,350 m of miogeoclinal clastic and carbonate rocks, including the Devonian Guilmette Formation, upward through the Mississippian Pilot Shale, the Joanna Limestone, Chainman Shales and into the Tertiary rhyolites. At approximately 111 Ma (McDowell and Kulp, 1967), a number of quartz monzonite porphyries intruded the sedimentary rocks. Evidently, faulting was active either prior to, or concurrently with, porphyry emplacement. Hydrothermal alteration and mineralization associated with the intrusive event, in the wall rocks resulted in the gold/silver deposits at the Taylor Mine and the Duer Mine immediately to the south.

During the early Tertiary Period, the district was overlain by conglomerate and lacustrine limestone of the Eocene Sheep Pass Formation, and by a series of rhyolitic volcanic rocks. Rhyolitic dikes and diatremes, also of Tertiary age, cut the strata.

Sets of tilted normal fault blocks are cut by several later series of normal faults, resulting in structural superposition. Faulting also caused mineralization that formed at varying elevations to be exposed at the surface, further complicating geologic interpretation.

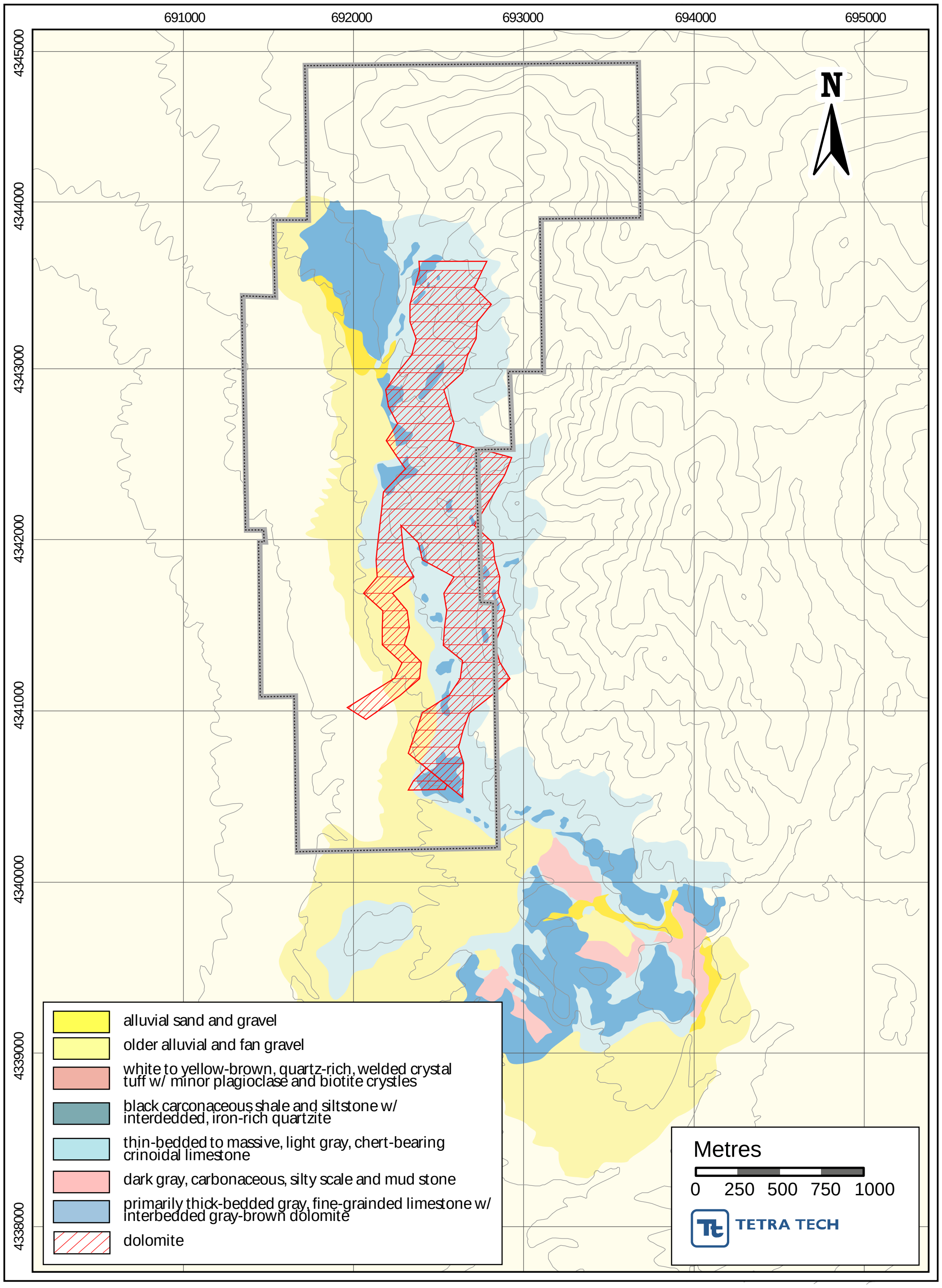
7.2 LOCAL GEOLOGY

The local geology consists of beds of Guilmette Limestone, Pilot Shale, Joanna Limestone and Chainman Shales dipping moderately to the west with block faulting disrupting the beds so that dips may steepen or even dip to the east in some localities.

Within the Guilmette are beds of dolomite altered from the limestone, which are referred to as the Simonson Dolomite unit.

The local geology of the Property is illustrated in Figure 7.1.

Figure 7.1 Property Geology and Dolomite Mineralization



7.3 MINERALIZATION

7.3.1 MAGNESIUM

Within the Guilmette Formation limestones is a unit referred to as the Simonson Dolomite (Figure 7.1). This dolomite is a hydrothermal alteration product of the Guilmette Limestone and is believed to be relatively consistent throughout the Guilmette. During the drilling program for the gold and manganese occurrences, several holes intersected strong magnesium dolomite.

The mineralization consists of hydrothermally-altered limestone. This alteration is poorly understood, and there are no documented locations where this alteration is occurring today, only the previously altered limestone is present. The alteration appears to be regional in extent, and varies only a few percentage points from place to place. At any place on the property where the dolomite has been mapped and sampled, the grade is generally above 10% and increasing up to 13% toward the northern end of the Property.

7.3.2 GOLD AND MANGANESE

The Property sits in an area considered to be part of the Carlin Trend, long recognized as a prospective gold silver district. Some of the jasperoid alteration is believed to be Carlin Type mineralization.

The Tami-Mosi claims are immediately to the north of five patented claims owned by the Duer Family. The Duer Mine is located in a strong northwest trending mineralized fault rich in manganese and carrying some gold. This deposit was worked for gold in the past, but is now abandoned. The rocks dip steeply to the west and are cut by strong strike faults which carry the mineralization. This structure was believed to continue onto the Property where high manganese values were intercepted in the drilling (Hole TM-07-003). The mineralization at TM-07-003 appears to be fault controlled, narrow and discontinuous. Holes TM-08-015 to TM-08-022 were drilled on what was thought to be the northern extension of the Duer structure. Further search for the Duer extension was considered unlikely to produce positive results.

8.0 DEPOSIT TYPES

The mineral of interest in this study is dolomite. The dolomite forms a bed, known as the Simonson Dolomite Unit within the Guilmette Formation. The bed is consistent in composition with the dolomite assaying between 9% and 13% Mg. There appears to be very little deformation of the Guilmette Formation rocks; they dip 25° to the west.

There is little local faulting; any regional faulting associated with the development of the basin and range geographic environment has had little effect on the Simonson Dolomite within the claims.

9.0 EXPLORATION

9.1 BIOGEOCHEMICAL SURVEYS

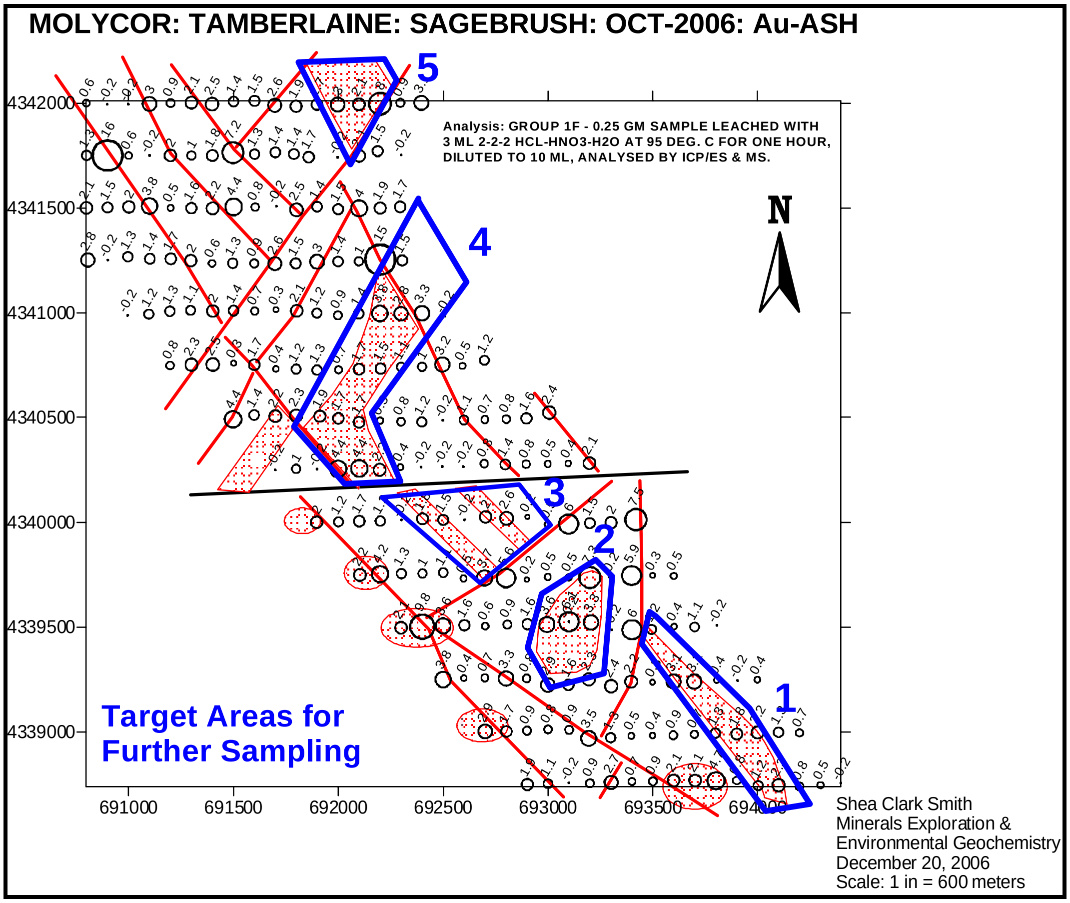
Exploration on the Property began in October 2006 with a biogeochemical survey (Smith 2007a) and a follow-up survey in March 2007 (Smith 2007b). The samples were collected by contractor Minerals Exploration & Environmental Geochemistry. This data was re-evaluated in 2008 to identify manganese targets (Smith 2008).

The initial survey (Smith 2007a) comprised 220 vegetation samples on survey lines that were 250 m apart and oriented east-west. Samples on each line were collected at a 100 m spacing. The location of each sample was logged by GPS and recorded. This survey identified five targets in the southern half of the Property (Figure 9.1 based on gold values. This survey also identified possible geological structures (red and black lines in Figure 9.1), which were further investigated by geological mapping.

The follow-up survey (Smith 2007b) focused on the areas identified by the initial survey. In-fill lines were surveyed on a 50 m spacing, in order to provide more detail on features identified by Smith (2007a). East-west lines were established between the earlier lines and were extended further to the east. An extension block to the north was also surveyed at a 100 m spacing along lines that were 250 m apart to further test Target 5 (Figure 9.1). The results of the follow-up survey are illustrated in Figure 9.2, where Smith (2007b) identified numerous areas with anomalous gold, silver, iron, lead, zinc, and manganese values. Possible geological structures were also identified (red and blue lines).

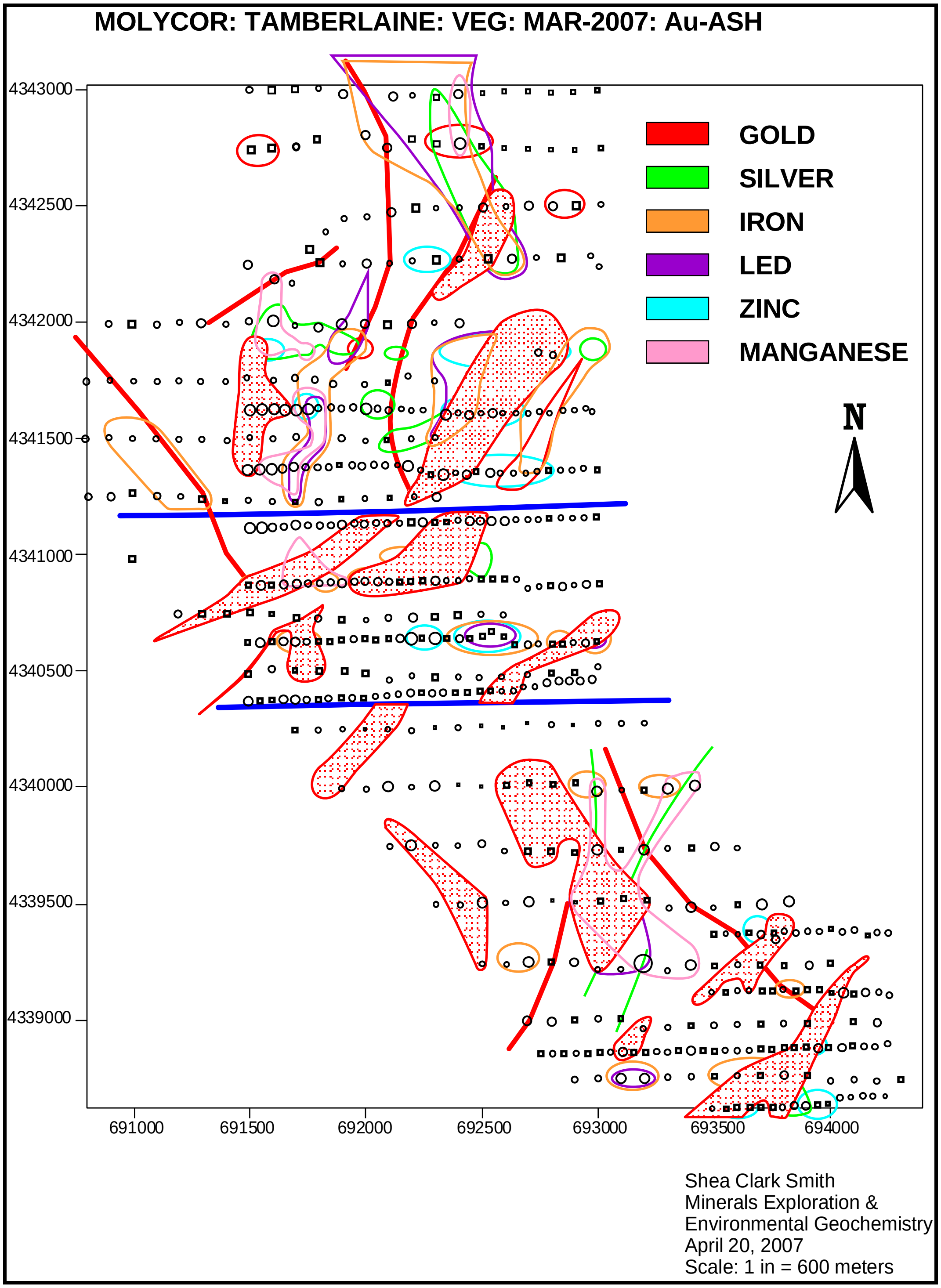
The biogeochemical surveys did not investigate magnesium and therefore are not directly relevant to the resource estimate. However, these surveys were used for drillhole targeting.

Figure 9.1 Results of 2006 Biogeochemical Sampling



Source: Smith (2007a)

Figure 9.2 Results of 2007 Follow-up Biogeochemical Sampling (Smith, May 2007)



Source: Smith (2007b)

9.2 GEOPHYSICAL SURVEYS

Two geophysical surveys were completed in 2007, concurrent with the biogeochemical surveys. The initial geophysical survey was completed in May 2007 (Practical Geophysics 2007a) and a follow-up survey covering a larger area was completed in June 2007 (Practical Geophysics 2007b).

A gradient array grid resistivity (GAR) and spontaneous potential gradient (SPG) survey was completed on a portion of the Property area measuring approximately 1,585 m north-south by 1,585 m east-west. The survey was intended to compliment outcrop mapping and biogeochemical sampling in order to identify targets for gold, copper, and manganese exploration. Survey results correlated well with mapping and sampling results. The initial survey (Practical Geophysics 2007a) covered a total of 41.8 line-km. The follow-up survey (Practical Geophysics 2007b) covered an additional 42.8 line-km.

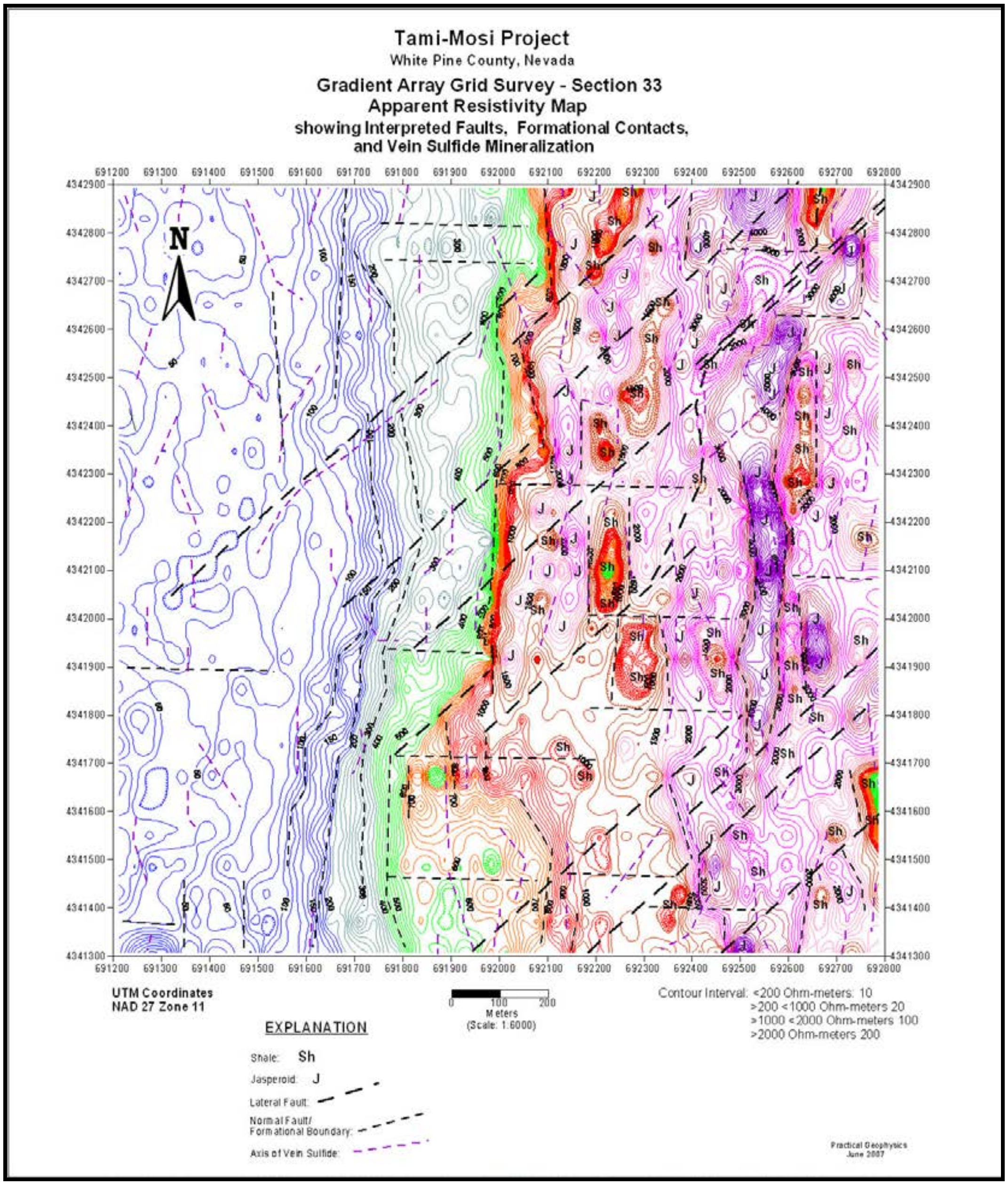
An electrical field was produced by transmitting an electrical signal into an east-west 2.7 km long current dipole. A 0.1 Hz signal at 2.0 A and 600 V was transmitted into the current dipole using a 3.2 kVA transmitter. Grid lines were run east-west along constant UTM northings at a grid line spacing of 61 m. The search dipole was 30 m in length and signal strength was measured with a digital voltmeter with a 0.1 mV resolution.

Apparent resistivity values vary from less than 50 ohm-meters to over 10,000 ohm-meters (Practical Geophysics 2007b). The generally west-dipping rocks are well defined by distinctive resistivity values determined from direct associations with mapped geologic units. Anomalously high resistivity values, greater than 1,500 ohm-meters, are interpreted to be associated with jasperoids created at shale/limestone contacts. Anomalous SPG values greater than 10 mV are interpreted to be associated with vein sulfide mineralization. The coincidence of shale/limestone contact, jasperoid development and vein sulphide mineralization defines primary exploration targets.

Figure 9.3 presents a map summarizing the interpretation of the geophysical surveys conducted on the Property.

These surveys focused on gold, copper, and manganese targets with little relation to the magnesium dolomite deposits. However, the geophysical survey results were considered when selecting targets for drilling.

Figure 9.3 Summary of Interpretation of GAR-SPG Surveys (Practical Geophysics, June 2007)



Source: Practical Geophysics (2007b)

9.3 MAPPING AND SURFACE SAMPLING

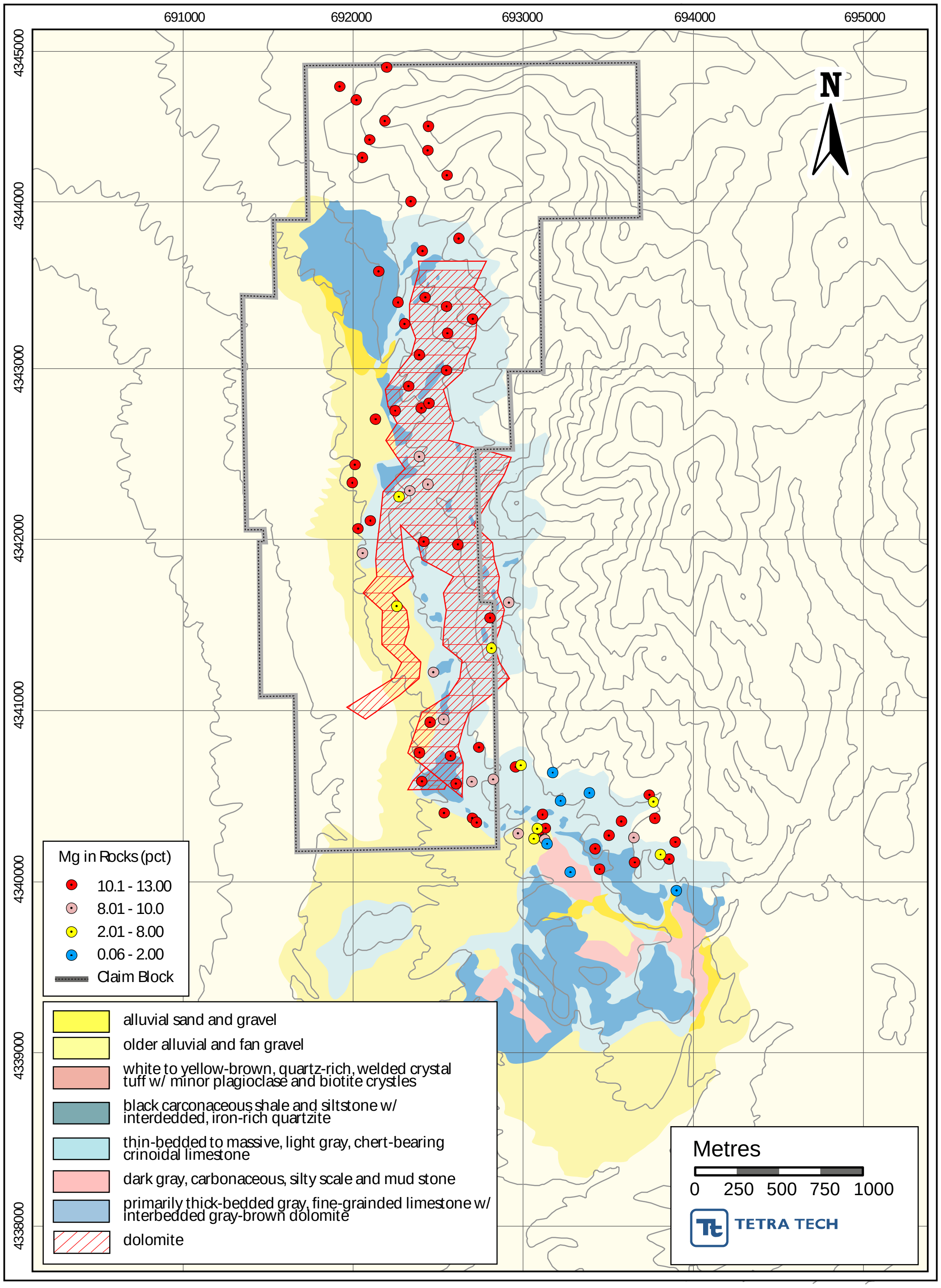
Outcrop mapping on the Property was completed before drilling was initiated. A map showing the results of this mapping and geological interpretation is provided in Figure 9.4

Concurrent with the surface mapping program, channel sampling was conducted early in 2011 to further explore the region to the north and east of the earlier drilling. In all, 55 samples were collected and sent to ALS for analysis. This sampling outlined a zone of mineralization in excess of 12% Mg (indicated by the red area in Figure 9.4). Representative samples were taken in three lines as continuous chip sampling along the outcrops. The purpose of this sampling was to determine the surface width of the dolomite bed. The lines were 60 m, 120 m and 240 m in length and varied depending on the availability of outcrop. The lines were oriented at right angles to the bedding. Samples were taken over a sample length of 10 m. The area covered by this sampling is approximately 250 m by 1 km. The locations of the ends of each sample line were logged by GPS and recorded.

Sample locations and results are illustrated in Figure 9.4.

The samples are believed to be representative of the Simonson dolomite and there were no factors which could be expected to introduce a bias.

Figure 9.4 Summary of Results from Mapping and Surface Sampling



10.0 DRILLING

A total of 24 drillholes were drilled on the Property, targeting biogeochemical or geophysical anomalies (Sections 9.1 and 9.2). Initial drill targeting did not focus on the current exploration focus of the Property, magnesium.

Of these drillholes, eight were directed toward gold exploration in the south and eastern part of the Property; eight holes were directed toward the manganese showing just north of the Duer Mine patented Claims. The remaining eight holes were directed toward the magnesium bearing dolomite through the center to northern part of the Property. In all, 3,840 m of rotary percussion reverse circulation drill was completed in two phases of exploration. The holes were generally drilled at an azimuth of 90° and a dip of -50°, cutting the strata at 70°. Drillholes included in the resource estimate (Section 14) are listed in Table 10.1.

The first phase of drilling, completed in 2007, consisted of 14 drillholes for a total of 2,567 m of drilling using a truck mounted rig. Eight of these holes were in the magnesium rich dolomite with an approximate spacing of 80 m.

The second phase drilling, completed in 2008, consisted of 10 holes and was focused on the magnesium rich dolomite. A total of 1,237.5 m (4,060 ft) was drilled in this second phase, using the same equipment and techniques as in Phase I. Only two of the holes in Phase II are suitably located for use in the block model.

A total of eight holes have been drilled on the Simonson Dolomite. Due to the fact that the deposit is bedded, and that the grades within the deposit are relatively consistent within the dolomite, the eight holes are considered adequate for a regional appraisal. A small gradation in magnesium grade is apparent in this drilling, with material ranging up to 13% Mg present in the northern part of the Property.

Drillholes included in the resource estimate are listed in Table 10.1 and highlights of results are provided in Table 10.2. The location of the drillholes relative to the claim boundaries and local geology is illustrated in Figure 10.1.

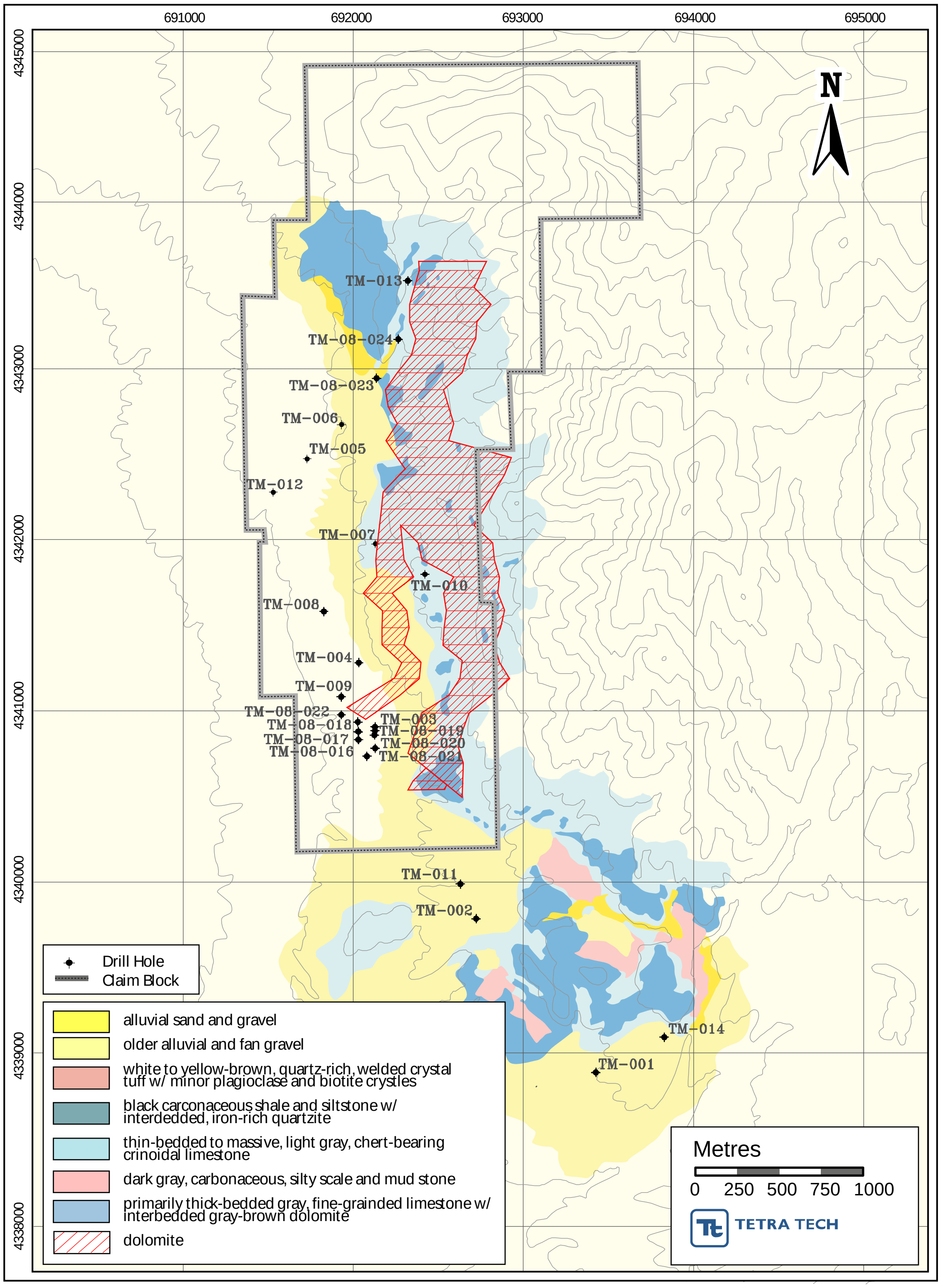
Table 10.1 Drillholes Included in Resource Estimate

Drillhole	Northing (m)	Easting (m)	Elevation (masl)	Azimuth	Dip	Depth
TM-07-004	691998	4341297	2094.011	-45	90	164.592
TM-07-005	691700	4342499	2095.792	-50	90	179.832
TM-07-006	691896	4342698	2103.017	-50	90	182.88
TM-07-007	692097	4342002	2112.223	-50	90	199.644
TM-07-010	692395	4341820	2144.322	-50	90	152.4
TM-08-023	692104	4342969	2119.384	-90	90	152.4
TM-08-024	692234	4343201	2136.313	-90	90	121.92

Table 10.2 Drilling Results - Drillholes with Intercepts of High Grade Magnesium Dolomite

Drillhole	Interval (m)	Grade (Mg %)
TM-07-004	60.98	9.45
TM-07-005	30.48	10.50
TM-07-006	67.06	12.08
TM-07-007	60.98	10.16
TN-O7-007	79.27	11.02
TM-O7-010	16.77	11.38
TM-07-010	60.98	9.74
TM-07-013	145.0	12.12
TM-08-023	108.23	12.22
TM-08-024	96.01	10.62

Figure 10.1 Location of Drillholes on the Property



11.0 SAMPLE PREPARATION, ANALYSES AND SECURITY

11.1 DRILLING

Samples were collected in a cyclone separator at the drill every 1.5 m and split in a Jones-type splitter to a final sample size of 2 kg. Only a very small amount of dust escaped and is not considered to affect the quality of the sample. One cut of the last split was sent to the sample library storage in Reno and the other was sent to the ALS sample preparation laboratory in Sparks, Nevada. At the ALS facility, the sample was crushed to a fine powder and cut again to a final sample of 25 g and shipped to the ALS laboratory in North Vancouver, BC, for analysis using a 34 element ICP method. For the most part, cuttings from the entire hole were analyzed with the exception of alluvial material. The sampling method is considered appropriate for this deposit type, the sample quality was excellent, and the samples are considered representative of the deposit.

The chips were logged at the site and copies of these logs are available at the Reno offices of NVM.

There were no drilling, sampling or recovery factors that could materially impact the accuracy or reliability of the results. There were no voids or caving reported by the drillers nor noted in the chips.

Sample preparation was completed by the ALS sample preparation laboratory in Sparks, Nevada, using the standard preparation methods. The following is a summary of the sample preparation.

Samples were:

- crushed to 70% minus 2 mm
- pulverized to 85% minus 75 µm in a ring pulverizer
- compared with one quality-control sample was introduced for every ten samples
- rolled, and approximately 25 g of the sample pulp was cut out for analysis
- processed and the pulps were sent to ALS in North Vancouver for analysis by ME-ICP41 (Multi-element Inductive Coupled Plasma mass spectrometry) methods, the accuracy of which is considered to be ±10% for magnesium
- only handled by Molycor personnel and those of the ALS Laboratory.

11.2 SURFACE SAMPLING

In 2011, surface reconnaissance exploration ventured into the northeastern part of the property and discovered an extension to the magnesium rich dolomite rocks which make up the deposit of interest. To better delineate the dolomite extent, a set of surface chip samples were collected.

Rock chip samples were collected in the course of outcrop mapping. Samples were collected from an approximately 2 m^2 area of the outcrop. Sample locations were recorded using a hand-held Garmin GPS unit with an accuracy of ±3 m. Rock chips varied from about 1.25 cm to 2.5 cm (½" to 1") in diameter. These chips were collected in cloth sample bags and labeled with a unique sample identification number. Sample weights averaged between 1 kg and 1.5 kg.

The samples were delivered to the ALS Chemex prep lab in Sparks NV, where they were crushed to 70% <2 mm and then pulverized for assay. Samples were analyzed by ICP with a 4 acid digestion at the ALS lab in North Vancouver. A 33 element suite was reported, along with a 30 gram gold analysis by fire assay with an AA finish.

Samples were only handled by Molycor or ALS personnel.

11.3 BIOGEOCHEMICAL SAMPLES

Vegetation samples were prepared for analysis at MEG Labs (Carson City, Nevada). Samples were washed, randomized, dried in microwave ovens, macerated and sized to minus 1 mm, and ashed in controlled kilns. Ash and dry tissue were sent to Acme Labs (Vancouver, BC, Canada) for ICP/MS gold and multi-element analysis. Two gold values are reported for each sample, one from ash and the other from dry tissue, while all other data derive only from dry tissue.

Samples were only handled by staff of the contractor collecting the samples (Minerals Exploration & Environmental Geochemistry), and by MEG and Acme personnel.

11.4 QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

QA/QC is discussed by Tribe (2009) and was handled by ALS; routine in-house checks using the acceptable lab standards performed by the lab on approximately every tenth sample. These checks did not indicate irregularities in the analyses.

Unlike gold and other precious metals, dolomite samples do not lend themselves to contamination. The chance of contamination is practically non-existent.

Mr. Norm Tribe visited ALS in Sparks, Nevada on August 23, 2008, and again on May 20, 2009 and found the facility to be in excellent condition, clean and well-organized on both occasions. Mr. Tribe has made numerous visits to the ALS laboratories in North Vancouver and found the facility to be in excellent condition, clean and well organized on each occasion. ALS uses standard control samples to ensure quality control. These control samples are inserted regularly into the sample stream for comparison. ALS is recognized by the industry as the leader in assay work quality. The ALS Quality Management System (QMS) complies with the requirements of the International Standard ISO 9001:2008. Specifically, the North Vancouver laboratory is accredited to International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) 17025:2005 from the Standards Council of Canada (SCC) for various methods including ME-ICP.

11.4.1 QA/QC of Biogeochemical Samples

QA/QC for biogeochemical samples is described by Smith (January, 2007).

Data quality was determined by inspecting random plots for evidence of systematic error, comparing standards to expected values, and replicate pairs. Multi-element data were determined to be reliable. However, gold data from dry tissue analysis had three prominent anomalies, suggesting localized instrumental error. These values were ignored in the interpretation. Also, gold values from ash display baseline shifts between 0.5 and 1.5 ppb, suggesting minor calibration error that does not affect the overall quality of the interpretations.

A test of the in-lab washing efficiency was done using samples from a dump in the historical mining district. One sample of sagebrush was washed, and another sample at the same site was not washed. Metal concentrations in the dust-load from the unwashed sample are high in Au, As, Co, Cr, Hg, Mn, Pb, Sb, Th, Tl, and Zn. This demonstrates that washing removes the influence of mineralized detritus that would otherwise bias disturbed areas.

Locations of high metal accumulation and/or zones of clustering were noted and compared between metals that are known to be reliable pathfinders to precious metal system, with attention to nearby analogues.

11.5 QP Opinion

The qualified person considers the sample preparation, security, and analytical procedures adequate for the purposes of the technical report.

12.0 DATA VERIFICATION

PDF lab certificates for drillhole samples were submitted to Tetra Tech, and a data validation was completed on 262 samples from 6 drillholes, out of a total of 664 samples, for a validation rate of 39.5%. Values for Ca, Mg, and Mn on the lab certificates were compared against the database used for resource estimation. No discrepancies were found.

PDF lab certificates for surface samples were provided to Tetra Tech, and a data validation was completed on 81 samples, out of a total of 190 samples, for a validation rate of 42.6%. Values for Ca, Mg, and Mn on the lab certificates were compared against the database used for resource estimation. No discrepancies were found.

In December 2010 Klaus Triebel conducted a site visit of the Tami Mosi property in part to verify additional surface samples collected earlier in 2010 by Paul Muto. These samples were used in the resource estimate to outline the boundaries between limestone and dolomite. No single grade of these samples exceeded the cutoff grade used in this study. The exact location of these grab samples could not be verified (no markers in the field) in the field but acid tests confirmed the presence of dolomitic rocks in the vicinity of the all tested dolomite sample coordinates.

These acid tests were conducted on outcropping limestone and dolomitic rocks. The identification of dolomites was established by the lack of reaction between the rocks and the diluted 5% HCl acid.

The qualified person considers the data is sufficiently reliable to support a mineral resource estimate.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 HEAD CHARACTERISTICS

In 2010, Hazen conducted preliminary test work to determine mineralogy and study process technology. The tested drill core samples and the bulk densities of the samples are shown in Table 13.1.

Table 13.1 Drill Core Samples

Sample ID	Weight (kg)	Loose Bulk Density (lb/ft³)	Packed Bulk Density (lb/ft³)
TM-08-024 340'-345'	6813	96	113
TM-08-024 345'-350'	7096	109	135
TM-08-024 350'-355'	6762	108	131
TM-08-024 355'-360'	6028	107	126
TM-08-024 360'-365'	6644	107	126
TM-08-024 370'-375'	5755	96	118

Hazen performed chemical analysis and XRD analysis on the drill core samples to verify the mineralogy. The test results are shown in Table 13.2 and Figure 13.1.

Table 13.2 Head Chemical Compositions

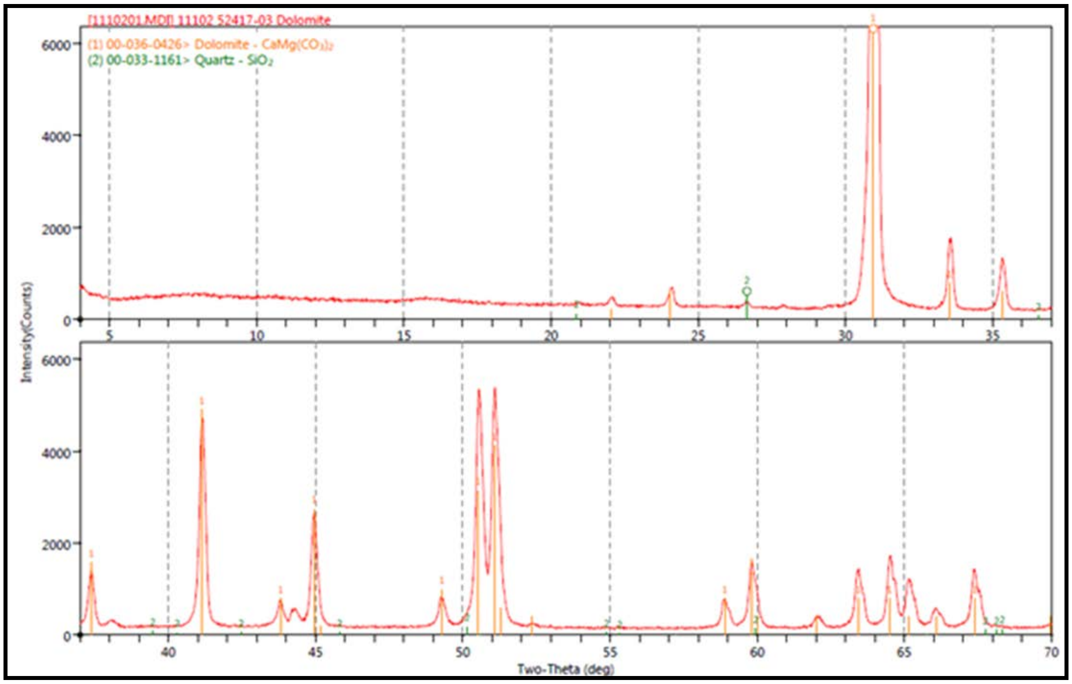
Compound/ Content (%)	Sample						
	SRM 88b*	340'-345'	345'-350'	350'-355'	355'-360'	360'-365'	370'-375'
MgO	21.03	20.3	21.1	20.9	19.8	21.0	21.6
CaO	29.95	28.3	30.4	29.0	28.5	28.9	30.0
CO_2	46.37	47.5	46.4	46.6	45.8	46.5	46.3
SiO_2	1.13	1.51	0.968	0.93	2.15	1.09	0.558
Fe_2O_3	0.277	0.154	0.066	0.092	0.29	0.152	0.097
Al_2O_3	0.336	0.329	0.098	0.132	0.548	0.227	0.232
MnO	0.016	0.015	0.018	0.015	0.01	0.014	0.018
P_2O_5	0.0044	<0.001	,0.001	<0.001	,0.001	<0.001	<0.001
K_2O	0.103	0.088	0.03	0.036	0.154	0.06	0.054
Pb	-	0.001	<0.001	<0.001	0.001	0.002	0.003
Total	99.2	98.2	99.1	97.7	97.3	97.9	98.9

*Standard reference material 88b for dolomite (National Institute of Standards & Technology)

The assay data show that magnesium oxide content of the samples ranged from 19.8% to 21.6%. The report titled “Tami-Mosi Property Evaluation Report 2009”, by N. Tribe & Associates Ltd., indicated that the average magnesium oxide content for the samples from the Drillhole TM-07-13 (over an interval of 164.4 m) was 18.6% MgO. The results appear to indicate that the chemical composition of the Tami-Mosi dolomite is favourable to magnesium recovery by conventional processes.

As shown in Figure 13.1, the XRD analysis verified that Sample TM-08-024 350’-355’ is primarily dolomite, with a very small amount of impurities consisting mainly of quartz.

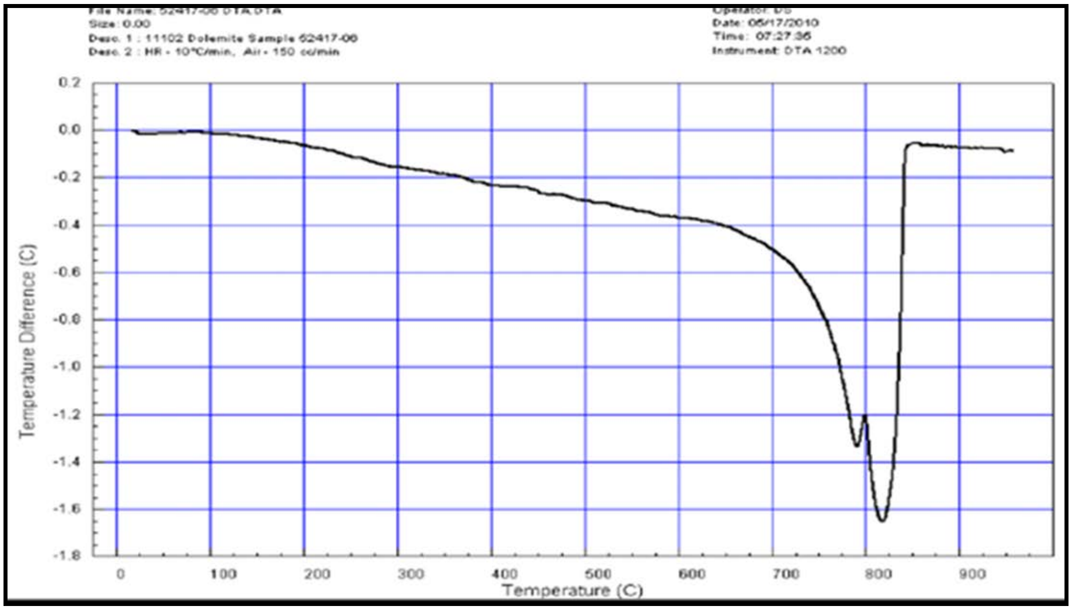
Figure 13.1 XRD Pattern – TM-08-024 350’-355



13.2 DECOMPOSITION TESTS

Hazen conducted preliminary testing in an effort to determine whether there is a distinct transition between the calcinations of $MgCO_3$ and $CaCO_3$. The tests included TGA, DTA and differential calcinations. The TGA tests did not show a distinct carbon dioxide (CO_2) release difference. However, DTA tests showed a distinct difference in the endothermic release of CO_2 between $MgCO_3$ and $CaCO_3$ in the dolomite. The $MgCO_3$ decomposed at approximately 790°C, while the $CaCO_3$ decomposed at approximately 820°C. The DTA thermogram is displayed in Figure 13.2.

Figure 13.2 DTA Analysis Result – TM-08-024 370’-375’



Hazen conducted a series of calcination tests to determine the differential decomposition as determined by the DTA analysis. The test results are shown in Table 13.3. It appeared that the $MgCO_3$ was selectively calcinated to magnesium oxide, while the $CaCO_3$ was kept unreacted or partially reacted by controlling the temperature and the partial CO_2 pressure of the calcination reactor.

Table 13.3 Batch Calcination Test Results

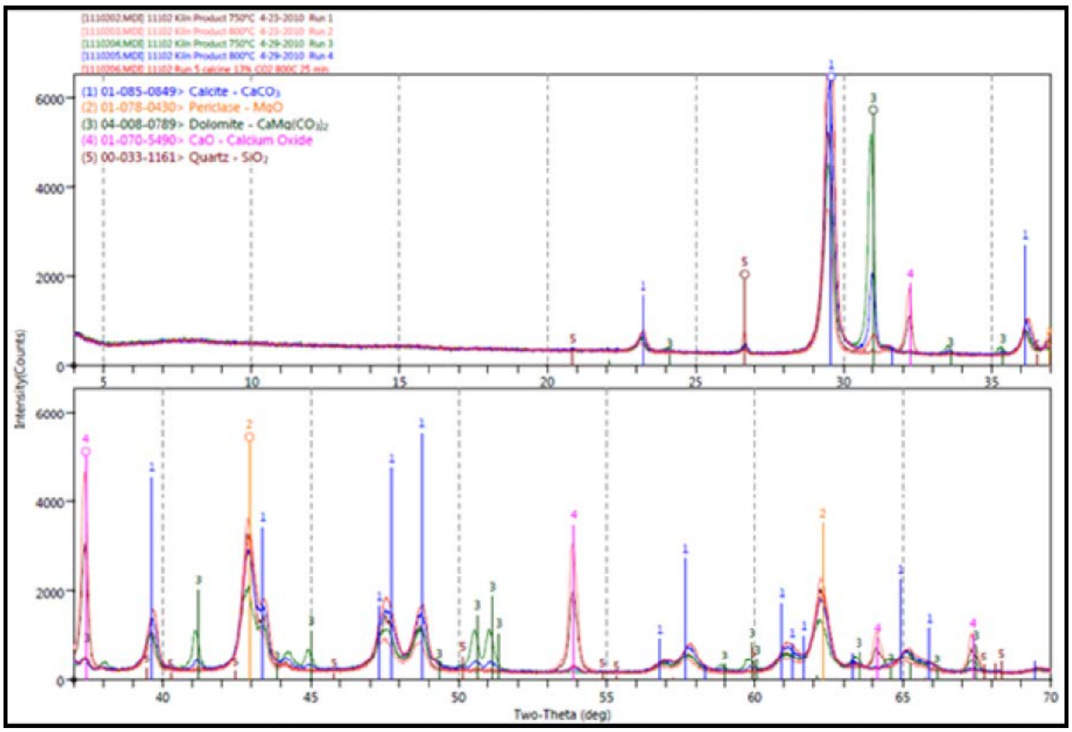
Sample ID	Test	Temperature (°C)	Atmosphere	Peak CO_2 (%)	Weight Loss (%)
TM-08-024 350’-355’	1	750	Air	25.6	39.8
	2	800	Air	48.0	35.4
	3	750	Air	26.0	19.6
	4	800	Air	43.5	23.6
TM-08-024 370’-375’	5	800	Air with 13% CO_2	46.7	24.0

XRD analysis showed that the calcination products contained mainly MgO and $CaCO_3$, in particular, the calcination products produced at 800°C. This confirmed that the differential calcination was achieved. The XRD results are shown in Table 13.4 and illustrated in Figure 13.3.

Table 13.4 XRD Analysis Results

Product	Area @ 30.9° Dolomite CaMg $(CO_3)_2$	Area @ 41.1° Dolomite CaMg $(CO_3)_2$	Area @ 37.3° Calcium Oxide CaO	Area @ 29.3° Calcite $CaCO_3$	Area @ 42.9° Periclase MgO
Dolomite	Major, 100%	Major, 100%	Not detected	Not detected	Not detected
Test 1	Not detected	Not detected	Subordinate	Subordinate	Major
Test 2	Not detected	Not detected	Major	Minor	Major
Test 3	Subordinate,~13%	Subordinate,~20%	Major	Minor	Subordinate
Test 4	Trace, ~4%	Trace, ~5%	Trace	Subordinate	Major
Test 5	Trace, ~1%	Trace, ~2%	Trace	Major	Major

Figure 13.3 XRD Pattern – Differential Calcination Test Products



Although the Hazen test work verified that the samples tested were primarily dolomite, and the $MgCO_3$ of the dolomite could be differentially decomposed at approximately 800°C, further test work is recommended to investigate the optimum process technology, effect of partial decomposition on subsequent processes, effect of impurities on recovery of magnesium, process related parameters, and determination of the optimum mill feed grade using representative samples. The flash calcination should be investigated, including the effect of the calcination on the magnesium thermal reduction.

14.0 MINERAL RESOURCE ESTIMATES

14.1 PREVIOUSLY COMPLETED MINERAL RESOURCES

The following text and Table 14.1 are copied from the initial NI 43-101 resource report dated May 1, 2009, Tami-Mosi Property Evaluation Report by N. Tribe & Associates Ltd.

In order to arrive at an Inferred Mineral Resource estimate for the dolomite mineralization, the drill holes were plotted on 100 m spaced cross section drawings. The following parameters were used in this calculation:

- *Drillholes plotted and projected onto vertical cross sections oriented east west (N90˚E, looking north).*
- *The Inferred Mineral Resource blocks were outlined on section, on grades exceeding 8% Mg and projected 100 m along strike and down dip or half way to the next intersection whichever was smaller.*
- *Although the dolomite bands are continuous along strike, no resource estimate was applied to those sections where the drillholes were more than 100 m apart.*
- *The resource blocks were projected to a depth of 200 m below the existing surface. This depth is considered to be a practical depth for open pit mining.*
- *Due to the large size of the dolomite zone and the small size of the sample intervals down to 1.52 m, the assays were plotted at a scale too small to read. Insets of appropriate mineralization were enlarged four times and set into the section drawings.*
- *Areas of mineralization were outlined by taking data directly from the drillholes, the surface sampling and adding any areas that project from adjacent sections. These mineral zones were subsequently projected along strike and dip. These mineral zones outline the Simonson dolomite unit and are only partially included in the resource.*
- *A figure of 2.84 t/m^3 was used to calculate the tonnage. This is figure is listed as a standard specific gravity (SG) for dolomite.*
- *An External dilution factor of 10% was taken into account. The grade of this dilution was given a value of 4.89% Mg. This being the average grade of material adjacent to the resource blocks. Some minor internal dilution was taken into the calculation where practical. These were isolated instances where samples were missing or grades were just slightly below the cut-off.*
- *The cut-off grade was arbitrarily set at 8% Mg.*

- *The total Inferred Resource is calculated to be 236,184,000 t of resource at a grade of 10.00% Mg.*

Table 14.1 Resource Tabulation by Block and Section*

Resource Calculations for the Tami-Mosi							
	Section	Area (m^2)	Horiz. (m)	Volume (m^3)	Tonnage (t)	Grade (% Mg)	Pounds (Mg)
1	43500N	72450	100	7245,000	20575800	12.12	5486331312
2	43200N	78378	100	7837,800	22259352	10.62	5200675001
3	43100N	58873	100	5887,300	16719932	10.16	3737239201
4	43000N	62513	100	6251,300	17753692	12.22	4772902557
5	42700N	46354	100	4635,400	13164536	10.09	2922263701
6	42600N	64290	100	6429,000	18258360	9.19	3691475225
7	42500N	99316	100	9931,600	28205744	10.5	6515526864
8	42000N	29483	100	2948300	8373172	10.16	1871571405
9	42000N	65001	100	6500100	18460284	11.02	4475511253
10	41800N	26558	100	2655800	7542472	9.74	1616200900
11	41800N	16897	100	1689700	4798748	11.38	1201414549
12	41300N	26491	100	2649100	7523444	9.45	1564124008
13	41000N	37326	100	3732600	10600584	9.33	2175875872
14	40900N	17436	100	1743600	4951824	10.21	1112278707
15	40900N	19400	100	1940000	5509600	9.1	1103021920
16	40800N	35264	100	3526400	10014976	9.95	2192278246
Total Pounds Mg							49,638,690,722
Total Tonnes and Grade Undiluted					214,712,520		10.51
With 10% Dilution at the Listed Grade					21,471,252	4.89	2,309,877,290
Diluted Tonnage and Grade					236,183,772		10.00

**Table 14.1 "Resource Tabulation by Block and Section" has been reformatted for clarity. The data and calculation presented in the table has been copied from the original table as provided in "Tami-Mosi Property Evaluation Report" by N. Tribe & Associates Ltd.*

To produce an Inferred Mineral Resource estimate for the magnesium mineralization on the Property, Wardrop completed a block model and resource analysis of the Simonson dolomite unit. The resource estimate was completed by building upon data from the initial NI 43-101 resource estimate (Tribe, 2009), and by including additional surface sample data generated in 2010.

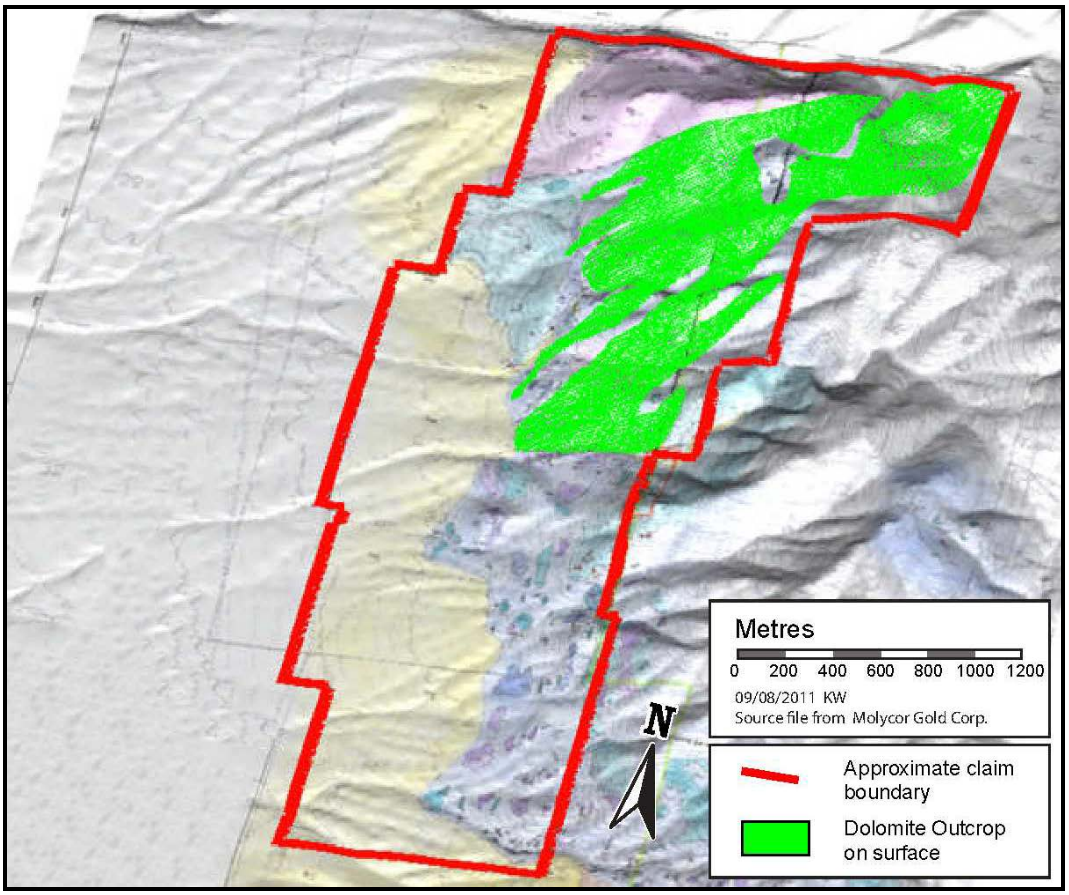
14.2 CURRENT MINERAL ESTIMATE

14.2.1 ASSUMPTIONS AND METHODS

Wardrop used Mintec's MineSight® version 6 to generate a block model for pit creation and mine planning. The dolomite of interest is exposed as outcrop over a strike length of approximately 7 km. There are 24 drillholes (including one hole that was re-drilled) over that distance. The area of immediate interest, selected because dolomite is present in higher proportions than in nearby carbonate rocks, is approximately 2 km long. The 3D topography used to limit the upper surface of the model was provided to Wardrop by Great Basin GIS of Spring Creek, Nevada.

The area included in the resource model is shown as a green region in Figure 14.1; the claim outline is shown in red. Draped onto the topography is the geological map (Muto, 2010) as a reference. Within the green area, four drillholes have been drilled. No valid grade interpolation could be carried out based on such limited drilling. To facilitate some viability for modeling, surface grab samples were also used to construct the geology wireframe and to interpolate the block model.

Figure 14.1 Geological Map



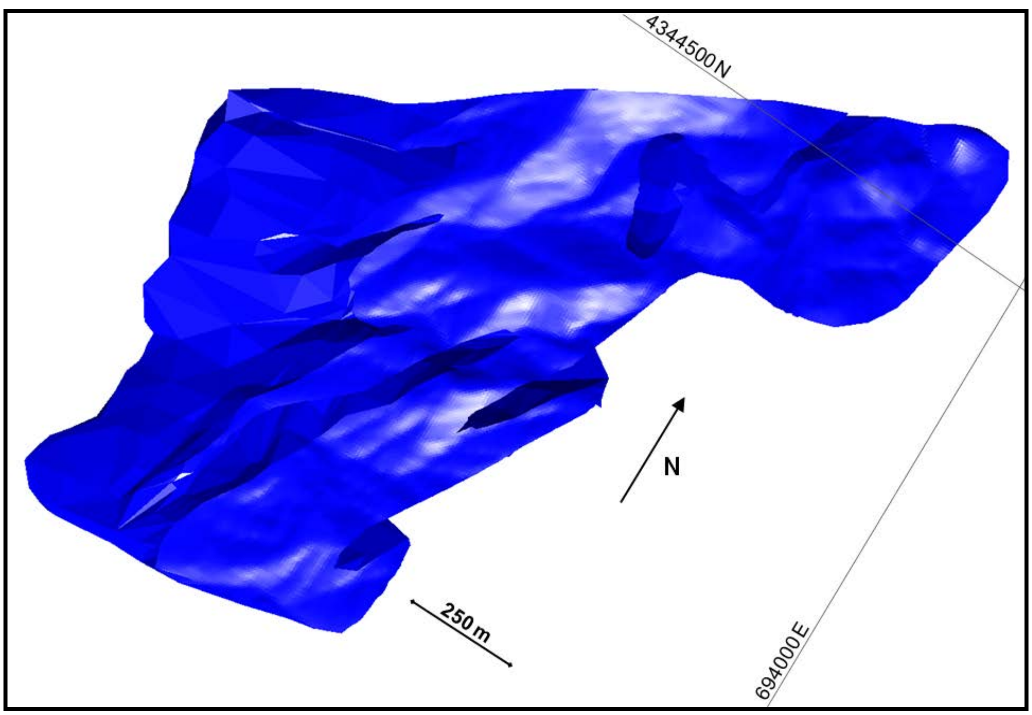
14.2.2 GEOLOGICAL MODEL

Bedrock mapping and geological interpretations of surface and drillhole samples were utilized to model the distribution of the Simonson dolomite unit. Mapping was conducted by geologist Paul Muto, Exploration Geologist, C&M Consultants (Nevada) in 2006 and 2010. The updated geological map produced in 2010 was used to create the geology wireframe and resource model. The presence of dolomite outcropping at surface was verified during the Wardrop site visit (the distinction between dolomite and limestone was confirmed using hydrochloric acid). Bedrock mapping established surface continuity of the dolomite over most of the area included in the resource model. Locally, limestone or interbedded limestone/dolomite was mapped; these intervals were excluded from the dolomite solid.

The 3D geology model of the dolomite was created by draping the geology map (Muto, 2010) on the 3D topography, which was then used as a base surface for geological interpretation. All relevant information from the geology map was digitized directly onto the topography (strike and dips, faults, and lithology boundaries). Surface grab-sample information was imported into MineSight® and the lithology interpretation of each sample was included during modeling. The wireframe was then built by honouring bedding attitudes, mapped rock units, and surface samples as well as relevant drillholes. All limestone or mixed limestone/dolomite surface samples within the modeled area are excluded from the wireframe by interpretation as dolomite-barren regions. Following Tribe's (2009) resource estimates the solid was then clipped at 200 m depth using a surface parallel to the topography, assuming only the uppermost 200 m of the deposit will be mined.

A screen capture of the 3D dolomite geology wireframe is presented in Figure 14.2. The volume of this solid is 335 Mm^3. Because the geology is not confirmed through core drilling, the solid is considered an approximation of the dolomite distribution. The model is constrained on the west side by overburden (Quaternary alluvium and gravel) and on the south and north sides by faults.

Figure 14.2 3D Geology Wireframe of the Simonson Dolomite Unit



14.2.3 COMPOSITING

The resource estimation was conducted using the dolomite geology wireframe presented in Figure 14.2. All blocks are classified as “Inferred”.

Surface grab samples were imported into MineSight® and, for the purposes of block modeling, the samples were assumed to represent short 1.5 m vertical drillholes collared on the sample location. Rock type and grade information from each sample was used. These pseudo-drillholes were then raised by 0.75 m to intercept the topography (to allow for contouring of the topography by sample assay grade), but had no influence on the model interpolation.

All drillhole assay samples were composited to 5 m interval lengths, respecting geology boundaries. Most assay samples were approximately 1.5 m (5 ft) in length; remnants were added to the composite if they were greater than 2.5 m, while remnants less than 2.5 m were disregarded. The 1.5 m pseudo-drillholes (surface grab-samples) were also included in the composite database.

The mineral resource was estimated as follows:

- A block model was created with parameters as outlined in Table 14.2.
- The block model covers approximately 96% of the dolomite rock solid.
- No geostatistical investigation or variography analysis was conducted because of the limited number and wide spacing of drillholes within the solid.
- Interpolation applied Inverse Distance to the power of 2 (ID2) as the main interpolation method and nearest neighbour (NN) technique to verify the inverse distance results. An ordinary kriging approach has not been attempted due to the low density of data.
- The search ellipsoid represents a “squished” sphere and was derived by visually orienting it along the overall strike and dip direction of the dolomite. It was chosen big enough to populate approximately 95% of all blocks within the rock solid. The search ellipsoid parameters are outlined in Table 14.3.
- An average dolomite density of 2.80 t/m³ was used for resource calculations. This is at the lower end of the dolomite density spectrum and attempts to compensate for an expected lower bulk density.

14.3 Block Model

The block model used had the parameters depicted in Table 14.2.

Table 14.2 Block Model Parameters

	Min	Max	Block Size	Number of Blocks
X	691,800	693,600	20	90
Y	4,342,300	4,344,800	20	125
Z	1,500	2,300	5	160

The resource estimate was generated by applying the interpolation as described in Section 14.2.3 and with the search ellipsoid parameters of Table 14.3.

Table 14.3 Interpolation and Search Ellipsoid Parameters

Interpolation Method	Minimum Number of Composites	Maximum Number of Composites	Maximum Number of Composites/ Hole	Main Axis Length	Secondary Axis Length	Tertiary Axis Length	Anisotropy	Az of Main Axis	Dip of Main Axis
ID2	1	10	3	150	600	600	Applied	120	-53

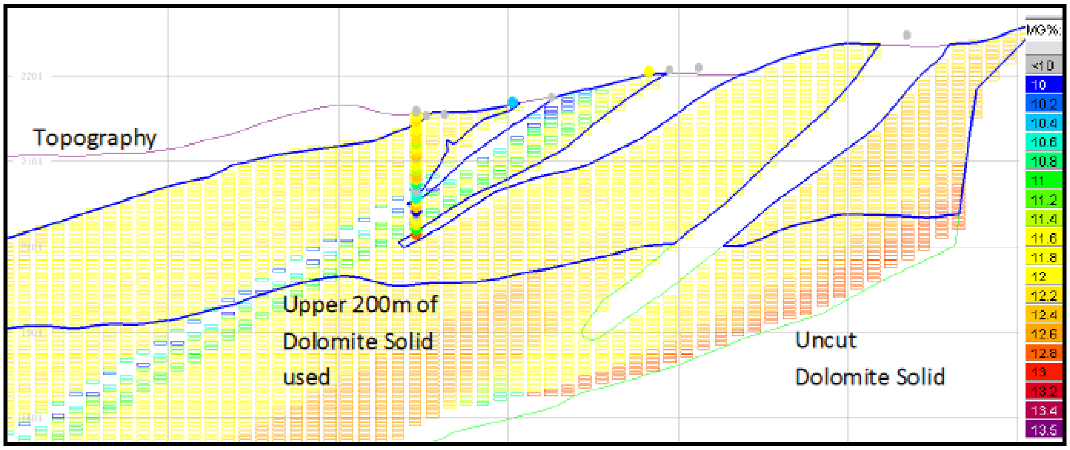
Results from this estimation are summarized in Table 14.4. At a cut-off of 12% Mg, there is a resource of 412 Mt at an average grade of 12.3% Mg.

Table 14.4 Resource Estimate of Volume, Mass, and Average Grade at Various Cut-off Grades

Cut-off Grade (% Mg)		Volume (Mm^3)	Mass (Mt)	Average Grade Above Cut-off (% Mg)
>=	9	301.2	843.5	11.67
>=	10	299.8	839.6	11.68
>=	10.5	287.2	804.3	11.74
>=	11	218.3	611.3	12.04
>=	11.5	190.9	534.5	12.16
>=	12	147.4	412.6	12.29
>=	12.5	32.0	89.7	12.57

Block model validation was conducted by visually comparing composite values and block grades in cross sections as exemplified in Figure 14.3. Also compared were nearest neighbor grades with inverse distance grades. In neither case were systematic discrepancies detected.

Figure 14.3 Block Model Validation Showing Comparison of Drillhole and Block Grades on Section N4343500.



14.4 RESOURCE CLASSIFICATION

Tetra Tech's block model and resource analysis classifies the Tami-Mosi magnesium property at an Inferred Resource level as containing 412 Mt of dolomite at an average grade of 12.3% Mg using a 12% cut-off grade.

14.5 REASONABLE PROSPECTS FOR ECONOMIC EXTRACTION

Lacking cutoff grade information of existing magnesium mines exploiting dolomitic rocks in similar settings to the Tami-Mosi deposit, reasonable prospects of economic extraction were established based on metallurgical considerations. The result is a cutoff of 12% Mg, which is conservative when comparing it to Tribe's (2009) cutoff of 8% and when considering that the highest possible Mg concentration in dolomite ($CaMg(CO_3)_2$) cannot exceed 13.18%.

14.6 GENERAL DISCUSSION

Environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors are dealt with in the relevant sections of this PEA, as follows

- Section 4 Property Description and Location is disclosing claim, title and ownership aspects.
- Section 19 Market Studies and Contracts is focusing on marketing and pricing.
- Section 20 Environmental, Permitting, and Social or Community Impact. This section also includes mine closure as well as other political and socio-economic attributes.

- Section 21 Capital and Operating Costs discloses projected costing structures.
- Section 22 Economic Analysis illuminates cash flow, taxes, sensitivity to various variables, and royalties.

15.0 MINERAL RESERVE ESTIMATES

According to the definition set out by the Canadian Institute of Mining, Metallurgy and Petroleum, a Mineral Reserve "is the economically mineable part of a Measured or Indicated Mineral Resource demonstrated by at least a Preliminary Feasibility Study."

Currently, the entire resource is within the Inferred category; therefore a mineral reserve cannot be estimated at this time.

16.0 MINING METHODS

Tetra Tech selected an open pit mining method for the Tami-Mosi deposit, on the basis that the resource lays at or near the surface, with little surrounding waste material. Due to the at-surface nature of the deposit, pit optimization software was not used in the design of the mine; rather the pit was designed around a drill hole and high-grade out-cropping.

16.1 MINE PLANNING 3D BLOCK MODEL

The provided block model contained 674 Mt of resource above a cut-off grade of 12% Mg, with an average grade of 12.49%. For the magnesium-containing rock, Tetra Tech assumed a density of 2.8 t/m^3. A portion of this resource is at the surface, and will require minimal waste stripping.

16.2 PRODUCTION RATE

The production rate was set at 30,000 t/a Mg. The mining rate is expected to fluctuate yearly, depending on the grade mined. The mine was assumed to operate 10 hours per day, four days per week.

16.3 ECONOMIC PIT LIMITS AND PIT DESIGNS

Considering the amount of available resource and the specified production rate, Tetra Tech selected a LOM of 30 years for the purposes of this study. Since a portion of the resource is lying at the surface, and no waste other than a thin layer at the surface is expected, a pit was manually designed without optimization software. A high-grade (greater than 12% Mg) resource outcropping at the surface was located (Figure 16.1) and an open-sided pit was designed using an average wall slope of 45° (Figure 16.2).

Figure 16.1 Pit Location Relative to Resource Outcropping

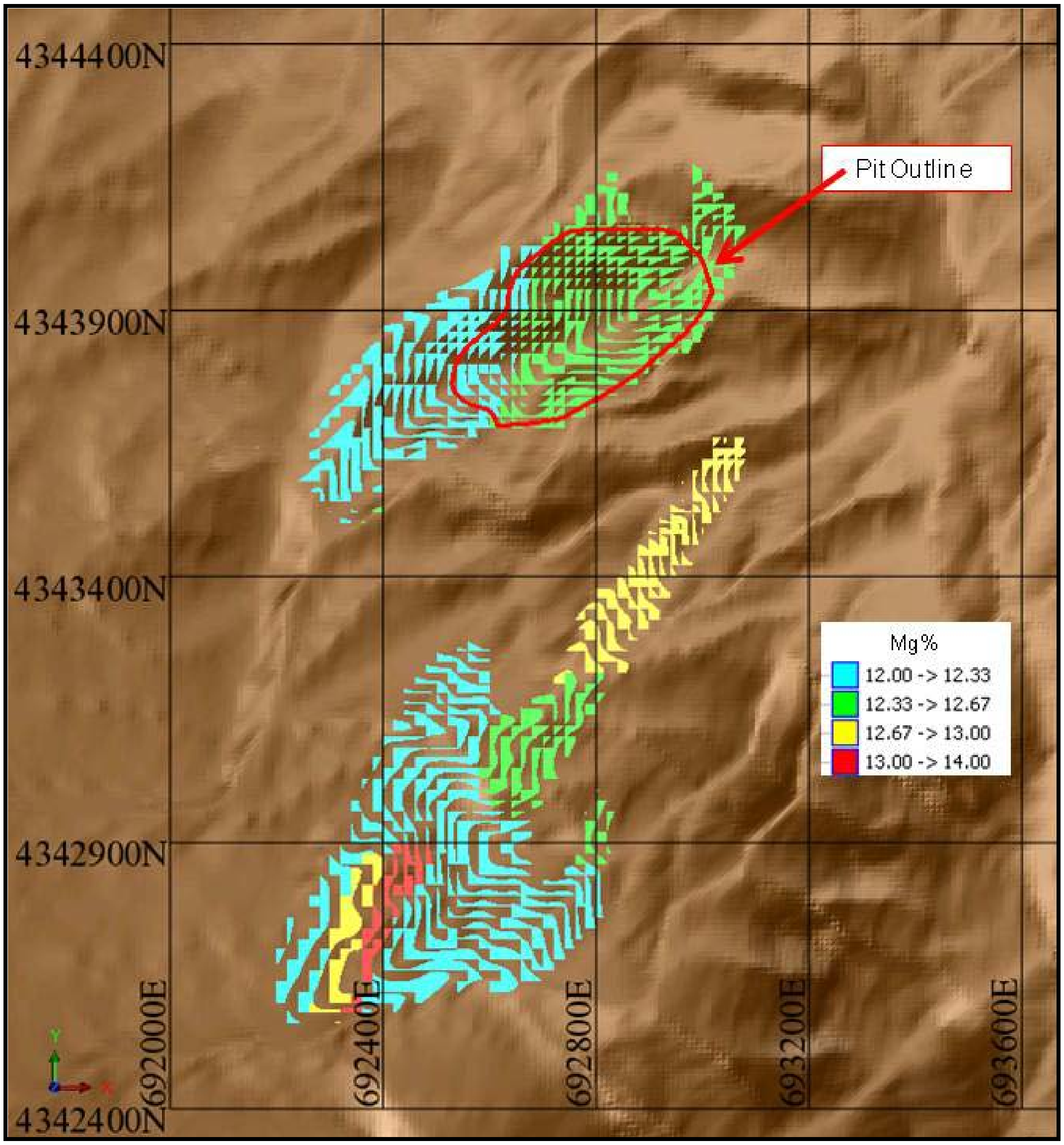
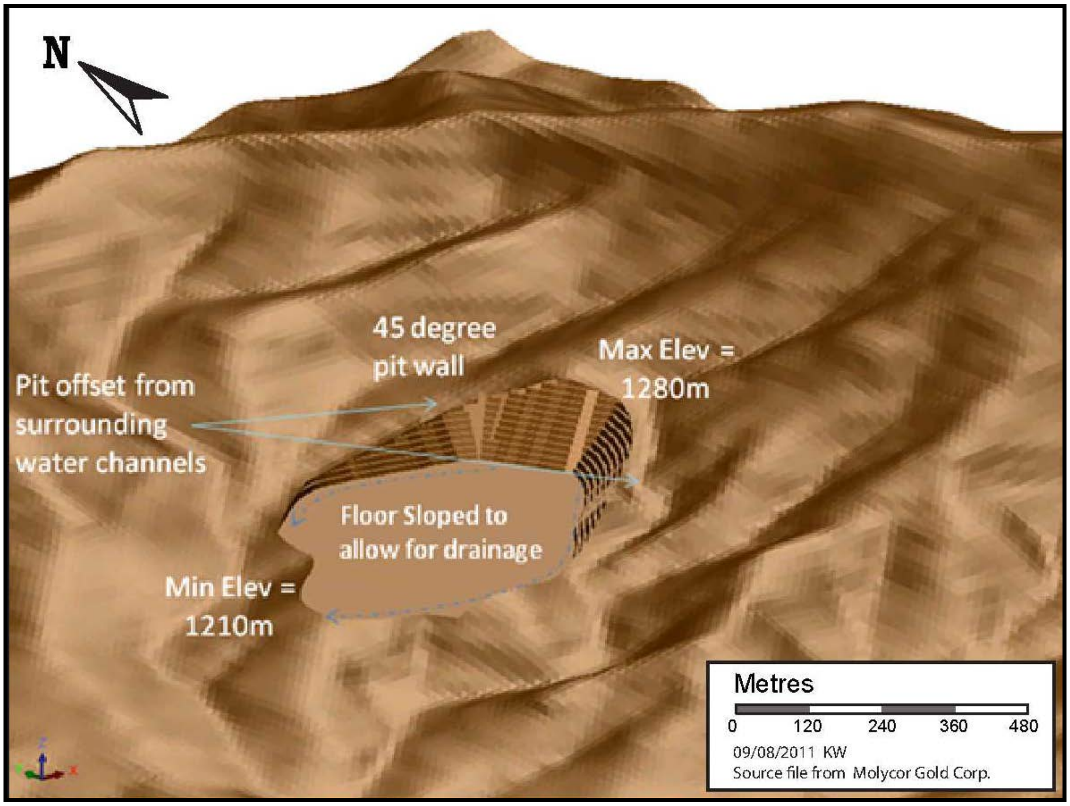


Figure 16.2 Pit Design for a 30-year Mine Life

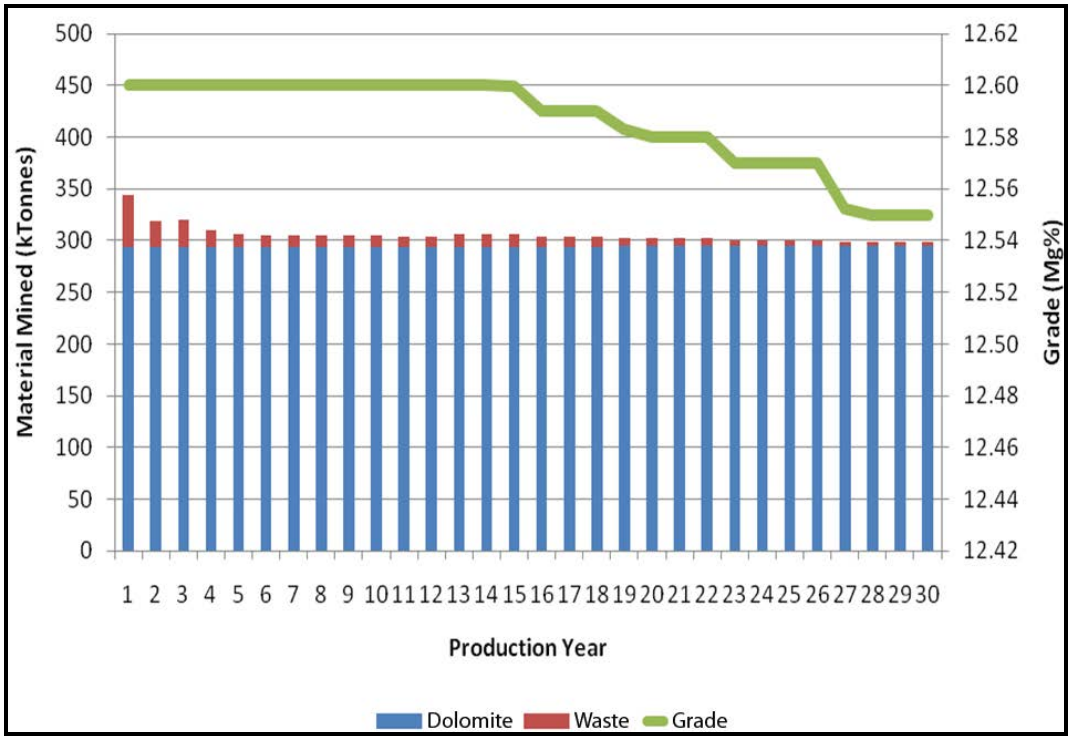


Should the project wish to go longer than the specified 30-year LOM, the current pit can be mined further down, while maintaining an open face and the integrity of nearby natural drainage channels.

16.4 MINE PLAN

The resource within the pit contains an average grade of 12.59% Mg. With the plant capacity set at 30,000 t/a of magnesium, the mine production rate was calculated to be approximately 294 kt/a. Over the 30-year production period, a total of 8.8 Mt of resource will be mined at an average strip ratio of 0.04. A graphical representation of the production schedule is shown in Figure 16.3.

Figure 16.3 Mine Production Schedule to Produce 30,000 t of Mg per Year



16.5 MINE OPERATIONS

Mining operations will include the use of two front-end loaders, a mobile crusher, a drill, and blast contract. One loader will move blasted material to the crusher, which will be located a short distance from the active mining face; the other loader will load the stockpiled, crusher material into highway trucks to be transported to the process plant.

There is minimal waste material covering the outcropping resource. This material will be bulldozed into piles and loaded off to the edge of the pit for future reclamation. The mine roads will be maintained and dust-controlled as required.

Over the 30-year LOM, the pit floor exits the side of a hill, so there is no need for dewatering activities. The pit is designed so that water will flow to a collection area and evaporate.

Waste from the process plant will be transported back to the mine and stored within the mined-out areas. The mining sequence must be designed to ensure that adequate mined-out area is available for this material without covering future resource.

16.6 MINE EQUIPMENT

The following equipment will be required to operate the mine:

- a 9-yd^3 front-end loader (owner)
- a 6-yd^3 front-end loader (owner)
- a mobile crusher (owner)
- a 4" drill (contractor)
- an ammonium nitrate/fuel oil (ANFO) loader (contractor)
- a stemming loader (contractor)
- a water truck (contractor)
- a grader (contractor)
- a bulldozer (contractor).

16.7 MINE CLOSURE AND RECLAMATION

No significant reclamation activities are expected at this time. The waste from the process plant will fill most of the mined-out pit, in a manner similar to concrete. The small amount of mine waste material that will be moved to the edge of the pit will be spread back over the mined area. Water will continue to drain to a collection area and evaporate.

16.8 CONCLUSIONS AND RECOMMENDATIONS

An open pit, containing 8.8 Mt of resource, was designed to produce 30 kt/a of magnesium over 30 years of production. The design will mine only a small portion of the overall resource available; future expansion is easily achievable. A production rate increase would likely benefit the projects economics and should be assessed in future studies.

17.0 RECOVERY METHODS

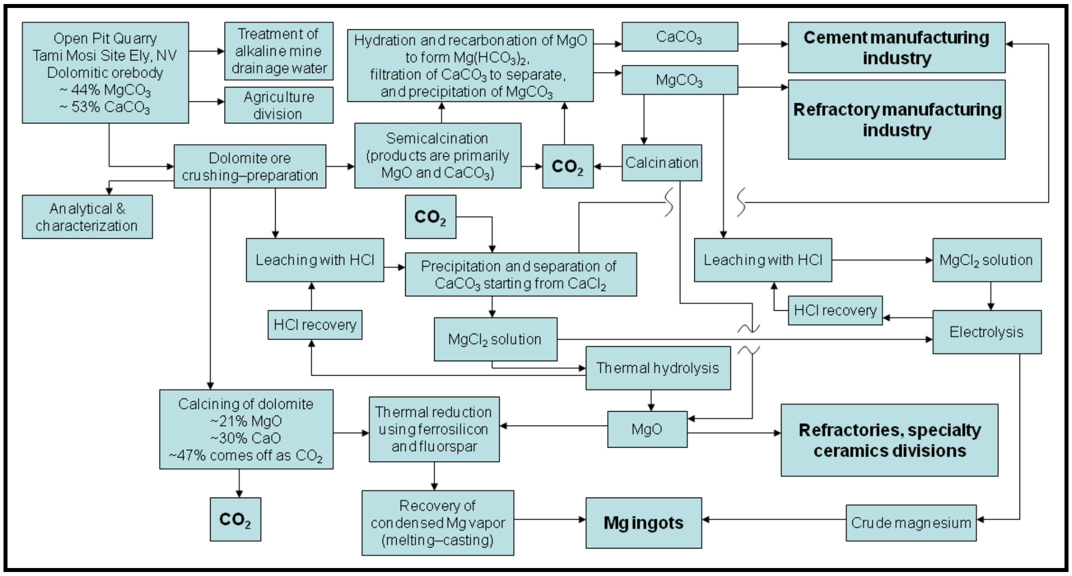
Magnesium is a reactive metal (among the alkaline earth, or “Group II” metals on the periodic table of elements). Its extraction requires special conditions, compared to that of conventional metals (copper, iron, zinc etc.). A full understanding of benefits and their shortcomings of available processes was required in order to select the most suitable process.

17.1 PROCESS TYPES

Two basic types of production processes are used to produce magnesium: the electrolytic process and the thermal reduction process. The electrolytic process, or hydrometallurgical process, is mainly used to produce magnesium from carnallite, salt brines or seawater. In this process, magnesium chloride ($MgCl_2$) is extracted, dried, melted and reduced in a direct current electrolytic cell to produce magnesium. The thermal reduction method utilizes a reductant such as silicon (Si) or aluminum (Al) at an elevated temperature and a low pressure to extract magnesium from calcined dolomite. Currently, the majority of magnesium is produced using the Pidgeon Process which is one of the thermal reduction methods. Both the hydrometallurgical process and the pyrometallurgical process are energy intensive.

Hazen conducted a literature review to investigate the potential magnesia-magnesium production from the dolomite of the Tami Mosi deposit. The potential production methods that are used in the industry or could be potentially used for the dolomite are summarized in Figure 17.1.

Figure 17.1 Potential Processing Paths for the Dolomite from the Tami-Mosi Deposit



The proposed processing paths by Hazen included:

- **Thermal Reduction Processes:** dolomite calcination, thermal reduction, recovery of condensed magnesium vapor
- **Hydrometallurgical Process**: hydrochloride acid leaching to produce magnesium chloride solution followed by thermal hydrolysis or electrolysis to produce magnesium
- **Pyrometallurgy + Hydrometallurgy**: differential calcination of dolomite, hydration/re-carbonation/precipitation to produce magnesium carbonate ($MgCO_3$), followed by calcination, thermal reduction and recovery of condensed magnesium vapor.

Hazen did not recommend an optimum process routine for the recovery of magnesium from the dolomite.

Based upon the mineralization type and current operating technologies, it appears that a thermal reduction approach would offer the best opportunity to extract magnesium economically from the Tami-Mosi dolomite. The thermal reduction process proceeds as follows:

1. calcination of dolomite to dolime
2. blending of the dolime with a reductant, such as ferrosilicon (FeSi)
3. heating of the dolime-reductant mixture in a vessel under vacuum
4. condensation of the liberated magnesium vapor
5. melting, alloying and casting of the condensed magnesium.

Chemical reactions for the thermal process are relatively simple, including dolomite decomposition and magnesium oxide reduction. The dolomite decomposition, or calcination, involves an endothermal chemical reaction at an elevated temperature:

$MgCO_3{\cdot}CaCO_3 \rightarrow MgO + CaO + 2CO_2$

Depending on the physical characteristics required for the dolime, the calcination temperature can vary from 780 to 1,450°C. Calcination conditions will influence the reduction reaction.

The calcined dolomite is then mixed with a reductant, typically silicon or aluminum, and heated at approximately 1,150 to 1,400°C at a low pressure of approximately 10-100 Pa to reduce the magnesium oxide in the dolime to metallic magnesium which escapes in the form of gas from the reaction zone and is captured at a reduced temperature.

$2MgO + 2CaO + Si \rightarrow 2Mg + 2CaO{\cdot}SiO_2$

$3MgO + 2CaO + 2Al \rightarrow 3Mg + 2CaO{\cdot}Al_2O_3$

There are a number of thermal processes, including:

- **Pidgeon Process**: This is the predominant process in use at this time. Calcined dolomite is ground and blended with ferrosilicon containing 75% silicon. The mixture is briquetted and charged into a steel retort. A vacuum is drawn on the retort which is externally heated to approximately 1,200°C. As the magnesium oxide reacts with the silicon, magnesium vaporizes and migrates to a water-cooled condenser attached to the retort. The condensed magnesium and spent briquettes are removed from the retort on a batch basis. Cycle time for the batch process varies between eight and 12 hours.
- **Bolzano Process:** This process is essentially the same as the Pidgeon Process, but the briquette charge is heated by electric resistance. Instead of using an externally heated retort, the charge is constructed of alternating layers of steel plate and briquettes. The charge is placed in a vertical furnace and electric current is applied to the electric resistance plates. The resistance heating brings the charge to the desired temperature allowing the magnesium to be reduced and vaporize. As in the Pidgeon Process, an external condenser attached to the furnace captures the reduced magnesium. The quantity of magnesium produced per furnace is eight to 10 times more than that extracted from a retort.
- **Magnetherm Process:** Dolime and reductants are together fed at a controlled rate to the furnace. Briquetting is not required. The furnace contains a quantity of slag that is heated by passing an alternating current (AC) current through the slag. The magnesium oxide is reduced by ferrosilicon, but aluminum is also used as a reductant and a slag conditioner. The furnace operates at a higher temperature (1,300°C to 1,700°C), but the vacuum required is not as low as the Pidgeon Process or Bolzano Process. The Magnetherm Process is semi-

continuous, however, the furnace must be shut down periodically to tap slag and to change out the condenser.

- **Mintek Thermal Magnesium Process (MTMP):** The MTMP furnace arrangement is similar to the Magnetherm unit. Rather than resistance heating of the slag, a direct current (DC) arc heats the charge to a higher temperature (1,650°C to 1,750°C) at which the system can operate at atmospheric pressure. A condenser is used that keeps the magnesium in the liquid phase rather than condensing it as a solid as in the other thermal processes described.

MTMP Process can be operated on a continuous basis; however, the system must be periodically shut down to allow for tapping of the slag and the metal.

17.2 PROCESS SELECTION

Based upon the mineralization type and current operating technologies, it was determined that a thermal reduction approach would be one of the best opportunities to extract magnesium economically from the Tami-Mosi dolomite.

Although the Pidgeon Process is more widely used in producing magnesium from dolomite, it was not selected for use for this project, primarily because:

- The process is labour intensive.
- The process is more energy intensive compared to the other thermal reduction processes.
- Retorts are expensive, and fail due to high temperature operation with an internal vacuum.

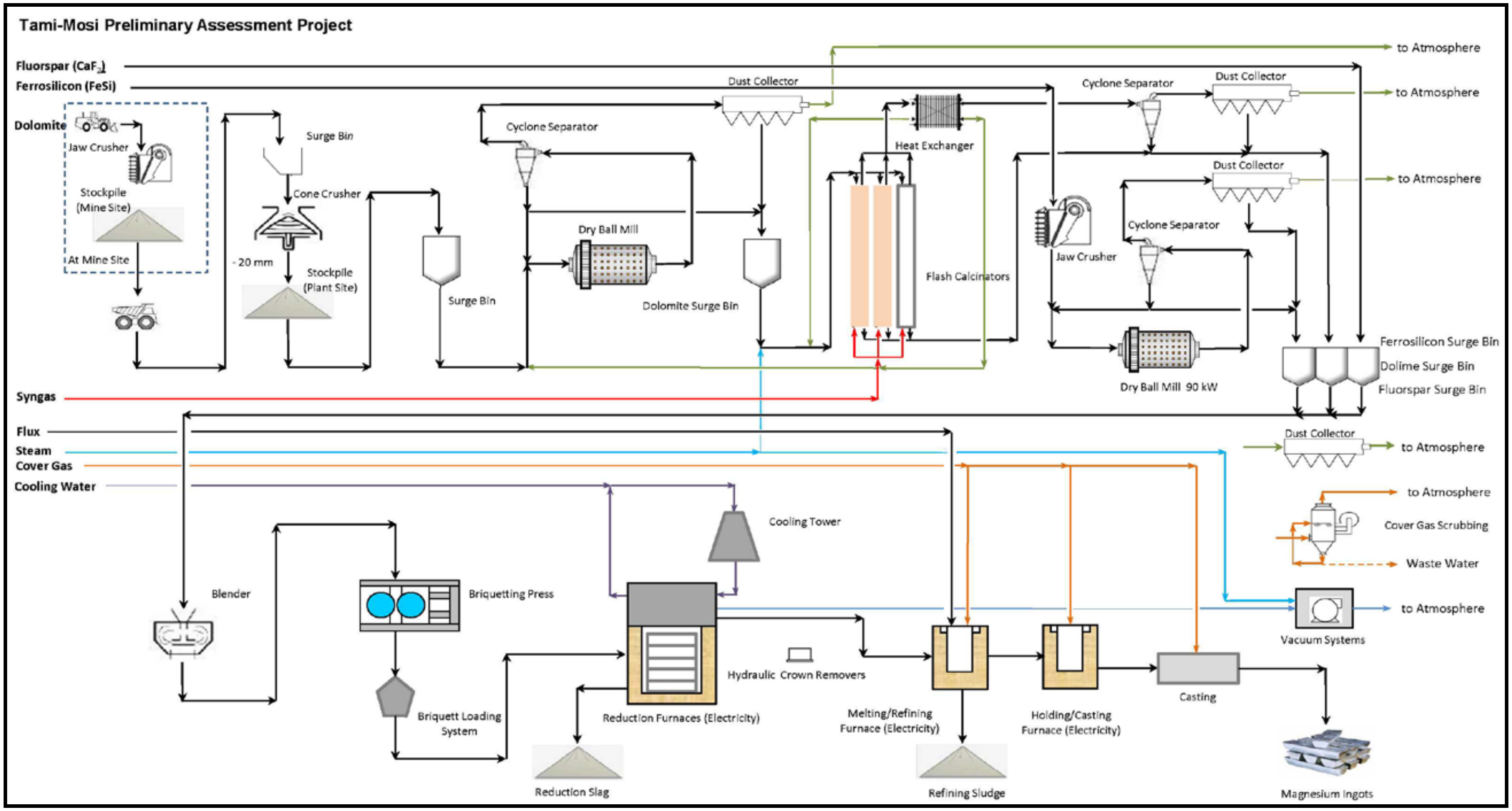
Although the Magnetherm Process and the MTMP Process can be operated at a semi-continuous or continuous basis, and the vacuum required is not as low as the Pidgeon Process or Bolzano Process, both the processes were excluded because:

- The MTMP Process has only operated on a pilot basis and additional work is necessary to advance the technology.
- The Magnetherm Process utilizes a complicated furnace, raw material feeding system and condenser all of which must be maintained under vacuum. In addition, there are issues with electrode failure and limited life of the condenser components.

A modified Bolzano Process was selected as the reduction process for this PEA study. A version of this process (known as the RIMA Process) is currently in use in Brazil. The resistance heating and simple furnace design result in efficient energy utilization and good vacuum integrity. The proposed flow sheet is shown in Figure 17.2.

Further investigations, including various test work and trade-off studies, are recommended for future studies to optimize the process technology for magnesium production from the dolomite.

Figure 17.2 Magnesium Process Flow Sheet



17.3 DESIGN CRITERIA

The proposed magnesium production plant is designed to produce 30,000 t/a of magnesium ingots. The major design criteria are shown in Table 17.1.

Table 17.1 Major Design Criteria

Items	Unit	Criteria
Annual Magnesium Production Rate	t/a	30,000
Operating Day	d	350
Magnesium Content in Mill Feed	% MgO	>20
Magnesium Recovery (to Ingots)	%	81
Crushing		
Operating Day	d/w	4
Operating Hour	h/d	10
Grinding/Calcination/Reduction/Refining		
Operating Day	d/a	7
Operating Hour	h/d	24
Process Rate (Dolomite)	t/h	39
Process Rate (Magnesium Ingots)	t/h	3.8
Calcination Process		Flash Calcination/Syngas
Calcination Temperature	°C	850-1,100
Briquetting Pressure	MPa	150
Briquette Size	mm	~10
Reduction Method		Ferrosilicon Thermal Reduction
Reduction Furnace Type		Vertical
Reduction Furnace Capacity	kg	1,000 kg of Mg Crown
Pressure (Inside of Furnace)	Pa	~20
Reduction Temperature	°C	1,200-1,250
Heating Method		Electricity
Crown Production	kg/batch	1,000
Reduction Retention Time	h	22
Crown Melting Temperature	°C	670-700
Casting Temperature	°C	710-720
Reagent Consumption		
FeSi	kg/t Mg	1,008
Fluorspar	kg/t Mg	166
Flux ($MgCl_2$/KCl/NaCl/$CaCl_2$/MgO)*	kg/t Mg	135
Ingot Weight	kg/piece	8±1
Magnesium Content (Ingots)	% Mg	>99.9

*NaCl – sodium chloride, $CaCl_2$ – calcium chloride

17.4 Process Description

17.4.1 Dolomite Handling and Crushing

The deposit is located 225 km south of the proposed processing site. The dolomite will be crushed at the dolomite quarry, using a mobile jaw crusher system equipped with dumping pocket, feed conveyor, jaw crusher and stacking conveyor. The dolomite will be crushed to 80% passing approximately 50 mm to 60 mm. The crushed dolomite will then be stockpiled prior to being delivered to the processing site by 20 t highway trucks. The proposed transport schedule will be identical to the mining schedule.

17.4.2 Secondary Crushing and Grinding

As the crushed dolomite from the dolomite quarry is discharged from the transport truck at the processing site, its size will be further reduced by an HP500 or equivalent cone crusher to 80% passing approximately 12 mm. The secondary crushing and material handling will be operated continuously to match the trucking schedule.

The cone crusher discharge will be conveyed to the dolomite stockpile, which will have a live capacity of 9,000 t. The stockpile will be capable of supplying feed to the plant for a minimum of 10 days.

The crushed dolomite will then be reclaimed by belt conveyor to the grinding mill feed surge bin, where the dolomite will be dried by the recovered heat from the downstream calcination process. The dried dolomite will be fed to a dry ball mill with an installed power of 700 kW. The ball mill will be in closed circuit with cyclone separators. The mill discharge will be sent to the cyclone separator where the fine dolomite (approximately 80% passing 150 μm) will leave the grinding circuit, while the coarse fraction will return to the mill for further grinding. The cyclone overflow (ultra fine fraction) will be sent to the baghouse where the fine dolomite will be captured.

17.4.3 Calcination

The ground dolomite, including the grinding area baghouse discharge, will gravity feed to the calcination feed surge bin. The heat recovered from the calcination discharge will preheat the calcination feed.

The calcination reactions of the dolomite will take place in 10 flash calciners (nine operating and one standby) at a temperature of approximately 850°C to 1,100°C. The fuel used for the calcination will be the synthesis gas (syngas) that will be generated from the coal gasification power plant at the processing site. The coal gasification power plant will provide electric power for the magnesium and ferrosilicon production plants. Heat will be recovered from the calciner discharges utilizing a fluidized bed heat exchange system. The recovered heat will be used for preheating the calciner combustion air and the calcination feed and drying the mill feed.

After cooling, the calcination product, or dolime will be pneumatically conveyed to the dust collecting system. The collected calcined material will gravity feed to the dolime surge bin.

17.4.4 Briquetting/Reduction Furnace Charge Loading

Ferrosilicon containing 75% Si will be produced on site in the dedicated ferrosilicon production facility. Consequently, the properties and silicon content of the ferrosilicon produced can be closely controlled and matched to the magnesium reduction requirements. The ferrosilicon will be ground to 80% passing 150 µm or finer prior to being used in the downstream operation.

The dolime will be blended with the reducing reagent, ferrosilicon, and the reduction catalytic reagent, fluorspar (CaF_2). The mixture will be pressed at 150 MPa into spherical briquettes with a nominal diameter of 10 mm.

The briquettes from the briquetting press will discharge to the briquette storage bins and subsequently charged to the briquette holding stacks. Each briquette holding stack consists of multiple steel resistance plates and will hold 6,000 kg of the briquettes.

17.4.5 Reduction

The reduction reactions will be conducted at a temperature of approximately 1,200°C to 1,250°C to generate magnesium vapour under a vacuum of approximately 20 Pa (0.15 mm mercury (Hg)). The vacuum will be generated by 6-stage stream vacuum jets utilizing available stream generated by the coal gasification power plant.

The estimated reduction retention time is approximately 22 hours. A total of 96 furnaces, each with a 6,000 kg briquette load capacity, will be used for the thermal reduction process. The furnaces will be electrically heated at a controlled rate. The electrically conductive steel plates in the charge stack will behave as resistors heating the entire charge when electric current is applied.

One loaded briquette stack will be placed in each of the magnesium reduction furnaces. The furnaces will be airtight and consist of two sections, the lower section for stack heating and the upper section for condensing magnesium vapour. The removable condensing section will be cooled by a water cooling jacket. The temperature of the water will be maintained via a closed circuit incorporating a cooling tower. The evaporated magnesium metal generated in the heating section of the reduction furnace will be condensed in the cooled chamber inside of the condensing section to form a solid magnesium crown.

The vacuum will be broken after the thermal reaction is complete. The upper section of the furnace will be removed to an area where the solid magnesium crown will be extracted by hydraulics.

The crown will be refined in the casting area where it will be melted, alloyed and cast into magnesium ingots.

The residue remaining in the resistor stack after the thermal reaction consists of dicalcium silicate and residual ferrosilicon. Upon removal from the reduction furnace, the residue will be separated from the resistor plates and transported to the residue storage load out bin from which it is transported to the quarry for backfilling. Owing to its cementatious properties, it may be used as construction materials.

17.4.6 Refining

The magnesium crown will be melted in one of four melting furnaces, each having a melting capacity of approximately 1.5 t/h. The crown will be melted by placing it in a cascade of molten flux at over 700°C. During this process, the raw magnesium will be refined by removal of entrained oxides and nitrides. In addition, any calcium that is reduced will convert the magnesium in magnesium chloride in the flux into metallic magnesium by reduction.

The molten refined magnesium metal will be transferred by pump to the alloying/holding furnaces where the molten magnesium will be prepared for casting.

After the metal quality is certified, the molten magnesium will be cast into magnesium ingots using a conventional ingot casting machine. The magnesium ingots will be stacked, packaged, placed in the warehouse and staged for shipping.

Covering gas consisting of a combination of sulfur dioxide (SO_2) and carbon dioxide (CO_2) will be injected into the furnaces to shield the reactive molten magnesium and avoid oxidation during melting and cleaning. The off-gas of the protecting cover gas system will be cleaned and neutralized by scrubbing prior to discharging to atmosphere. A non-sulfur hexafluoride (SF_6) cover gas, such as Novec™ 612 or HFC-134a, will be used for protecting the magnesium metal during casting.

17.4.7 Process Control and Instrumentation

The plant control system will consist of a Distributed Control System (DCS) with PC-based Operator Interface Stations (OIS) located in the central control room. The control room will be staffed by trained personnel 24 h/d.

An on-site assay system will be provided to control final and intermediate product quality.

18.0 PROJECT INFRASTRUCTURE

18.1 INTRODUCTION

The project infrastructure is divided into two main areas: the dolomite quarry infrastructure and the processing site infrastructure.

The proposed dolomite quarry will include:

- one mobile crushing plant and stacker
- one 9-yd^3 front-end loader at blast face
- one 6-yd^3 front-end loader at truck loading
- one two-bay truck shop
- site services and utilities.

In addition, the dolomite quarry infrastructure will include site and access roads, a sewerage holding tank, and power supply and distribution facilities.

The proposed processing site is presented in Figure 18.1 and Figure 18.2. Figure 18.1 illustrates the existing and future road and rail access, and Figure 18.2 shows the layout of the vertically integrated processing site, respectively.

Figure 18.1 Processing Site Access

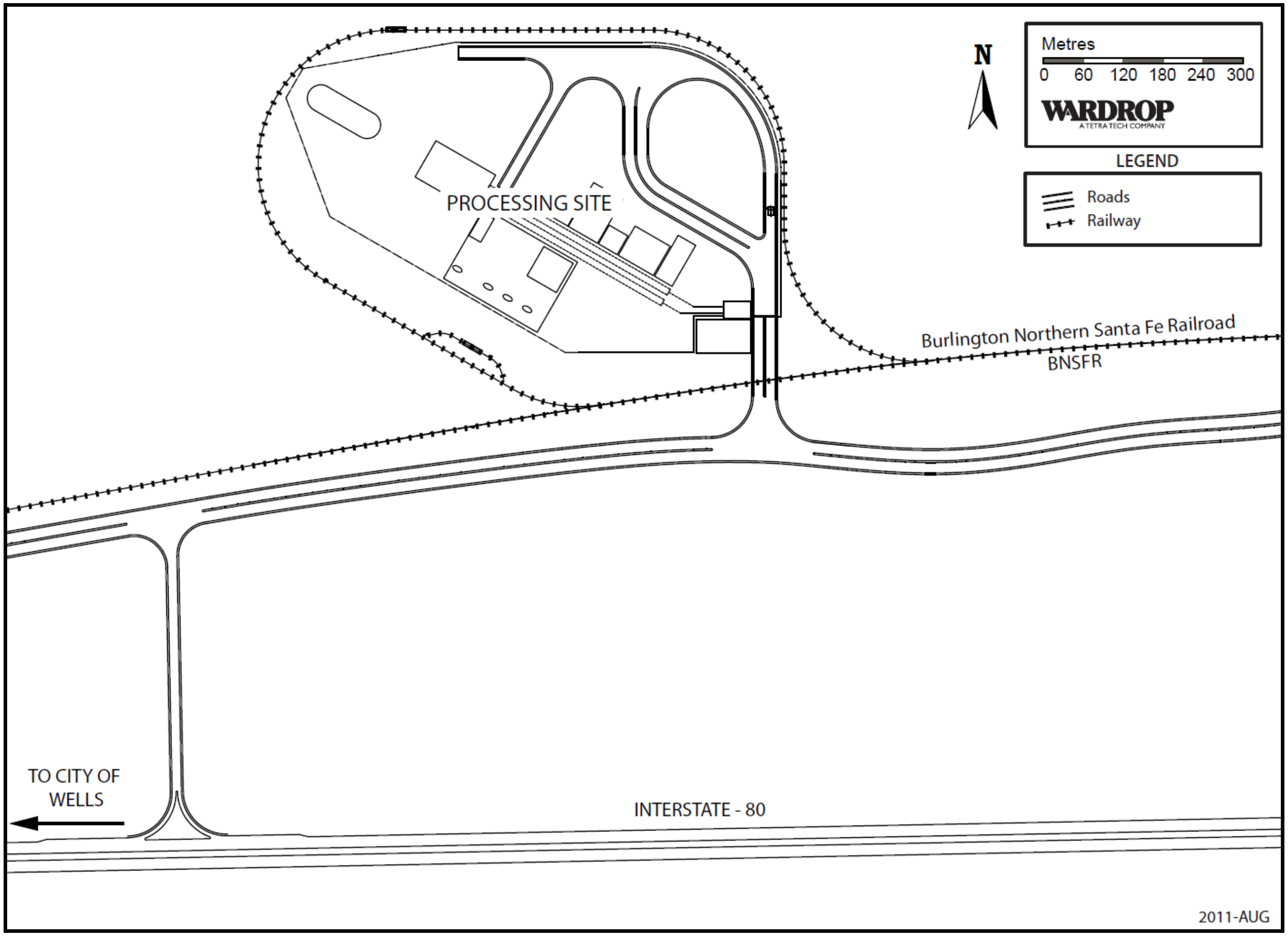
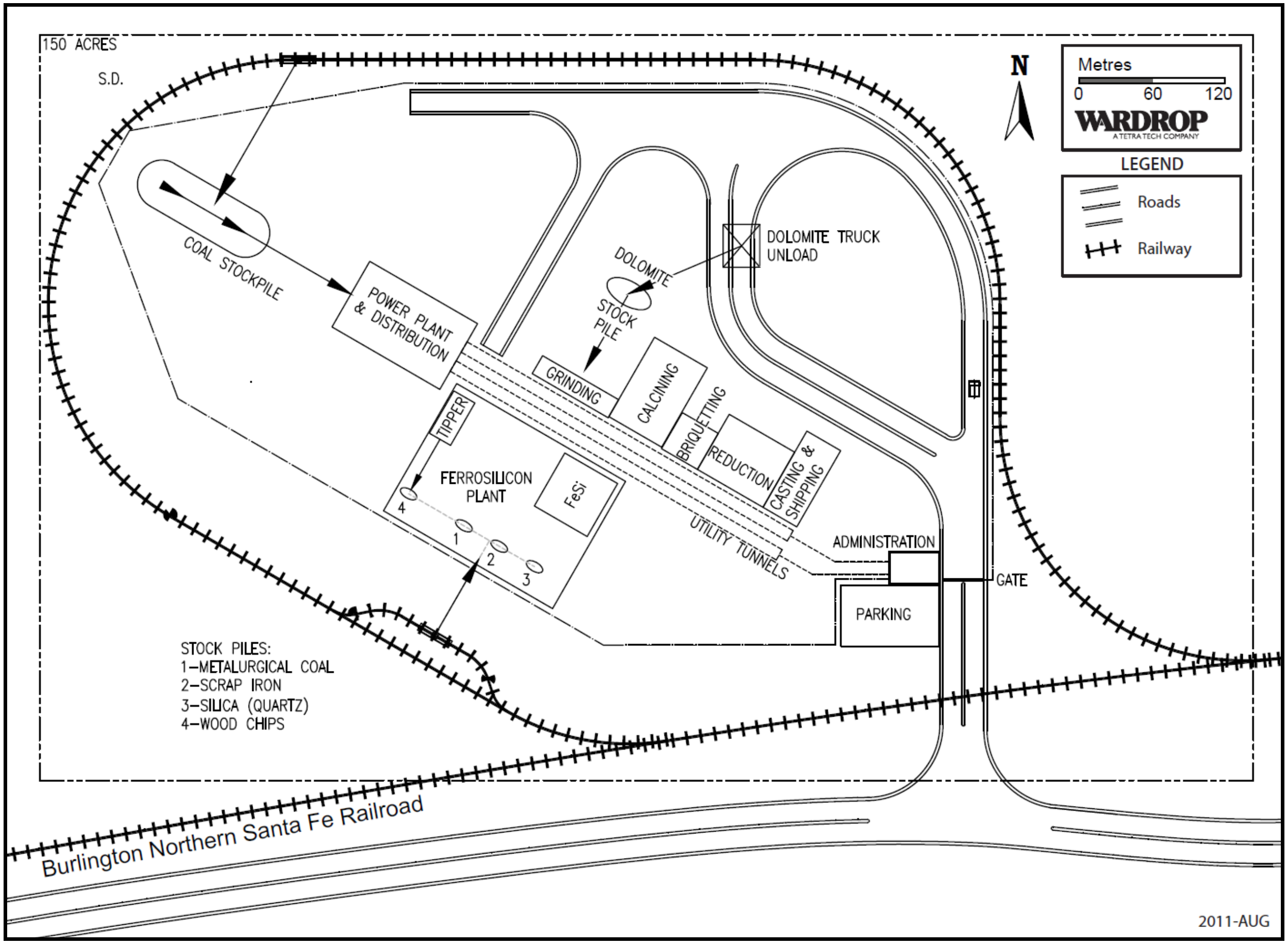


Figure 18.2 Processing Site Layout



The processing site layout was designed to provide optimal material flow, efficient utility distribution, and effective road and rail access to and from the site. The processing site will be capable of processing 85.7 t/d Mg. The site will include:

- a dolomite off-loading, crushing and grinding facility
- a magnesium plant, including:
  - calcining
  - briquetting
  - reduction
  - casting
- ferosilicon production
- power generation and distribution infrastructure
- other site services and utilities
- site and access roads, including rail spur
- fresh and process water supply systems.

18.2 ROADS

18.2.1 ACCESS ROADS

The dolomite quarry access road branches off of the existing Highway 93 southeast of Ely, and runs 1.5 km to the dolomite quarry. The existing access road will be upgraded to gravel road suitable for tandem highway dump trucks.

The processing site access road will branch off of the existing highway access road north of Interstate 80, east of Wells, and run north approximately 400 m to the processing site entrance. The access road will be paved and divided, and will provide commercial and employee access to the site.

18.2.2 SITE ROADS

Planned quarry site roads include a gravel truck loop for the tandem highway dump trucks, and an explosives store access road.

Planned processing site roads include gravel haul roads from the paved site access road to the dolomite off-loading loop, a main process buildings pavement area, and a truck turn-out. A paved employee and visitor parking lot will be accessed from the paved processing site access road.

18.3 RAIL

Planned rail access to and from the processing site includes a rail spur line loop complete with one coal off-loading facility, and one process input materials off-loading facility. The approximately 1.5 km spur line loop will access the existing BNSFR.

18.4 POWER

18.4.1 QUARRY SITE POWER SUPPLY

Power will be supplied to the quarry site via the local gridline that runs parallel to Highway 93, approximately 1 km west of the site, in a 200-amp service panel. Power will be distributed to truck shop for interior and exterior lighting, service outlets, and sentinel lighting in the immediate area. All other equipment will be powered by mobile diesel units.

18.4.2 PROCESSING SITE POWER PLANT

The processing site will require a significant amount of electrical power. There is basic existing electric power distribution infrastructure adjacent to the plant site; however, electric power costs were determined to be prohibitively high. Accordingly, a clean coal gasification and a gas turbine was selected as the plant's power supply.

Three forms of energy will be used in the production of magnesium processing facility: electricity, syngas (coal gas) and high pressure steam. All three energy sources will be produced in a single facility using Powder River Basin coal (PRB) or its equivalent. In addition to energy production, a plant-wide water treatment and cooling system will be incorporated within the power plant.

PRB coal is used worldwide because of its low cost, and its low-ash and low-sulfur properties. With the plant sited relatively close to these coal deposits and residing adjacent to the main transcontinental rail line, delivery cost via unit train will be low.

The power plant, with a gross generation of 75 MW, will be capable of delivering a minimum of 71 MW of AC electric power continuously, 52.8 million BTU/h of syngas and process steam as required. The power plant, fed by a high-speed coal train offloading and stockpile reclaim system, will consists of:

- coal gasifiers
- a combustion turbine-generator
- a heat recovery steam generator (HRSG)
- a steam turbine
- a boiler
- power regulating and distribution equipment (for all three energy sources)

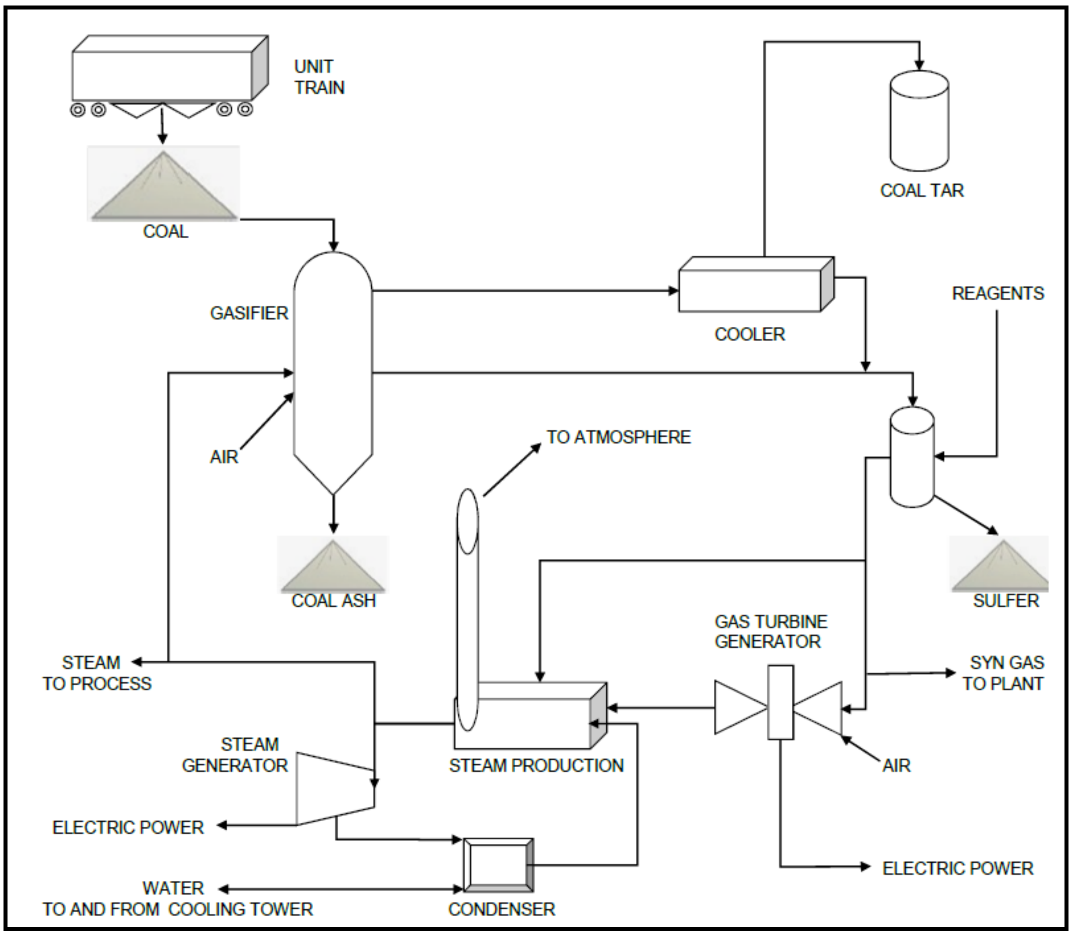
- water treatment and cooling equipment.

An electric power substation will also serve as the entrance point for power from the local electric power grid. Imported electric power will be utilized to initiate a "cold start" of the power plant, and to safely shutting down the Tami-Mosi Facility in the event of a power plant failure.

POWER PLANT OPERATION DESCRIPTION

A power plant flow diagram is provided in Figure 18.3 to accompany the Operation Description presented here.

Figure 18.3 Power Plant Flow Diagram



A unit coal train will arrive every 9 to 10 days. The unit coal train will transfer onto a discharge rail loop containing a high-speed unloader. As the train progresses through the loop, the cars are automatically dumped. The high-speed unloader system will be constructed to allow the entire train to be processed within six hours or less. When the last car will be emptied, the train will return to the main line.

The coal will then be transported by conveyer belt to an elevated tripper/stacker. The tripper operation will be controlled such that the coal will be continually discharged on the apex of the coal storage pile minimizing dust generation and breakage of the coal. The storage pad containing the coal storage pile will be sized to contain 1.5 unit trains coal capacity.

The coal will be recovered, as needed, from the coal storage pile via one of three feed chutes located beneath the pile. A belt conveyer will transport the coal to the gasifiers. The gasifiers will produce syngas for use in the power plant and distribution to the facility. A portion of the syngas generated will be directed to a combined cycle power generation system consisting of a combustion turbine-generator, a HRSG, and a steam turbine generator to produce electric power. Another portion of the syngas produced in the gasifiers will be used in a high pressure boiler to generate steam to power the magnesium facility's vacuum pumps and to aid in the flash calcination of the dolomite. The remaining syngas produced will be transmitted across the facility for use in calcination, preheating of equipment, and potentially, in the cast house to heat and melt the magnesium metal.

Electric power for emergency use will be provided by the substation adjacent to the power plant.

Power Plant Waste Streams

The gasifiers will generate an ash and elemental sulfur waste stream. The ash will be collected and then transported to the dolomite mine as a “back haul”. This waste stream will be effectively combined with the oxide residue from the magnesium reduction plant to make a cementatious product used for roads and staging pads at the dolomite quarry. Part of the sulfur will be used internally to generate sulfur dioxide for the prevention of oxidation of molten magnesium. Any remaining sulfur will be a by-product marketed to sulfuric acid producers. Economic value of the sulfur by-product was not included in this assessment.

18.5 Site Services

18.5.1 Water Supply

Quarry site potable water will be brought in from local supplier and distributed in bottles. No process water is required.

Planned processing site potable water will be brought in from local supplier and distributed in bottles. Sanitation water and process make-up water for various closed circuit systems will be provided via a water tower and limited distribution system. The tower will be filled and maintained by contracted truck delivery.

18.5.2 SEWERAGE

Quarry site sewage and processing site sewage will be stored in a collection tank and regularly transported offsite by sewage contractor.

18.6 FERROSILICON PRODUCTION

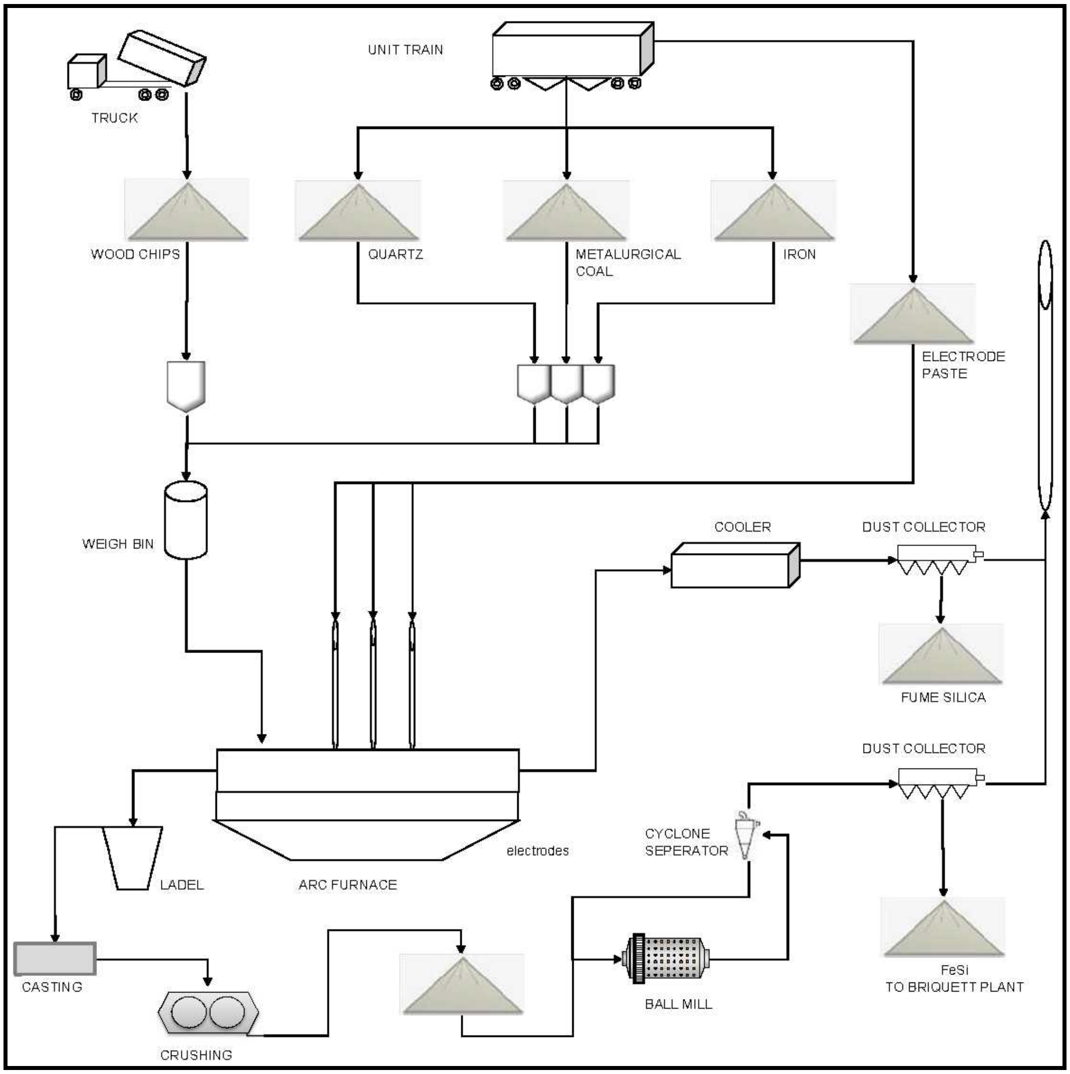
Ferrosilicon reductant constitutes over one-third of the cost to produce magnesium using a siliconthermic method. Even though the ferrosilicon is commercially available, the delivered cost is too high for the proposed magnesium project to be viable over the long term. Therefore, a ferrosilicon production operation was incorporated into the overall facility.

18.6.1 FERROSILICON PLANT

The thermal reduction process used to produce magnesium metal from dolomite utilizes 75% ferrosilicon as the reductant. The cost of the ferrosilicon constitutes the largest single cost component in the magnesium cost of metal produced. On Site production rather than purchase of the reductant appears to be an effective method to reducing overall magnesium production costs. A major benefit derived from the local production of ferrosilicon is the ability to directly control the quality of the major process chemical with respect to composition and variability. This will enable efficient control of the magnesium reduction process and lead to maximization of productivity.

Figure 18.4 shows the ferrosilicon plant flow diagram.

Figure 18.4 Ferrosilicon Plant Flow Diagram



The ferrosilicon plant will consist of the following major components:

1. **Storage**: A raw material handling and storage area for metallurgical coal, quartz, iron scrap, woodchips and electrode paste.
2. **Process Storage**: Storage tanks for each material as required throughout the process.
3. **Reduction Furnace**: A 36 to 40 MVA Soderberg electrode submerged arc furnace with a rotating hearth.
4. **Casting**: Crucibles, handling equipment, water cooled slab casting machine with 24 molds.
5. **Grinding**: Handling equipment, roll crusher, ball mill, cyclone classifier and storage bin.

6. **Environmental**: Bag houses for the by-product amorphous fumed silica- dust generated as part of the ferrosilicon, insulated duct from furnace to cooler, loop cooler, bag house, and fan.

18.6.2 FERROSILICON PROCESS CONTROL

A key to stable process operation is high quality consistent raw materials. This will be defined by contract and maintained using vendor based statistical process control.

Direct control of the furnace and the weigh batch system will be by process control computers located in the plant control room. The charge ratio (i.e. ratio of raw material to quartz feed) is set by the process control manager. The electrode position which eventually results in furnace temperature will be controlled by a power temperature algorithm.

Tapping will be semi continuous. As the furnace rotation moves one tap hole out of position, a new one will be opened and the active one plugged.

Product samples will be taken periodically from the flowing ferrosilicon stream at a point immediately past the tap hole. These samples will be delivered to an automatic analytic cell located on the process floor. The analytic cell will automatically prepare and analyze the sample, communicating the results to the control room via the process control data base. This data will be used by the control computer to make small corrections to the feed charge.

18.6.3 FERROSILICON PLANT OPERATION

Raw materials, including: iron scrap, metallurgical coal, quartz, and wood chips, will be brought in via truck in the case of the wood chips, or by rail in bottom dump hopper cars. These will be unloaded and conveyed to the storage area. A minimum of 10 days operation quantity will be available for each raw material.

Twice each day, the raw materials will be reclaimed from the storage area and conveyed to process storage tanks located adjacent to the furnace. Measured amounts of the raw materials are periodically taken from the process tanks. These are delivered by bucket elevator to the charge system located above the furnace. Once a complete charge is accumulated in the bin, it will be positioned above the furnace and fed to the furnace bed via multiple chutes. A furnace operator will then distribute the charge using a powered stoker.

As the charge in the furnace is consumed, the quartz reacts with the carbon components and is converted into silicon. This dissolves into the iron within the charge. The molten ferrosilicon settles to the bottom of the furnace.

The furnace is rotated to prevent a build-up of intermediate product (silicon carbide, etc.) at the cold sides of the furnace and to prevent overheating of the furnace bottom and shell. One rotation is typically completed in 24 to 36 hours.

A series of tap holes will be constructed into the side wall of the furnace at the interior floor level. Once the desired volume of product has accumulated in the bottom of the furnace, a tap hole will be opened by drilling, arcing and/or shooting with a tapping gun. The molten ferrosilicon flows from the tap hole along a refractory lined trough (launder) and cascades into a refractory lined ladle. As one ladle will be filled, the flow will be temporarily shut off by plugging of the tap hole. The full ladle will be removed and a fresh one placed in position for resumption of the tap.

The filled ladle will be transported by overhead crane to a tilt stand. Once secured in the stand, the ladle will be tilted to pour molten ferrosilicon onto water cooled molds. In order to maintain a fine grain size and uniform composition within the product, only 1 cm of the mold will be filled. Once filled, the mold will be rotated out of position to allow the ferrosilicon to solidify and cool. After all the molds in the casting wheel have been filled once, the operation will be repeated. This continues until the ladle is empty, at which point, there will be 6 to 7 cm of solid ferrosilicon in each mold. As the empty ladle is being changed for a fresh one, the molds will be tipped to a vertical position as they index past a dump hopper. The product falls from the mold and breaks into chunks as it enters the hopper.

The hopper will be elevated to the top of the crusher portion of the ferrosilicon building. The ferrosilicon will be dumped into a feed hopper that allows a controlled amount of ferrosilicon to reach a roll crusher. Discharge from the roll crusher falls into a feed bin. From here, the chips are metered into a ball mill. As the ferrosilicon will be pulverized, an air sweep transports the product out of the mill, through a separation system and into a storage bin. At this point, the ferrosilicon will be transported to the briquetting portion of the magnesium reduction plant.

18.6.4 FERROSILICON PLANT ELECTRODE PRODUCTION

Carbon furnace electrodes will be consumed during plant operations. The electrodes will be replaced via the Soderberg process, which utilizes the heat transmitted from the furnace to the top of the electrode to bake a mixture of coal tar, coal and coke into an amorphous carbon mass.

At the top of the electrode, a cylinder of heavy gauge steel will be welded on to the existing casing forming an empty cylinder. This cylinder will be filled with blocks consisting of coal tar, coal and coke. As the electrode is consumed, it will move down, and these blocks will enter the temperature zone that causes them to flow and fuse into a plastic mass without voids. As this segment of the electrode progresses down, it will pass through progressively hotter zones. The coal tar will then be converted into amorphous carbon, binding the coal and coke into a continuous mass. Above the furnace bed, the electrodes pass through the pressure ring where electrical power will be applied to the electrode to provide the heat for curing paste into the final baked electrode. Volatiles from the coal tar flow down through the bottom of the electrode and are consumed in the reduction process.

18.6.5 FERROSILICON PLANT WASTE STREAMS

Proper selection of raw materials will result in all of the furnace charge being consumed. Slag is not expected to form.

The top of the furnace will be covered to capture all fumes emanating from the process. Access doors enable service by the operator. An exhaust system conveys the fume to a cooler and bag house. Exhaust from the bag house will be ducted to the plant exhaust stack. Solid particles trapped by the bag house are predominantly very fine amorphous silica and minor amounts of carbon soot. This solid waste stream will be discharged into a silo via pneumatic conveyer. The silo will be periodically emptied into a dolomite truck returning to the dolomite quarry. This fumed silica will be blended with the oxide waste stream coming from the magnesium reduction plant to form a cementatious material suitable for roads and staging areas within the quarry.

18.7 ANCILLARY BUILDINGS

The processing site administration building, change facility, assembly/board room and gate office will provide offices and workstations for all management, supervisory and support staff. This facility will be located adjacent to the main process site entrance gate and employee/visitor parking lot. The administration building will be provided with heating, ventilation, and air-conditioning (HVAC), and other services required.

18.8 SITE PROCESS CONTROL, INSTRUMENTATION, AND DATA SYSTEMS

The quarry site will include communication via two-way radio capable cell phones utilizing a cell phone repeater located in the pit. A single workstation will be included in the truck shop for limited administrative functions.

The various areas of the processing site will be connected through three separate data systems and one phone system. Operation data will be relayed throughout the site via a closed data network (intranet). Similarly, a second closed data network will relay financial data. External data access will be administered through a restricted separate data network. In addition, the processing site will be equipped with a multi-line phone system.

Process control will be managed via a central control room located at the power plant utilizing the operation data network.

18.9 CONCLUSION

The dolomite quarry truck-loading and truck shop will be located in close proximity to the open sided pit to limit material handling and within 1 to 2 km of the highway and electrical service line.

The processing site layout was planned to minimize the overall footprint and to utilize the existing grade for site drainage minimizing excavation requirements. The rail loop encircles the processing site to afford unit train unloading clear of main rail line and to limit rail crossings to one, at the main entrance only. Distribution of utilities will be provided via service tunnels running under the central corridor of the plant to minimize overhead wires and pipes and to provide ultraviolet (UV) protection. All process facilities have been located based on process sequence to minimize material handling and footprint.

The vertical integration of the processing site further enhances the economic opportunity present in the Tami-Mosi Magnesium Project.

19.0 MARKET STUDIES AND CONTRACTS

The worldwide production and usage of magnesium grew by 16% in 2010. The price of magnesium in the US and worldwide has been rising and world consumption is anticipated to increase by 5% per year from 2010 to 2015.

19.1 MARKETS

The world market for magnesium is small compared to other industrial metals markets. Unlike most commodities, magnesium is not traded on any major exchange. Major magnesium users negotiate contracts for magnesium alloy deliveries in advance of their production requirements, and do not make actual prices publically available. Some major metals magazines indicate general pricing trends.

Magnesium markets are categorized by end uses of the metal, both on a worldwide and local basis. There are three major categories of magnesium usage:

- aluminum alloying
- magnesium die casting
- desulfurization of iron and steel.

Magnesium consumption has been growing slowly in recent years, in response to the slowing world economy. Because total magnesium production is relatively low compared to world aluminum production (800,000 t/a versus 40 million t/a, respectively), magnesium sales contracts are small, but vital to aluminum producers as an alloying element. Both aluminum sheet and extrusions are composed of 3% to 5% magnesium to improve alloy properties.

It has been suggested that “the sustained use of magnesium in automotive production (in the US) may depend on its availability from multiple sources” (NADCA, 2010). Accordingly, several large US die casters have already contacted NVM representatives to discuss the Project and the production schedule. The potential introduction of magnesium from the Project will provide an additional supply of magnesium to the automotive industry.

19.1.1 WORLD PRODUCTION AND USAGE

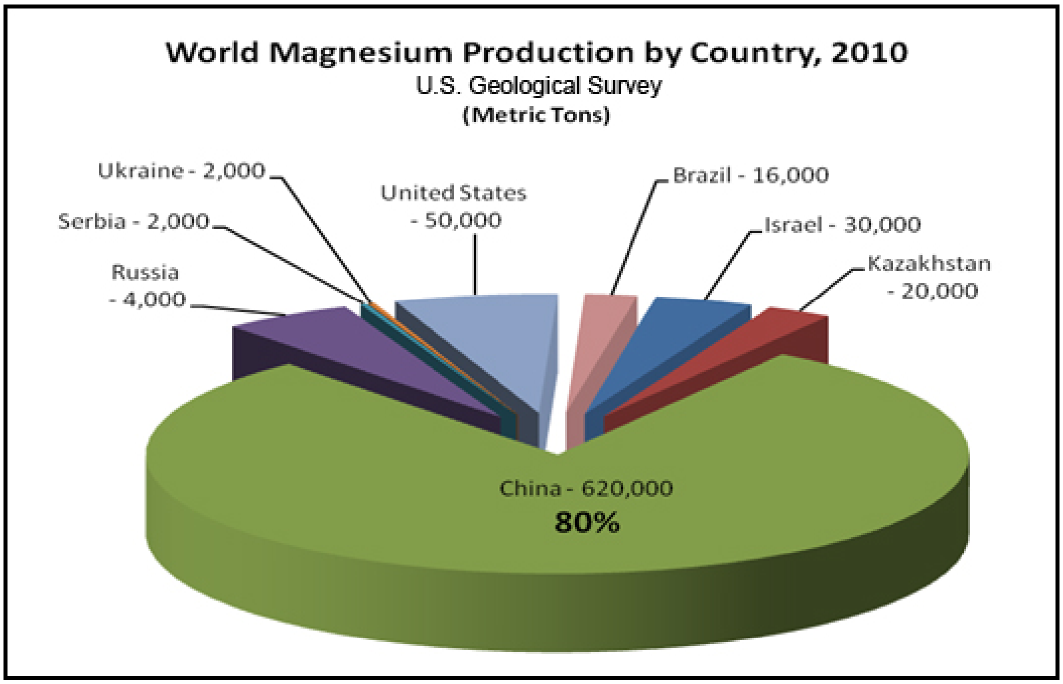
A brief summary review of world production from the US Geological Survey (USGS) is provided in Table 19.1 and illustrated in Figure 19.1 (Kramer, 2011).

Table 19.1 2009-2010 World Magnesium Production*

Country of production	Total Magnesium Produced 2009(t)	Total Magnesium Produced 2010(t)
United States	50,000	50,000
Brazil	16,000	16,000
Israel	29,000	30,000
PR of China	501,000	620,000
Serbia	2,000	2,000
Russia	37,000	40,000
Ukraine	2,000	2,000
Kazakhstan	21,000	20,000
Totals	658,000	780,000

*Table based on USGS estimates adjusted

Figure 19.1 World Magnesium Production 2010 US Geological Survey



In 2010, total world magnesium production was an estimated 780,000 t, up from 658,000 t in 2009. China produces over 80% of the magnesium supplied worldwide, which significantly impacts world magnesium prices. The internal consumption of magnesium in China is increasing rapidly.

The worldwide demand for magnesium grew by 16% in 2010. Aluminum alloying continues to be the largest worldwide usage category, while demand for die casting (principally used for automotive production) has decreased. China consumes more magnesium than any other country in the world.

In the context of the current world economic uncertainty, worldwide consumption can only be projected to 2015. Total consumption can be reasonably expected to increase 5% each year between 2010 and 2015. Accordingly, total world consumption of magnesium is expected to reach 995,000 t/a by 2015.

19.1.2 US Usage Of Magnesium And Magnesium Alloys

There is only one US-based producer of magnesium, and supply numbers are withheld to protect the parties involved; accordingly, it is difficult to accurately determine magnesium consumption in the US. However, a recent presentation from the Minerals, Metals and Materials Survey (TMS) (Slade, 2011) suggested an improved market environment in 2011 over 2010.

Table 19.2 presents US Magnesium Consumption by Use on an annual basis.

Table 19.2 US Magnesium Consumption by Use (Tons)

Category	2003	2004	2005	2006	2007	2008	2009	2010**
Die Casting	49,100	69,100	33,500	25,600	23,100	16,200	19,100	19,600
Permanent Mold	71	112	112	50	29	19	107(r)	163
Sand Castings	394	391	412	357	2800	428	410	424
Wrought Products	3,190	2,240	2,890	2,410	2,720	2,480	1,090(r)	2,120
Aluminum Alloys	33,800	33,900	30,300	33,700	29,800	35,000	23,000	23,800
Cathodic Protection	3,720	3,520	3,020	3,000	916	824	686	709
Desulfurization	8,130	8,360	7,410	7,570	9,290	7,070	3,970	5,960
Reducing agent Ti,	930	934	812	869	1,280	1,320	1,120	882
Other	3,340	3,580	3,300	3,690	2,010	1,080	1,350	1,630
Nodular Iron	W/other	W/other	240	323	304	61	72	412
Total	103,000	122,000	82,100	77,600	72,300	64,500	50,900	55,680

Source: US Geological Survey Minerals Year Book.
** Unofficial estimated numbers
(r) revised

The majority of magnesium consumed in the US is used as an alloying agent for aluminum, followed by die casting and desulfurization. Other uses are as a reducing agent in the production of titanium, beryllium, and zirconium, a ferroalloy nodulizing additive, a sacrificial anode, an engraving plate, and as a catalyst.

Table 19.3 show the US uses of primary magnesium as a percentage of total US consumption.

Table 19.3 US Uses of Primary Magnesium (2010)

US Use of Primary Magnesium	Consumption (%)
Aluminum Alloy (Packaging/Transportation, etc.)	41
Structural (Cast/Wrought)	32
Desulfurization of iron and steel	13
Other	14

The majority of the growth of magnesium demand in the past decade is a result of its increased use in automotive applications. Further increases in automobile applications are expected to boost the demand for magnesium. However, automotive manufacturers may be less likely to choose magnesium over other lightweight materials if the availability of magnesium continues to be limited to a very small number of producers (Kramer, 2009).

Tariff Influences

Because of anti-dumping duties assessed on magnesium imported from China and until recently Russia, automotive manufacturers and die casters were limited to sourcing primary magnesium from only two companies: one in Israel, and one in the US. The limited number of suppliers and lack of competition is one of the reasons that the US automotive industry has historically been reluctant to use magnesium in its manufacturing process.

Aluminum sheet Influences

In mid-2010, the output of US aluminum rolled product producers was approximately 50% of their capacity. However, aluminum production in the US apparently is rising. Aluminum producers are bringing idled rolling capacity on line to meet the demand for lighter-weight car production. Expansion is expected to continue.

The can sheet market (which uses large quantities of magnesium) is mature; usage remains level (Martens, 2011).

Die Casting influence

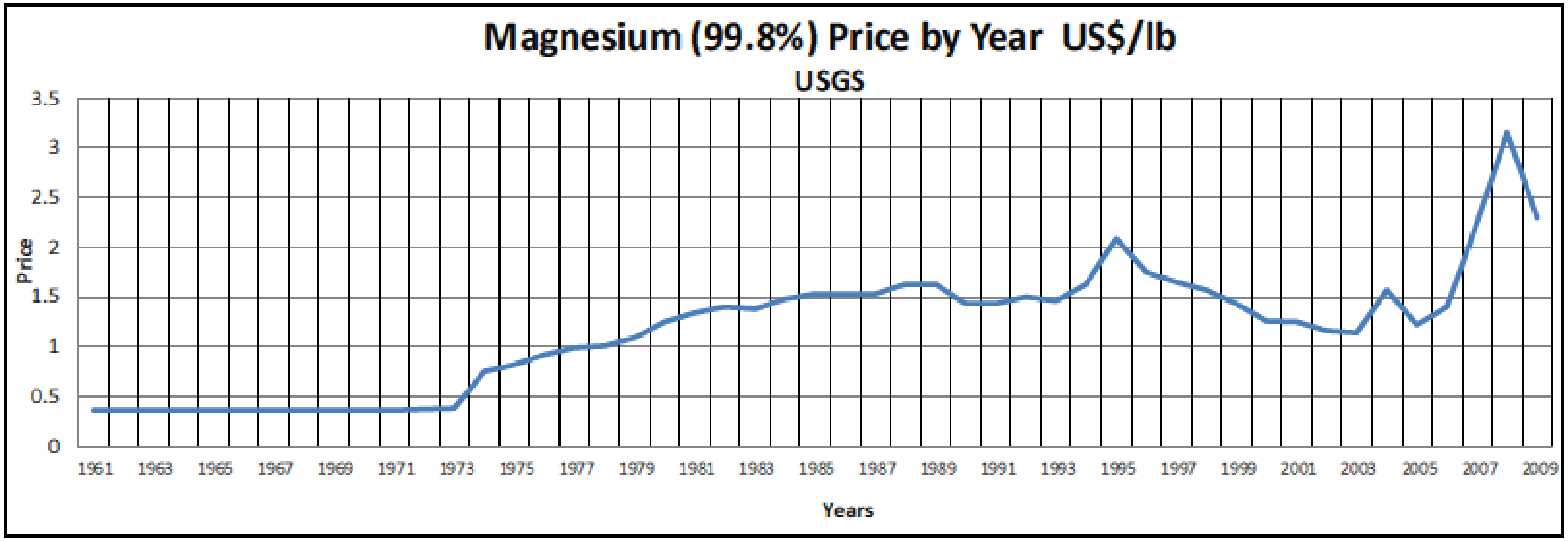
Auto production demand for magnesium die castings is also expected to increase. The demand for magnesium is expected to rise 10% in 2011, partly because auto manufacturers are seeking new magnesium part designs to reduce vehicle weight, incorporate crash energy management, and improve “fit and finish” over steel stamping assemblies. These new design initiatives are in response to changes in Corporate Average Fuel Economy (CAFE) regulations that require vehicle manufacturers to improve their overall vehicle portfolio fuel efficiency.

While the US die casting industry has been weakened by the economic down turn, there have been recent reports of new magnesium die casters opening in 2011 (Slade, 2011).

Other influences

The demand for magnesium as a reducing agent in the production of other metals, such as beryllium and titanium, is growing in the US.

Figure 19.2 Magnesium Price US$/lb



19.2 MAGNESIUM PRICING AND CONTRACTS

19.2.1 INFLUENCES ON US SELLING PRICE OF MAGNESIUM

There are a number of factors that influence the US selling price of magnesium.

- Magnesium is not traded on a metal exchange; hence prices are regional and the product of negotiated contracts and supply and demand.
- Magnesium produced within the US is not subject to anti-dumping or import duties. The internal US domestic selling price is of magnesium is higher than that of Europe or Asia.
- There is steady upward pressure on production costs in China due to increases in labour costs, electricity costs, and changes in environmental regulations. This upward pressure is reducing China's current cost advantage.

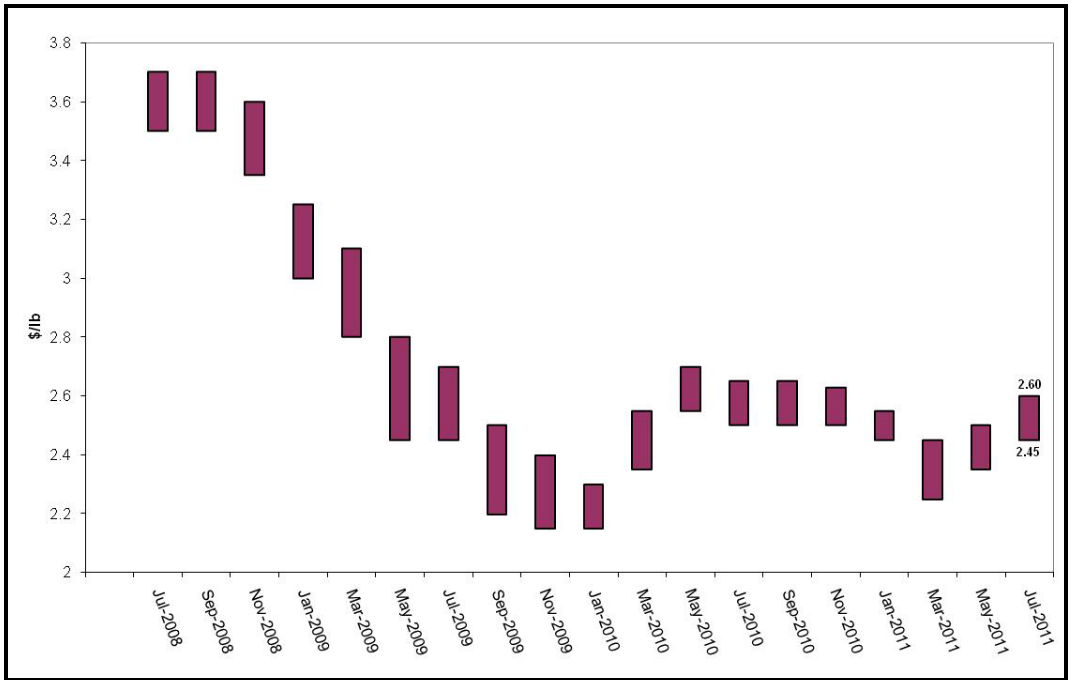
19.2.2 CONTRACTS

It is normal practice for larger users of magnesium and magnesium alloy to negotiate contracts and place orders for enough magnesium to accommodate the upcoming years' production. Price review periods are routinely included in the contracts.

One of the major industry outlook reports qualifies their numbers by adding a disclaimer which says, "This report quotes figures for volumes, prices and costs in the traded magnesium industry. It is important that readers understand that no single organization produces, collects, collates and publishes accurate and independent statistics for the entire traded magnesium industry. A comprehensive set of industry statistics was published periodically by the International Magnesium Association until 2002. This was ceased as the result of the dwindling number of 'western world' primary producers and the unwillingness of the remaining producers to share sensitive data." (Clark, 2011)

Reference prices are basically those listed in Metals Week magazine. They have listed the selling price of US Spot Western pure magnesium as an average of US$2.60/lb for 2010. This is estimated by the Metals Week staff which surveys producers, traders, buyers and users. They are based on an estimate since the actual transaction prices are kept confidential. Figure 19.3 presents the contract price ranges bi monthly based on the estimates from Metals Week Magazine.

Figure 19.3 US Spot Price Range Bi-monthly (99.9% Magnesium)



The entire magnesium user industry, particularly the die casters, will be watching the development of this project very carefully.

20.0 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

This section describes the overall permitting and approval process that must be completed by NVM in order to construct, operate and close the Tami-Mosi dolomite quarry and processing site facilities.

This process includes the acquisition of all necessary permits and approvals from various federal, state and local government agencies, and the completion of a baseline study program to collect data for biological and socio-economic resources that will be used to support the overall permitting and approval process.

As part of this process, an environmental documentation program, completed in accordance with NEPA will be completed to assess the potential impacts to the human and natural environment that could result from the implementation of project activities.

20.1 ENVIRONMENTAL STUDIES

A multi-resource baseline study program will be implemented to collect the data required to support the completion of the multi-federal and state agency permitting program, and the anticipated environmental documentation process required under NEPA. This baseline program may include, but will not be limited to, studies on the following resources:

- general vegetation
- general wildlife
- special status vegetation and wildlife species including those species managed under the requirements of the Federal Endangered Species Act of 1973, as amended
- invasive, non-native plant species including noxious weeds
- soils
- palaeontology
- water quality and quantity, including surface and groundwater hydrology
- Jurisdictional Wetlands and Waters of the United States as required by Section 404 of the Federal Clean Water Act of 1977, as amended
- air quality as required by the Federal Clean Air Act of 1963, as amended

- cultural resources as managed under the Federal National Historic Preservation Act of 1966, as amended, and the Federal Archaeological Resources Protection Act of 1979
- Native American traditional values as regulated by various federal laws and regulations including the American Indian Religious Freedom Act of 1978, as amended, the Native American Graves Protection and Repatriation Act of 1990, and Executive Order 13175 – Consultation and Coordination with Tribal Governments
- Environmental Justice in accordance with Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Providers
- hazardous materials and solid waste
- range management
- social and economic impacts
- aesthetics, including noise and visual assessments.

This baseline program would be developed in consultation with the appropriate federal and state regulatory agency specialists to ensure the information is collected using approved procedures to meet appropriate data adequacy standards to support the multi-federal and state agency permitting program, and the anticipated NEPA environmental documentation process.

The estimated cost to complete the baseline program could range between $100,000 and $200,000, depending on the resources that that will require study, the amount of data that must be collected to assess the particular resource, and the type of environmental documentation program that is required by NEPA which the baseline data will support. The federal and state agency consultation program will assist in determining the detailed cost estimate for completing the baseline program.

20.2 WASTE AND TAILING DISPOSAL, SITE MONITORING, AND WATER MANAGEMENT

The management of waste rock, tailings disposal facilities, water management, and site monitoring during operations is a key issue for any mine, quarry, and mineral processing operation in Nevada. The State Mining Regulations contained in NAC 445A.350 through NAC 445A.447, mandate that mine/quarry and mineral processing operations “will not degrade waters of the State”. This is accomplished by constructing and managing quarry and mineral processing operations in accordance with approved engineering design plans, and regulatory agency approved operating plans.

The Regulation Branch of the NDEP, BMRR, will issue the State of Nevada WPCP for the dolomite quarry and processing site operations in accordance with NAC 445A.350 through NAC 445A.447, inclusive. The WPCP will stipulate requirements for the management and monitoring of the dolomite quarry and processing site operations to ensure they do not "degrade waters of the State". Operating plans that detail the management of waste rock, tailings, quarterly site monitoring, and water quality management and monitoring will be developed and implemented as part of the WPCP process. Staff from the BMRR will conduct routine inspections of the dolomite quarry and processing site to ensure the requirements of the WPCP are being implemented as stipulated.

BLM will serve as lead regulatory agency for the project. BLM normally incorporates the WPCP permit requirements for the management of waste rock, tailings, quarterly site monitoring, and water quality management and monitoring into their stipulations for the approval and operation of the dolomite quarry and processing site operations.

20.3 PERMITTING

20.3.1 FEDERAL, STATE AND LOCAL AGENCY PERMITTING

A multi-agency regulatory process will be completed to obtain all required federal, state and local agency permits and approvals necessary to construct, operate and ultimately close the Tami-Mosi dolomite quarry and processing site operations. The proposed dolomite quarry is located in south central White Pine County, on federal public lands administered by the BLM Ely District Office of the US Department of the Interior. The proposed processing site is located in east central Elko County, east of the town of Wells on a checkerboard of public lands managed by BLM's Elko District Office, and private lands owned by BNSFR. The proposed processing site is located approximately 215 km north of Ely. Dolomite will be transported from the dolomite quarry to the processing site using licensed, over-the-road trucks that travel north along Highway 93.

Either the BLM's Ely District Office or the Elko District Office will be the lead agency for the overall project permitting and approval process. Discussions between the two offices will determine which District serves as the lead agency, and which District would be the co-lead agency. It is possible that separate federal permitting actions will be required for the dolomite quarry and the processing site, given their locations in separate BLM Districts, and the distance separating the two sites. However, it is strongly suggested that NVM pursue one, comprehensive permitting and approval action with one lead agency.

As lead agency, the BLM will ensure all required federal, state and local permits and approvals are obtained. BLM would issue federal approval for the operations in accordance with their Surface Management Regulations contained in 43 CFR 3809. BLM will require the submittal of a Quarry Plan of Operations and Reclamation Plan, prepared in accordance with 43 CFR 3809 inclusive, that details the proposed dolomite quarry and processing site operations, along with reclamation and closure activities. The BLM will also require the placement of a financial guarantee (reclamation bond) to ensure dolomite quarry and processing site reclamation is completed in accordance with the approved plan. The Plan of Operations and reclamation bond are coordinated with the Reclamation Branch of the NDEP BMRR as described in the following section.

The NDEP BMRR will be the primary cooperating agency for the overall dolomite quarry and processing site permitting and approval process. The Regulation Branch of the BMRR will issue the State of Nevada WPCP for the mine and ore processing operations in accordance with NAC 445A.350 through NAC 445A.447. The WPCP will stipulate requirements for the management and monitoring of the dolomite quarry and processing site operations to ensure they do not degrade waters of the State. Due to the distance between the dolomite quarry and the processing sites, and the distinct difference between dolomite quarry and processing site operations, the BMRR could issue separate WPCPs for each operation.

The Reclamation Branch of the BMRR will issue the State of Nevada reclamation permit for the project in accordance with NAC 519A, inclusive. The reclamation permit, with the associated Plan of Operations and Reclamation Plan, will stipulate procedures for the reclamation and closure of the dolomite quarry and processing site facilities. As mentioned above, the BLM required Plan of Operations and Reclamation Plan will be a joint plan submitted concurrently to both the BLM and the Reclamation Branch of the BMRR for review and approval under a Memorandum of Understanding (MOU) between these two agencies. The Reclamation Branch of the BMRR will review and approve the joint plan and the associated reclamation bond cost, and will issue the State of Nevada Reclamation Permit. It is expected that only one reclamation permit addressing both the dolomite quarry and processing site operations will be issued.

Other federal, state and White Pine County agencies will issue appropriate permits, approvals or concurrences for various mine operations and activities in accordance with applicable federal, state and county ordinances, guidelines, regulations and laws. County Departments that could issue permits or approvals for the Project include the Public Works Department, and the County Health Department. Other State agencies that could issue permits, approvals or concurrence for the project include, but are not limited to, the NDEP Bureau of Air Quality, the NDEP Bureau of Waste Management, the NDEP Bureau of Water Pollution Control, the Nevada Department of Wildlife (NDOW), the Nevada State Fire Marshal's Office, the Nevada Department of Health for public water system, and the Nevada State Historic Preservation Office (SHPO). Additional federal agencies include, but are not limited to, the US Fish and Wildlife Service (USFWS), the .US Army Corps of Engineers (USCOE), and the Bureau of Alcohol, Tobacco and Firearms (BATF).

It is anticipated that the federal, state and local agency permitting and approval program can be completed within a 24-month period. This would allow coordination with the NEPA process, whether it is an environmental assessment (EA) or an environmental impact statement (EIS).

PERMITTING AND APPROVAL COST ESTIMATE

Excluding the NEPA process, the estimated cost to complete the multi-agency permitting and approval process is estimated to range between $100,000 and $250,000, or more, depending on the additional permits and approvals that are actually required. Scoping meetings with the appropriate federal, state and local agencies will help determine the detailed cost estimate for this permitting and approval process.

20.3.2 NEPA Environmental Documentation Process

The proposed dolomite quarry and processing project constitutes a federal action. The federal action will be assessed for potential environmental impacts as required by NEPA. NEPA is not a permit or approval action. NEPA is a "law of disclosure" which:

- analyzes and discloses to the public the potential impacts to the environment that could result from the proposed action (and/or alternatives)
- assesses the level of significance for each identified impact
- proposes mitigation measures, if needed, to reduce the potential impact from the selected proposed action to a less than significant level.

The results of the NEPA analysis are used by the BLM to support their 43 CFR 3809 decision-making process.

Potential impacts resulting from the proposed action would also be assessed in terms of cumulative impacts during the NEPA process. Cumulative impacts are inter-related impacts to individual resources that are the result of past, present and reasonably foreseeable future actions (RFFAs), including the proposed action. Cumulative impacts for individual resources are assessed according to defined areas that include, or are adjacent to, the proposed project area. The BLM would determine the size and location of the cumulative study areas for individual resources. The cumulative assessment program would be completed as part of the selected NEPA program. The proposed baseline study program would be developed to collect appropriate resource data to support the cumulative impact assessment studies.

The NEPA analysis program for the dolomite quarry and processing project would take the form of an EA, or an EIS. The EA process is less stringent then the more comprehensive EIS process in terms of public scoping and depth of analysis. As lead agency, BLM will determine the appropriate NEPA program to assess the proposed project upon formal review of the draft Plan of Operations.

In Nevada, an EIS program is normally required to analyze and assess a new quarry or mine project in accordance with NEPA. However, based on the size and scope of the proposed project, BLM could determine that an EA is the proper NEPA analysis.

The formal decisions approving mining projects located on BLM-managed public lands in Nevada are often appealed by special interest groups or individuals. These appeals are often based on pre-determined inadequacies in the NEPA assessments. Under the less-stringent EA process, the burden of proof to show the environmental analysis was scoped and properly completed is placed on BLM. If an appeal to an EA is ultimately upheld, then BLM and the proponent, at minimum, could be required to revise portions of the environmental assessment. Alternatively, if an EA appeal is upheld, the BLM could be required to re-analyze the proposed action under an EIS. This new EIS program could require several years and significant monies to complete, and delay the proposed action. Depending on the scope of an EA appeal, the proponent is often allowed to move forward with construction and operation activities while the appeal, and possibly a resource re-assessment, is worked through.

To avoid the EA appeal action discussed above, the proponent could request that an EIS program be completed for the project environmental analysis. Although an EIS is generally more time consuming, with a greater cost, an ultimate time and cost savings could be realized if the Record of Decision (ROD) and the Finding of No Significant Impact (FONSI) for an EA is appealed. Under an EIS program, the burden of proof is placed on the appellant to show that BLM did not adequately scope and complete the EIS process, which is normally a very challenging technical and legal activity to complete. Also, an appeal to an EIS, should it be actively pursued, could simply require a re-assessment of a specific resource issue. Under an EIS appeal, the proponent is often allowed to move forward with construction and operation activities while the appeal, and possibly a resource re-assessment, is worked through. Again, the burden of proof is on the appellant to prove an EIS program was not completed properly by the BLM. Also, for a project of the proposed size and scope of Tami-Mosi, an EIS program that is properly scoped and planned upfront with the BLM could easily be within the estimated time and cost range of an EA project.

By law, the NEPA process is a federal agency process that technically should be completed by the lead BLM District staff. However, BLM Districts are not adequately staffed to complete NEPA actions personally. In order to complete NEPA programs in a timely manner, BLM allows qualified third-party contractors to complete the process, under their direct supervision; BLM simply manages this third-party process.

If an EA is the selected NEPA action, BLM will normally let the project proponent select their own third party contractor to complete the project, with BLM approval. A Conflict of Interest is generally not considered an issue under an EA process in regards to a project proponent selecting their own third party contractor.

If an EIS is the selected NEPA action, BLM will require a formal solicitation and bid process to select the third party contractor. This solicitation and bid process is closely managed by BLM to ensure there is no conflict of interest by either the project proponent or the consulting firms submitting bids.

When the NEPA action is started, involvement of the project proponent during the process is often a politically sensitive issue, whether it is an EA or an EIS. BLM will make it very clear that the NEPA process is “their process”, and although NVM will be part of the Interdepartmental Team for the NEPA process, direct involvement and contact by the mine staff has to be “politically correct”.

One method of determining whether an EA or EIS program should be completed for the proposed project is the completion of an Environmental Information Document (EID). EID is a comprehensive assessment of the key resource issues associated with the project. Prepared by NVM in advance of the Draft Mine Plan of Operations, the EID identifies and assess the key resources and the potential impacts that could result to them from project activities. The EID can be prepared in consultation with the BLM, and would be a valuable tool for both NVM and the BLM in regards to determining the appropriate NEPA action.

NEPA and EID Cost Estimate

Depending on the scope of the project, including the resources that could be impacted by the Proposed Action, experience indicates that an EA process for a quarry and mineral processing project in Nevada can be completed for a cost ranging between $250,000 to $350,000. An EIS process can cost between $350,000 to over $700,000. The NEPA process and the associated cost estimate could be complicated due to the "split nature" of the proposed action. Scoping and consultation meetings with BLM's Ely and Elko District Offices would assist in determining the detailed cost estimate to complete the selected NEPA process.

An EID project to evaluate the Proposed Action in terms of the potential NEPA process can be completed for a cost estimate ranging between $30,000 and $50,000. An EID project can be completed within 30 days.

NEPA Time Frames

This section describes estimated time frames to complete an EA or an EIS process under NEPA. Note that coordination with the BLM is required to determine an approved time frame estimate for the completion of the selected NEPA process.

Under 43 CFR 3809, BLM has 30 business days to review and accept a draft Plan of Operations and Reclamation Plan as technically complete after it is submitted by NVM. Once the BLM determines the Draft Plan of Operations and Reclamation Plan is technically complete, the process to determine the appropriate NEPA action will commence. This would include selecting the ID Team which is comprised of the specific BLM specialists who will work on the NEPA program, and representatives of NVM. Experience indicates this activity can be completed within 15 to 30 business days.

Once the Interdepartmental Team is selected and the appropriate NEPA action determined, the process of selecting the NEPA contractor can start. Under an EA process, the BLM will usually allow the project proponent to select their own third-party NEPA contactor without going through a formal bid process. The BLM will review the qualifications of the contractor, but that generally is very quick, especially if they are familiar with the firm. Experience indicates this selection process can be completed within 15 to 30 working days.

Under the EA process, pre-project public scoping is not required. Once the Interdepartmental Team is in place, key EA issues will be discussed during a formal Interdepartmental Team meeting, baseline study needs will be outlined, a draft work plan may be prepared, a draft schedule will be prepared, and the process will be initiated. The EA could be completed between 12 to 24 months, assuming BLM accepts one season of baseline data for specific resources including general vegetation and wildlife, and special status vegetation and wildlife species. Other baseline studies, as described in Section 20.1 should be completed within the 12 to 24 month time period.

Under an EIS process, selection of the third party NEPA contractor can take between 3 to 6 months. This would include preparation of the draft and final EIS bid document/data adequacy standards, the 30-day bid preparation process, 15 to 30 days to review bids and select the contractor, and then preparation of the formal contract and other paperwork for the EIS process. It is an extensive process.

For an EIS, the proponent should plan on a minimum duration of 36 months to:

- complete the pre-EIS public scoping
- address comments
- prepare the work plan
- complete the required baseline studies
- complete the analysis
- complete administrative draft documents and agency reviews
- prepare the draft final document for public notice and review
- address comments
- prepare the final EIS.

An EIS process could require up to 48 months, or more, to complete.

20.4 Social or Community Requirements

The construction and operation of dolomite quarry and processing site should not impact social or community infrastructure. Both operations will be located in areas with established social and community infrastructure, including housing, retail and commercial facilities such as stores and restaurants, and public service infrastructure including schools, medical, and public safety departments including fire and police/sheriff departments.

An estimated two full-time positions will be hired for dolomite quarry operations, while processing site operations will require an estimated 194 full-time positions. Based on quarry dolomite reserves, these positions are expected to last for at least 30 years. These positions are expected to be filled by local or regional residents of Ely, and White Pine County for the dolomite quarry, and local or regional residents of the Elko and Wendover, Wells and northern Elko County for the processing site operations. Both these regional areas provide an experienced work force for dolomite quarry and processing site operations.

An additional benefit would be the creation of additional short term positions for dolomite quarry and processing site construction activities. It is expected the majority of these construction positions would be hired from the regional labour pool, along with certain percentage of outside workers who are brought in. Although these positions would last for approximately 18 to 24 months, they would contribute to positive direct, indirect and induced economic benefits to the local and regional communities.

Dolomite quarry and processing site operations will have a positive impact in regards to direct, indirect and induced local and regional economics. These activities would be considered basic industries, as they would draw dollars from outside the area in terms of operation purchases and employee hiring (direct impacts). Additional positive economic links would result from the purchases of goods and services from the local service sectors including businesses such as restaurants, gas stations, hotels, and other retail businesses. As earnings increase in these businesses, they hire additional people and buy more inputs from other businesses (indirect impacts). Both the direct and indirect impacts would change the flow of dollars to the local households, which alter their consumption accordingly. The effect of this change in local household consumption upon businesses in a regional economic area is referred to as an induced impact. The positive change in the local and regional economic area works its way throughout the entire local economy (Harris and Dobra, 2009).

20.5 Mine Closure

Reclamation and closure of the dolomite quarry and processing site operations will be completed in accordance with the joint BLM and BMRR approved Plan of Operations and Reclamation Plan, and other approved closure plans prepared as part of the State of Nevada WPCP that will be issued by the BMRR. These plans will be updated on a regular basis, in consultation with the BLM and the BMRR Mining Regulation Branch and Reclamation Branch, to ensure they remain up to date in terms of the latest available reclamation and closure technology, and also to ensure the posted reclamation bond remains sufficient to reclaim and close the dolomite quarry and processing site operations, if needed.

The Nevada BLM Districts and the State of Nevada have initiated a long-term trust fund program as part of the federal and state permitting program to provide for the funding of site maintenance and monitoring activities following the completion of final reclamation and closure activities. The financial method for securing and placement of the trust fund, the trust fund cost, and the determined long-term duration varies by project. Consultation with BLM and the BMRR will determine the specifics of the long-term trust fund program.

20.6 Conclusions and Recommendations

A multi-agency permitting and approval process must be completed to allow NVM to construct, operate and close the Tami-Mosi project in accordance with all applicable federal, state and local regulations. This program will include the acquisition of numerous permits and approvals from various regulatory agencies.

To streamline the time required to complete the overall permitting and approval process, and to indentify the specific permits and approvals required, it is recommended that representatives of NVM hold formal scoping meetings with appropriate personnel from the BLM and the NDEP BMRR, the lead agency and cooperating agency, respectively. During these meetings, all proposed project activities and issues will be reviewed and discussed, including the identification of the required federal, state and local permits and approvals, completion of the appropriate environmental documentation program under NEPA, and a permitting and approval process schedule.

The permitting process will be aligned with the project progression in terms of schedule, function, and allocation of funds.

21.0 CAPITAL AND OPERATING COSTS

21.1 CAPITAL COSTS

The capital cost estimate was developed for the Tami-Mosi Magnesium Project with the accuracy of +50% /-25%, which is suitable for client review, but not for project appropriation, financing, or forming the cost basis for controlling the engineering, procurement, and construction management (EPCM) stage of the project.

21.1.1 SUMMARY

The capital cost estimate for the initial development of the facilities described in this report including dolomite quarry, processing and infrastructure is $424.06 M. The capital cost estimate consists of four main parts:

- direct costs
- indirect costs
- contingency
- owner's costs.

A summary of the capital cost estimate is shown in Table 21.1. The capital cost estimate is provided in detail in Appendix B. The cost estimate was prepared in Q2 2011 US dollars.

21.1.1 ESTIMATE BASE CURRENCY, DATE, EXCHANGE RATE AND VALIDITY PERIOD

The estimate has been prepared with US dollars as the base currency and using a base date of Q2 2011. Foreign exchange rate of Cdn$1.00 to US$1.00 was applied as required. No escalation beyond Q2 2011 has been applied to the estimate.

21.1.2 PROJECT AREAS

The estimate has been assembled and coded based on the project-specific work breakdown structure (WBS). The Capital Cost Estimate Area Summary is provided in Table 21.2.

Table 21.1 Capital Cost Summary (US$)

		Labour Manhour	Labour Cost	Material Cost	Construction Equipment Cost	Mechanical Equipment Cost	Total Cost (USD)
	Direct Works						
10	Dolomite Quarry Site General Subtotal	1,320	73,920	193,700	8,200	200,000	475,820
20	Dolomite Quarry Open Pit Subtotal	420	23,520	8,000	1,000	987,000	1,019,520
22	Dolomite Quarry Crushing Plant Subtotal	4,680	262,080	300,000	100,000	1,300,000	1,962,080
23	Dolomite Quarry Utilities Subtotal	1,512	84,672	207,500	39,000	0	331,172
25	Dolomite Quarry Temporary works Subtotal	0	0	0	0	0	0
30	Processing Site General Subtotal	83,004	4,648,217	6,770,994	896,920	4,091,540	16,407,671
31	Processing Site Stock Piles Subtotal	14,912	835,055	1,678,974	263,768	833,567	3,611,364
40	Processing Site - Processing Facilities Subtotal	425,110	23,806,178	35,598,980	4,869,741	77,492,867	141,767,766
50	Processing Site Power Plant Subtotal	357,004	19,992,249	46,139,606	3,551,460	76,564,600	146,247,915
61	Processing Site Infrastructure Subtotal	17,386	973,594	3,182,580	269,350	1,228,571	5,654,094
71	Processing Site Off-Site Infrastructure Subtotal	0	0	0	0	0	0
81	Processing Site Temporary works Subtotal	0	0	0	0	0	0
85	Closure and Reclamation (both sites) Subtotal	0	0	5,000,000	0	0	5,000,000
	Direct Works Subtotal	**905,348**	**50,699,485**	**99,080,334**	**9,999,440**	**162,698,145**	**322,477,402**
	Indirects						
91	Indirect Costs Subtotal	5,680	581,280	49,294,735	0	0	49,876,015
98	Owners Costs Subtotal	0	0	7,447,088	0	0	7,447,088
99	Contingency Subtotal	0	0	44,265,437	0	0	44,265,437
	Indirects Subtotal	**5,680**	**581,280**	**101,007,260**	**0**	**0**	**101,588,540**

Table 21.2 Capital Cost Estimate Area Summary

Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
10 - Dolomite Quarry Site General							
101	*General Development*	*1,320*	*73,920*	*193,700*	*8,200*	*200,000*	*475,820*
	10 - Dolomite Quarry Site General Subtotal	**1,320**	**73,920**	**193,700**	**8,200**	**200,000**	**475,820**
20 - Dolomite Quarry Open Pit							
210	*Pit*	*420*	*23,520*	*8,000*	*1,000*	*987,000*	*1,019,520*
	20 - Dolomite Quarry Open Pit Subtotal	**420**	**23,520**	**8,000**	**1,000**	**987,000**	**1,019,520**
22 - Dolomite Quarry Crushing Plant							
220	*Dolomite Quarry Site Processing*	*4,680*	*262,080*	*300,000*	*100,000*	*1,300,000*	*1,962,080*
	22 - Dolomite Quarry Crushing Plant Subtotal	**4,680**	**262,080**	**300,000**	**100,000**	**1,300,000**	**1,962,080**
23 - Dolomite Quarry Utilities							
230	*Electrical*	*0*	*0*	*50,000*	*0*	*0*	*50,000*
231	*Fuel Supply, Storage & Distribution*	*84*	*4,704*	*7,500*	*500*	*0*	*12,704*
232	*Water Systems*	*60*	*3,360*	*5,000*	*1,000*	*0*	*9,360*
233	*Waste Disposal*	*0*	*0*	*10,000*	*0*	*0*	*10,000*
234	*Buildings*	*1,368*	*76,608*	*135,000*	*37,500*	*0*	*249,108*
	23 - Dolomite Quarry Utilities Subtotal	**1,512**	**84,672**	**207,500**	**39,000**	**0**	**331,172**
25 - Dolomite Quarry Temporary works							
251	*General Site*	*0*	*0*	*0*	*0*	*0*	*0*
	25 - Dolomite Quarry Temporary works Subtotal	**0**	**0**	**0**	**0**	**0**	**0**

Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
30 - Processing Site General							
301	*General Development*	*83,004*	*4,648,217*	*6,770,994*	*896,920*	*4,091,540*	*16,407,671*
	30 - Processing Site General Subtotal	**83,004**	**4,648,217**	**6,770,994**	**896,920**	**4,091,540**	**16,407,671**
31 - Processing Site Stock Piles							
311	*Stockpiles*	*14,912*	*835,055*	*1,678,974*	*263,768*	*833,567*	*3,611,364*
	31 - Processing Site Stock Piles Subtotal	**14,912**	**835,055**	**1,678,974**	**263,768**	**833,567**	**3,611,364**
40 - Processing Site - Processing Facilities							
401	*Ferrosilicon Facility*	*108,686*	*6,086,405*	*12,793,743*	*1,128,200*	*11,610,000*	*31,618,347*
402	*Dolomite Grinding and Slag Loadout Facilities*	*36,034*	*2,017,892*	*2,061,007*	*432,852*	*4,805,000*	*9,316,751*
403	*Magnesium Facility*	*269,795*	*15,108,506*	*19,722,758*	*3,118,339*	*59,467,867*	*97,417,470*
404	*Cooling Tower and Distribution*	*10,596*	*593,376*	*1,021,472*	*190,350*	*1,610,000*	*3,415,198*
	40 - Processing Site - Processing Facilities Subtotal	**425,110**	**23,806,178**	**35,598,980**	**4,869,741**	**77,492,867**	**141,767,766**
50 - Processing Site Power Plant							
501	*Power Plant*	*357,004*	*19,992,249*	*46,139,606*	*3,551,460*	*76,564,600*	*146,247,915*
	50 - Processing Site Power Plant Subtotal	**357,004**	**19,992,249**	**46,139,606**	**3,551,460**	**76,564,600**	**146,247,915**
61 - Processing Site Infrastructure							
613	*Ancilliary Buildings*	*5,520*	*309,120*	*1,973,640*	*47,990*	*152,346*	*2,483,096*
614	*On-Site Mobile Equipment*	*14*	*806*	*102*	*0*	*1,076,225*	*1,077,133*
615	*On-Site Bulk Storage*	*83*	*4,637*	*19,938*	*360*	*0*	*24,935*
616	*On-Site Services / Utilities*	*836*	*46,838*	*88,900*	*21,000*	*0*	*156,738*

Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
619	*On-Site Power Supply & Transmission*	*10,932*	*612,192*	*1,100,000*	*200,000*	*0*	*1,912,192*
	61 - Processing Site Infrastructure Subtotal	**17,386**	**973,594**	**3,182,580**	**269,350**	**1,228,571**	**5,654,094**
71 - Processing Site Off-Site Infrastructure							
711	*Temporary works*	*0*	*0*	*0*	*0*	*0*	*0*
	71 - Processing Site Off-Site Infrastructure Subtotal	**0**	**0**	**0**	**0**	**0**	**0**
81 - Processing Site Temporary works							
811	*General site*	*0*	*0*	*0*	*0*	*0*	*0*
	81 - Processing Site Temporary works Subtotal	**0**	**0**	**0**	**0**	**0**	**0**
85 - Closure and Reclamation (both sites)							
851	*Site (Both sites complete)*	*0*	*0*	*5,000,000*	*0*	*0*	*5,000,000*
	85 - Closure and Reclamation (both sites) Subtotal	**0**	**0**	**5,000,000**	**0**	**0**	**5,000,000**
91 - Indirect Costs							
911	*Indirect*	*5,680*	*581,280*	*49,294,735*	*0*	*0*	*49,876,015*
	91 - Indirect Costs Subtotal	**5,680**	**581,280**	**49,294,735**	**0**	**0**	**49,876,015**
98 - Owners Costs							
981	*Owners Cost*	*0*	*0*	*7,447,088*	*0*	*0*	*7,447,088*
	98 - Owners Costs Subtotal	**0**	**0**	**7,447,088**	**0**	**0**	**7,447,088**
99 - Contingency							
991	*Project Contingency*	*0*	*0*	*44,265,437*	*0*	*0*	*44,265,437*

21.1.3 Area Exclusions

Tetra Tech assumed a "green field site".

21.1.4 Sources of Costing Information

The capital cost estimate was based on the following:

- budget quotations for all "tagged" major equipment
- Tetra Tech's in-house database for non-tagged and other equipment, etc.
- preliminary material take-offs by discipline, as required
- electrical, instrumentation, and piping expressed as percentage.

All equipment and material costs were included as free carrier (FCA) or FOB (free board marine) manufacturer plant and exclusive of spare parts, taxes, duties, freight and packaging. These costs, if appropriate, were covered in the indirect section of the estimate.

Equipment items valued under $100,000 may be priced from in-house data and previous project data if pricing was recently updated, unless the equipment is of a specialized nature.

The estimate for installation hours was based on in-house experience and cost references.

All equipment and material costs were based on FCA manufacturer plant (INCOTERMS 2010) and were exclusive of spare parts, taxes, duties, freight, and packaging.

The freight costs and spares costs are covered in the indirect section of the estimate as an allowance, based on a percentage of the value of materials and equipment. With the exception of the mining equipment, the costs are inclusive of freight.

Tetra Tech has assumes the construction man-hours/work week to be 10 hour/day with a 3-week-on and 1-week-off rotation, with local accommodation.

21.1.5 Quantity Development and Pricing

All quantities were developed from process design criteria, process flow diagrams, preliminary layouts (plan only), and major equipment lists. Design allowances were applied to bulk materials based on discussions between the respective discipline and the estimator. Details on the respective discipline quantities are as described in the following sections.

21.1.6 Direct Costs

Mining

The quarry capital costs were derived from common market pricing and historical data. The equipment capital includes delivery to site and assembly, but does not include taxes or duties. The capital required for the quarry is included in the estimate.

Highway haul trucks, on-site fuelling, mobile equipment maintenance, and potable water have been provided as service contract costs in the operating cost estimate.

Magnesium Plant Capital Costs

The magnesium plant capital costs were derived from quoted pricing or in-house database. The estimates were developed by Tetra Tech and Alpha/Omega Engineering, U. S. of A. The equipment capital cost includes delivery to the site and assembly, but does not include taxes or duties.

Power Plant Capital Costs

Power plant capital costs were obtained from estimates prepared by EPIC Clean Technologies Corporation (EPIC).

Total budgetary quotation for the power facility is $144 M for a total of $146 M, including foundations, concrete, spares, etc. This estimate does not include the infrastructure such as cooling tower, water treatment plant, control system, power distribution, and coal unloading. These items have been included elsewhere in the capital cost estimate.

Ferrosilicon Production Plant Capital Costs

A budgetary quotation was solicited from two vendors – Ghalsasi Engineering Systems Pvt. Ltd. (GESPL), and from Tenova Group, South Africa (Tenova) for a “turn-key” ferrosilicon plant capable of producing 88 t/d of 75% ferrosilicon (86 t/d is required to support production of 30,000 t/a Mg.). The resulting valuation from the received information was $22.5 M. To this estimate, $4.8 M was added to cover transportation and engineering. The foundation and building was priced separately. The final capital cost for the ferrosilicon facility was estimated to be $31.6 M.

Ancillary Infrastructure Capital Costs

The ancillary infrastructure capital costs were derived from common market pricing and in-house database. The estimates were developed by Tetra Tech and Alpha/Omega Engineering, U. S. of A. The costs included processing site ancillary buildings, access roads, on-site roads, mobile equipment, material handling facilities, and services/utilities.

Labour Rates and Costs

The blended labour rate of $56/hr was used throughout the estimate. These labour rates were developed based on local Nevada contracts.

The labour rates include:

- vacation and statutory holiday pay
- fringe benefits and payroll burdens
- overtime and shift premiums
- small tools
- consumables
- personal protection equipment
- contractors' overhead and profit.

Tetra Tech assumed that 50% of the labour sources are available locally. Travel and living allowances will be included in the construction indirect section.

A productivity factor of 1.2 was applied to the labour portion of the estimate to allow for the inefficiency of long work hours, climate and rotation.

COST BASIS BY DISCIPLINE

Bulk Earthworks Including Site Preparation, Access and Haul Roads

All of the excavated material is deemed to be excavation in rock which requires blasting and assumed is stockpiled on site within 5 km.

Mining

Mining quantities were based on estimated quantities involved. Mobile mining equipment is assumed to be contractor-provided, but two loaders were included in the estimate.

Concrete

Concrete quantities are based on estimated quantities; no allowance was included for over-pour and wastage.

Typically, all concrete is based on a 28-day compressive strength of 30 MPa. The average installed concrete unit rate for 30 MPa concrete used in the estimate was $626/m^3$. Concrete unit rates include for formwork, reinforcing steel, placement, and finishing of concrete.

Structural Steel

Structural steel quantities were based on estimated quantities with no allowance made for growth and wastage. Allowances were included for cut-offs, bolts, and connections.

An average supply unit rate of $4,611/t for fabricated steel, based on quotations from recent similar projects, was used in this estimate. Craneage is included for all tonnages at a rate of $250/t.

Platework and Liners

Preliminary quantities for platework and metal liners for tanks, launders, pump-boxes, and chutes were estimated using recent similar projects and in-house data.

Mechanical

The preliminary equipment estimate was prepared, based on the project supplied information and drawings, where available. The mechanical pricing was based on budgetary quotes obtained for the power plant and ferrosilicon plant.

All other mechanical equipment was based on information from recent quotes on similar applications and factored estimates.

HVAC and Fire Protection

HVAC and fire protection is included as a percentage of the process equipment cost and is based on experience with recent similar recent projects.

Dust Collection

Major dust collection equipment is covered in the mechanical section.

Piping and Valves

Piping and valves allowances were included as a percentage of process equipment, based on experience with recent similar projects.

Electrical

Electrical allowances were included as a percentage of process equipment, based on experience with recent similar projects.

Instrumentation

Instrumentation is included as a percentage of the equipment list allowance assigned to each area and based on experience with recent similar projects.

Buildings

The estimates for the engineered steel framed buildings were included, with the exception of the power plant which was calculated by other consultants and included in the turn-key budgetary quotation.

21.1.7 Indirect Costs

Construction Indirects

Plant site construction indirects are calculated on a percentage basis to include overheads and profit.

Initial Fills and Warehouse Inventories

An allowance of $2.7 M initial fills has been included for reagents and fuel.

Spares

Capital and commissioning spares were included based on a percent of the direct costs.

Freight and Logistics

Although no logistics study was performed for this project, a provision of 4% was provided for freight of most materials, and for the process equipment.

Commissioning and Start-up

An allowance for vendor representatives, contractors' crew and management staff required on-site to supervise equipment installation, perform pre-start-up inspections, in order to satisfy equipment performance warranty requirements. Costs associated with this requirement were included in the estimate.

Engineering and Procurement (EP)

Engineering and procurement costs are estimated as a percentage of the total direct costs at 7.5%. Mining is included at 4%.

Construction Management

Construction management costs are estimated as a percentage of the total direct costs at 7.5%. Mining is included at 4%.

Owner's Costs

An allowance has been included for the owners' costs, based on a percent of the direct costs in keeping with typical percentage used in other similar recent projects.

21.1.8 Exclusions

The following items were excluded from the capital cost estimate:

- schedule delays such as those caused by:
  - major scope changes
  - unidentified ground conditions

  - labour disputes
  - environmental permitting activities
  - abnormally adverse weather conditions
- receipt of information beyond the control of the EPCM contractors
- cost of financing (including interests incurred during construction)
- royalties
- schedule acceleration costs
- working capital
- contractors camps
- catering and housekeeping
- bussing, etc.
- working or deferred capital
- sustaining capital
- refundable taxes and duties
- land acquisition
- currency fluctuations
- lost time due to force majeure
- any project sunk costs including this study
- pre-production costs, excluding pre-stripping
- dolomite transportation equipment trucking from Dolomite Quarry to Processing Site—contracted dolomite transportation cost included in Operating Cost Estimate.
- escalation beyond June 2011
- community relations
- taxes including Canadian Goods and Services Tax (GST)/Provincial Sales Tax (PST)/Harmonizes Sales Tax (HST), US State or Federal
- owner's risks and exposure.

21.1.9 Costs Incurred Prior to Release of Detail Engineering and Construction Assumptions

The following assumptions were made in the preparation of this estimate:

- All material and installation subcontracts will be competitively tendered on an open-shop, lump-sum basis.
- Site work is continuous and is not constrained by the Owner or others.

- Skilled tradespersons, supervisors, and contractors will be readily available.
- The geotechnical nature of the site is assumed to be sound, uniform, and able to support the intended structures and activities. Adverse or unusual geotechnical conditions requiring piles or soil densification have not been allowed for in this estimate.

21.1.10 Contingency

A contingency allowance is included. It excludes the power plant which has its contingency included in the direct cost as provided in the budgetary quotation.

It is expected that this estimate will adequately cover minor changes to the current scope to be expected during the next phase of the project. The contingency for the project is calculated to be 14% of the direct costs.

21.2 Operating Costs

The vertically-integrated processing site is designed on a modular basis. The various major facilities (i.e. magnesium plant, power plant, ferrosilicon plant) have been sized to complement one another as a modular production unit. The dolomite quarry operating costs have been provided for in the operating cost estimate included in the economic analysis, section 22.0 of this report.

21.2.1 Magnesium Plant Operating Cost and Basis

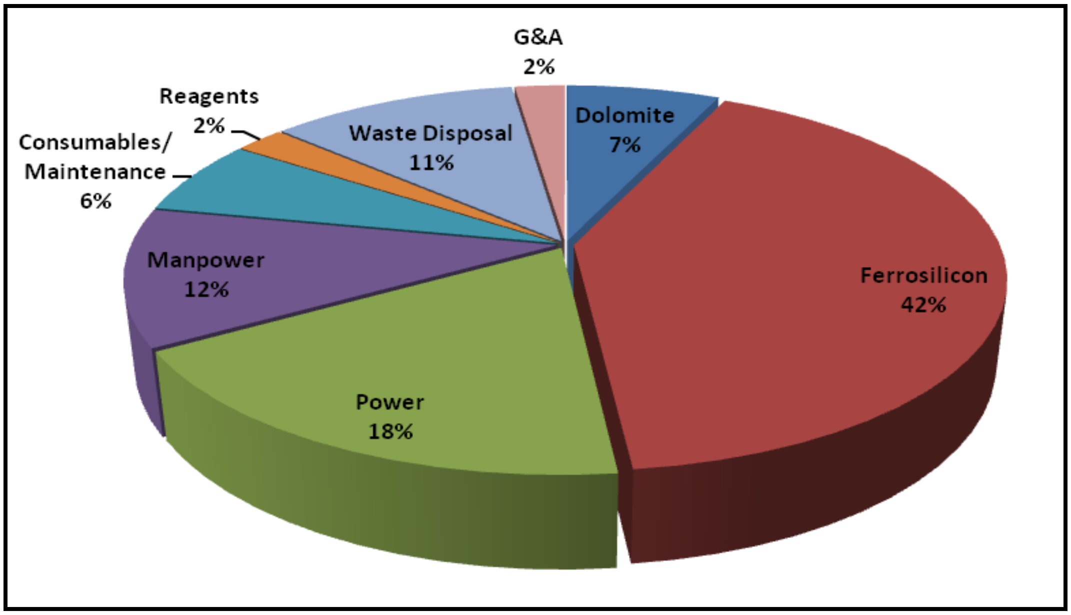
The estimated process operating cost for the magnesium production is $1.28/lb Mg ingot or $2,820/t Mg ingot. The estimate was conducted in conjunction with Alpha/Omega Engineering, U. S. of A. and is summarized in Table 21.3. The estimate includes the costs for general management, general material receiving handling and magnesium plant operation. Major costs are ferrosilicon, which accounts 42% of the total cost, and power, which contributes approximately 18% of the total cost. The cost distribution at different areas is shown in Figure 21.1.

Table 21.3 Magnesium Process Operating Cost

Description	Manpower	Consumable/Supply		Operating Cost	
		Consumption (kWh, kg/t Mg)	Unit Cost ($/kg/kWh)	US$/a (000s)	$/lb Mg
G&A					
Manpower	14			1,338	0.020
Management Related Expense				550	0.009
Magnesium Plant					
Dolomite		10,300	18.74	5,784	0.087
Ferrosilicon		1,008	1.189	35,081	0.530
Power, including Syngas		16,800*	0.031*	15,500*	0.234*
Manpower (Magnesium Plant Only)	116			9,849	0.149
Consumables/Maintenance		varying	varying	5,390	0.081
Reagents		varying	varying	1,881	0.028
Waste Disposal				9,348	0.141
Total	**130****			**84,720**	**1.281**

* Power consumption/cost based on Magnesium Plant consumption only. Power consumption/cost for Ferrosilicon production, Dolomite quarry operation, etc. is included in the unit and operating costs for those respective areas.
** Manpower head count for Magnesium production and G&A only (130). Manpower assigned to Ferrosilicon (52) and assigned to Power, including Syngas (12) are accounted for in the Unit and Operating Costs for Ferrosilicon and Power, including Syngas.

Figure 21.1 Magnesium Plant Operating Cost Distribution



All costs are exclusive of taxes, permitting costs, or other government-imposed costs, unless otherwise noted. The following items have been included in the process operating estimate:

- Labour requirements, including supervision, operation, and maintenance. Salary/wage levels were based on current labour rates including benefit burden of 47% to cover holiday and vacation payment, pension plan, various other benefits, and tool allowance costs.
- Power supply, from on-site coal gasification power plant. The estimated power unit cost ($0.031/kWh) was prepared by Mr. Jim Sever of Alpha/Omega under the guidance of Dr. Fred Buckingham, Ph.D., P.E. of MPR, and with reference to budgetary power plant quotation from EPIC. The unit cost estimate was exclusive of amortization of the power plant capital cost which is included in the total project budget and major maintenance cost which is budgeted as a sustaining capital cost. The power cost estimate is detailed in Section 21.2.2.
- Ferrosilicon consumption and unit cost. Ferrosilicon consumption and unit cost were estimated by Mr. James Sever, B.S., M.S., M.B.A. of Alpha/Omega Engineering, U. S. of A. and Mr. Ralph Carter, B. S.
- The unit power cost, as above, has been used to estimate the unit ferrosilicon cost. The ferrosilicon unit cost estimate was exclusive of amortization of the ferrosilicon plant capital cost which is included in the total project budget.
- Dolomite supply, including mining, primary crushing and shipping costs.
- Consumables/maintenance, including: major consumables, maintenance supplies and safety supplies for the magnesium plant.
- Regents, including: fluorspar for magnesium reduction and flux for crown refining.
- G&A costs, including: management manpower requirement and general management expenses, and excluding: property and production insurances provided as an allowance in the capital expenditure.
- Waste disposals costs.

21.2.2 Power Plant Operating Costs and Basis

Power unit cost estimate was prepared by Mr. Jim Sever of Alpha/Omega Engineering, U. S. of A. under the guidance of Dr. Fred Buckingham, Ph.D., P.E. of MPR, and with reference to budgetary power plant quotation from EPIC Clean Technologies Corporation.

The location of the Tami-Mosi Facility allows the use of two possible energy sources: natural gas (delivered via a pipeline located near the plant) or PRB coal (delivered via unit train). The main transcontinental rail line for the BNSFR is immediately adjacent to the processing site.

Both energy sources were evaluated for the process. Utilization of coal gasification to generate syngas from PRB coal proved to be the lowest cost option as shown in Table 21.4.

Table 21.4 Utilization of Coal Gasification

Fuel Source	Cost per million BTU
Natural Gas	\$6.34
Coal	\$1.88
Coal Syngas	\$2.35

Information regarding coal pricing was obtained from publications of the US Department of Energy. Transportation cost was derived from an example rate for unit train transportation of PRB coal. Operating costs for the gasifier and electric generators was obtained from the estimate provided by EPIC.

Since the power plant is incorporated within the larger Tami-Mosi facility, some traditional expenses such as G&A expenses and manpower costs were included in the magnesium plant cost estimate. The manpower listed in the power plant estimate refers to only those functions that require additional staff for sustained operation. Much of the work will be performed by personnel identified in other operating segments of the facility (e.g. due to incorporation of computer process control only one control room operator is required to oversee the entire plant operation during normal (steady state) operation.

21.2.3 Ferrosilicon Plant Operating Costs and Basis

Ferrosilicon unit cost was estimated by Mr. James Sever, B.S., M.S., MBA of Alpha/Omega Engineering, U. S. of A. and Mr. Ralph Carter, B.S.

Quantities for all consumable materials were derived from performance data at a comparable facility, and cross-checked with information contained in a commercially-generated economic analysis of the ferrosilicon industry.

The costs of the raw materials were obtained from USGS publications and vendor pricing. Transportation costs were added to provide delivered unit cost.

The cost of power was derived from the production cost of the onsite power plant.

Since the majority of the manpower and G&A expense costs are contained within the magnesium plant cost estimate, the man power included in this estimate is the incremental labour required for the inclusion of this facility into the plant.

22.0 ECONOMIC ANALYSIS

The PEA is preliminary in nature and includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. There is no certainty that the financial results in the PEA will be realized.

Tetra Tech conducted an economic evaluation of the Project that incorporated all the relevant capital, operating, working, sustaining capital costs, and royalties. The evaluation was based on a pre-tax financial model. Sensitivity analyses were developed to evaluate the project economics. A summary and the details of the economic analysis are provided in Table 22.2 to Table 22.6.

22.1 PRINCIPAL ASSUMPTIONS

The production schedule has been incorporated into the 100% equity pre-tax financial model to develop annual recovered metal production from the relationships of tonnage processed, head grades, and recoveries. The model considered a total of 8.8 Mt of resources to be processed over a 30-year LOM.

Revenues were calculated based on market prices. The magnesium price used for the base case is $2.45/lb, based on the latest negotiated contract tariff spot price in the US ranging between $2.45 and $2.65/lb 99.9% Mg (Metal Pages, June 1, 2011). The exchange rate was set at 1.0 US$:1.0 Cdn$.

Unit operating costs for mining, processing, site services, G&A, and off-site charges (insurance and royalties) were applied to annual milled tonnages, to determine the overall operating cost. This cost was deducted from revenue to derive annual operating cash flow (i.e. net revenue).

Initial and sustaining capital costs were incorporated on a year-by-year basis over the mine life, and then deducted from the net revenue to determine the net cash flow before taxes. Initial capital expenditures include costs accumulated prior to first production of magnesium ingot, sustaining capital includes expenditures for mining and processing additions, replacement of equipment, and environmental/closure costs.

Working capital is estimated as three months of the first year on-site operating costs. The estimated working capital is applied to the first year of expenditures. The working capital is recovered at the end of the mine life and aggregated with the salvage value contribution and applied towards reclamation during closure.

The revenues projected in the cash flow model were based on the average metal values indicated in Table 22.1.

Table 22.1 Metal Production from Tami-Mosi Project

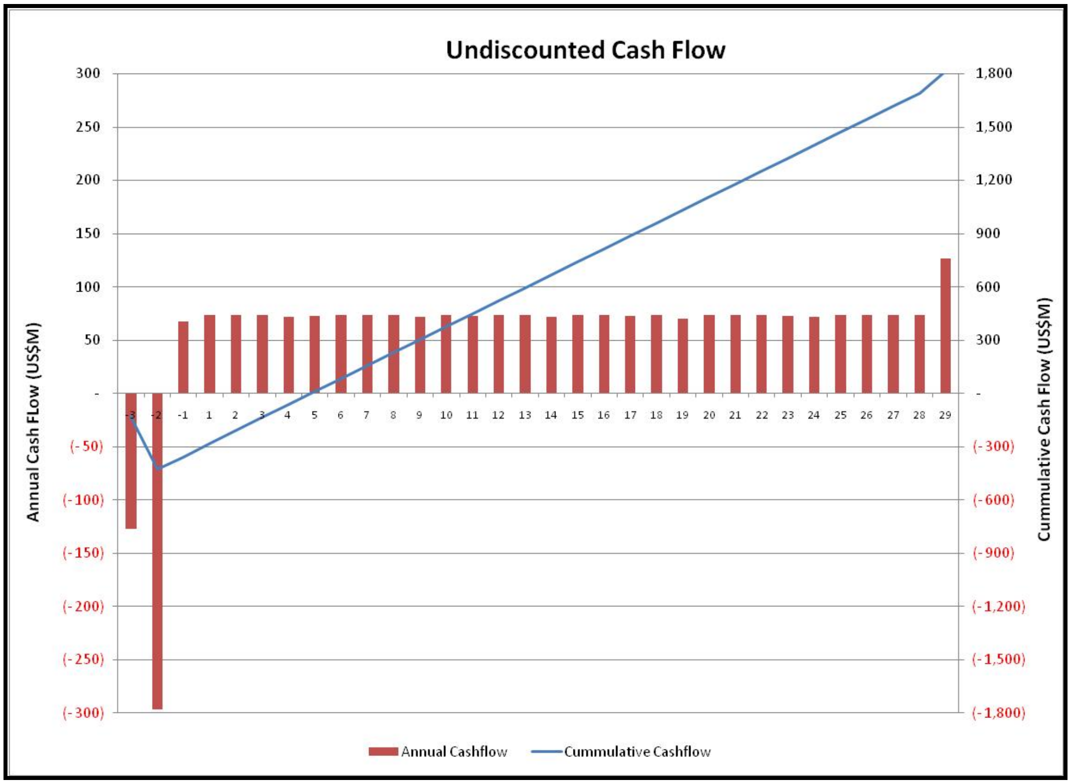
	Years 1 to 5	LOM
Total Tonnes to Mill (000s)	1,470	8,828
Annual Tonnes to Mill (000s)	294	294
Average Grade		
Magnesium (%)	12.60	12.59
Total Production		
Magnesium (000s lb)	330,690	1,984,140
Average Annual Production		
Magnesium (000s lb)	66,138	66,138

22.2 CASH FLOW

Initial capital is estimated to be $424 M with an additional $84 M in sustaining capital added over the life of the project. The average operating cash flow is estimated at $78 M/a, after deducting operating costs averaging $1.28/lb of magnesium.

The undiscounted annual cash flows are illustrated in Figure 22.1.

Figure 22.1 Undiscounted Annual and Cumulative Cash-Flow



22.3 NET PRESENT VALUE, INTERNAL RATE OF RETURN, AND PAYBACK PERIOD

The pre-tax financial model was established on a 100% equity basis, excluding debt financing and loan interest charges. The financial outcomes have been tabulated for NPV, IRR, payback of capital, and cost per pound of magnesium. Discount rates of 6% and 0% were applied. The results are presented in Table 22.2.

Table 22.2 Summary of Pre-Tax NPV, IRR & Payback

	Unit	Base Case
Metal Price		
Magnesium	US$/lb	2.45
Exchange Rate	US$:Cdn$	1.0
Economic Results		
NPV (at 0%)	US$ M	1,818
NPV (at 6%)	US$ M	547
IRR	%	16.1
Payback	years	5.9
Cash Cost/lb Mg	US$/lb	1.28
Total Cost/lb Mg	US$/lb	1.53

Notes: Total costs per pound include all start-up capital, sustaining capital and reclamation/closure costs.

The summary and the details of the economic analysis are provided in Table 22.3 to Table 22.6.

Table 22.3 Economic Returns

	Units	Pre-Tax
Project NPV		
8.0% discount rate	million US$	361
6.0% discount rate	million US$	547
3.0% discount rate	million US$	993
0.0% discount rate	million US$	1,818
Project IRR		16.1%
Payback	Years	5.9
Mine Life	Years	30.0
Operating Cash Flow		
Years 1-5		
Total	million US$	387
Average	million US$	77
LOM		
Total	million US$	2,326
Average	million US$	78
Capital Costs		
Pre-production (pre-strip)	million US$	0
Initial Capital	million US$	424
Working Capital	million US$	6
Sustaining Capital	million US$	78
Total Capital Costs	million US$	508

Table 22.4 Production Summary

	Units	Years 1-5	LOM
Material Mined			
Mill Feed	kt	1,470	8,828
Average	kt	294	294
Total Mined	kt	1,599	9,162
Strip Ratio		0.09	0.04
Mill Feed Grade			
Mg	%	12.60	12.59
Magnesium Ingot Production			
Total Mg	klbs	330,690	1,984,140
Average Mg	klbs	66,138	66,138

Table 22.5 Unit Cost Summary

	Years 1-5	LOM
Operating Costs	US$/lb Mg	US$/lb Mg
Dolomite Mining	0.027	0.025
Dolomite Transport	0.059	0.059
Ferrosilicon	0.530	0.530
Power	0.234	0.234
GA&E	0.029	0.029
Manpower	0.149	0.149
Consumable	0.081	0.081
Reagents	0.028	0.028
Waste Disposal	0.141	0.141
Total Operating Costs	1.279	1.278
Capital Cost/lb Mg		0.256
Total Cost/lb Mg		1.534

Table 22.6 Economic Analysis Details

Tami-Mosi Magnesium Project - Pre-Tax Financial Model											
(100% Project Equity)		<== Preproduction ==>									
PEA (30,000 tpa) rev2		Year -3	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Metal Prices	**Units**										
Magnesium	US$/lb	-	-	-	2.45	2.45	2.45	2.45	2.45	2.45	2.45
Exchange Rate	US:CDN	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mill Feed Production											
Mill Feed Mined	kt	0	0	0	294	294	294	294	294	294	294
Waste Mined	kt	0	0	0	50	25	26	16	12	11	11
Total Mined	kt	0	0	0	344	319	320	310	306	305	305
Total Moved	kt	0	0	0	344	319	320	310	306	305	305
Strip Ratio (waste t : mill feed t)		0.00	0.00	0.00	0.17	0.09	0.09	0.05	0.04	0.04	0.04
Mill Feed Processed	kt	0	0	0	294	294	294	294	294	294	294
Magnesium Grade	%	0.00	0.00	0.00	12.60	12.60	12.60	12.60	12.60	12.60	12.60
Magnesium Ingot Production (99.8% Mg)											
Recovery											
Reduction Conversion Efficiency	%				90.0	90.0	90.0	90.0	90.0	90.0	90.0
Casting Recovery	%				90.0	90.0	90.0	90.0	90.0	90.0	90.0
Total	%				81.0	81.0	81.0	81.0	81.0	81.0	81.0
Metal Recovered											
Magnesium	klbs				66,138	66,138	66,138	66,138	66,138	66,138	66,138
Cash Flow (US)											
Magnesium Revenues	000's US$				**162,038**	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**
Direct Operating Costs											
Dolomite Mining	000's US$				1,897	1,759	1,761	1,706	1,687	1,680	1,680
Dolomite Transportation	000's US$				3,889	3,889	3,889	3,889	3,889	3,889	3,889
Ferrosilicon	000's US$				35,081	35,081	35,081	35,081	35,081	35,081	35,081
Power	000's US$				15,500	15,500	15,500	15,500	15,500	15,500	15,500
GA&E	000's US$				1,888	1,888	1,888	1,888	1,888	1,888	1,888
Manpower	000's US$				9,849	9,849	9,849	9,849	9,849	9,849	9,849
Consumables	000's US$				5,390	5,390	5,390	5,390	5,390	5,390	5,390
Reagents	000's US$				1,881	1,881	1,881	1,881	1,881	1,881	1,881
Waste Disposal	000's US$				9,348	9,348	9,348	9,348	9,348	9,348	9,348
Total Operating Costs	000's US$				**84,722**	**84,584**	**84,586**	**84,530**	**84,511**	**84,504**	**84,505**
Operating Cash Flow	000's US$				**77,316**	**77,454**	**77,452**	**77,508**	**77,527**	**77,534**	**77,533**

table continues…

Tami-Mosi Magnesium Project - Pre-Tax Financial Model											
(100% Project Equity)		<== Preproduction ==>									
PEA (30,000 tpa) rev2		Year -3	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Capital Costs											
Initial Capital	000's US$	-	127,220	296,846							
Pre-production (Development & Pre-Strip)	000's US$	-	-	-							
Working Capital	000's US$				6,281	-	-	-	-	-	-
Sustaining Capital	000's US$				3,370	3,670	3,995	4,075	5,375	4,375	3,775
Sustaining #1	000's US$				3,370	3,670	3,995	4,075	5,375	4,375	3,775
Sustaining #2	000's US$				-	-	-	-	-	-	-
Sustaining #3	000's US$				-	-	-	-	-	-	-
Sustaining #4	000's US$				-	-	-	-	-	-	-
Salvage	000's US$				-	-	-	-	-	-	-
Sustaining #6	000's US$				-	-	-	-	-	-	-
Total Capital Costs	000's US$	**-**	**127,220**	**296,846**	**9,651**	**3,670**	**3,995**	**4,075**	**5,375**	**4,375**	**3,775**
Pre-tax Cash Flow	000's US$	**-**	**(- 127,220)**	**(- 296,846)**	**67,665**	**73,784**	**73,457**	**73,433**	**72,152**	**73,159**	**73,758**
	Cumulative	-	(- 127,220)	(- 424,066)	(- 356,401)	(- 282,616)	(- 209,159)	(- 135,726)	(- 63,574)	9,584	83,343

Unit Costs (US)

Dolomite Mining	US$/lb Mg				0.029	0.027	0.027	0.026	0.026	0.025	0.025
Dolomite Transportation	US$/lb Mg				0.059	0.059	0.059	0.059	0.059	0.059	0.059
Ferrosilicon	US$/lb Mg				0.530	0.530	0.530	0.530	0.530	0.530	0.530
Power	US$/lb Mg				0.234	0.234	0.234	0.234	0.234	0.234	0.234
GA&E	US$/lb Mg				0.029	0.029	0.029	0.029	0.029	0.029	0.029
Manpower	US$/lb Mg				0.149	0.149	0.149	0.149	0.149	0.149	0.149
Consumables	US$/lb Mg				0.081	0.081	0.081	0.081	0.081	0.081	0.081
Reagents	US$/lb Mg				0.028	0.028	0.028	0.028	0.028	0.028	0.028
Waste Disposal	US$/lb Mg				0.141	0.141	0.141	0.141	0.141	0.141	0.141
Total Unit Operating Cost	US$/lb Mg				**1.281**	**1.279**	**1.279**	**1.278**	**1.278**	**1.278**	**1.278**
Total Unit Capital Cost	US$/lb Mg										
Total Unit Cost	US$/lb Mg										

table continues…

Tami-Mosi Magnesium Project - Pre-Tax Financial Model (100% Project Equity) PEA (30,000 tpa) rev2	Units	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17
Metal Prices											
Magnesium	US$/lb	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45
Exchange Rate	US:CDN	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mill Feed Production											
Mill Feed Mined	kt	294	294	294	294	294	294	294	294	294	294
Waste Mined	kt	11	11	11	10	10	12	12	12	9	9
Total Mined	kt	305	305	304	304	304	306	306	306	304	304
Total Moved	kt	305	305	304	304	304	306	306	306	304	304
Strip Ratio (waste t : mill feed t)		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03
Mill Feed Processed	kt	294	294	294	294	294	294	294	294	294	294
Magnesium Grade	%	12.60	12.60	12.60	12.60	12.60	12.60	12.60	12.60	12.59	12.59
Magnesium Ingot Production (99.8% Mg)											
Recovery											
Reduction Conversion Efficiency	%	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Casting Recovery	%	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Total	%	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0
Metal Recovered											
Magnesium	klbs	66,138	66,138	66,138	66,138	66,138	66,138	66,138	66,138	66,138	66,138
Cash Flow (US)											
Magnesium Revenues	000's US$	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**
Direct Operating Costs											
Dolomite Mining	000's US$	1,682	1,682	1,678	1,676	1,677	1,687	1,687	1,686	1,673	1,673
Dolomite Transportation	000's US$	3,889	3,889	3,889	3,889	3,889	3,889	3,889	3,889	3,892	3,892
Ferrosilicon	000's US$	35,081	35,081	35,081	35,081	35,081	35,081	35,081	35,081	35,081	35,081
Power	000's US$	15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500
GA&E	000's US$	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888
Manpower	000's US$	9,849	9,849	9,849	9,849	9,849	9,849	9,849	9,849	9,849	9,849
Consumables	000's US$	5,390	5,390	5,390	5,390	5,390	5,390	5,390	5,390	5,390	5,390
Reagents	000's US$	1,881	1,881	1,881	1,881	1,881	1,881	1,881	1,881	1,881	1,881
Waste Disposal	000's US$	9,348	9,348	9,348	9,348	9,348	9,348	9,348	9,348	9,348	9,348
Total Operating Costs	000's US$	**84,506**	**84,506**	**84,502**	**84,501**	**84,502**	**84,512**	**84,512**	**84,511**	**84,501**	**84,501**
Operating Cash Flow	000's US$	**77,532**	**77,532**	**77,536**	**77,537**	**77,537**	**77,526**	**77,526**	**77,527**	**77,537**	**77,537**

table continues…

Tami-Mosi Magnesium Project - Pre-Tax Financial Model (100% Project Equity) PEA (30,000 tpa) rev2		Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17
Capital Costs											
Initial Capital	000's US$										
Pre-production (Development & Pre-Strip)	000's US$										
Working Capital	000's US$	-	-	-	-	-	-	-	-	-	-
Sustaining Capital	000's US$	4,060	4,210	5,860	3,810	4,410	3,760	4,110	5,860	4,060	3,760
Sustaining #1	000's US$	4,060	4,210	5,860	3,810	4,410	3,760	4,110	5,860	4,060	3,760
Sustaining #2	000's US$	-	-	-	-	-	-	-	-	-	-
Sustaining #3	000's US$	-	-	-	-	-	-	-	-	-	-
Sustaining #4	000's US$	-	-	-	-	-	-	-	-	-	-
Salvage	000's US$	-	-	-	-	-	-	-	-	-	-
Sustaining #6	000's US$	-	-	-	-	-	-	-	-	-	-
Total Capital Costs	000's US$	**4,060**	**4,210**	**5,860**	**3,810**	**4,410**	**3,760**	**4,110**	**5,860**	**4,060**	**3,760**
Pre-tax Cash Flow	000's US$	**73,472**	**73,322**	**71,676**	**73,727**	**73,127**	**73,766**	**73,416**	**71,667**	**73,477**	**73,777**
	Cumulative	156,814	230,136	301,812	375,539	448,665	522,431	595,848	667,514	740,992	814,769

Unit Costs (US)

Dolomite Mining	US$/lb Mg	0.025	0.025	0.025	0.025	0.025	0.026	0.026	0.025	0.025	0.025
Dolomite Transportation	US$/lb Mg	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
Ferrosilicon	US$/lb Mg	0.530	0.530	0.530	0.530	0.530	0.530	0.530	0.530	0.530	0.530
Power	US$/lb Mg	0.234	0.234	0.234	0.234	0.234	0.234	0.234	0.234	0.234	0.234
GA&E	US$/lb Mg	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
Manpower	US$/lb Mg	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149
Consumables	US$/lb Mg	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081
Reagents	US$/lb Mg	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028
Waste Disposal	US$/lb Mg	0.141	0.141	0.141	0.141	0.141	0.141	0.141	0.141	0.141	0.141
Total Unit Operating Cost	US$/lb Mg	**1.278**	**1.278**	**1.278**	**1.278**	**1.278**	**1.278**	**1.278**	**1.278**	**1.278**	**1.278**
Total Unit Capital Cost	US$/lb Mg										
Total Unit Cost	US$/lb Mg										

table continues…

Tami-Mosi Magnesium Project - Pre-Tax Financial Model (100% Project Equity) PEA (30,000 tpa) rev2		Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27
Metal Prices	**Units**										
Magnesium	US$/lb	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45	2.45
Exchange Rate	US:CDN	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Mill Feed Production											
Mill Feed Mined	kt	294	294	294	294	294	295	295	295	295	295
Waste Mined	kt	9	8	8	8	8	5	5	5	5	4
Total Mined	kt	304	302	302	302	302	300	299	299	299	299
Total Moved	kt	304	302	302	302	302	300	299	299	299	299
Strip Ratio (waste t : mill feed t)		0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01
Mill Feed Processed	kt	294	294	294	294	294	295	295	295	295	295
Magnesium Grade	%	12.59	12.58	12.58	12.58	12.58	12.57	12.57	12.57	12.57	12.55
Magnesium Ingot Production (99.8% Mg)											
Recovery											
Reduction Conversion Efficiency	%	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Casting Recovery	%	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
Total	%	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0
Metal Recovered											
Magnesium	klbs	66,138	66,138	66,138	66,138	66,138	66,138	66,138	66,138	66,138	66,138
Cash Flow (US)											
Magnesium Revenues	000's US$	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**	**162,038**
Direct Operating Costs											
Dolomite Mining	000's US$	1,673	1,667	1,664	1,664	1,664	1,650	1,650	1,650	1,650	1,645
Dolomite Transportation	000's US$	3,892	3,894	3,895	3,895	3,895	3,898	3,898	3,898	3,898	3,904
Ferrosilicon	000's US$	35,081	35,081	35,081	35,081	35,081	35,081	35,081	35,081	35,081	35,081
Power	000's US$	15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500	15,500
GA&E	000's US$	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888	1,888
Manpower	000's US$	9,849	9,849	9,849	9,849	9,849	9,849	9,849	9,849	9,849	9,849
Consumables	000's US$	5,390	5,390	5,390	5,390	5,390	5,390	5,390	5,390	5,390	5,390
Reagents	000's US$	1,881	1,881	1,881	1,881	1,881	1,881	1,881	1,881	1,881	1,881
Waste Disposal	000's US$	9,348	9,348	9,348	9,348	9,348	9,348	9,348	9,348	9,348	9,348
Total Operating Costs	000's US$	**84,501**	**84,496**	**84,495**	**84,495**	**84,495**	**84,484**	**84,484**	**84,484**	**84,484**	**84,485**
Operating Cash Flow	000's US$	**77,537**	**77,542**	**77,543**	**77,543**	**77,543**	**77,554**	**77,554**	**77,554**	**77,554**	**77,553**

table continues…

Tami-Mosi Magnesium Project - Pre-Tax Financial Model (100% Project Equity) PEA (30,000 tpa) rev2		Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27
Capital Costs											
Initial Capital	000's US$										
Pre-production (Development & Pre-Strip)	000's US$										
Working Capital	000's US$	-	-	-	-	-	-	-	-	-	-
Sustaining Capital	000's US$	4,560	3,760	7,360	4,160	4,060	3,760	4,460	5,410	4,060	4,260
Sustaining #1	000's US$	4,560	3,760	7,360	4,160	4,060	3,760	4,460	5,410	4,060	4,260
Sustaining #2	000's US$	-	-	-	-	-	-	-	-	-	-
Sustaining #3	000's US$	-	-	-	-	-	-	-	-	-	-
Sustaining #4	000's US$	-	-	-	-	-	-	-	-	-	-
Salvage	000's US$	-	-	-	-	-	-	-	-	-	-
Sustaining #6	000's US$	-	-	-	-	-	-	-	-	-	-
Total Capital Costs	000's US$	**4,560**	**3,760**	**7,360**	**4,160**	**4,060**	**3,760**	**4,460**	**5,410**	**4,060**	**4,260**
Pre-tax Cash Flow	000's US$	**72,977**	**73,782**	**70,183**	**73,383**	**73,483**	**73,794**	**73,094**	**72,144**	**73,494**	**73,293**
	Cumulative	887,746	961,528	1,031,711	1,105,095	1,178,578	1,252,372	1,325,466	1,397,610	1,471,104	1,544,397

Unit Costs (US)

Dolomite Mining	US$/lb Mg	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Dolomite Transportation	US$/lb Mg	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
Ferrosilicon	US$/lb Mg	0.530	0.530	0.530	0.530	0.530	0.530	0.530	0.530	0.530	0.530
Power	US$/lb Mg	0.234	0.234	0.234	0.234	0.234	0.234	0.234	0.234	0.234	0.234
GA&E	US$/lb Mg	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
Manpower	US$/lb Mg	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149
Consumables	US$/lb Mg	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081
Reagents	US$/lb Mg	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028	0.028
Waste Disposal	US$/lb Mg	0.141	0.141	0.141	0.141	0.141	0.141	0.141	0.141	0.141	0.141
Total Unit Operating Cost	US$/lb Mg	**1.278**	**1.278**	**1.278**	**1.278**	**1.278**	**1.277**	**1.277**	**1.277**	**1.277**	**1.277**
Total Unit Capital Cost	US$/lb Mg										
Total Unit Cost	US$/lb Mg										

table continues…

Tami-Mosi Magnesium Project - Pre-Tax Financial Model (100% Project Equity) PEA (30,000 tpa) rev2		Year 28	Year 29	Year 30		TOTAL/AVG
Metal Prices	**Units**					
Magnesium	US$/lb	2.45	2.45	2.45		2.45
Exchange Rate	US:CDN	1.00	1.00	1.00		1.00
Mill Feed Production						
Mill Feed Mined	kt	295	295	295		8,828
Waste Mined	kt	3	3	3		334
Total Mined	kt	299	299	299		9,162
Total Moved	kt	299	299	299		9,162
Strip Ratio (waste t : mill feed t)		0.01	0.01	0.01		0.04
Mill Feed Processed	kt	295	295	295		8,828
Magnesium Grade	%	12.55	12.55	12.55		12.59
Magnesium Ingot Production (99.8% Mg)						
Recovery						
Reduction Conversion Efficiency	%	90.0	90.0	90.0		90.0
Casting Recovery	%	90.0	90.0	90.0		90.0
Total	%	81.0	81.0	81.0		81.0
Metal Recovered						
Magnesium	klbs	66,138	66,138	66,138		1,984,140
Cash Flow (US)						
Magnesium Revenues	000's US$	**162,038**	**162,038**	**162,038**		**4,861,143**
Direct Operating Costs						
Dolomite Mining	000's US$	1,645	1,645	1,645		50,483
Dolomite Transportation	000's US$	3,904	3,904	3,904		116,798
Ferrosilicon	000's US$	35,081	35,081	35,081		1,052,418
Power	000's US$	15,500	15,500	15,500		464,999
GA&E	000's US$	1,888	1,888	1,888		56,630
Manpower	000's US$	9,849	9,849	9,849		295,467
Consumables	000's US$	5,390	5,390	5,390		161,690
Reagents	000's US$	1,881	1,881	1,881		56,427
Waste Disposal	000's US$	9,348	9,348	9,348		280,442
Total Operating Costs	000's US$	**84,485**	**84,485**	**84,485**		**2,535,355**
Operating Cash Flow	000's US$	**77,553**	**77,553**	**77,553**		**2,325,788**

table continues…

Tami-Mosi Magnesium Project - Pre-Tax Financial Model (100% Project Equity) PEA (30,000 tpa) rev2		Year 28	Year 29	Year 30		TOTAL/AVG
Capital Costs						
Initial Capital	000's US$					424,066
Pre-production (Development & Pre-Strip)	000's US$					-
Working Capital	000's US$	-	-	(- 6,281)		-
Sustaining Capital	000's US$	4,060	3,760	(- 42,407)		83,798
Sustaining #1	000's US$	4,060	3,760	-		126,205
Sustaining #2	000's US$	-	-	-		-
Sustaining #3	000's US$	-	-	-		-
Sustaining #4	000's US$	-	-	-		-
Salvage	000's US$	-	-	(- 42,407)		(- 42,407)
Sustaining #6	000's US$	-	-	-		-
Total Capital Costs	000's US$	**4,060**	**3,760**	**(- 48,688)**		**507,864**
Pre-tax Cash Flow	000's US$	**73,493**	**73,793**	**126,241**		**1,817,924**
	Cumulative	1,617,890	1,691,683	1,817,924		

Unit Costs (US)

		Year 28	Year 29	Year 30	TOTAL/AVG
Dolomite Mining	US$/lb Mg	0.025	0.025	0.025	0.025
Dolomite Transportation	US$/lb Mg	0.059	0.059	0.059	0.059
Ferrosilicon	US$/lb Mg	0.530	0.530	0.530	0.530
Power	US$/lb Mg	0.234	0.234	0.234	0.234
GA&E	US$/lb Mg	0.029	0.029	0.029	0.029
Manpower	US$/lb Mg	0.149	0.149	0.149	0.149
Consumables	US$/lb Mg	0.081	0.081	0.081	0.081
Reagents	US$/lb Mg	0.028	0.028	0.028	0.028
Waste Disposal	US$/lb Mg	0.141	0.141	0.141	0.141
Total Unit Operating Cost	US$/lb Mg	**1.277**	**1.277**	**1.277**	**1.278**
Total Unit Capital Cost	US$/lb Mg				**0.256**
Total Unit Cost	US$/lb Mg				**1.534**

22.4 TAXES AND ROYALTIES

No royalties were applied to the Tami-Mosi mining leases of interest in this study.

NVM engaged PwC to perform a federal income tax and NNPT analysis of the Project.

The following general tax regime was recognized as applicable at the time of report writing.

22.4.1 US FEDERAL AND STATE TAXATION REGIME

For US federal income tax purposes, in accordance with the Internal Revenue Code (IRC), a taxpayer is required to calculate taxes under both the regular corporate tax system and the Alternative Minimum Tax (AMT) system and pay whichever method results in the higher amount of taxes in a given taxation year.

The statutory US federal income tax rate is 35% and the tax rate under AMT is 20%. The Nevada Net Proceeds tax rate is 5% and this tax is deductible for federal income tax purposes.

US federal net operating losses generated in a given year may be carried forward for 20 years and applied to taxable income when it arises, or carried back 2 years and applied against taxable income from the project in those years. The IRC also allows mining companies to claim certain deductions related to their investment in mining properties (i.e. depletion and development expenditures).

Table 22.7 US Federal Tax Rate

Taxable Income ($)	Tax (%)
0 to 50,000	15
50,000 to 75,000	25
75,000 to 100,000	34
100,000 to 335,000	39
335,000 to 10,000,000	34
10,000,000 to 15,000,000	35
15,000,000 to 18,333,333	38
18,333,333 to ∞	35

22.4.2 DEPLETION

Generally speaking, depletion, like depreciation, is a form of cost recovery. Just as the owner of a business asset is allowed to recover the cost of an asset over its useful life, a miner is allowed to recover the cost of a mineral property. Depletion is taken over the period that minerals are being extracted.

For federal income tax purposes, two forms of depletion are allowed: cost depletion and percentage depletion. The taxpayer is required to use the method that will result in the greatest deduction.

COST DEPLETION

Cost depletion is the process of charging a portion of the property cost to the production cost. This is based upon the premise that the value of a reserve declines in proportion with the quantity of minerals extracted and removed. The first step of this method is to determine the number of units (as of the beginning of each year), which comprise the deposit. The unit can be any measure of production such as tonnes of ore, barrels of oil, board feet of timber, etc. The taxpayer must be consistent from year to year in the type of unit being calculated to insure uniformity. The second step takes the cost or adjusted basis of the property, which pertains to the deposit and divides this basis by the total number of units to obtain the depletion cost per unit. The depletion cost per unit is multiplied by the total units sold during the year to arrive at cost depletion.

PERCENTAGE DEPLETION

Under the percentage depletion method, a flat percentage of adjusted gross income from the activity is used to calculate the depletion allowance. The deduction for depletion cannot exceed 50% of the adjusted taxable income from the activity. This limitation is computed without regard to the depletion allowance. The amount of the deduction allowable under percentage depletion is not limited by the basis of the property. Thus, even though the basis of the property is reduced by the amount of depletion taken, if the basis becomes zero, the depletion based on the percentage of adjusted gross income may continue. However, if cost depletion in a given taxation year yields a higher deduction, it must be used in the calculation of taxable income.

22.4.3 NEVADA NET PROCEEDS OF MINERAL TAX

NNPT is an ad valorem property tax assessed on minerals mined or produced in Nevada when they are sold or removed from the state. NNPT is assessed on individual mine operations. The tax is separate from, and in addition to, any property tax paid on land, equipment and other assets.

The gross proceeds from the sale of the minerals minus the allowable deductions determine the taxable net proceeds. Only costs incurred in the process of performing these tasks in the current tax year may be deducted. Costs cannot be carried forward to future tax years or carried back to previous tax years.

The tax rate applied to the net proceeds is based on a sliding scale between 2% and 5%, depending on the ratio of net proceeds to gross proceeds (please see details below.)

If the “net proceeds” of the Project in a given taxation year totals $4 million or more, the NNPT rate is 5%. If the “net proceeds” is less than $4 million, the following tax rates shown in Table 22.8 apply.

Table 22.8 Net Proceeds Rate of Tax Percentage – For Net Proceeds Less than $4 million per Year

Net Proceeds as a Percentage of Gross Proceeds	Rate of Tax as a Percentage of Net Proceeds (%)
Less than 10%	2.00
10% or more but less than 18%	2.50
18% or more but less than 26%	3.00
26% or more but less than 34%	3.50
34% or more but less than 42%	4.00
42% or more but less than 50%	4.50
50% or more	5.00

22.4.4 Estimated Taxes Payable

At the long-term metal prices that were used in the base case scenario in this PEA, the total estimated taxes payable on the Project profits are US$507 million over the 30-year mine life.

The components of the various taxes that will be payable are shown in Table 22.9.

Table 22.9 Components of the Various Taxes

Tax Component	LOM Amount (US$ million)
Federal Income Taxes	404
Nevada Net Proceeds Taxes	103
Total Taxes	**507**

Base case post-tax financial results for the Project are summarized in Table 22.10.

Table 22.10 Summary of Post-tax Financial Results

Description	Units	Post-tax
Net Cash Flow	million US$	1,311
Project NPV		
8% discount rate	million US$	199
6% discount rate	million US$	**335**
3% discount rate	million US$	672
0% discount rate	million US$	1,311
Project IRR	%	13.4
Payback	Years	6.6

22.5 SENSITIVITY

Sensitivity analyses were carried out on the following parameters:

- magnesium metal price
- initial capital expenditure
- on-site operating costs
- exchange rate.

The analyses are presented graphically as financial outcomes in terms of NPV and IRR. The project NPV is most sensitive to operating costs, followed by exchange rate and magnesium price, while the project IRR is most sensitive to magnesium price, followed by operating costs and capital. The NPV and IRR sensitivities are shown in Figure 22.2 and Figure 22.3.

Figure 22.2 NPV Sensitivity Analysis

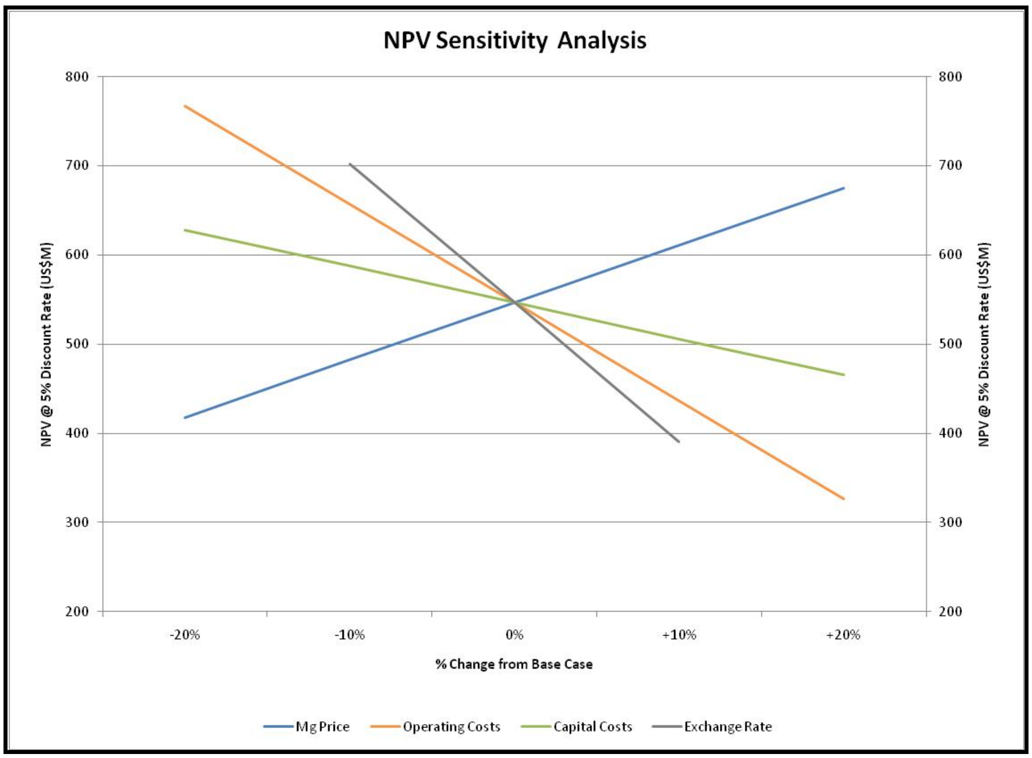
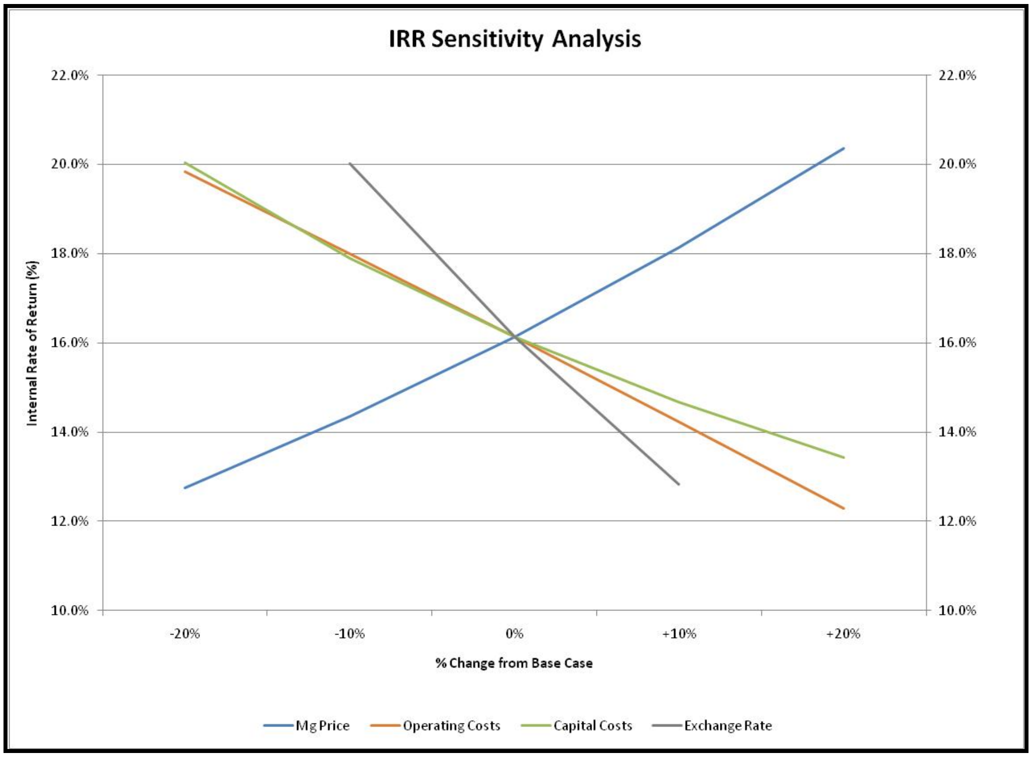


Figure 22.3 IRR Sensitivity Analysis



22.6 CONCLUSION AND RECOMMENDATIONS

A pre-tax economic evaluation of the Project incorporating all the relevant capital, operating, working and sustaining costs was developed. Using a base case price of $2.45/lb, the 30-year production period processes 8.8 Mt of resources resulting in the following economic returns:

- 16.1% IRR
- 5.9-year payback on US$424 M capital
- US$547 M NPV at 6% discount value.

NVM engaged PwC to perform a federal income tax and NNPT analysis of the Project.

The following post-tax financial parameters were calculated:

- 13.4% IRR
- 6.6-year payback on US$424 M capital
- US$335 M NPV at 6% discount rate.

The potential for increasing the value of the project, through increased processed resources and production rates, can be assessed in future studies. The current plan involves processing only small amounts of the total resource; increasing the production rate should lower operating costs, which is one of the more sensitive parameters on the project economics.

23.0 ADJACENT PROPERTIES

The Tami-Mosi property is considered to be within the Carlin Trend, although it is approximately 200 km SE of the main economic area of the trend. Gold, silver, and copper mining has historically, and continues to be, conducted in the region around Ely, Nevada. There are three notable properties proximal to the Tami-Mosi claims.

The Robinson Mine is located approximately 15 km northwest of the Property and is currently operational under KGHM International. The Robinson Mine is host to a number of copper porphyry deposits that are being mined primarily for copper, with gold and molybdenum as secondary metals.

The Taylor Mine, an historical silver mine, is located approximately 15 km south of the Property. The Taylor deposit is currently being explored by Silver Predator Corp. and is considered to be a typical Carlin-style, sediment hosted gold-silver deposit.

A small historical mine is present immediately south of the Property. The Duer Mine is a small underground operation that has been abandoned for more than 60 years (Tribe 2009). The mineralization is hosted in a sheared vein and the metals recovered include gold, silver, and manganese. The claims around the Duer mine are still patented. To the author's knowledge, there is no public record of the tonnage or grade of material extracted from the mine.

None of these deposits have a structural or mineralization relationship with the Tami-Mosi dolomite.

24.0 OTHER RELEVANT DATA AND INFORMATION

This section is not applicable to this report.

25.0 INTERPRETATIONS AND CONCLUSIONS

NVM retained Tetra Tech together with a number of specialists with expertise in the magnesium, ferrosilicon and power generation industries to complete this PEA for a proposed 30,000 t/a magnesium project. This report has been prepared to an accuracy level of +50% /-25%.

The current study should be followed by a prefeasibility study, to further assess the technical and economic viability of the Project.

25.1 PROJECT ECONOMICS

Tetra Tech developed a pre-tax economic evaluation of the Project that incorporated all the relevant capital, operating, working, sustaining costs, and royalties was developed. Using a base case magnesium price of US$2.45/lb, the 30-year production period processes 8.8 Mt of resources, generating 30 kt/a, 99.9% Mg ingot, resulted in the following economic returns:

- 16.1% IRR
- 5.9-year payback on $424 M capital
- $547 M NPV at 6% discount value.

NVM engaged PwC to perform a federal income tax and NNPT analysis of the Project.

The following post-tax financial parameters were calculated:

- 13.4% IRR
- 6.6-year payback on US$424 M capital
- US$335 M NPV at 6% discount rate.

The current plan only processes a small amount of the total resource while ramping up the production rate should lower the operating costs, which is one of the more sensitive parameters on the project economics.

25.2 GEOLOGY

The Tami-Mosi Project shows promise as a magnesium producer selling into the US domestic market.

Dolomite outcrop is plentiful on the property. Surface continuation was established by field-mapping in 2010, which identified boundaries between limestone and dolomite areas. The dolomite within these boundaries was conceptualized as a wireframe. The upper-most 200 m of this wireframe was interpolated as a block model, which yielded an Inferred Resource of 412 Mt of dolomite at an average grade of 12.3% Mg above a cut-off of 12%.

Due to the speculative nature of Inferred resources, there is no certainty that these resources will be realized. More drilling is required to convert Inferred Resources into Indicated and Measured, to quantify possible reserves in future studies.

25.3 Mining

An open-pit was designed containing 8.8 Mt of resource which is enough material for the proposed processing site to produce 30 kt/a Mg over 30 years of production. This represents only a small portion of the overall resource available so future expansion is easily achievable.

25.4 Metallurgy and Process

25.4.1 Metallurgical Testing

The test work showed that the drill core samples tested by Hazen are mainly dolomite, containing 19.8% to 21.6% MgO. The $MgCO_3$ of the dolomite can be differentially decomposed at approximately 800°C. The results appear to indicate that the chemical composition of the Tami-Mosi dolomite is favourable to magnesium recovery by conventional processes.

25.4.2 Process

Vertical integration of the magnesium process with coal gasification power plant and ferrosilicon plant is preliminarily estimated to be low in terms of contribution to the overall operating cost, and capable of maintaining the stability and consistency of the magnesium production operation. Coal gasification coupled with syngas fired turbine generator and a waste heat steam turbine generator will generate electric power, steam and syngas which are required for the magnesium production and processing site ancillary requirements.

The modified Bolzano Process would offer one of the best approaches for magnesium ingot production through dolomite reduction. Further studies should be conducted to assess the optimum process for the magnesium recovery from the dolomite.

25.5 MARKET STUDIES AND CONTRACTS

The project timing seems to be very good for the establishment of a new source of primary magnesium located in the US, and with direct access to US-based magnesium die casters in particular. There is a steady upward pressure on world prices. China is experiencing increased production costs due to increases in labour costs, electricity costs, and environmental regulations. The internal Chinese export tax on magnesium and magnesium alloys is a further cost burden for the Chinese producers servicing the world market.

25.6 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

A multi-agency permitting and approval process must be completed to allow NVM to construct, operate and close the Tami-Mosi Project in accordance with all applicable federal, state and local regulations. This program will include the acquisition of permits and approvals from various regulatory agencies. The program will be planned to align with project progression.

26.0 RECOMMENDATIONS

This section outlines a number of potential project improvements and opportunities. A prefeasibility study is recommended to pursue these recommendations and further develop the project definition. A high-level budgetary estimate for the completion of each recommended item is provided.

26.1 RECOMMENDATIONS

26.1.1 PROJECT ECONOMICS

The overall value of the project may be increased by increasing the rate of production. This PEA contemplates the processing of a small percentage of the total resource. Increasing the production rate should lower operating costs, which is one of the most sensitive parameters of the project economics.

Further recommendations include the following:

- secure detailed quotations, including transportation costs, to acquire raw materials, and then construct a rigorous mass and energy balance across all unit operations in the proposed plant to validate the operating cost model, and clarify areas which can be improved upon
- perform a cost/benefit analysis on possible changes to the process that may lead to improved unit production cost
- compare costs and associated engineering requirements for stick-built versus pre-engineered buildings
- contact potential users for waste streams and convert them into co products.

The estimated budget for these future works is approximately $200,000.

26.1.2 GEOLOGY

The northern extent of the wireframe model was based on the location of a fault crossing the property. Surface mapping showed that dolomite without noticeable limestone contamination occurs north of this fault. No drilling information is currently available from this area.

Tetra Tech recommends conducting a drill program consisting of 15 drill-holes in this area. This program will include:

- three drillcore holes on the periphery of the area of interest to confirm the geology
- twelve rotary percussion reverse circulation holes as infill drilling to define the grade more accurately.

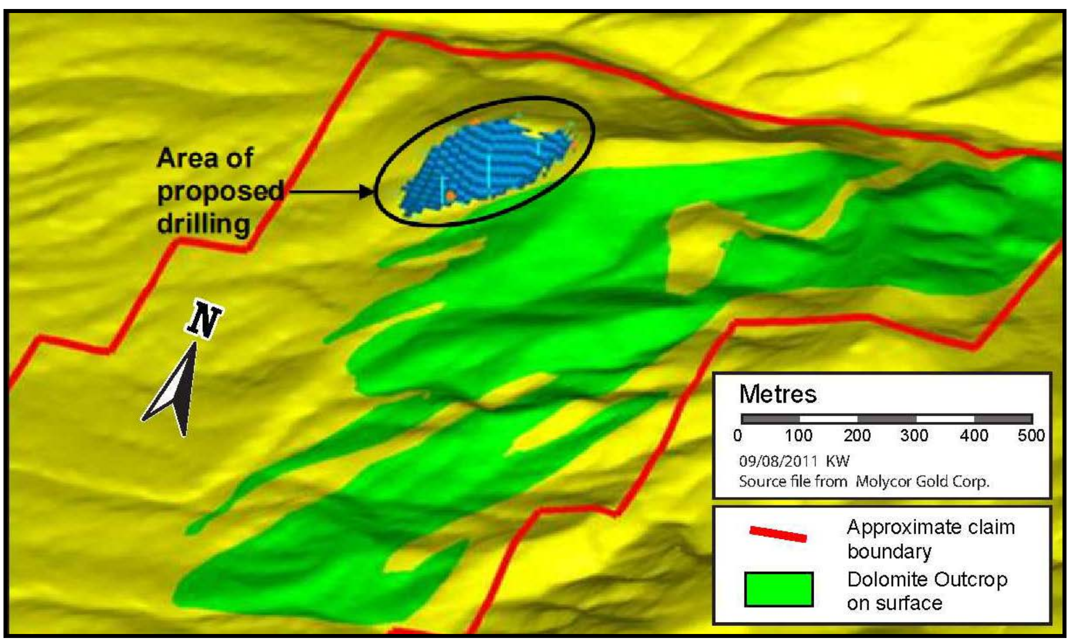
The approximate locations of recommended core holes are shown in Figure 26.1; the actual collar locations will be determined by the geologist on site. The location of the recommended reverse circulation holes will be determined following completion of the core holes the results of assays from the extracted cores are favourable.

Cost estimates for these recommended drill-holes are:

- three NQ core holes, estimated to cost $360/m, with maximum depths of 200 m: $72,000 per drill-hole for a total of $216,000
- twelve rotary percussion reverse circulation holes, estimated to cost $260/m, with maximum depths of 200 m: $52,000 per drill-hole, for a total of $624,000.

Total project cost for all 15 drill-holes is estimated to be $840,000.

Figure 26.1 Recommended Locations of Core Holes



26.1.3 MINING

An open pit, containing 8.8 Mt of resource, was designed to produce 30 kt/a of magnesium over 30 years of production. The design will mine only a small portion of the overall resource available; future expansion is easily achievable. A production rate increase would likely benefit the projects economics and should be assessed in future studies.

Further recommendations include the following:

- Detail the usage of the reduction residue for staging areas and roadways.
- Review local labour and supply costs, as well as services and support, for a mining operation in the project area.
- Develop more detailed cost estimates for G&A, mining operating and capital, and infrastructure capital (power distribution, roads, sedimentation structures, field facilities in the mine area, etc.).
- Investigate efficiency/cost of using pit-run grizzly and transporting -30 cm to process plant for all size reduction.
- Detail reclamation designs and costs to minimize the project impact and optimize future closure costs.
- Define a contractor to provide transportation of the product to the reduction plant, and obtain a detailed cost estimate for these services.
- Investigate the opportunity to utilize the existing narrow gauge railroad as an alternative to trucking.

The estimated budget for this future work is approximately $100,000.

26.1.4 METALLURGY AND PROCESS

Tetra Tech recommends further test work to investigate the optimum magnesium reduction process technology, the effect of impurities of the mineralization on recovery of magnesium, and process-related parameters. The major parameters, including those concerning calcination and mill feed, to be defined through this bench scale test program are:

- impact of the degree of calcination of the dolomite on productivity and yield
- briquette geometry and process parameters as they impact heat transfer, friability and permeability to magnesium vapour
- furnace operating conditions such as reduction temperature and pressure to define optimum productivity and yield
- condenser structure and operating parameters to optimize recovery and purity.

The estimated budget for this test work is approximately $500,000.

26.1.5 Infrastructure

The power plant is a key element of the vertically-integrated processing site. Tetra Tech recommends process modeling and development of the process definition for the power plant, to properly define the equipment and operation of the power plant.

The estimated budget for this modeling and development is approximately $250,000.

The ferrosilicon plant is also a key element of the vertical integration of the processing site; Tetra Tech recommends assessing economic benefit of the ferrosilicon plant by conducting a pilot test to evaluate and select the raw materials, and to define the process and operating parameters required to produce ferrosilicon using the same type of coal that will be used in the power plant.

Tetra Tech recommends the following investigations:

- Select and commission an engineering group specializing in ferro-alloy production to design the proposed ferrosilicon facility.
- Identify and quantify the necessary raw materials.
- Obtain a current worldwide production cost report for all ferrosilicon producers, and update the cost model accordingly.
- Identify and hire a vender to provide the operating and commissioning technology for the ferrosilicon plant.

The estimated budget for this modeling and development is approximately $230,000.

26.1.6 Environmental Studies, Permitting, and Social or Community Impact

A multi-agency permitting and approval process must be completed to allow NVM to construct, operate and close the Tami-Mosi Project. This program will include the acquisition of permits and approvals from various regulatory agencies.

To streamline the permitting process, and to identify the specific permits and approvals required, Tetra Tech recommends that representatives of NVM hold formal scoping meetings with appropriate personnel from BLM and the NDEP, BMRR, the lead agency and cooperating agency, respectively. These meetings will provide an opportunity to review all proposed project activities and issues, including the identification of the required federal, state and local permits and approvals. In addition, these meetings will provide an opportunity to discuss the appropriate environmental documentation program under NEPA, and establish a schedule to complete the permitting and approval process.

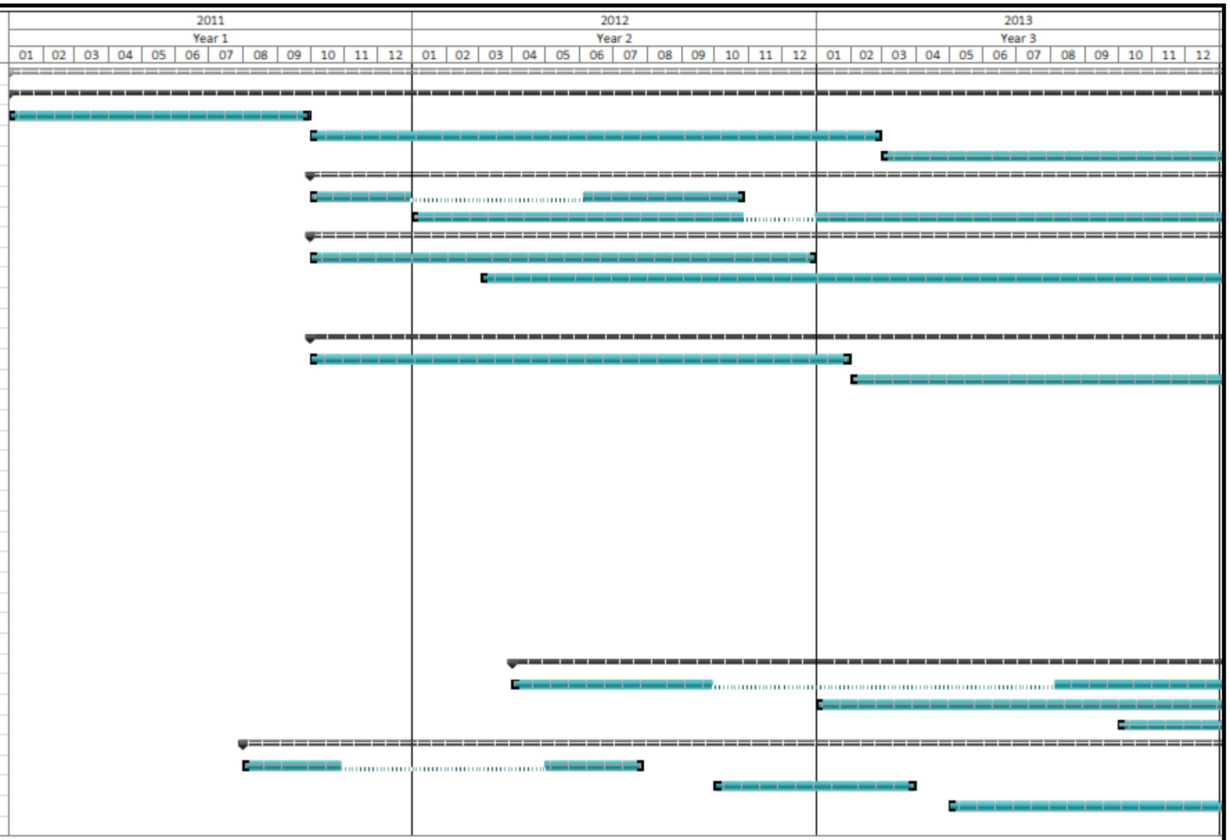
The estimated budget for these permitting and approval activities is approximately $450,000.

26.1.7 PROJECT SCHEDULE

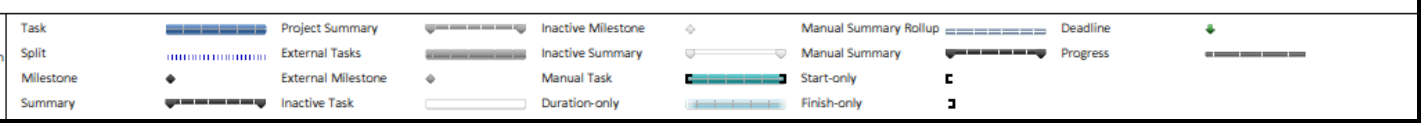
A preliminary high-level project schedule has been prepared for the Tami-Mosi Magnesium Project. This schedule is provided in Table 26.1.

Table 26.1 Preliminary High Level Project Schedule

ID	Task Name
0	**Molycor Tami-Mosi Magnesium Project**
1	**Studies**
2	Preliminary Economic Assessment (PEA)
3	Prefeasibility Study (PFS)
4	Feasibility Study (FS)
5	**Drilling and Process Testing**
6	Mine Reserve Delineation
7	Metallurgical and Process Test Work
8	**Environmental**
9	Baseline Data Collection
10	Environmental Impact Assessment
11	Public Hearings
12	Certificate of Authorization
13	**Engineering**
14	Preliminary Engineering
15	Basic Engineering
16	Detailed Engineering
17	**Procurement**
18	Procurement
19	**Construction**
20	Overall Site Preparation
21	Power Plant
22	Mg Plant
23	FeSi Plant
24	**Commissioning & Start-up**
25	Commissioning & Start-up Power Plant
26	Commissioning & Start-up Mg Plant
27	Commissioning & Start-up FeSi Plant
28	Commerical Metal Production
29	**Commercial**
30	Market Evaluation
31	Mg Off-take Agreements and Contracts
32	Raw Materials Contracts
33	**Financing**
34	Prefeasibility
35	Feasibility
36	Project Financing
37	Investment Decision



Project: Molycor Tami-Mosi Magn
Date: Wed 07/09/11



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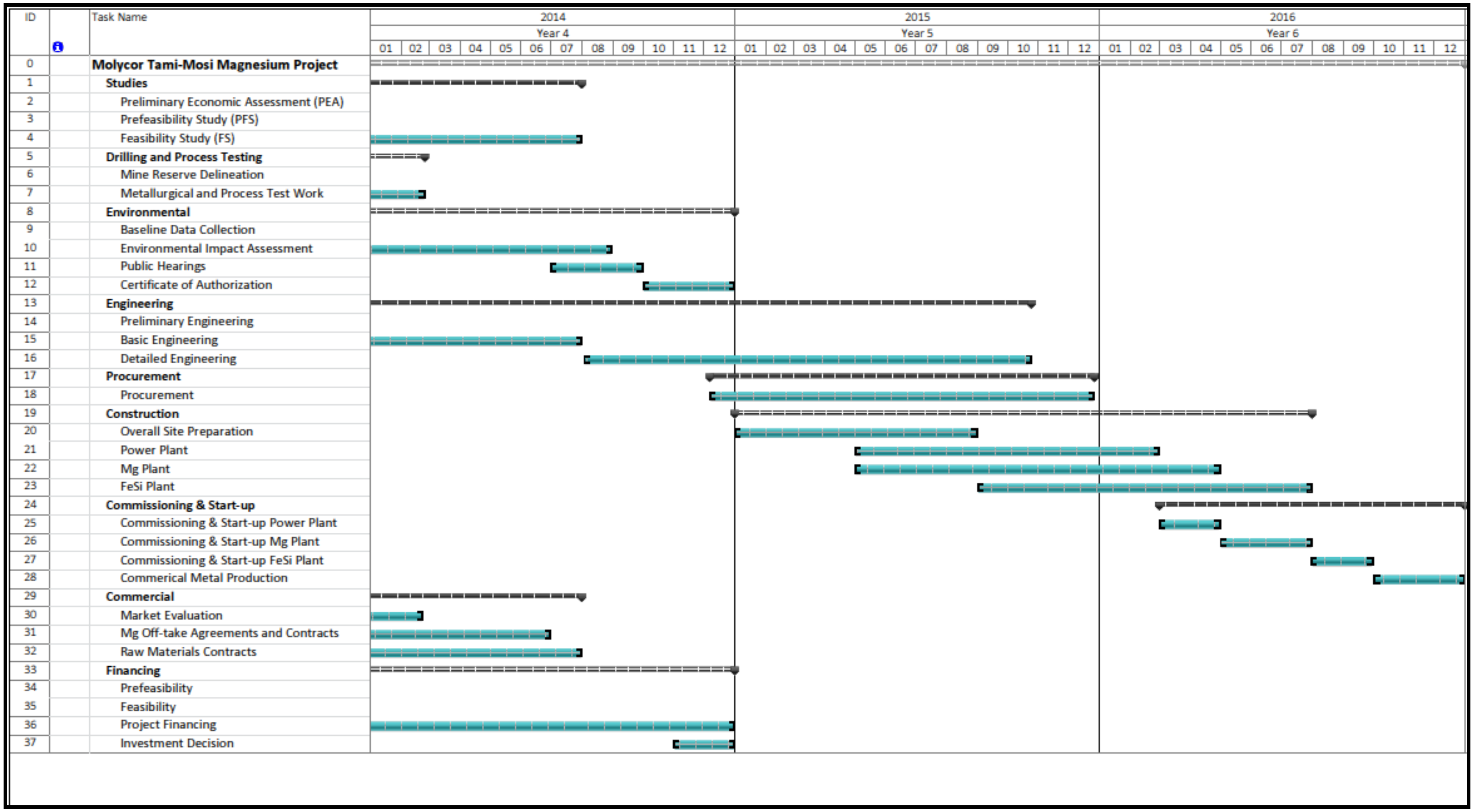
ID
Task Name
2014
Year 4
2015
Year 5
2016
Year 6
01 02 03 04 05 06 07 08 09 10 11 12
0 Molycor Tami-Mosi Magnesium Project
1 Studies
2 Preliminary Economic Assessment (PEA)
3 Prefeasibility Study (PFS)
4 Feasibility Study (FS)
5 Drilling and Process Testing
6 Mine Reserve Delineation
7 Metallurgical and Process Test Work
8 Environmental
9 Baseline Data Collection
10 Environmental Impact Assessment
11 Public Hearings
12 Certificate of Authorization
13 Engineering
14 Preliminary Engineering
15 Basic Engineering
16 Detailed Engineering
17 Procurement
18 Procurement
19 Construction
20 Overall Site Preparation
21 Power Plant
22 Mg Plant
23 FeSi Plant
24 Commissioning & Start-up
25 Commissioning & Start-up Power Plant
26 Commissioning & Start-up Mg Plant
27 Commissioning & Start-up FeSi Plant
28 Commerical Metal Production
29 Commercial
30 Market Evaluation
31 Mg Off-take Agreements and Contracts
32 Raw Materials Contracts
33 Financing
34 Prefeasibility
35 Feasibility
36 Project Financing
37 Investment Decision

26.2 OPPORTUNITIES

The result of the economic analysis provided in this PEA indicated an operating cost of $1.281/lb Mg.

A number of opportunities have been identified to potentially improve the overall project economics by reducing operating costs and/or increasing revenues. These potential opportunities have not been included in the cost estimates or economic analyses provided in this PEA.

Exploration of these opportunities will require additional studies, trade-off analyses, and in many cases bench and/or pilot testing. These opportunities and their potential economic benefit to the project are pre-scoping estimates only; the economic benefits of these opportunities are subject to trade-off studies.

The potential economics of these opportunities have been divided into product cost opportunities and revenue opportunities.

Some of the product cost opportunities are:

- Operational improvements:
  - Specification versus Actual Magnesium Furnace Throughput – Optimize the magnesium process to utilize the total magnesium furnace capacity of 4 t/h for each furnace group, versus the designed process throughput of only 3.5 t/h.
- Raw materials:
  - Quartz – Source a local quartz deposit capable of producing the required ferrosilicon plant raw material
  - Coal – Replace metallurgical coal requirement with PRB coal in the ferrosilicon production process
  - Reagent – Eliminate fluorspar from the reduction process
  - Soderburg Past Production – Produce Soderburg electrode paste with power plant coal tar as raw material.
- Process change:
  - Ferrosilicon Recycling – Recycle spent ferrosilicon from the magnesium reduction process to reduce ferrosilicon production requirement
  - Magnesium Burning - Elimination of burning at time of condenser separation, reducing salt cake sludge and increasing magnesium recovery
  - Two-cycle per Day – A historic cycle time of 24 hours was used for this assessment; current publications suggest a 10 to 12 hour cycle is possible
  - Continuous Operation – Development of a continuous reduction process.

- Energy:
  - Direct the calcination carbon dioxide gas and stream to gasifier to increase carbon and hydrogen in the syn gas while capturing the thermal energy in the off gas stream
  - Low Grade Energy – Investigate recovery of energy from various process sources.

Revenue opportunities include:

- conversion of waste into co-products:
  - Fume Silica – Investigate the marketing of fume silica to the cement industry as a strengthening additive
  - Residual Ferrosilicon – Investigate the marketing of residual ferrosilicon for alloying in the iron industry
  - Reduction Residue – Investigate the marketing of reduction residue as a feed material for the production of Portland Cement
  - Sulfur – Investigate the marketing of sulfur extracted from the gas steam for use in various industries.

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Smith, S.C. Interpretation of Tamberlaine Vegetation Survey Manganese Target. Internal Report Prepared for Molycor Gold Corp. April, 2008.

Tribe, N. (2009) Tami-Mosi Property Evaluation Report. Prepared for Molycor Gold Corp. May 1, 2009.

APPENDIX A

Certificates of Qualified persons

FRED P. BUCKINGHAM, PH.D., P.E.

I, Fred P. Buckingham, of Houston, Texas, USA, do hereby certify:

- I am a Mechanical Engineer with MPR Associates Inc., with a business address at Suite 3325, 1221 McKinney Street, Houston, Texas, USA, 77010.
- This certificate applies to the technical report entitled Preliminary Economic Assessment and Technical Report of the Tami-Mosi Magnesium Project, Nevada, with an effective date of September 15, 2011 and an amended date of July 4, 2014 (the "Technical Report").
- I am a graduate of the University of Texas at Austin (BSME, 1975), University of Texas at Arlington (MSME, 1980), and University of Texas at Arlington (Ph.D., 1993). I am a licensed Professional Engineer in the State of Texas (License #47271), as well as a member in good standing of the American Society of Mechanical Engineers (Member #153312) and the American Nuclear Society. My relevant experience is over 30 years of executing numerous projects for electric utility, petro-chemical, and marine clients; developing processes and procedures for implementation of retrofit projects for electric utility boilers, designed fuel handling, blending, and delivery systems for many applications. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").
- I have not personally inspected the Dolomite Property.
- I am responsible for Sections 18.4, 21.1.7 (power plant only), and 21.2.2 of the Technical Report.
- I am independent of Nevada Clean Magnesium, Inc. as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property that is the subject of the Technical Report.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information, and belief, the sections of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 4th day of July, 2014 at Houston, Texas, USA.

Original document signed and sealed by
Fred P. Buckingham, P.Eng.

Fred P. Buckingham, P.Eng.
Mechanical Engineer
MPR Associates Inc.

HASSAN GHAFFARI, P.ENG.

I, Hassan Ghaffari, P.Eng, of Vancouver, BC, do hereby certify:

- I am a Director of Metallurgy with Tetra Tech WEI Inc., with a business address at #800-555 West Hastings Street, Vancouver, British Columbia, V6B 4N6.
- This certificate applies to the technical report entitled Preliminary Economic Assessment and Technical Report of the Tami-Mosi Magnesium Project, Nevada, dated September 15, 2011 and an amended date of July 4, 2014 (the "Technical Report").
- I am a graduate of the University of Tehran (M.A.Sc., Mining Engineering, 1990) and the University of British Columbia (M.A.Sc., Mineral Process Engineering, 2004). I am a member in good standing of the Association of Professional Engineers and Geoscientists of the Province of British Columbia (#30408). My relevant experience with respect to mineral process engineering includes 22 years of experience in mining and plant operation, project studies, management, and engineering. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").
- I have not personally inspected the Dolomite Property.
- I am responsible for Sections 1.1, 1.7, 1.8, 1.9, 1.10, 2, 3, 18.0, 19, 20, 21.1, 21.1.7 (ferrosilicon plant only), 21.2.3, 24, 25 (introduction), 25.5, 25.6, 26.1.5, 26.1.6, 26.1.7, 26.2, and 27 of the Technical Report.
- I am independent of Nevada Clean Magnesium Inc. as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property that is the subject of the Technical Report.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information and belief, the sections of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 4th day of July, 2014 at Vancouver, British Columbia.

Original document signed and sealed by
Hassan Ghaffari, P.Eng.

Hassan Ghaffari, P.Eng.
Director of Metallurgy
Tetra Tech WEI Inc.

Jianhui (John) Huang, Ph.D., P.Eng.

I, Jianhui (John) Huang, Ph.D., P.Eng., of Burnaby, British Columbia, do hereby certify:

- I am a Senior Metallurgist with Tetra Tech WEI Inc., with a business address at #800-555 West Hastings Street, Vancouver, British Columbia, V6B 4N6.
- This certificate applies to the technical report entitled Preliminary Economic Assessment and Technical Report of the Tami-Mosi Magnesium Project, Nevada, dated September 15, 2011 and an amended date of July 4, 2014 (the "Technical Report").
- I am a graduate of North-East University, (Eng. Bachelor, 1982), Beijing General Research Institute for Non-ferrous Metals (Eng, Master, 1988) and Birmingham University (Ph.D, 2000). I am a member in good standing of the Association of Professional Engineers and Geoscientists of the Province of British Columbia (License #30898). My relevant experience with respect to mineral engineering including over 28-year involvement in mineral process for base metal ores, gold and silver ores, and rare metal ores. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").
- I have not personal inspected the Dolomite Property.
- I am responsible for Sections responsible for Sections 1.5, 1.11, 13, 17, 21.1.7 (magnesium plant costs only), 21.2.1, 25.4, 26.1.4 of the Technical Report.
- I am independent of Nevada Clean Magnesium, Inc. as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property that is the subject of the Technical Report.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information and belief, the sections of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Signed and dated this 4th day of July, 2014 at Vancouver, British Columbia.

Original document signed and sealed by
Jianhui (John) Huang, Ph.D., P.Eng.

Jianhui (John) Huang, Ph.D., P.Eng.
Senior Metallurgist
Tetra Tech WEI Inc.

Klaus Triebel, CPG

I, Klaus Triebel, CPG, of Wheaton, Illinois, USA, do hereby certify:

- I am a Resource Geologist with an address at 27W075 Walz Dr, Wheaton, Il 60189. At the effective date of this original technical report, I was an employee with Tetra Tech WEI Inc. with a business address 800-555 West Hastings Street, Vancouver, British Columbia, V6B 4N6.
- This certificate applies to the technical report entitled Preliminary Economic Assessment and Technical Report of the Tami-Mosi Magnesium Project, Nevada, dated September 15, 2011 and an amended date of July 4, 2014 (the "Technical Report").
- I am a graduate of the University of Alaska, Fairbanks (M.Sc. Geological Engineering, 1990) and the University of Applied Science, Bochum, Germany (B.Sc. Mining Engineering, 1981). I am a member in good standing of the American Institute of Professional Geologist (License CPG 10657), the BDG - Professional Geologist Association Germany (Registration # 1372) and the State of Alaska (Registration #GEO G 545.I. My relevant experience includes 30 years of post-graduate experience, seven years of which are in the fields of geological modelling and geostatistical resource estimation. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").
- My most recent personal inspection of the Dolomite Property was December 12, 2010 for 3 days.
- I am responsible for Sections 1.4, 12, 14, 25.2, and 26.1.2 Technical Report.
- I am independent of Nevada Clean Magnesium, Inc. as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property that is the subject of the Technical Report.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information and belief, the sections of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 4th day of July, 2014 at Wheaton, Illinois.

Original document signed and sealed by
Klaus Triebel, CPG

Klaus Triebel, CPG
Resource Geologist

Norm L. Tribe, P.Eng.

I, Norm L. Tribe, P.Eng., of Kelowna, BC, do hereby certify:

- I am the President and Principal of N. Tribe & Associates Ltd. with a business address at 2611 Springfield Road, Kelowna, British Columbia, V1X 1B9.
- This certificate applies to the technical report entitled Preliminary Economic Assessment and Technical Report of the Tami-Mosi Magnesium Project, Nevada, dated September 15, 2011 and an amended date of July 4, 2014 (the "Technical Report").
- I am a graduate of the University of British Columbia (B.A.Sc., Geological Engineering, 1964). I am a member in good standing of the Association of Professional Engineers and Geoscientists of the Province of British Columbia (License #11330). My relevant experience is 47 years of experience in my profession including underground grade control, pit grade control, mine development and evaluation, property evaluation, project and exploration management, plant design, exploration geology and reporting to the various governments and stock exchanges. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").
- My most recent personal inspection of the Dolomite Property was May 17 to May 20, 2009.
- I am responsible for Sections 1.2, 1.3, 4, 5, 6, 7, 8, 9, 10, 11, and 23 of the Technical Report.
- I am independent of Nevada Clean Magnesium, Inc. as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property that is the subject of the Technical Report.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information and belief, the sections of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 4th day of July, 2014 at Kelowna, British Columbia.

Original document signed and sealed by
Norm L. Tribe, P.Eng.

Norm L. Tribe, P.Eng.
President and Principal
N. Tribe & Associates Ltd.

Sabry Abdel Hafez, Ph.D., P.Eng.

I, Sabry Abdel Hafez, Ph.D., P.Eng., of Vancouver, British Columbia, do hereby certify:

- I am a Senior Mining Engineer with Tetra Tech WEI Inc., with a business address at #800-555 West Hastings Street, Vancouver, British Columbia, V6B 4N6.
- This certificate applies to the technical report entitled Preliminary Economic Assessment and Technical Report of the Tami-Mosi Magnesium Project, Nevada, dated September 15, 2011 and an amended date of July 4, 2014 (the "Technical Report").
- I am a graduate of Assiut University (B.Sc Mining Engineering, 1991; M.Sc. in Mining Engineering, 1996; Ph.D. in Mineral Economics, 2000). I am a member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia, License #34975. My relevant experience is in mine evaluation. I have more than 19 years of experience in the evaluation of mining projects, advanced financial analysis, and mine planning and optimization. My capabilities range from the conventional mine planning and evaluation to the advanced simulation-based techniques that incorporate both market and geological uncertainties. I have been involved in the technical studies of several base metals, gold, coal, and aggregate mining projects in Canada and abroad. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").
- I have not personally inspected the Dolomite Property.
- I am responsible for Sections 1.12 (post-tax portion only) 15, 22.4, 22.6 (post-tax portion only), and 25.1 (post-tax portion only) of the Technical Report.
- I am independent of Nevada Clean Magnesium, Inc. as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property that is the subject of the Technical Report.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information and belief, the sections of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Signed and dated this 4th day of July, 2014 at Vancouver, British Columbia.

Original document signed and sealed by
Sabry Abdel Hafez, Ph.D., P.Eng.

Sabry Abdel Hafez, Ph.D., P.Eng.
Senior Mining Engineer
Tetra Tech WEI Inc.

Tysen Hantelmann, P.Eng., M.Eng.

I, Tysen Hantelmann, P.Eng, M.Eng, of Edmonton, Alberta, do hereby certify:

- I am a Senior Mining Engineer with JDS Energy and Mining Inc., with a business address at Suite 200 – 532 Leon Avenue, Kelowna, British Columbia, V1Y 6J6. At the effective date of the original technical report, I was an employee with Tetra Tech WEI Inc. with a business address at 14940-123 Avenue, Edmonton, Alberta, T5V 1B4.
- This certificate applies to the technical report entitled Preliminary Economic Assessment and Technical Report of the Tami-Mosi Magnesium Project, Nevada, dated September 15, 2011 and an amended date of July 4, 2014 (the "Technical Report").
- I am a graduate of the University of Alberta (B.Sc., Mining Engineering, 2001; M.Eng., Mining Engineering, 2003). I am a member in good standing of the Association of Professional Engineers and Geoscientists of Alberta (License #M71697). My relevant experience is 11 years of mine engineering and mine operations experience including financial analysis, operating and capital cost estimation, long-range and short-range production scheduling, operational support for various truck/shovel mining activities
- I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").
- I have not personally inspected the Dolomite Property.
- I am responsible for Sections 1.6, 1.12, 16, 21.1.7 (dolomite quarry costs only), 22 (except 22.4), 25.1, 25.3, 26.1.1, 26.1.3 of the Technical Report.
- I am independent of Nevada Clean Magnesium, Inc. as defined by Section 1.5 of the Instrument.
- I have no prior involvement with the Property that is the subject of the Technical Report.
- I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.
- As of the date of this certificate, to the best of my knowledge, information and belief, the sections of the Technical Report that I am responsible for contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 4th day of July, 2014 at Edmonton, Alberta

Original document signed and sealed by
Tysen Hantelmann, P.Eng., M.Eng.

Tysen Hantelmann, P.Eng., M.Eng.
Senior Mining Engineer
JDS Energy and Mining Inc.

APPENDIX B

Detailed Capital Cost Estimate

***** Final *****

Project No: 1191380100 | **Tami - Mosi Project** | **Report Date: 09-Sep-11**

Client: Molycor Gold Corp. | **Scoping Study - Level 2 Summary** | **Rev 00**

Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
10 - Dolomite Quarry Site General							
101	*General Development*	*1,320*	*73,920*	*193,700*	*8,200*	*200,000*	*475,820*
	10 - Dolomite Quarry Site General Subtotal	**1,320**	**73,920**	**193,700**	**8,200**	**200,000**	**475,820**
20 - Dolomite Quarry Open Pit							
210	*Pit*	*420*	*23,520*	*8,000*	*1,000*	*987,000*	*1,019,520*
	20 - Dolomite Quarry Open Pit Subtotal	**420**	**23,520**	**8,000**	**1,000**	**987,000**	**1,019,520**
22 - Dolomite Quarry Crushing Plant							
220	*Dolomite Quarry Site Processing*	*4,680*	*262,080*	*300,000*	*100,000*	*1,300,000*	*1,962,080*
	22 - Dolomite Quarry Crushing Plant Subtotal	**4,680**	**262,080**	**300,000**	**100,000**	**1,300,000**	**1,962,080**
23 - Dolomite Quarry Utilities							
230	*Electrical*	*0*	*0*	*50,000*	*0*	*0*	*50,000*
231	*Fuel Supply, Storage & Distribution*	*84*	*4,704*	*7,500*	*500*	*0*	*12,704*
232	*Water Systems*	*60*	*3,360*	*5,000*	*1,000*	*0*	*9,360*
233	*Waste Disposal*	*0*	*0*	*10,000*	*0*	*0*	*10,000*
234	*Buildings*	*1,368*	*76,608*	*135,000*	*37,500*	*0*	*249,108*
	23 - Dolomite Quarry Utilities Subtotal	**1,512**	**84,672**	**207,500**	**39,000**	**0**	**331,172**
25 - Dolomite Quarry Temporary works							
251	*General Site*	*0*	*0*	*0*	*0*	*0*	*0*
	25 - Dolomite Quarry Temporary works Subtotal	**0**	**0**	**0**	**0**	**0**	**0**

Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
30 - Processing Site General							
301	*General Development*	*83,004*	*4,648,217*	*6,770,994*	*896,920*	*4,091,540*	*16,407,671*
	30 - Processing Site General Subtotal	**83,004**	**4,648,217**	**6,770,994**	**896,920**	**4,091,540**	**16,407,671**
31 - Processing Site Stock Piles							
311	*Stockpiles*	*14,912*	*835,055*	*1,678,974*	*263,768*	*833,567*	*3,611,364*
	31 - Processing Site Stock Piles Subtotal	**14,912**	**835,055**	**1,678,974**	**263,768**	**833,567**	**3,611,364**
40 - Processing Site - Processing Facilities							
401	*Ferrosilicon Facility*	*108,686*	*6,086,405*	*12,793,743*	*1,128,200*	*11,610,000*	*31,618,347*
402	*Dolomite Grinding and Slag Loadout Facilities*	*36,034*	*2,017,892*	*2,061,007*	*432,852*	*4,805,000*	*9,316,751*
403	*Magnesium Facility*	*269,795*	*15,108,506*	*19,722,758*	*3,118,339*	*59,467,867*	*97,417,470*
404	*Cooling Tower and Distribution*	*10,596*	*593,376*	*1,021,472*	*190,350*	*1,610,000*	*3,415,198*
	40 - Processing Site - Processing Facilities Subtotal	**425,110**	**23,806,178**	**35,598,980**	**4,869,741**	**77,492,867**	**141,767,766**
50 - Processing Site Power Plant							
501	*Power Plant*	*357,004*	*19,992,249*	*46,139,606*	*3,551,460*	*76,564,600*	*146,247,915*
	50 - Processing Site Power Plant Subtotal	**357,004**	**19,992,249**	**46,139,606**	**3,551,460**	**76,564,600**	**146,247,915**
61 - Processing Site Infrastructure							
613	*Ancilliary Buildings*	*5,520*	*309,120*	*1,973,640*	*47,990*	*152,346*	*2,483,096*
614	*On-Site Mobile Equipment*	*14*	*806*	*102*	*0*	*1,076,225*	*1,077,133*
615	*On-Site Bulk Storage*	*83*	*4,637*	*19,938*	*360*	*0*	*24,935*
616	*On-Site Services / Utilities*	*836*	*46,838*	*88,900*	*21,000*	*0*	*156,738*

Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
619	*On-Site Power Supply & Transmission*	*10,932*	*612,192*	*1,100,000*	*200,000*	*0*	*1,912,192*
	61 - Processing Site Infrastructure Subtotal	**17,386**	**973,594**	**3,182,580**	**269,350**	**1,228,571**	**5,654,094**
71 - Processing Site Off-Site Infrastructure							
711	*Temporary works*	*0*	*0*	*0*	*0*	*0*	*0*
	71 - Processing Site Off-Site Infrastructure Subtotal	**0**	**0**	**0**	**0**	**0**	**0**
81 - Processing Site Temporary works							
811	*General site*	*0*	*0*	*0*	*0*	*0*	*0*
	81 - Processing Site Temporary works Subtotal	**0**	**0**	**0**	**0**	**0**	**0**
85 - Closure and Reclamation (both sites)							
851	*Site (Both sites complete)*	*0*	*0*	*5,000,000*	*0*	*0*	*5,000,000*
	85 - Closure and Reclamation (both sites) Subtotal	**0**	**0**	**5,000,000**	**0**	**0**	**5,000,000**
91 - Indirect Costs							
911	*Indirect*	*5,680*	*581,280*	*49,294,735*	*0*	*0*	*49,876,015*
	91 - Indirect Costs Subtotal	**5,680**	**581,280**	**49,294,735**	**0**	**0**	**49,876,015**
98 - Owners Costs							
981	*Owners Cost*	*0*	*0*	*7,447,088*	*0*	*0*	*7,447,088*
	98 - Owners Costs Subtotal	**0**	**0**	**7,447,088**	**0**	**0**	**7,447,088**
99 - Contingency							
991	*Project Contingency*	*0*	*0*	*44,265,437*	*0*	*0*	*44,265,437*

Area	Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
99 - Contingency Subtotal	0	0	44,265,437	0	0	44,265,437
Scoping Study Total	911,028	51,280,765	200,087,594	9,999,440	162,698,145	424,065,943

Project No: 1191380100 | **Tami - Mosi Project** | **Report Date: 09-Sep-11**

Client: Molycor Gold Corp. | **Scoping Study - Level 3 Summary** | **Rev 00**

Sub-Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
101 - General Development							
10110	*Dolomite Quarry Bulk Earthworks / Site Preparation*	*108*	*6,048*	*5,000*	*8,000*	*0*	*19,048*
10120	*Dolomite Quarry Existing Access Road Improvement*	*0*	*0*	*0*	*0*	*0*	*0*
10130	*Dolomite Quarry Site Roads At Mine*	*1,200*	*67,200*	*30,000*	*0*	*200,000*	*297,200*
10140	*Dolomite Quarry Site Drainage*	*0*	*0*	*0*	*0*	*0*	*0*
10150	*Dolomite Quarry Fencing/Gates (Site Control)*	*0*	*0*	*150,000*	*0*	*0*	*150,000*
10160	*Dolomite Quarry Control System*	*0*	*0*	*0*	*0*	*0*	*0*
10170	*Dolomite Quarry Communication System*	*0*	*0*	*5,000*	*0*	*0*	*5,000*
10180	*Dolomite Quarry Fire Alarm System*	*2*	*134*	*200*	*0*	*0*	*334*
10190	*Dolomite Quarry Yard Lighting*	*10*	*538*	*3,500*	*200*	*0*	*4,238*
	101 - General Development Subtotal	**1,320**	**73,920**	**193,700**	**8,200**	**200,000**	**475,820**
210 - Pit							
20120	*Dolomite Quarry Mobile Equipment*	*180*	*10,080*	*0*	*1,000*	*971,000*	*982,080*
20130	*Dolomite Quarry Explosive Store*	*240*	*13,440*	*8,000*	*0*	*16,000*	*37,440*
	210 - Pit Subtotal	**420**	**23,520**	**8,000**	**1,000**	**987,000**	**1,019,520**
220 - Dolomite Quarry Site Processing							
22110	*Dolomite Quarry Crushing Plant*	*4,680*	*262,080*	*300,000*	*100,000*	*1,300,000*	*1,962,080*
	220 - Dolomite Quarry Site Processing Subtotal	**4,680**	**262,080**	**300,000**	**100,000**	**1,300,000**	**1,962,080**

Sub-Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
230 - Electrical							
23010	*Dolomite Quarry Powerlines*	*0*	*0*	*50,000*	*0*	*0*	*50,000*
23020	*Dolomite Quarry Gensets (Construction and Emergency)*	*0*	*0*	*0*	*0*	*0*	*0*
23030	*Dolomite Quarry Main Substations*	*0*	*0*	*0*	*0*	*0*	*0*
23040	*Dolomite Quarry Lightning Protection*	*0*	*0*	*0*	*0*	*0*	*0*
	230 - Electrical Subtotal	**0**	**0**	**50,000**	**0**	**0**	**50,000**
231 - Fuel Supply, Storage & Distribution							
23110	*Dolomite Quarry Fuel Storage*	*84*	*4,704*	*7,500*	*500*	*0*	*12,704*
	231 - Fuel Supply, Storage & Distribution Subtotal	**84**	**4,704**	**7,500**	**500**	**0**	**12,704**
232 - Water Systems							
23210	*Dolomite Quarry Water Distribution System*	*60*	*3,360*	*5,000*	*1,000*	*0*	*9,360*
23220	*Dolomite Quarry Potable Water*	*0*	*0*	*0*	*0*	*0*	*0*
23230	*Dolomite Quarry Site Drainage*	*0*	*0*	*0*	*0*	*0*	*0*
23240	*Dolomite Quarry Water Treatment (Pit Run-Off)*	*0*	*0*	*0*	*0*	*0*	*0*
	232 - Water Systems Subtotal	**60**	**3,360**	**5,000**	**1,000**	**0**	**9,360**
233 - Waste Disposal							
23310	*Dolomite Quarry Solid Waste Disposal*	*0*	*0*	*0*	*0*	*0*	*0*

Sub-Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
23320	*Dolomite Quarry Sewage*	*0*	*0*	*10,000*	*0*	*0*	*10,000*
	233 - Waste Disposal Subtotal	**0**	**0**	**10,000**	**0**	**0**	**10,000**
234 - Buildings							
23410	*Dolomite Quarry Truck Maintenance, Office and First Aid and Mine Dry*	*1,368*	*76,608*	*135,000*	*37,500*	*0*	*249,108*
	234 - Buildings Subtotal	**1,368**	**76,608**	**135,000**	**37,500**	**0**	**249,108**
251 - General Site							
25110	*Dolomite Quarry Laydown Area*	*0*	*0*	*0*	*0*	*0*	*0*
25120	*Dolomite Quarry Construction Camp*	*0*	*0*	*0*	*0*	*0*	*0*
25130	*Dolomite Quarry Catering and House Keeping*	*0*	*0*	*0*	*0*	*0*	*0*
	251 - General Site Subtotal	**0**	**0**	**0**	**0**	**0**	**0**
301 - General Development							
30105	*Processing Site Bulk Earthworks / Site Preparation*	*1,728*	*96,768*	*0*	*129,915*	*0*	*226,683*
30110	*Processing Site New Roads and Parking*	*5,700*	*319,200*	*495,500*	*0*	*484,000*	*1,298,700*
30115	*Processing Site Site Drainage*	*16,752*	*938,112*	*1,733,750*	*140,000*	*0*	*2,811,862*
30120	*Processing Site Fencing/Gates (Site Control)*	*3,234*	*181,104*	*314,000*	*53,260*	*0*	*548,364*
30125	*Processing Site Communication System*	*3,000*	*168,000*	*1,200,000*	*50,000*	*0*	*1,418,000*
30130	*Processing Site Fire Alarm System*	*474*	*26,544*	*71,000*	*7,168*	*0*	*104,712*

Sub-Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
30135	*Processing Site Yard Lighting*	*96*	*5,376*	*150,000*	*10,000*	*0*	*165,376*
30140	*Processing Site Power Supply*	*23,115*	*1,294,447*	*1,423,844*	*131,900*	*0*	*2,850,190*
30145	*Processing Site Rail Siding*	*11,712*	*655,872*	*730,500*	*63,012*	*0*	*1,449,384*
30150	*Processing Site Rail Offloading Including Conveyors*	*17,193*	*962,795*	*652,400*	*311,665*	*3,607,540*	*5,534,400*
	301 - General Development Subtotal	**83,004**	**4,648,217**	**6,770,994**	**896,920**	**4,091,540**	**16,407,671**
311 - Stockpiles							
31110	*Processing Site Woodchip Stockpile*	*1,004*	*56,246*	*50,265*	*13,080*	*203,080*	*322,671*
31120	*Processing Site Power Plant Coal Stockpile*	*13,907*	*778,808*	*1,628,709*	*250,688*	*630,487*	*3,288,693*
	311 - Stockpiles Subtotal	**14,912**	**835,055**	**1,678,974**	**263,768**	**833,567**	**3,611,364**
401 - Ferrosilicon Facility							
40110	*Processing Site Ferrosilicon Production Plant*	*108,686*	*6,086,405*	*12,793,743*	*1,128,200*	*11,610,000*	*31,618,347*
	401 - Ferrosilicon Facility Subtotal	**108,686**	**6,086,405**	**12,793,743**	**1,128,200**	**11,610,000**	**31,618,347**
402 - Dolomite Grinding and Slag Loadout Facilities							
40210	*Processing Site Dolomite Grinding and Slag Loadout*	*17,006*	*952,328*	*1,459,297*	*345,430*	*1,407,000*	*4,164,056*
40220	*Processing Site Crushing and Grinding Area*	*19,028*	*1,065,564*	*601,710*	*87,422*	*3,398,000*	*5,152,696*
	402 - Dolomite Grinding and Slag Loadout Facilities Subtotal	**36,034**	**2,017,892**	**2,061,007**	**432,852**	**4,805,000**	**9,316,751**
403 - Magnesium Facility							
40310	*Processing Site Calciner Area*	*97,654*	*5,468,639*	*1,404,935*	*203,914*	*49,984,280*	*57,061,769*

Sub-Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
40320	*Processing Site Bricquetting Area*	*32,311*	*1,809,397*	*4,094,256*	*388,983*	*3,323,350*	*9,615,986*
40330	*Processing Site Reduction Building Area*	*92,668*	*5,189,423*	*9,461,968*	*1,689,794*	*2,405,197*	*18,746,382*
40340	*Processing Site Casting Area*	*47,162*	*2,641,046*	*4,761,599*	*835,648*	*3,755,040*	*11,993,333*
	403 - Magnesium Facility Subtotal	**269,795**	**15,108,506**	**19,722,758**	**3,118,339**	**59,467,867**	**97,417,470**
404 - Cooling Tower and Distribution							
40410	*Processing Site Cooling Systems*	*10,596*	*593,376*	*1,021,472*	*190,350*	*1,610,000*	*3,415,198*
	404 - Cooling Tower and Distribution Subtotal	**10,596**	**593,376**	**1,021,472**	**190,350**	**1,610,000**	**3,415,198**
501 - Power Plant							
50110	*Processing Site Power Plant*	*355,860*	*19,928,160*	*46,062,874*	*3,535,200*	*76,500,000*	*146,026,234*
50120	*Processing Site Ash Loadout*	*1,144*	*64,089*	*76,732*	*16,260*	*64,600*	*221,681*
50130	*Processing Site Coal Gas Surge Storage*	*0*	*0*	*0*	*0*	*0*	*0*
	501 - Power Plant Subtotal	**357,004**	**19,992,249**	**46,139,606**	**3,551,460**	**76,564,600**	**146,247,915**
613 - Ancilliary Buildings							
61310	*Processing Site Administration and Change House*	*5,508*	*308,448*	*1,968,600*	*47,940*	*2,346*	*2,327,334*
61320	*Processing Site Emergency Response Including Medical Clinic*	*0*	*0*	*0*	*0*	*0*	*0*
61330	*Processing Site Gatehouses and Fencing*	*12*	*672*	*5,040*	*50*	*150,000*	*155,762*
	613 - Ancilliary Buildings Subtotal	**5,520**	**309,120**	**1,973,640**	**47,990**	**152,346**	**2,483,096**

Sub-Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
614 - On-Site Mobile Equipment							
61410	*Processing Site Mobile Maintenance Equipment*	*14*	*806*	*102*	*0*	*1,076,225*	*1,077,133*
	614 - On-Site Mobile Equipment Subtotal	**14**	**806**	**102**	**0**	**1,076,225**	**1,077,133**
615 - On-Site Bulk Storage							
61510	*Processing Site Water*	*0*	*0*	*15,000*	*0*	*0*	*15,000*
61520	*Processing Site Fuel*	*83*	*4,637*	*4,938*	*360*	*0*	*9,935*
	615 - On-Site Bulk Storage Subtotal	**83**	**4,637**	**19,938**	**360**	**0**	**24,935**
616 - On-Site Services / Utilities							
61610	*Processing Site Water Distribution System*	*120*	*6,720*	*1,500*	*3,000*	*0*	*11,220*
61620	*Processing Site Potable Water*	*0*	*0*	*0*	*0*	*0*	*0*
61630	*Processing Site Process Water*	*0*	*0*	*0*	*0*	*0*	*0*
61640	*Processing Site Fire Water*	*86*	*4,838*	*2,400*	*0*	*0*	*7,238*
61650	*Processing Site Solid Waste Disposal*	*0*	*0*	*0*	*0*	*0*	*0*
61660	*Processing Site Sewage Treatment Plant*	*240*	*13,440*	*25,000*	*3,000*	*0*	*41,440*
61670	*Processing Site Effluent Treatment Distribution*	*0*	*0*	*0*	*0*	*0*	*0*
61680	*Processing Site Water Treatment*	*390*	*21,840*	*60,000*	*15,000*	*0*	*96,840*
	616 - On-Site Services / Utilities Subtotal	**836**	**46,838**	**88,900**	**21,000**	**0**	**156,738**
619 - On-Site Power Supply & Transmission							

Sub-Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
61910	*Processing Site Power Distribution*	*10,932*	*612,192*	*1,100,000*	*200,000*	*0*	*1,912,192*
	619 - On-Site Power Supply & Transmission Subtotal	**10,932**	**612,192**	**1,100,000**	**200,000**	**0**	**1,912,192**
711 - Temporary works							
71110	*Temporary works*	*0*	*0*	*0*	*0*	*0*	*0*
	711 - Temporary works Subtotal	**0**	**0**	**0**	**0**	**0**	**0**
811 - General site							
81110	*Processing Site Laydown Area*	*0*	*0*	*0*	*0*	*0*	*0*
81120	*Processing Site Construction Camp*	*0*	*0*	*0*	*0*	*0*	*0*
81130	*Processing Site Catering and House Keeping*	*0*	*0*	*0*	*0*	*0*	*0*
	811 - General site Subtotal	**0**	**0**	**0**	**0**	**0**	**0**
851 - Site (Both sites complete)							
85110	*Processing Site General Site*	*0*	*0*	*5,000,000*	*0*	*0*	*5,000,000*
	851 - Site (Both sites complete) Subtotal	**0**	**0**	**5,000,000**	**0**	**0**	**5,000,000**
911 - Indirect							
91110	*Construction Indirects*	*0*	*0*	*13,716,093*	*0*	*0*	*13,716,093*
91120	*Initial Fills*	*0*	*0*	*2,700,000*	*0*	*0*	*2,700,000*
91130	*Spares*	*0*	*0*	*1,282,712*	*0*	*0*	*1,282,712*
91140	*Freight and Logistics*	*0*	*0*	*6,086,966*	*0*	*0*	*6,086,966*

Sub-Area		Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
91150	*Commissioning and Start-up*	*5,280*	*521,280*	*0*	*0*	*0*	*521,280*
91160		*0*	*0*	*25,508,963*	*0*	*0*	*25,508,963*
91170	*Vendor Commissioning and Assistance*	*400*	*60,000*	*0*	*0*	*0*	*60,000*
	911 - Indirect Subtotal	**5,680**	**581,280**	**49,294,735**	**0**	**0**	**49,876,015**
981 - Owners Cost							
98100	*Owners Cost*	*0*	*0*	*7,447,088*	*0*	*0*	*7,447,088*
	981 - Owners Cost Subtotal	**0**	**0**	**7,447,088**	**0**	**0**	**7,447,088**
991 - Project Contingency							
99110	*Project Contingency*	*0*	*0*	*44,265,437*	*0*	*0*	*44,265,437*
	991 - Project Contingency Subtotal	**0**	**0**	**44,265,437**	**0**	**0**	**44,265,437**
Scoping Study Total		**911,028**	**51,280,765**	**200,087,594**	**9,999,440**	**162,698,145**	**424,065,943**

WARDROP
A TETRA TECH COMPANY

*** Final ***

MOLYCOR GOLD CORP.

Project No: 1191380100 | **Tami - Mosi Project** | **Report Date: 09-Sep-11**

Client: Molycor Gold Corp. | **Scoping Study - Expenditure Code Summary** | **Rev 00**

Expenditure Number	Description	Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
1 - Direct Costs							
		0	0	0	0	0	0
9	Rail	11,712	655,872	730,500	63,012	0	1,449,384
10	Bulk Earthworks	33,402	1,870,519	3,803,150	437,275	684,000	6,794,944
20	Concrete	72,555	4,063,067	5,588,613	408,038	0	10,059,718
30	Structural Steel	93,680	5,246,052	12,109,400	1,075,770	11,500,000	29,931,222
40	Architectural	88,278	4,943,568	15,085,000	1,748,460	18,300	21,795,328
50	Mechanical	530,754	29,722,231	50,197,852	5,379,937	145,671,945	230,971,965
55	Platework	4,518	253,008	391,500	7,530	0	652,038
57	Building Services	337	18,877	34,726	1,326	29,270	84,199
58	Plant Mobile Equipment	528	29,559	182,605	8,392	35,280	255,837
60	Piping	19,325	1,082,227	1,798,436	297,534	335,370	3,513,567
70	Electrical	23,779	1,331,600	2,492,501	406,740	1,428,698	5,659,539
80	Instrumentation and Controls	26,480	1,482,905	1,666,050	165,425	2,995,282	6,309,662
87	Close out	0	0	5,000,000	0	0	5,000,000
89	Temporary facilities	0	0	0	0	0	0
	1 - Direct Costs Subtotal	**905,348**	**50,699,485**	**99,080,334**	**9,999,440**	**162,698,145**	**322,477,402**
2 - Indirect Costs							
91	Construction Indirects	0	0	13,716,093	0	0	13,716,093
92	Initial Fills	0	0	2,700,000	0	0	2,700,000
93	Spares	0	0	1,282,712	0	0	1,282,712
94	Freight and Logistics	0	0	6,086,966	0	0	6,086,966
95	Commissioning and Start-up	5,280	521,280	0	0	0	521,280
96	EPCM	0	0	25,508,963	0	0	25,508,963
97	Vendors assistance	400	60,000	0	0	0	60,000
98	Owners Costs	0	0	7,447,088	0	0	7,447,088
	2 - Indirect Costs Subtotal	**5,680**	**581,280**	**56,741,823**	**0**	**0**	**57,323,103**
3 - Owner's Costs							
99	Contingency	0	0	44,265,437	0	0	44,265,437
	3 - Owner's Costs Subtotal	**0**	**0**	**44,265,437**	**0**	**0**	**44,265,437**

***** Final *****

Project No: 1191380100 | **Tami - Mosi Project** | **Report Date: 09-Sep-11**

Client: Molycor Gold Corp. | **Scoping Study - Expenditure Code Summary** | **Rev 00**

Expenditure Number	Description	Labour Manhour	Labour Cost	Material Cost	Construction Eqpt Cost	Mechancial Eqpt Cost	Total Cost (USD)
Scoping Study Total		**911,028**	**51,280,765**	**200,087,594**	**9,999,440**	**162,698,145**	**424,065,943**

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
10110 - Dolomite Quarry Bulk Earthworks / Site Preparation															
10110-10-1.00	Bulk earthworks														
	1.sum	90.00	108.00	1.2	108.00	56.00	6,048	5,000.00	5,000	8,000.00	8,000	0.00	0	19,048.00	19,048
10110 - Dolomite Quarry Bulk Earthworks / Site Preparation Subtotal					**108.00**		**6,048**		**5,000**		**8,000**		**0**		**19,048**
10120 - Dolomite Quarry Existing Access Road Improvement															
10120-10-1.00	Existing Access Road improvement Not Included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
10120 - Dolomite Quarry Existing Access Road Improvement Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
10130 - Dolomite Quarry Site Roads At Mine															
10130-10-1.00	Upgrade existing - road improvement Allowance 2 km approved Material (dical material from pit and backhaul)														
	1.sum	1,000.00	1,200.00	1.2	1,200.00	56.00	67,200	30,000.00	30,000	0.00	0	200,000.00	200,000	297,200.00	297,200
10130 - Dolomite Quarry Site Roads At Mine Subtotal					**1,200.00**		**67,200**		**30,000**		**0**		**200,000**		**297,200**
10140 - Dolomite Quarry Site Drainage															
10140-10-1.00	Site drainage allowance Not Included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
10140 - Dolomite Quarry Site Drainage Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
10150 - Dolomite Quarry Fencing/Gates (Site Control)															
10150-10-1.00	Fencing/Gates (Site Control) Allowance														
	1.lot	0.00	0.00	1.2	0.00	56.00	0	150,000.00	150,000	0.00	0	0.00	0	150,000.00	150,000
10150 - Dolomite Quarry Fencing/Gates (Site Control) Subtotal					**0.00**		**0**		**150,000**		**0**		**0**		**150,000**
10160 - Dolomite Quarry Control System															
10160-80-1.00	Control System Not Included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
10160 - Dolomite Quarry Control System Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
10170 - Dolomite Quarry Communication System															

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
10170-80-1.00	Communication System Allowance for cell phone repeater In quarry														
	1.sum	0.00	0.00	1.2	0.00	56.00	0	5,000.00	5,000	0.00	0	0.00	0	5,000.00	5,000
10170-80-2.00	Communication System cell phone with 2 way capability Included above														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
	10170 - Dolomite Quarry Communication System Subtotal				**0.00**		**0**		**5,000**		**0**		**0**		**5,000**
10180 - Dolomite Quarry Fire Alarm System															
10180-70-1.00	Fire extinguishers local only Class C Fire extinguishers														
	1.sum	2.00	2.40	1.2	2.40	56.00	134	200.00	200	0.00	0	0.00	0	334.40	334
	10180 - Dolomite Quarry Fire Alarm System Subtotal				**2.40**		**134**		**200**		**0**		**0**		**334**
10190 - Dolomite Quarry Yard Lighting															
10190-70-1.00	Yard Lighting allowance Building flood lights, fuel station pole and floods														
	1.sum	8.00	9.60	1.2	9.60	56.00	538	3,500.00	3,500	200.00	200	0.00	0	4,237.60	4,238
	10190 - Dolomite Quarry Yard Lighting Subtotal				**9.60**		**538**		**3,500**		**200**		**0**		**4,238**
20120 - Dolomite Quarry Mobile Equipment															
20120-50-1.00	Front end loaders CAT 988 9cyd														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	0.00	0	0.00	0	727,000.00	727,000	727,000.00	727,000
20120-50-2.00	Front end loaders Cat 966H 6yd														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	0.00	0	0.00	0	244,000.00	244,000	244,000.00	244,000
20120-50-3.00	Installation and first service														
	1.lot	150.00	180.00	1.2	180.00	56.00	10,080		0	1,000.00	1,000	0.00	0	11,080.00	11,080
	20120 - Dolomite Quarry Mobile Equipment Subtotal				**180.00**		**10,080**		**0**		**1,000**		**971,000**		**982,080**
20130 - Dolomite Quarry Explosive Store															
20130-40-1.00	Explosive store road, berms etc 100m allowance														
	1.sum	200.00	240.00	1.2	240.00	56.00	13,440	8,000.00	8,000	0.00	0	16,000.00	16,000	37,440.00	37,440
20130-40-2.00	Explosive store By Contractor														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
20130 - Dolomite Quarry Explosive Store Subtotal					**240.00**		**13,440**		**8,000**		**0**		**16,000**		**37,440**
22110 - Dolomite Quarry Crushing Plant															
22110-50-6.00	Mobile Crushing Plant Mobile hopper, crusher, stacker and diesel power and controls Allowance														
	1.sum	3,900.00	4,680.00	1.2	4,680.00	56.00	262,080	300,000.00	300,000	100,000.00	100,000	1,300,000.00	1,300,000	1,962,080.00	1,962,080
22110 - Dolomite Quarry Crushing Plant Subtotal					**4,680.00**		**262,080**		**300,000**		**100,000**		**1,300,000**		**1,962,080**
23010 - Dolomite Quarry Powerlines															
23010-70-1.00	Power Lines Residential quality Drop down transformer and lines 1Km poles etc														
	1.sum	0.00	0.00	1.2	0.00	56.00	0	50,000.00	50,000	0.00	0	0.00	0	50,000.00	50,000
23010 - Dolomite Quarry Powerlines Subtotal					**0.00**		**0**		**50,000**		**0**		**0**		**50,000**
23020 - Dolomite Quarry Gensets (Construction and Emergency)															
23020-70-1.00	Gensets (Construction and Emergency) not required														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
23020 - Dolomite Quarry Gensets (Construction and Emergency) Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
23030 - Dolomite Quarry Main Substations															
23030-70-1.00	Sub-station allowance included with power lines														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
23030 - Dolomite Quarry Main Substations Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
23040 - Dolomite Quarry Lightning Protection															
23040-70-1.00	Lightning Protection Not Included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
23040 - Dolomite Quarry Lightning Protection Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
23110 - Dolomite Quarry Fuel Storage															
23110-58-1.00	Fuel Storage concrete slab Allowance for Diesel tank														
	1.sum	70.00	84.00	1.2	84.00	56.00	4,704	7,500.00	7,500	500.00	500	0.00	0	12,704.00	12,704
23110-20-2.00	Tanks and distribution by vendor														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
23110 - Dolomite Quarry Fuel Storage Subtotal					**84.00**		**4,704**		**7,500**		**500**		**0**		**12,704**
23210 - Dolomite Quarry Water Distribution System															
23210-60-1.00	Water Distribution System Allowance for tanks and distribution														
	1.sum	50.00	60.00	1.2	60.00	56.00	3,360	5,000.00	5,000	1,000.00	1,000	0.00	0	9,360.00	9,360
23210 - Dolomite Quarry Water Distribution System Subtotal					**60.00**		**3,360**		**5,000**		**1,000**		**0**		**9,360**
23220 - Dolomite Quarry Potable Water															
23220-60-1.00	Potable Water not included - using bottles														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
23220 - Dolomite Quarry Potable Water Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
23230 - Dolomite Quarry Site Drainage															
23230-10-1.00	Site Drainage Not Included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
23230 - Dolomite Quarry Site Drainage Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
23240 - Dolomite Quarry Water Treatment (Pit Run-Off)															
23240-50-1.00	Water Treatment (pit run-off) Not Included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
23240 - Dolomite Quarry Water Treatment (Pit Run-Off) Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
23310 - Dolomite Quarry Solid Waste Disposal															
23310-50-1.00	Solid Waste Disposal Not Included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
23310 - Dolomite Quarry Solid Waste Disposal Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
23320 - Dolomite Quarry Sewage															
23320-40-1.00	Sewage Allowance for Tanks single toilet														
	1.sum	0.00	0.00	1.2	0.00	56.00	0	10,000.00	10,000	0.00	0	0.00	0	10,000.00	10,000
23320 - Dolomite Quarry Sewage Subtotal					**0.00**		**0**		**10,000**		**0**		**0**		**10,000**
23410 - Dolomite Quarry Truck Maintenance, Office and First Aid and Mine Dry															

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
23410-40-1.00	Workshop Size 150m2 Including excavations and Concrete														
	1.sum	1,140.00	1,368.00	1.2	1,368.00	56.00	76,608	125,000.00	125,000	37,500.00	37,500	0.00	0	239,108.00	239,108
23410-50-2.00	Tools and equipment miscellaneous - Major equipment By contractor														
	1.sum	0.00	0.00	1.2	0.00	56.00	0	10,000.00	10,000	0.00	0	0.00	0	10,000.00	10,000
ite Quarry Truck Maintenance, Office and First Aid and Mine Dry Subtotal					**1,368.00**		**76,608**		**135,000**		**37,500**		**0**		**249,108**
25110 - Dolomite Quarry Laydown Area															
25110-10-1.00	Laydown Area included in site development														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
25110 - Dolomite Quarry Laydown Area Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
25120 - Dolomite Quarry Construction Camp															
25120-89-1.00	Construction Camp Not Included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
25120 - Dolomite Quarry Construction Camp Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
25130 - Dolomite Quarry Catering and House Keeping															
25130-89-1.00	Catering and House keeping Not Included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
25130 - Dolomite Quarry Catering and House Keeping Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
30105 - Processing Site Bulk Earthworks / Site Preparation															
30105-10-1.00	Clear site including drainage and grading														
	45.ha	32.00	38.40	1.2	1,728.00	56.00	96,768	0.00	0	2,887.00	129,915	0.00	0	5,037.40	226,683
30105-10-2.00	Site levelling included in site development														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
30105 - Processing Site Bulk Earthworks / Site Preparation Subtotal					**1,728.00**		**96,768**		**0**		**129,915**		**0**		**226,683**
30110 - Processing Site New Roads and Parking															
30110-10-1.00	Road - gravel surface														
	52,500.m2	0.06	0.07	1.2	3,780.00	56.00	211,680	7.00	367,500	0.00	0	8.00	420,000	19.03	999,180

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producicitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
30110-10-2.00	Parking area tar macadam														
	4,000.m2	0.40	0.48	1.2	1,920.00	56.00	107,520	32.00	128,000	0.00	0	16.00	64,000	74.88	299,520
	30110 - Processing Site New Roads and Parking Subtotal				**5,700.00**		**319,200**		**495,500**		**0**		**484,000**		**1,298,700**

30115 - Processing Site Site Drainage

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producicitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
30115-10-1.00	Site storm water Drainage and evaporation pond Allowance														
	1.sum	2,000.00	2,400.00	1.2	2,400.00	56.00	134,400	3,750.00	3,750	60,000.00	60,000	0.00	0	198,150.00	198,150
30115-10-2.00	Facility drainage to catchment lined pond allowance for catchment around each building and piping Allowance														
	1.sum	910.00	1,092.00	1.2	1,092.00	56.00	61,152	80,000.00	80,000	50,000.00	50,000	0.00	0	191,152.00	191,152
30115-10-3.00	Facility drainage collection pond lined Allowance														
	1.sum	2,300.00	2,760.00	1.2	2,760.00	56.00	154,560	500,000.00	500,000	0.00	0	0.00	0	654,560.00	654,560
30115-10-4.00	Asphalt paving between buildings Levelling, binder and surfacing														
	20,000.m2	0.10	0.12	1.2	2,400.00	56.00	134,400	20.00	400,000	0.00	0	0.00	0	26.72	534,400
30115-10-5.00	3m wide apron around building concrete and curbs														
	1,500.m3	4.50	5.40	1.2	8,100.00	56.00	453,600	500.00	750,000	20.00	30,000	0.00	0	822.40	1,233,600
	30115 - Processing Site Site Drainage Subtotal				**16,752.00**		**938,112**		**1,733,750**		**140,000**		**0**		**2,811,862**

30120 - Processing Site Fencing/Gates (Site Control)

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producicitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
30120-10-1.00	Fencing 8 ' high														
	2,100.m	1.25	1.50	1.2	3,150.00	56.00	176,400	140.00	294,000	25.00	52,500	0.00	0	249.00	522,900
30120-40-2.00	Gates for vehicle														
	2.ea	25.00	30.00	1.2	60.00	56.00	3,360	8,000.00	16,000	300.00	600	0.00	0	9,980.00	19,960
30120-40-3.00	Gates for pedestrian														
	2.ea	10.00	12.00	1.2	24.00	56.00	1,344	2,000.00	4,000	80.00	160	0.00	0	2,752.00	5,504
	30120 - Processing Site Fencing/Gates (Site Control) Subtotal				**3,234.00**		**181,104**		**314,000**		**53,260**		**0**		**548,364**

30125 - Processing Site Communication System

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producicitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
30125-80-1.00	Communication System 50 phones and 6 tie lines Included in Process and accounting cost														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	0.00	0	0.00	0	0.00	0	0.00	0

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
30125-80-2.00	Communication System Process and accounting data														
	1.ea	2,500.00	3,000.00	1.2	3,000.00	56.00	168,000	1,200,000.00	1,200,000	50,000.00	50,000	0.00	0	1,418,000.00	1,418,000
30125-80-3.00	Communication System Internet site wide Included in Process and accounting cost														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	0.00	0	0.00	0	0.00	0	0.00	0
30125-80-4.00	Site Communication system, PA, Alarms etc Included in Process and accounting cost														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	0.00	0	0.00	0	0.00	0	0.00	0
	30125 - Processing Site Communication System Subtotal				**3,000.00**		**168,000**		**1,200,000**		**50,000**		**0**		**1,418,000**
30130 - Processing Site Fire Alarm System															
30130-70-1.00	Incident Alarm System (fire and H2S,) PA as required by local code														
	1.ea	240.00	288.00	1.2	288.00	56.00	16,128	50,000.00	50,000	6,568.00	6,568	0.00	0	72,696.00	72,696
30130-70-2.00	Sprinklers to Admin building only (Not Magnesium, Power Or Silicon)														
	50.ea	2.50	3.00	1.2	150.00	56.00	8,400	300.00	15,000	12.00	600	0.00	0	480.00	24,000
30130-70-3.00	Fire alarm systems included in PA System Control, Canteen And Admin allowance														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
30130-70-4.00	Fire Hoses not included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
30130-70-5.00	Fire extinguishers Allowance														
	30.ea	1.00	1.20	1.2	36.00	56.00	2,016	200.00	6,000	0.00	0	0.00	0	267.20	8,016
	30130 - Processing Site Fire Alarm System Subtotal				**474.00**		**26,544**		**71,000**		**7,168**		**0**		**104,712**
30135 - Processing Site Yard Lighting															
30135-70-1.00	Yard Lighting Allowance including concrete base														
	10.ea	8.00	9.60	1.2	96.00	56.00	5,376	15,000.00	150,000	1,000.00	10,000	0.00	0	16,537.60	165,376
	30135 - Processing Site Yard Lighting Subtotal				**96.00**		**5,376**		**150,000**		**10,000**		**0**		**165,376**
30140 - Processing Site Power Supply															
30140-70-1.00	Power supply power lines to grid included with Power plant														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
30140-70-2.00	Substations not required included with plant														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
30140-70-3.00	Temporary power distribution (construction), emergency, back-up and start up and connection to grid, transformer etc Included in power plant 1MW, allowance														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
30140-70-4.00	Temporary power distribution pole and service transformers, allowance														
	1.sum	0.00	0.00	1.2	0.00	56.00	0	25,000.00	25,000	0.00	0	0.00	0	25,000.00	25,000
30140-20-5.00	Power Distribution tunnels excavation Main Utility tunnel														
	7,200.m3	0.10	0.12	1.2	864.00	56.00	48,384	0.00	0	4.00	28,800	0.00	0	10.72	77,184
30140-20-6.00	Power Distribution tunnels backfill Main Utility tunnel														
	2,880.m3	0.12	0.14	1.2	414.72	56.00	23,224	10.00	28,800	5.00	14,400	0.00	0	23.06	66,424
30140-20-7.00	Power Distribution tunnels Concrete base Main Utility tunnel														
	432.m3	4.50	5.40	1.2	2,332.80	56.00	130,637	356.62	154,060	20.00	8,640	0.00	0	679.02	293,337
30140-20-8.00	Power Distribution tunnels slip cast tunnel size 2 x 3m Main Utility tunnel														
	1,512.m3	4.50	5.40	1.2	8,164.80	56.00	457,229	500.00	756,000	20.00	30,240	0.00	0	822.40	1,243,469
30140-20-9.00	Power Distribution tunnels Manhole access with cover Manhole ring and cover allowance														
	20.ea	40.00	48.00	1.2	960.00	56.00	53,760	1,000.00	20,000	10.00	200	0.00	0	3,698.00	73,960
30140-80-10.00	Power Distribution tunnels Cable racks one side allowance														
	360.m	5.00	6.00	1.2	2,160.00	56.00	120,960	75.00	27,000	15.00	5,400	0.00	0	426.00	153,360
30140-80-11.00	Power Distribution tunnels Pipe racks allowance														
	360.m	3.00	3.60	1.2	1,296.00	56.00	72,576	50.00	18,000	15.00	5,400	0.00	0	266.60	95,976
30140-20-12.00	Power Distribution tunnels excavation Branch tunnels														
	3,000.m3	0.10	0.12	1.2	360.00	56.00	20,160	0.00	0	4.00	12,000	0.00	0	10.72	32,160
30140-20-13.00	Power Distribution tunnels backfill Branch tunnels														
	1,200.m3	0.12	0.14	1.2	172.80	56.00	9,677	10.00	12,000	5.00	6,000	0.00	0	23.06	27,677

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
30140-20-14.00	Power Distribution tunnels Concrete base Branch tunnels														
	180.m3	4.50	5.40	1.2	972.00	56.00	54,432	356.62	64,192	20.00	3,600	0.00	0	679.02	122,224
30140-20-15.00	Power Distribution tunnels slip cast tunnel size 2 x 3m Branch tunnels														
	630.m3	4.50	5.40	1.2	3,402.00	56.00	190,512	457.21	288,042	20.00	12,600	0.00	0	779.61	491,154
30140-30-16.00	Power Distribution tunnels Manhole access with cover Manhole ring and cover allowance														
	12.ea	40.00	48.00	1.2	576.00	56.00	32,256	1,000.00	12,000	10.00	120	0.00	0	3,698.00	44,376
30140-80-17.00	Power Distribution tunnels Cable racks one side allowance														
	150.m	5.00	6.00	1.2	900.00	56.00	50,400	75.00	11,250	15.00	2,250	0.00	0	426.00	63,900
30140-80-18.00	Power Distribution tunnels Pipe rack one side only allowance														
	150.m	3.00	3.60	1.2	540.00	56.00	30,240	50.00	7,500	15.00	2,250	0.00	0	266.60	39,990
	30140 - Processing Site Power Supply Subtotal				**23,115.12**		**1,294,447**		**1,423,844**		**131,900**		**0**		**2,850,190**
30145 - Processing Site Rail Siding															
30145-9-1.00	Rail siding														
	2,300.m	4.00	4.80	1.2	11,040.00	56.00	618,240	250.00	575,000	20.00	46,000	0.00	0	538.80	1,239,240
30145-9-2.00	Junctions "Y"														
	4.ea	20.00	24.00	1.2	96.00	56.00	5,376	15,000.00	60,000	2,000.00	8,000	0.00	0	18,344.00	73,376
30145-9-3.00	Crossover tracks "X"														
	3.ea	40.00	48.00	1.2	144.00	56.00	8,064	20,000.00	60,000	2,000.00	6,000	0.00	0	24,688.00	74,064
30145-9-4.00	Signalling upgrade for spur line allowance														
	1.sum	160.00	192.00	1.2	192.00	56.00	10,752	16,000.00	16,000	1,712.00	1,712	0.00	0	28,464.00	28,464
30145-9-6.00	Road crossing over tracks (Railway to provide lights and alarms on main line)														
	1.ea	100.00	120.00	1.2	120.00	56.00	6,720	7,500.00	7,500	500.00	500	0.00	0	14,720.00	14,720
30145-9-7.00	Manual switches of loop														
	2.ea	25.00	30.00	1.2	60.00	56.00	3,360	3,000.00	6,000	200.00	400	0.00	0	4,880.00	9,760

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
30145-9-8.00	Main switches of loop on main line														
	2.ea	25.00	30.00	1.2	60.00	56.00	3,360	3,000.00	6,000	200.00	400	0.00	0	4,880.00	9,760
	30145 - Processing Site Rail Siding Subtotal				**11,712.00**		**655,872**		**730,500**		**63,012**		**0**		**1,449,384**
30150 - Processing Site Rail Offloading Including Conveyors															
30150-55-1.00	Coal Head chute														
	3,000.kg	0.05	0.06	1.2	180.00	56.00	10,080	5.00	15,000	0.10	300	0.00	0	8.46	25,380
30150-50-2.00	Coal Conveyor train offload 2 m wide excavation continuous off load system														
	90.m3	0.03	0.04	1.2	3.24	56.00	181	0.00	0	3.50	315	0.00	0	5.52	496
30150-50-3.00	Coal Conveyor train offload 2 m wide concrete continuous off load system														
	30.sum	7.00	8.40	1.2	252.00	56.00	14,112	710.00	21,300	20.00	600	0.00	0	1,200.40	36,012
30150-50-4.00	Coal Conveyor train offload 2 m wide continuous off load system														
	1.sum	3,000.00	3,600.00	1.2	3,600.00	56.00	201,600	10,000.00	10,000	10,000.00	10,000	1,250,000.00	1,250,000	1,471,600.00	1,471,600
30150-50-5.00	Coal Inclined conveyor 450mm wide														
	120.m	12.00	14.40	1.2	1,728.00	56.00	96,768	600.00	72,000	600.00	72,000	3,600.00	432,000	5,606.40	672,768
30150-30-6.00	Coal Inclined conveyor 450mm wide support steel														
	20.T	21.30	25.56	1.2	511.20	56.00	28,627	3,000.00	60,000	180.00	3,600	0.00	0	4,611.36	92,227
30150-50-7.00	Coal Tripper Conveyor 450mm Wide														
	100.m	18.00	21.60	1.2	2,160.00	56.00	120,960	700.00	70,000	700.00	70,000	4,250.00	425,000	6,859.60	685,960
30150-30-8.00	Coal Tripper Conveyor 450mm Wide support steel														
	15.T	21.30	25.56	1.2	383.40	56.00	21,470	3,000.00	45,000	180.00	2,700	0.00	0	4,611.36	69,170
30150-55-9.00	Process head chute														
	5,000.kg	0.05	0.06	1.2	300.00	56.00	16,800	5.00	25,000	0.10	500	0.00	0	8.46	42,300
30150-50-10.00	Process Conveyor train off load system excavation non-continuous off load system														
	180.m3	0.03	0.04	1.2	6.48	56.00	363	0.00	0	3.50	630	0.00	0	5.52	993

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
30150-50-11.00	Process Conveyor train off load system concrete non-continuous off load system														
	60.m3	7.00	8.40	1.2	504.00	56.00	28,224	710.00	42,600	20.00	1,200	0.00	0	1,200.40	72,024
30150-50-12.00	Process Conveyor train off load system non-continuous off load system														
	1.sum	2,000.00	2,400.00	1.2	2,400.00	56.00	134,400	5,000.00	5,000	3,000.00	3,000	638,400.00	638,400	780,800.00	780,800
30150-50-13.00	Process Inclined conveyor 450mm wide														
	135.m	12.00	14.40	1.2	1,944.00	56.00	108,864	600.00	81,000	600.00	81,000	3,600.00	486,000	5,606.40	756,864
30150-30-14.00	Process Inclined conveyor 450mm wide support steel														
	25.t	21.30	25.56	1.2	639.00	56.00	35,784	3,000.00	75,000	180.00	4,500	0.00	0	4,611.36	115,284
30150-50-15.00	Process Tripper conveyor 450 mm wide for dumping area														
	80.m	18.00	21.60	1.2	1,728.00	56.00	96,768	700.00	56,000	700.00	56,000	4,250.00	340,000	6,859.60	548,768
30150-30-16.00	Process Tripper conveyor 450 mm wide support steel														
	24.t	21.30	25.56	1.2	613.44	56.00	34,353	3,000.00	72,000	180.00	4,320	0.00	0	4,611.36	110,673
30150-55-17.00	Process 450mm wide Bins not included - assume stockpile														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
30150-50-18.00	Process 450mm wide Remainder of equipment assumed in FeSi facility														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
30150-50-19.00	Process 20 t remote control Continuous winch for moving trucks to be confirmed														
	1.ea	200.00	240.00	1.2	240.00	56.00	13,440	2,500.00	2,500	1,000.00	1,000	36,140.00	36,140	53,080.00	53,080
30150 - Processing Site Rail Offloading Including Conveyors Subtotal					**17,192.76**		**962,795**		**652,400**		**311,665**		**3,607,540**		**5,534,400**
31110 - Processing Site Woodchip Stockpile															
31110-20-1.00	Hopper support system excavation														
	20.m3	0.10	0.12	1.2	2.40	56.00	134	0.00	0	4.00	80	0.00	0	10.72	214
31110-20-2.00	Hopper support system concrete														
	20.m3	4.50	5.40	1.2	108.00	56.00	6,048	356.62	7,132	20.00	400	0.00	0	679.02	13,580

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
31110-55-3.00	Hopper														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
31110-20-4.00	Foundation excavation allowance														
	50.m3	0.10	0.12	1.2	6.00	56.00	336	0.00	0	4.00	200	0.00	0	10.72	536
31110-20-5.00	Foundation concrete allowance														
	20.m3	4.50	5.40	1.2	108.00	56.00	6,048	356.62	7,132	20.00	400	0.00	0	679.02	13,580
31110-40-6.00	Stockpile cover wood chip sprung structure not included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
31110-50-7.00	Truck Unloading System Allowance 18T chip trucks														
	1.ea	500.00	600.00	1.2	600.00	56.00	33,600	30,000.00	30,000	6,000.00	6,000	125,600.00	125,600	195,200.00	195,200
31110-50-8.00	Pneumatic conveying system														
	1.ea	150.00	180.00	1.2	180.00	56.00	10,080	6,000.00	6,000	6,000.00	6,000	77,480.00	77,480	99,560.00	99,560
	31110 - Processing Site Woodchip Stockpile Subtotal				**1,004.40**		**56,246**		**50,265**		**13,080**		**203,080**		**322,671**

31120 - Processing Site Power Plant Coal Stockpile

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
31120-10-1.00	Clear Site included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
31120-10-2.00	Gravel 100m Thick														
	2,500.m3	0.03	0.04	1.2	90.00	56.00	5,040	7.00	17,500	0.00	0	0.00	0	9.02	22,540
31120-20-3.00	Excavate For Tunnel Coal stockpile reclaim														
	1,600.m3	0.10	0.12	1.2	192.00	56.00	10,752	0.00	0	4.00	6,400	0.00	0	10.72	17,152
31120-10-4.00	Multiplate Tunnel Coal stockpile reclaim														
	240.m	7.00	8.40	1.2	2,016.00	56.00	112,896	2,000.00	480,000	200.00	48,000	0.00	0	2,670.40	640,896
31120-10-5.00	Backfill With Granular Material Coal stockpile reclaim														
	1,400.m3	0.06	0.07	1.2	100.80	56.00	5,645	6.00	8,400	4.00	5,600	0.00	0	14.03	19,645

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
31120-30-6.00	Ladder Coal stockpile reclaim														
	20.m	7.00	8.40	1.2	168.00	56.00	9,408	710.00	14,200	20.00	400	0.00	0	1,200.40	24,008
31120-20-7.00	Concrete Slab Coal stockpile reclaim														
	1,800.m3	2.30	2.76	1.2	4,968.00	56.00	278,208	356.62	641,916	20.00	36,000	0.00	0	531.18	956,124
31120-30-8.00	Steel Insert Coal stockpile reclaim														
	9.t	21.30	25.56	1.2	230.04	56.00	12,882	3,000.00	27,000	180.00	1,620	0.00	0	4,611.36	41,502
31120-55-9.00	Chutes Coal stockpile reclaim														
	4,500.kg	0.05	0.06	1.2	270.00	56.00	15,120	5.00	22,500	0.10	450	0.00	0	8.46	38,070
31120-55-10.00	Chute work Incl Liners power plant coal														
	5,000.kg	0.05	0.06	1.2	300.00	56.00	16,800	5.00	25,000	0.10	500	0.00	0	8.46	42,300
31120-60-11.00	Head chute														
	2,000.kg	0.05	0.06	1.2	120.00	56.00	6,720	5.00	10,000	0.10	200	0.00	0	8.46	16,920
31120-50-12.00	Conveyor 450mm Wide power plant coal Under stock pile														
	100.m	14.00	16.80	1.2	1,680.00	56.00	94,080	600.00	60,000	600.00	60,000	3,000.00	300,000	5,140.80	514,080
31120-50-13.00	Conveyor 450mm Wide to top bin														
	100.m	14.00	16.80	1.2	1,680.00	56.00	94,080	600.00	60,000	600.00	60,000	3,000.00	300,000	5,140.80	514,080
31120-30-14.00	Conveyor 450mm Wide to top bin support steel														
	18.T	21.30	25.56	1.2	460.08	56.00	25,764	3,000.00	54,000	180.00	3,240	0.00	0	4,611.36	83,004
31120-60-15.00	Coal hopper included in power plant														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
31120-60-16.00	Piping Misting allowance 1.5%														
	1.sum	184.12	184.12	1	184.12	56.00	10,311	21,397.74	21,398	3,426.15	3,426	10,162.20	10,162	45,297.02	45,297
31120-70-17.00	Electrical Allowance 2.0%														
	1.sum	245.50	245.50	1	245.50	56.00	13,748	28,530.32	28,530	4,568.20	4,568	13,549.60	13,550	60,396.03	60,396

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
31120-80-18.00	Instrumentation Allowance 1.0%														
	1.sum	122.75	122.75	1	122.75	56.00	6,874	14,265.16	14,265	2,284.10	2,284	6,774.80	6,775	30,198.02	30,198
31120-50-19.00	Pan feeder under chutes														
	3.ea	300.00	360.00	1.2	1,080.00	56.00	60,480	48,000.00	144,000	6,000.00	18,000	0.00	0	74,160.00	222,480
	31120 - Processing Site Power Plant Coal Stockpile Subtotal				**13,907.29**		**778,808**		**1,628,709**		**250,688**		**630,487**		**3,288,693**
40110 - Processing Site Ferrosilicon Production Plant															
40110-30-1.00	Ferro Silicon Production Plant allowance														
	1.sum	65,000.00	78,000.00	1.2	78,000.00	56.00	4,368,000	10,500,000.00	10,500,000	1,000,000.00	1,000,000	11,500,000.00	11,500,000	27,368,000.00	27,368,000
40110-30-2.00	Ferro Silicon Production Plant Manganese Ore Sintering Plant excluded from quote TBD														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
40110-20-2.00	Ferro Silicon Production Plant foundations - excavate Assumed no Piling														
	2,500.m3	0.10	0.12	1.2	300.00	56.00	16,800	0.00	0	4.00	10,000	0.00	0	10.72	26,800
40110-20-3.00	Ferro Silicon Production Plant 3 floors suspended concrete														
	2,250.m3	4.50	5.40	1.2	12,150.00	56.00	680,400	283.47	637,808	20.00	45,000	0.00	0	605.87	1,363,208
40110-20-3.00	Ferro Silicon Production Plant Foundations -														
	1,875.m3	4.50	5.40	1.2	10,125.00	56.00	567,000	500.00	937,500	20.00	37,500	0.00	0	822.40	1,542,000
40110-30-4.00	Ferro Silicon Production Plant Insulated Cladding Walls														
	3,600.m2	0.95	1.14	1.2	4,104.00	56.00	229,824	115.00	414,000	5.00	18,000	0.00	0	183.84	661,824
40110-30-5.00	Ferro Silicon Production Plant Insulated Cladding Roofing														
	2,500.m2	0.95	1.14	1.2	2,850.00	56.00	159,600	115.00	287,500	5.00	12,500	0.00	0	183.84	459,600
40110-60-6.00	Service connections Piping included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
40110-70-7.00	Service connections Electrical included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40110-80-8.00	Coal gas service connections Piping 50 m line														
	200.m	0.32	0.38	1.2	76.80	56.00	4,301	9.68	1,935	1.00	200	0.00	0	32.18	6,436
40110-80-9.00	Pneumatic conveyor from FeSi to Briquetting assumed included in plant														
	1.sum	900.00	1,080.00	1.2	1,080.00	56.00	60,480	15,000.00	15,000	5,000.00	5,000	110,000.00	110,000	190,480.00	190,480
40110 - Processing Site Ferrosilicon Production Plant Subtotal					**108,685.80**		**6,086,405**		**12,793,743**		**1,128,200**		**11,610,000**		**31,618,347**
40210 - Processing Site Dolomite Grinding and Slag Loadout															
40210-10-1.00	Earth Ramp														
	3,600.m3	0.03	0.04	1.2	129.60	56.00	7,258	0.00	0	3.00	10,800	0.00	0	5.02	18,058
40210-20-2.00	Concrete														
	20.m3	4.50	5.40	1.2	108.00	56.00	6,048	356.62	7,132	20.00	400	0.00	0	679.02	13,580
40210-10-2.00	MSE Wall Wire basket wall														
	720.m2	1.00	1.20	1.2	864.00	56.00	48,384	462.50	333,000	15.00	10,800	0.00	0	544.70	392,184
40210-30-3.00	Steel insert grating 4m x 2m														
	3.5T	21.30	25.56	1.2	89.46	56.00	5,010	3,000.00	10,500	180.00	630	0.00	0	4,611.36	16,140
40210-55-4.00	Hopper 10t 25mm thick														
	5,500.kg	0.05	0.06	1.2	330.00	56.00	18,480	5.00	27,500	0.10	550	0.00	0	8.46	46,530
40210-55-5.00	Chute														
	2,000.kg	0.05	0.06	1.2	120.00	56.00	6,720	5.00	10,000	0.10	200	0.00	0	8.46	16,920
40210-10-6.00	Hopper support structure														
	7.T	21.30	25.56	1.2	178.92	56.00	10,020	3,000.00	21,000	180.00	1,260	0.00	0	4,611.36	32,280
40210-50-7.00	Ferro Silicon Production Plant analytical cell including spectro photometer, robot, mill, computer house and AC														
	1.ea	20.00	24.00	1.2	24.00	56.00	1,344	1,000.00	1,000	500.00	500	57,000.00	57,000	59,844.00	59,844
40210-50-8.00	Ferro Silicon Production Plant cooling tower included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40210-50-9.00	Conveyor 100 x 900mm wide top stockpile														
	100.m	20.00	24.00	1.2	2,400.00	56.00	134,400	800.00	80,000	800.00	80,000	5,400.00	540,000	8,344.00	834,400
40210-50-10.00	Conveyor 450mm Wide Reclaim system dolomite														
	100.m	12.00	14.40	1.2	1,440.00	56.00	80,640	600.00	60,000	600.00	60,000	3,600.00	360,000	5,606.40	560,640
40210-30-11.00	Conveyor support steel														
	20.T	21.30	25.56	1.2	511.20	56.00	28,627	3,000.00	60,000	180.00	3,600	0.00	0	4,611.36	92,227
40210-50-12.00	Pan feeder apron feeder														
	1.ea	300.00	360.00	1.2	360.00	56.00	20,160	48,000.00	48,000	6,000.00	6,000	0.00	0	74,160.00	74,160
40210-30-13.00	Tripper support steel														
	20.T	21.30	25.56	1.2	511.20	56.00	28,627	3,000.00	60,000	180.00	3,600	0.00	0	4,611.36	92,227
40210-20-14.00	Concrete apron slab														
	750.m3	3.00	3.60	1.2	2,700.00	56.00	151,200	356.62	267,465	20.00	15,000	0.00	0	578.22	433,665
40210-10-15.00	Gravel bedding														
	1,200.m3	0.15	0.18	1.2	216.00	56.00	12,096	3.00	3,600	4.00	4,800	0.00	0	17.08	20,496
40210-30-16.00	Steel Insert Coal stockpile reclaim														
	3.t	21.30	25.56	1.2	76.68	56.00	4,294	3,000.00	9,000	180.00	540	0.00	0	4,611.36	13,834
40210-55-17.00	Chutes Reclaim system dolomite														
	1,500.kg	0.05	0.06	1.2	90.00	56.00	5,040	5.00	7,500	0.10	150	0.00	0	8.46	12,690
40210-50-18.00	Cone Crusher HP 500														
	1.sum	3,500.00	4,200.00	1.2	4,200.00	56.00	235,200	90,000.00	90,000	90,000.00	90,000	450,000.00	450,000	865,200.00	865,200
40210-50-19.00	Tripper														
	20.m	27.00	32.40	1.2	648.00	56.00	36,288	3,000.00	60,000	900.00	18,000	0.00	0	5,714.40	114,288
40210-20-20.00	Excavate For Tunnel Reclaim system dolomite														
	1,600.m3	0.10	0.12	1.2	192.00	56.00	10,752	0.00	0	4.00	6,400	0.00	0	10.72	17,152

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producicity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40210-10-21.00	Multiplate Tunnel Reclaim system dolomite														
	100.m	7.00	8.40	1.2	840.00	56.00	47,040	2,000.00	200,000	200.00	20,000	0.00	0	2,670.40	267,040
40210-10-22.00	Backfill With Granular Material Reclaim system dolomite														
	1,400.m3	0.06	0.07	1.2	100.80	56.00	5,645	6.00	8,400	4.00	5,600	0.00	0	14.03	19,645
40210-30-23.00	Ladder Reclaim system dolomite														
	20.m	7.00	8.40	1.2	168.00	56.00	9,408	710.00	14,200	20.00	400	0.00	0	1,200.40	24,008
40210-10-24.00	Concrete footings for conveyor														
	50.m3	3.80	4.56	1.2	228.00	56.00	12,768	460.00	23,000	0.00	0	0.00	0	715.36	35,768
40210-55-25.00	Head Chute 1m x 1 x1m														
	2,000.kg	0.05	0.06	1.2	120.00	56.00	6,720	5.00	10,000	0.10	200	0.00	0	8.46	16,920
40210-50-26.00	Pan feeder Reclaim system dolomite														
	1.ea	300.00	360.00	1.2	360.00	56.00	20,160	48,000.00	48,000	6,000.00	6,000	0.00	0	74,160.00	74,160
40210 - Processing Site Dolomite Grinding and Slag Loadout Subtotal					**17,005.86**		**952,328**		**1,459,297**		**345,430**		**1,407,000**		**4,164,056**
40220 - Processing Site Crushing and Grinding Area															
40220-40-1.00	Concrete pad 15m x 70m														
	750.m3	4.50	5.40	1.2	4,050.00	56.00	226,800	500.00	375,000	20.00	15,000	0.00	0	822.40	616,800
40220-40-2.00	excavate and backfill														
	800.m3	0.10	0.12	1.2	96.00	56.00	5,376	0.00	0	4.00	3,200	0.00	0	10.72	8,576
40220-55-3.00	Day tank 120m3														
	10,000.kg	0.05	0.06	1.2	600.00	56.00	33,600	5.00	50,000	0.10	1,000	0.00	0	8.46	84,600
40220-55-4.00	Ball mill feed chute														
	5,000.sum	0.05	0.06	1.2	300.00	56.00	16,800	5.00	25,000	0.10	500	0.00	0	8.46	42,300
40220-50-5.00	Weigh belt feeder on load cells														
	1.ea	325.00	390.00	1.2	390.00	56.00	21,840	48,500.00	48,500	6,500.00	6,500	0.00	0	76,840.00	76,840

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40220-50-6.00	Ball mill 40tph -120micron input 1in minus dolomite install and foundations														
	1.sum	9,000.00	10,800.00	1.2	10,800.00	56.00	604,800	50,000.00	50,000	50,000.00	50,000	3,000,000.00	3,000,000	3,704,800.00	3,704,800
40220-50-7.00	Cyclone separator including fan 40tph - 120micron product														
	1.ea	580.00	696.00	1.2	696.00	56.00	38,976	5,000.00	5,000	2,500.00	2,500	100,000.00	100,000	146,476.00	146,476
40220-57-8.00	HVAC 0														
	1.ea	0.00	0.00	1	0.00	56.00	0	0.00	0	0.00	0	0.00	0	0.00	0
40220-60-9.00	Piping and ducting allowance 1.0%														
	1.sum	169.32	169.32	1	169.32	56.00	9,482	5,535.00	5,535	787.00	787	31,000.00	31,000	46,803.92	46,804
40220-70-10.00	Electrical allowance 3.0%														
	1.sum	507.96	507.96	1	507.96	56.00	28,446	16,605.00	16,605	2,361.00	2,361	93,000.00	93,000	140,411.76	140,412
40220-80-11.00	Instrumentation allowance allowance 2.0%														
	1.sum	338.64	338.64	1	338.64	56.00	18,964	11,070.00	11,070	1,574.00	1,574	62,000.00	62,000	93,607.84	93,608
40220-50-12.00	Pneumatic conveyor -120micron dolomite 20 m														
	1.ea	900.00	1,080.00	1.2	1,080.00	56.00	60,480	15,000.00	15,000	4,000.00	4,000	112,000.00	112,000	191,480.00	191,480
40220 - Processing Site Crushing and Grinding Area Subtotal					**19,027.92**		**1,065,564**		**601,710**		**87,422**		**3,398,000**		**5,152,696**
40310 - Processing Site Calciner Area															
40310-20-1.00	Concrete slab 75 x 50														
	1,125.m3	3.00	3.60	1.2	4,050.00	56.00	226,800	356.62	401,198	20.00	22,500	0.00	0	578.22	650,498
40310-20-2.00	Equipment foundations concrete cylinders 2ft x 3ft deep														
	96.ea	4.00	4.80	1.2	460.80	56.00	25,805	1,500.00	144,000	100.00	9,600	0.00	0	1,868.80	179,405
40310-50-3.00	Plant wide Bag Houses including installation, 700 SCFM for pneumatic conveyor														
	1.ea	7,800.00	9,360.00	1.2	9,360.00	56.00	524,160	500,000.00	500,000	10,000.00	10,000	900,000.00	900,000	1,934,160.00	1,934,160
40310-50-4.00	Calciners 700 tpd dolomite input = 250,000tpa														
	1.sum	65,000.00	78,000.00	1.2	78,000.00	56.00	4,368,000	205,000.00	205,000	125,000.00	125,000	47,000,000.00	47,000,000	51,698,000.00	51,698,000

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40310-50-5.00	Gas supply 300m dia. schedule steel welded, power plant to calciner														
	275.m	3.40	4.08	1.2	1,122.00	56.00	62,832	325.00	89,375	65.00	17,875	0.00	0	618.48	170,082
40310-50-6.00	Pneumatic conveyor /dust collector -150 micron 25tph included with dust collection from calciner to briquette in tunnel														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
40310-50-7.00	10 t Bridge crane on rails														
	1.ea	680.00	816.00	1.2	816.00	56.00	45,696	750.00	750	750.00	750	82,500.00	82,500	129,696.00	129,696
40310-80-8.00	BET Analyser allowance														
	1.ea	65.00	78.00	1.2	78.00	56.00	4,368	10,000.00	10,000	10,000.00	10,000	75,000.00	75,000	99,368.00	99,368
40310-80-9.00	Liquid Nitrogen By Vendor														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
40310-57-10.00	HVAC .0%														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
40310-60-11.00	Piping and ducting .0%														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
40310-70-12.00	Electrical allowance 2.0%														
	1.sum	1,877.74	1,877.74	1	1,877.74	56.00	105,153	27,306.45	27,306	3,994.50	3,995	963,390.00	963,390	1,099,844.17	1,099,844
40310-80-13.00	Instrumentation allowance allowance 2.0%														
	1.sum	1,877.74	1,877.74	1	1,877.74	56.00	105,153	27,306.45	27,306	3,994.50	3,995	963,390.00	963,390	1,099,844.17	1,099,844
40310-50-14.00	Testing crane														
	1.ea	10.00	12.00	1.2	12.00	56.00	672	0.00	0	200.00	200	0.00	0	872.00	872
	40310 - Processing Site Calciner Area Subtotal				**97,654.27**		**5,468,639**		**1,404,935**		**203,914**		**49,984,280**		**57,061,769**

40320 - Processing Site Bricquetting Area

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40320-40-1.00	Building size Pre-engineered (steel faced insulated cladding) including excavation and foundations														
	900.m2	0.00	0.00	1.2	0.00	56.00	0	3,200.00	2,880,000	0.00	0	0.00	0	3,200.00	2,880,000

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40320-50-2.00	Overhead Crane - 30 t bridge														
	1.ea	130.00	156.00	1.2	156.00	56.00	8,736	100.00	100	125.00	125	80,000.00	80,000	88,961.00	88,961
40320-50-3.00	Overhead Crane - 10 t Jib boom														
	1.ea	40.00	48.00	1.2	48.00	56.00	2,688	125.00	125	200.00	200	35,000.00	35,000	38,013.00	38,013
40320-50-4.00	Overhead Crane - 30 t bridge load cell														
	1.ea		0.00	1.2	0.00	56.00	0	2,000.00	2,000		0		0	2,000.00	2,000
40320-50-5.00	Overhead Crane - 10 t Jib boom load cell														
	1.ea		0.00	1.2	0.00	56.00	0	2,000.00	2,000		0		0	2,000.00	2,000
40320-50-6.00	Testing 30T crane														
	1.ea	16.00	19.20	1.2	19.20	56.00	1,075	0.00	0	300.00	300	0.00	0	1,375.20	1,375
40320-55-7.00	Dolime Fine Dolime Storage Bin size 40t 1.2 SG = t/m3														
	5,500.kg	0.05	0.06	1.2	330.00	56.00	18,480	5.00	27,500	0.10	550	0.00	0	8.46	46,530
40320-50-8.00	Testing 10 T crane														
	1.ea	10.00	12.00	1.2	12.00	56.00	672	0.00	0	200.00	200	0.00	0	872.00	872
40320-50-9.00	Dolime load cells for dolime storage bin														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	2,000.00	2,000		0		0	2,000.00	2,000
40320-55-10.00	FeSi Tote bin 5 no 5T capacity 1x 1 x1m														
	500.kg	0.05	0.06	1.2	30.00	56.00	1,680	5.00	2,500	0.10	50	0.00	0	8.46	4,230
40320-30-11.00	FeSi load cell platform steel 1 x1m no 1														
	1,000.kg	0.05	0.06	1.2	60.00	56.00	3,360	5.00	5,000	0.10	100	0.00	0	8.46	8,460
40320-50-12.00	Dolime Bin Reclaim Feeder vibrating feeder														
	1.ea	580.00	696.00	1.2	696.00	56.00	38,976	5,000.00	5,000	2,500.00	2,500	100,000.00	100,000	146,476.00	146,476
40320-50-13.00	FeSi load cells for tote bin no 1														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	2,000.00	2,000	0.00	0	0.00	0	2,000.00	2,000

Tami - Mosi Project
Scoping Study
*** Final ***

Project No: 1191380100
Client: Molycor Gold Corp.

Report Date: 09-Sep-11
Rev 00
Sorted By Area and Sequence

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40320-50-14.00	FeSi Bin Reclaim Feeder														
	1.ea		0.00	1.2	0.00	56.00	0	77,000.00	77,000		0		0	77,000.00	77,000
40320-50-15.00	Pneumatic offloading system CaF2 from CaF2 silo to briquetting														
	1.ea	900.00	1,080.00	1.2	1,080.00	56.00	60,480	15,000.00	15,000	4,000.00	4,000	112,000.00	112,000	191,480.00	191,480
40320-55-16.00	CaF2 Storage Bin size 40t 1.2 SG = t/m3														
	15,000.kg	0.05	0.06	1.2	900.00	56.00	50,400	5.00	75,000	0.10	1,500	0.00	0	8.46	126,900
40320-50-17.00	CaF2 silo assumed not required - use storage bin														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
40320-50-18.00	CaF2 load cells storage bin														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	2,000.00	2,000		0		0	2,000.00	2,000
40320-55-19.00	Weigh bin 2 x2 x1 m														
	1,300.kg	0.05	0.06	1.2	78.00	56.00	4,368	5.00	6,500	0.10	130	0.00	0	8.46	10,998
40320-50-20.00	CaF2 Bin Reclaim Feeder vibrating feeder														
	1.ea	580.00	696.00	1.2	696.00	56.00	38,976	5,000.00	5,000	2,500.00	2,500	100,000.00	100,000	146,476.00	146,476
40320-50-21.00	Load cell														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	2,000.00	2,000	0.00	0	0.00	0	2,000.00	2,000
40320-55-22.00	Bin 2 x2 x1 m														
	1,000.kg	0.05	0.06	1.2	60.00	56.00	3,360	5.00	5,000	0.10	100	0.00	0	8.46	8,460
40320-50-23.00	Dolime/FeSi/Fluorspar Blender Irich Mixer 2.5 t dolime FeSi and CaF2														
	1.ea	870.00	1,044.00	1.2	1,044.00	56.00	58,464	400.00	400	3,750.00	3,750	150,000.00	150,000	212,614.00	212,614
40320-50-24.00	Briquetter Press Feeder														
	1.ea	290.00	348.00	1.2	348.00	56.00	19,488	2,500.00	2,500	1,250.00	1,250	50,000.00	50,000	73,238.00	73,238
40320-55-25.00	Bin 2 x2 x1 m														
	1,000.kg	0.05	0.06	1.2	60.00	56.00	3,360	5.00	5,000	0.10	100	0.00	0	8.46	8,460

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40320-80-26.00	Processing Cassette , rotary valve, resistor plate cassette, hydraulic push cylinder, 6 eyes, Hydraulic elevator with rotate														
	1.ea	10,000.00	12,000.00	1.2	12,000.00	56.00	672,000	25,000.00	25,000	30,000.00	30,000	1,600,000.00	1,600,000	2,327,000.00	2,327,000
40320-50-27.00	Briquetter Press Roll crusher 1m x 0.75m dia. 30000t/sq in														
	1.ea	3,000.00	3,600.00	1.2	3,600.00	56.00	201,600	4,000.00	4,000	5,000.00	5,000	500,000.00	500,000	710,600.00	710,600
40320-50-28.00	Turntable 12m Dia. 150T over a third Allowance including motors gears controls														
	1.ea	3,200.00	3,840.00	1.2	3,840.00	56.00	215,040	80,000.00	80,000	80,000.00	80,000	200,000.00	200,000	575,040.00	575,040
40320-50-29.00	Disk and spent briquette recapture facility														
	1.ea	5,000.00	6,000.00	1.2	6,000.00	56.00	336,000	700,000.00	700,000	250,000.00	250,000	250,000.00	250,000	1,536,000.00	1,536,000
40320-57-30.00	HVAC 1.0%														
	1.ea	250.69	250.69	1	250.69	56.00	14,039	32,326.25	32,326	1,325.55	1,326	29,270.00	29,270	76,960.55	76,961
40320-60-31.00	Piping and ducting allowance 1.0%														
	1.sum	250.69	250.69	1	250.69	56.00	14,039	32,326.25	32,326	1,325.55	1,326	29,270.00	29,270	76,960.55	76,961
40320-70-32.00	Electrical allowance 2.0%														
	1.sum	501.38	501.38	1	501.38	56.00	28,078	64,652.50	64,653	2,651.10	2,651	58,540.00	58,540	153,921.10	153,921
40320-80-33.00	Instrumentation allowance allowance 1.0%														
	1.sum	250.69	250.69	1	250.69	56.00	14,039	32,326.25	32,326	1,325.55	1,326	29,270.00	29,270	76,960.55	76,961
	40320 - Processing Site Bricquetting Area Subtotal				**32,310.66**		**1,809,397**		**4,094,256**		**388,983**		**3,323,350**		**9,615,986**
40330 - Processing Site Reduction Building Area															
40330-40-1.00	Building size 50 x 60m including crane rails Pre-engineered (steel faced insulated cladding) including excavation sand foundations														
	3,000.m2	12.50	15.00	1.2	45,000.00	56.00	2,520,000	1,920.00	5,760,000	320.00	960,000	0.00	0	3,080.00	9,240,000
40330-40-2.00	Control room PC's, and monitors, furniture														
	1.m2	250.00	300.00	1.2	300.00	56.00	16,800	50,000.00	50,000	10,000.00	10,000	0.00	0	76,800.00	76,800
40330-30-3.00	Internal steel work floor grating steel stairs rails														
	3,000.m2	1.00	1.20	1.2	3,600.00	56.00	201,600	125.00	375,000	5.00	15,000		0	197.20	591,600

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40330-50-4.00	Overhead Crane - 30 t RC control -not pendant														
	2.ea	150.00	180.00	1.2	360.00	56.00	20,160	100.00	200	125.00	250	100,000.00	200,000	110,305.00	220,610
40330-50-5.00	Overhead Crane - 30 t load cell														
	2.ea	0.00	0.00	1.2	0.00	56.00	0	2,000.00	4,000	0.00	0	0.00	0	2,000.00	4,000
40330-50-6.00	Hydraulic wrench system 24 hydraulic wrench on 2m circle 2" nuts														
	2.ea	780.00	936.00	1.2	1,872.00	56.00	104,832	20,000.00	40,000	20,000.00	40,000	100,000.00	200,000	192,416.00	384,832
40330-50-7.00	Fume collection on crane into ducts Allowance														
	2.ea	1,140.00	1,368.00	1.2	2,736.00	56.00	153,216	137,500.00	275,000	25,000.00	50,000	0.00	0	239,108.00	478,216
40330-50-8.00	Testing 30T crane														
	2.ea	16.00	19.20	1.2	38.40	56.00	2,150	0.00	0	300.00	600	0.00	0	1,375.20	2,750
40330-50-9.00	Furnace Reduction includes electrodes and installation														
	100.ea	80.00	96.00	1.2	9,600.00	56.00	537,600	6,250.00	625,000	2,500.00	250,000	10,000.00	1,000,000	24,126.00	2,412,600
40330-50-10.00	Condenser 12mm wall steel cap, 2m Dia. 3m high														
	30,000.kg	0.10	0.12	1.2	3,600.00	56.00	201,600	5.00	150,000	0.10	3,000	0.00	0	11.82	354,600
40330-50-11.00	Water jacket 12mm wall steel cap, 2m Dia. 3m high														
	30,000.kg	0.10	0.12	1.2	3,600.00	56.00	201,600	5.00	150,000	0.10	3,000	0.00	0	11.82	354,600
40330-50-12.00	Rails in floor 40kg/m														
	120.m	2.00	2.40	1.2	288.00	56.00	16,128	138.00	16,560	2.50	300	0.00	0	274.90	32,988
40330-50-13.00	Rail Carts														
	2.ea	50.00	60.00	1.2	120.00	56.00	6,720		0		0	50,000.00	100,000	53,360.00	106,720
40330-50-14.00	Cable tugger rope tow remote control 200 m														
	2.ea	20.00	24.00	1.2	48.00	56.00	2,688	0.00	0	0.00	0	50,000.00	100,000	51,344.00	102,688
40330-50-15.00	Cooling tower included in power plant														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40330-55-16.00	Liquid argon tank by Vendor														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
40330-50-17.00	Vacuum system steam eductor														
	6.ea	30.00	36.00	1.2	216.00	56.00	12,096	500.00	3,000	300.00	1,800	50,000.00	300,000	52,816.00	316,896
40330-80-18.00	Valves remote ball valves 4"														
	200.ea	0.75	0.90	1.2	180.00	56.00	10,080	75.00	15,000	0.00	0		0 0	125.40	25,080
40330-80-19.00	Valves remote ball valves 1"														
	100.ea	0.50	0.60	1.2	60.00	56.00	3,360	45.00	4,500	0.00	0		0 0	78.60	7,860
40330-60-20.00	Piping to valves 4" Carbon steel, schedule 40														
	70.m	0.50	0.60	1.2	42.00	56.00	2,352	47.50	3,325	10.00	700		0 0	91.10	6,377
40330-60-21.00	Piping to valves 1" Carbon steel, schedule 40														
	70.m	1.30	1.56	1.2	109.20	56.00	6,115	125.00	8,750	25.00	1,750		0 0	237.36	16,615
40330-60-22.00	Duct 60m x 1m Dia. Trunk and collection ducting manifold cooling area														
	24,000.kg	0.10	0.12	1.2	2,880.00	56.00	161,280	5.00	120,000	0.10	2,400	0.00	0 0	11.82	283,680
40330-57-23.00	HVAC - heat only allowance														
	1.sum	0.00	0.00	1	0.00	56.00	0	0.00	0	0.00	0	0.00	0	0.00	0
40330-60-24.00	Piping and ducting allowance 10.0%														
	1.sum	8,190.31	8,190.31	1	8,190.31	56.00	458,657	846,196.63	846,197	159,542.78	159,543	229,635.00	229,635	1,694,031.54	1,694,032
40330-70-25.00	Electrical allowance 10.0%														
	1.sum	8,190.31	8,190.31	1	8,190.31	56.00	458,657	846,196.63	846,197	159,542.78	159,543	229,635.00	229,635	1,694,031.54	1,694,032
40330-80-26.00	Instrumentation allowance allowance 2.0%														
	1.sum	1,638.06	1,638.06	1	1,638.06	56.00	91,731	169,239.33	169,239	31,908.56	31,909	45,927.00	45,927	338,806.31	338,806
40330-50-27.00	Liquid argon evaporator by Vendor														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
	40330 - Processing Site Reduction Building Area Subtotal				**92,668.27**		**5,189,423**		**9,461,968**		**1,689,794**		**2,405,197**		**18,746,382**

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40340 - Processing Site Casting Area															
40340-40-1.00	Casting Building Building size 70 x 30m (steel faced insulated cladding) including excavation sand foundations														
	2,100.m2	12.50	15.00	1.2	31,500.00	56.00	1,764,000	1,920.00	4,032,000	320.00	672,000	0.00	0	3,080.00	6,468,000
40340-50-2.00	Overhead Crane - 10 t														
	2.ea	130.00	156.00	1.2	312.00	56.00	17,472	100.00	200	125.00	250	80,000.00	160,000	88,961.00	177,922
40340-50-3.00	Overhead Crane - 10 t load cell														
	2.ea	0.00	0.00	1.2	0.00	56.00	0	2,000.00	4,000	0.00	0	0.00	0	2,000.00	4,000
40340-50-4.00	Testing 10T crane														
	2.ea	16.00	19.20	1.2	38.40	56.00	2,150	0.00	0	300.00	600	0.00	0	1,375.20	2,750
40340-20-5.00	Crane rails on floors 40kg/m														
	140.m	2.00	2.40	1.2	336.00	56.00	18,816	138.00	19,320	2.50	350	0.00	0	274.90	38,486
40340-40-6.00	Shipping Building including in Casting building														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
40340-50-7.00	2Ton cranes on floor rails for shipping with load cell														
	2.ea	100.00	120.00	1.2	240.00	56.00	13,440	15,000.00	30,000	2,500.00	5,000	0.00	0	24,220.00	48,440
40340-50-8.00	Melting Furnaces (4 melters, 8 holding and 20 pumps)														
	1.sum	2,200.00	2,640.00	1.2	2,640.00	56.00	147,840	100,000.00	100,000	40,000.00	40,000	2,240,000.00	2,240,000	2,527,840.00	2,527,840
40340-50-9.00	Refining/casting Furnace co vibratory crucible 4 crucible s, included with melting furnaces														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
40340-50-10.00	Flux pumps High temp sump pumps elect VSD size 38m head 12m 30 gals/min molten salt 750 Degree C, Included in melting furnace														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
40340-80-11.00	Spectrometer Cell including robotics analyzer, milling machine, single robot arm, computer														
	1.ea	180.00	216.00	1.2	216.00	56.00	12,096	4,000.00	4,000	2,000.00	2,000	50,000.00	50,000	68,096.00	68,096
40340-50-12.00	metal pumps High temp sump pumps elect VSD size 38m head 12m 30 gals/min molten salt 750 Degree C, Included in melting furnace														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40340-50-13.00	Cover Gas Generating and Protecting System														
	1.ea	150.00	180.00	1.2	180.00	56.00	10,080	3,000.00	3,000	1,000.00	1,000	50,000.00	50,000	64,080.00	64,080
40340-50-14.00	Off-gas Collecting and wet Scrubbing System 200000ACFM included in cover gas system														
	1.sum	3,000.00	3,600.00	1.2	3,600.00	56.00	201,600	250,000.00	250,000	20,000.00	20,000	500,000.00	500,000	971,600.00	971,600
40340-50-15.00	Automated ingot stacker														
	1.ea	2,050.00	2,460.00	1.2	2,460.00	56.00	137,760	22,500.00	22,500	22,500.00	22,500	247,500.00	247,500	430,260.00	430,260
40340-50-16.00	Sludge pans, tools, and loading														
	1.ea	90.00	108.00	1.2	108.00	56.00	6,048	1,000.00	1,000	1,000.00	1,000	11,000.00	11,000	19,048.00	19,048
40340-50-17.00	Ingot Casting machine 50 lb														
	1.ea	2,050.00	2,460.00	1.2	2,460.00	56.00	137,760	22,500.00	22,500	22,500.00	22,500	247,500.00	247,500	430,260.00	430,260
40340-50-18.00	Pump cleaning station recirculating dilute sulphuric acid and filter press														
	1.ea	185.00	222.00	1.2	222.00	56.00	12,432	2,000.00	2,000	2,000.00	2,000	22,000.00	22,000	38,432.00	38,432
40340-60-19.00	Syngas piping from power plant CS Piping size 37mm														
	400.m	0.15	0.18	1.2	72.00	56.00	4,032	50.00	20,000	0.10	40	0.00	0	60.18	24,072
40340-58-20.00	HVAC 1.0%														
	1.ea	443.84	443.84	1	443.84	56.00	24,855	45,105.20	45,105	7,892.40	7,892	35,280.00	35,280	113,132.86	113,133
40340-60-21.00	Piping and ducting allowance 1.0%														
	1.sum	443.84	443.84	1	443.84	56.00	24,855	45,105.20	45,105	7,892.40	7,892	35,280.00	35,280	113,132.86	113,133
40340-70-22.00	Electrical allowance 2.0%														
	1.sum	887.69	887.69	1	887.69	56.00	49,711	90,210.40	90,210	15,784.80	15,785	70,560.00	70,560	226,265.73	226,266
40340-80-23.00	Instrumentation allowance allowance 1.5%														
	1.sum	665.77	665.77	1	665.77	56.00	37,283	67,657.80	67,658	11,838.60	11,839	52,920.00	52,920	169,699.30	169,699
40340-50-24.00	Condenser cleaning system pit, hood, flail														
	4.ea	70.00	84.00	1.2	336.00	56.00	18,816	750.00	3,000	750.00	3,000	8,250.00	33,000	14,454.00	57,816
	40340 - Processing Site Casting Area Subtotal				**47,161.54**		**2,641,046**		**4,761,599**		**835,648**		**3,755,040**		**11,993,333**

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
40410 - Processing Site Cooling Systems															
40410-20-1.00	Cooling tower and distribution foundations excavations														
	800.m3	0.10	0.12	1.2	96.00	56.00	5,376	0.00	0	4.00	3,200	0.00	0	10.72	8,576
40410-20-2.00	Cooling tower and distribution excavations for pond														
	3,750.m3	0.10	0.12	1.2	450.00	56.00	25,200	0.00	0	4.00	15,000	0.00	0	10.72	40,200
40410-20-3.00	Cooling tower and distribution foundations concrete														
	600.m3	4.50	5.40	1.2	3,240.00	56.00	181,440	356.62	213,972	20.00	12,000	0.00	0	679.02	407,412
40410-55-4.00	Cooling tower and distribution reserve tank 10000gal														
	1,500.kg	0.05	0.06	1.2	90.00	56.00	5,040	5.00	7,500	0.10	150	0.00	0	8.46	12,690
40410-60-5.00	Cooling tower and distribution distribution piping Allowance														
	1.ea	5,200.00	6,240.00	1.2	6,240.00	56.00	349,440	500,000.00	500,000	100,000.00	100,000	0.00	0	949,440.00	949,440
40410-50-6.00	Cooling tower and distribution Cooling tower including hot and cold wells, pumps, heat exchangers, manifolds and instruments														
	1.ea	400.00	480.00	1.2	480.00	56.00	26,880	300,000.00	300,000	60,000.00	60,000	1,610,000.00	1,610,000	1,996,880.00	1,996,880
	40410 - Processing Site Cooling Systems Subtotal				**10,596.00**		**593,376**		**1,021,472**		**190,350**		**1,610,000**		**3,415,198**
50110 - Processing Site Power Plant															
50110-20-1.00	Power plant footings excavations														
	4,000.m3	0.10	0.12	1.2	480.00	56.00	26,880	0.00	0	4.00	16,000	0.00	0	10.72	42,880
50110-20-2.00	Power plant footings Concrete														
	2,700.m3	4.50	5.40	1.2	14,580.00	56.00	816,480	356.62	962,874	20.00	54,000	0.00	0	679.02	1,833,354
50110-60-3.00	Service connections														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	100,000.00	100,000	0.00	0	0.00	0	100,000.00	100,000
50110-60-4.00	Power plant water supply softened water tanks and steel supports included in quote														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
50110-50-5.00	Plant by others freight or spares included in Quote														
	1.ea	284,000.00	340,800.00	1.2	340,800.00	56.00	19,084,800	45,000,000.00	45,000,000	3,465,200.00	3,465,200	76,500,000.00	76,500,000	144,050,000.00	144,050,000

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
50110 - Processing Site Power Plant Subtotal					**355,860.00**		**19,928,160**		**46,062,874**		**3,535,200**		**76,500,000**		**146,026,234**
50120 - Processing Site Ash Loadout															
50120-20-1.00	Foundation to bucket elevator excavations														
	12.m3	0.10	0.12	1.2	1.44	56.00	81	0.00	0	4.00	48	0.00	0	10.72	129
50120-20-2.00	Foundation to bucket elevator concrete														
	12.ea	4.50	5.40	1.2	64.80	56.00	3,629	500.00	6,000	20.00	240	0.00	0	822.40	9,869
50120-20-3.00	Bin foundation excavations														
	20.m3	0.10	0.12	1.2	2.40	56.00	134	0.00	0	4.00	80	0.00	0	10.72	214
50120-20-4.00	Bin foundation Concrete														
	20.m3	4.50	5.40	1.2	108.00	56.00	6,048	356.62	7,132	20.00	400	0.00	0	679.02	13,580
50120-55-5.00	Steel bin 70T density 1.3t/m3														
	6,000.kg	0.05	0.06	1.2	360.00	56.00	20,160	5.00	30,000	0.10	600	0.00	0	8.46	50,760
50120-30-6.00	Support steelwork for bin														
	5.t	21.30	25.56	1.2	127.80	56.00	7,157	3,000.00	15,000	180.00	900	0.00	0	4,611.36	23,057
50120-50-6.00	Bucket elevator 300 m x 17m high														
	17.m	20.00	24.00	1.2	408.00	56.00	22,848	800.00	13,600	800.00	13,600	3,800.00	64,600	6,744.00	114,648
50120-50-7.00	Manual gates below bin														
	1.ea	60.00	72.00	1.2	72.00	56.00	4,032	5,000.00	5,000	392.00	392	0.00	0	9,424.00	9,424
50120 - Processing Site Ash Loadout Subtotal					**1,144.44**		**64,089**		**76,732**		**16,260**		**64,600**		**221,681**
50130 - Processing Site Coal Gas Surge Storage															
50130-55-1.00	Coal Gas Surge Storage included in Power plant														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
50130 - Processing Site Coal Gas Surge Storage Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
61310 - Processing Site Administration and Change House															
61310-40-1.00	Administration and change house, first aid including foundations Building size 40 x 25m														
	1,000.m2	4.50	5.40	1.2	5,400.00	56.00	302,400	1,800.00	1,800,000	47.00	47,000	2.30	2,300	2,151.70	2,151,700

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
61310-58-2.00	Furniture and office equipment														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	100,000.00	100,000	0.00	0	0.00	0	100,000.00	100,000
61310-58-3.00	Lockers benches allowance														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	30,000.00	30,000	0.00	0	0.00	0	30,000.00	30,000
61310-57-4.00	HVAC														
	1.ea	0.00	0.00	1	0.00	56.00	0	0.00	0	0.00	0	0.00	0	0.00	0
61310-60-5.00	Piping allowance 1.0%														
	1.sum	54.00	54.00	1	54.00	56.00	3,024	19,300.00	19,300	470.00	470	23.00	23	22,817.00	22,817
61310-70-6.00	Electrical/Instrumentation allowance 1.0%														
	1.sum	54.00	54.00	1	54.00	56.00	3,024	19,300.00	19,300	470.00	470	23.00	23	22,817.00	22,817
61310 - Processing Site Administration and Change House Subtotal					**5,508.00**		**308,448**		**1,968,600**		**47,940**		**2,346**		**2,327,334**
61320 - Processing Site Emergency Response Including Medical Clinic															
61320-40-1.00	Emergency Response including Medical Clinic included in administration building														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
:20 - Processing Site Emergency Response Including Medical Clinic Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
61330 - Processing Site Gatehouses and Fencing															
61330-80-1.00	Gatehouses included in administration building														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
61330-50-2.00	Truck Weight Scale - including software														
	1.ea	10.00	12.00	1.2	12.00	56.00	672	40.00	40	50.00	50	150,000.00	150,000	150,762.00	150,762
61330-50-3.00	Barrier controller														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	5,000.00	5,000	0.00	0	0.00	0	5,000.00	5,000
61330 - Processing Site Gatehouses and Fencing Subtotal					**12.00**		**672**		**5,040**		**50**		**150,000**		**155,762**
61410 - Processing Site Mobile Maintenance Equipment															
61410-50-1.00	Loader F/E Cat 966H 2yd														
	2.ea	0.00	0.00	1.2	0.00	56.00	0	0.00	0	0.00	0	125,000.00	250,000	125,000.00	250,000

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
61410-50-2.00	Ambulance/Quarry Rescue F450														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	0.00	0	0.00	0	141,225.00	141,225	141,225.00	141,225
61410-50-3.00	Truck 1/2 tonne 2 wheel drive, regular cab														
	6.ea	0.00	0.00	1.2	0.00	56.00	0	0.00	0	0.00	0	25,000.00	150,000	25,000.00	150,000
61410-50-4.00	Bobcat small skid steer														
	2.ea	0.00	0.00	1.2	0.00	56.00	0	1.00	2	0.00	0	30,000.00	60,000	30,001.00	60,002
61410-50-5.00	Utility Crane - 20t														
	1.ea	12.00	14.40	1.2	14.40	56.00	806	100.00	100	0.00	0	225,000.00	225,000	225,906.40	225,906
61410-50-6.00	Fork lift 1 side shift hi mast 4 regular 5T electric														
	5.ea		0.00		0.00	56.00	0		0		0	50,000.00	250,000	50,000.00	250,000
61410 - Processing Site Mobile Maintenance Equipment Subtotal					**14.40**		**806**		**102**		**0**		**1,076,225**		**1,077,133**
61510 - Processing Site Water															
61510-55-1.00	Tanks and piping Allowance tank on stand														
	1.sum	0.00	0.00	1.2	0.00	56.00	0	15,000.00	15,000	0.00	0	0.00	0	15,000.00	15,000
61510 - Processing Site Water Subtotal					**0.00**		**0**		**15,000**		**0**		**0**		**15,000**
61520 - Processing Site Fuel															
61520-20-1.00	Excavate														
	15.m3	0.10	0.12	1.2	1.80	56.00	101	0.00	0	4.00	60	0.00	0	10.72	161
61520-20-2.00	Concrete slab														
	15.m3	4.50	5.40	1.2	81.00	56.00	4,536	329.19	4,938	20.00	300	0.00	0	651.59	9,774
61520-55-3.00	Fuel tanks and pumps by vendor														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
61520 - Processing Site Fuel Subtotal					**82.80**		**4,637**		**4,938**		**360**		**0**		**9,935**
61610 - Processing Site Water Distribution System															
61610-60-1.00	Water Distribution System allowance														
	1.sum	100.00	120.00	1.2	120.00	56.00	6,720	1,500.00	1,500	3,000.00	3,000	0.00	0	11,220.00	11,220

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
61610--2.00	Power Plant water distribution include with power plant														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	0.00	0	0.00	0	0.00	0	0.00	0
	61610 - Processing Site Water Distribution System Subtotal				**120.00**		**6,720**		**1,500**		**3,000**		**0**		**11,220**
61620 - Processing Site Potable Water															
61620-58-1.00	Potable Water water coolers														
	1.ea	0.00	0.00	1.2	0.00	56.00	0		0	0.00	0	0.00	0	0.00	0
	61620 - Processing Site Potable Water Subtotal				**0.00**		**0**		**0**		**0**		**0**		**0**
61630 - Processing Site Process Water															
61630-60-1.00	Process Water														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
	61630 - Processing Site Process Water Subtotal				**0.00**		**0**		**0**		**0**		**0**		**0**
61640 - Processing Site Fire Water															
61640-57-1.00	Fire suppression extinguishers														
	6.ea	6.00	7.20	1.2	43.20	56.00	2,419	200.00	1,200		0	0.00	0	603.20	3,619
61640-57-2.00	Fire suppression control room computers allowance														
	6.ea	6.00	7.20	1.2	43.20	56.00	2,419	200.00	1,200		0	0.00	0	603.20	3,619
	61640 - Processing Site Fire Water Subtotal				**86.40**		**4,838**		**2,400**		**0**		**0**		**7,238**
61650 - Processing Site Solid Waste Disposal															
61650-50-1.00	Solid Waste Disposal in operating costs														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
	61650 - Processing Site Solid Waste Disposal Subtotal				**0.00**		**0**		**0**		**0**		**0**		**0**
61660 - Processing Site Sewage Treatment Plant															
61660-40-1.00	Sewage Treatment Plant Septic tank														
	1.sum	200.00	240.00	1.2	240.00	56.00	13,440	25,000.00	25,000	3,000.00	3,000	0.00	0	41,440.00	41,440
	61660 - Processing Site Sewage Treatment Plant Subtotal				**240.00**		**13,440**		**25,000**		**3,000**		**0**		**41,440**
61670 - Processing Site Effluent Treatment Distribution															

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
61670-40-1.00	Effluent Treatment Distribution Not required														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
61670 - Processing Site Effluent Treatment Distribution Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
61680 - Processing Site Water Treatment															
61680-60-1.00	Compressed Air allowance														
	1.sum	325.00	390.00	1.2	390.00	56.00	21,840	60,000.00	60,000	15,000.00	15,000	0.00	0	96,840.00	96,840
61680-50-1.00	Water Treatment By Vendor at power plant														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
61680 - Processing Site Water Treatment Subtotal					**390.00**		**21,840**		**60,000**		**15,000**		**0**		**96,840**
61910 - Processing Site Power Distribution															
61910-70-1.00	Power Distribution on site														
	1.sum	9,110.00	10,932.00	1.2	10,932.00	56.00	612,192	1,100,000.00	1,100,000	200,000.00	200,000	0.00	0	1,912,192.00	1,912,192
61910-70-2.00	Power Distribution transformers and substation plant station														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
61910 - Processing Site Power Distribution Subtotal					**10,932.00**		**612,192**		**1,100,000**		**200,000**		**0**		**1,912,192**
71110 - Temporary works															
71110-89-1.00	Temporary works off site not included														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
71110 - Temporary works Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
81110 - Processing Site Laydown Area															
81110-10-1.00	Lay down Area included with site clearance														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
81110 - Processing Site Laydown Area Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
81120 - Processing Site Construction Camp															
81120-89-1.00	Construction Camp Excluded by Client														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
81120-89-2.00	Living out allowance Excluded by Client														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
81120 - Processing Site Construction Camp Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
81130 - Processing Site Catering and House Keeping															
81130-89-1.00	Catering By Contractor														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
81130 - Processing Site Catering and House Keeping Subtotal					**0.00**		**0**		**0**		**0**		**0**		**0**
85110 - Processing Site General Site															
85110-87-1.00	Closure and Reclamation General Site As requested by Client														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	5,000,000.00	5,000,000	0.00	0	0.00	0	5,000,000.00	5,000,000
85110 - Processing Site General Site Subtotal					**0.00**		**0**		**5,000,000**		**0**		**0**		**5,000,000**
91110 - Construction Indirects															
91110-91-1.00	Construction Indirects Quarry Site 8.0%														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	238,528.00	238,528	0.00	0	0.00	0	238,528.00	238,528
91110-91-2.00	Construction Indirects Process, rails, stockpiles, ancillary buildings etc 8.0%														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	11,288,125.47	11,288,125	0.00	0	0.00	0	11,288,125.47	11,288,125
91110-91-3.00	Construction Indirects Power plant .0% included in direct cost														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
91110-91-4.00	Construction Indirects Ferro Silicon 8.0%														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	2,189,440.00	2,189,440	0.00	0	0.00	0	2,189,440.00	2,189,440
91110 - Construction Indirects Subtotal					**0.00**		**0**		**13,716,093**		**0**		**0**		**13,716,093**
91120 - Initial Fills															
91120-92-1.00	Initial fills Mining														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
91120-92-2.00	Initial fills Process														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	2,700,000.00	2,700,000	0.00	0	0.00	0	2,700,000.00	2,700,000

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
91120 - Initial Fills Subtotal					**0.00**		**0**		**2,700,000**		**0**		**0**		**2,700,000**
91130 - Spares															
91130-93-1.00	Spares Commissioning spares only Capital spares Excluded from Estimate. To be covered in Vendor packages.														
	1.ea	0.00	0.00	1	0.00	56.00	0	1,282,712.17	1,282,712	0.00	0	0.00	0	1,282,712.17	1,282,712
91130 - Spares Subtotal					**0.00**		**0**		**1,282,712**		**0**		**0**		**1,282,712**
91140 - Freight and Logistics															
91140-94-1.00	Freight and Logistics														
	1.ea	0.00	0.00	1	0.00	56.00	0	6,086,966.21	6,086,966	0.00	0	0.00	0	6,086,966.21	6,086,966
91140 - Freight and Logistics Subtotal					**0.00**		**0**		**6,086,966**		**0**		**0**		**6,086,966**
91150 - Commissioning and Start-up															
91150-95-1.00	Commissioning and Start-Up Facility Allow for 8men 30 days @ $150 ph														
	2,400.hrs	1.00	1.00	1	2,400.00	150.00	360,000	0.00	0	0.00	0	0.00	0	150.00	360,000
91150-95-2.00	Commissioning and Start-Up Facility Allow for 8 Tradesmen 30 days @ $64 ph														
	2,400.hrs	1.00	1.20	1.2	2,880.00	56.00	161,280	0.00	0	0.00	0	0.00	0	67.20	161,280
91150 - Commissioning and Start-up Subtotal					**5,280.00**		**521,280**		**0**		**0**		**0**		**521,280**
91160 -															
91160-96-1.00	EP Mining 4.0%														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	119,264.00	119,264	0.00	0	0.00	0	119,264.00	119,264
91160-96-2.00	EP Process 7.5%														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	10,582,617.63	10,582,618	0.00	0	0.00	0	10,582,617.63	10,582,618
91160-96-3.00	EP Power plant 7.5% included in directs														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
91160-96-4.00	EP Ferro Silicon 7.5%														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	2,052,600.00	2,052,600	0.00	0	0.00	0	2,052,600.00	2,052,600
91160-96-5.00	CM Mining 4.0%														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	119,264.00	119,264	0.00	0	0.00	0	119,264.00	119,264

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
91160-96-6.00	CM Process 7.5%														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	10,582,617.63	10,582,618	0.00	0	0.00	0	10,582,617.63	10,582,618
91160-96-7.00	CM Power plant 7.5% included in directs														-
	-	-	-		-	-	-	-	-	-	-	-	-	-	-
91160-96-8.00	CM Ferro Silicon 7.5%														
	1.ea	0.00	0.00	1.2	0.00	56.00	0	2,052,600.00	2,052,600	0.00	0	0.00	0	2,052,600.00	2,052,600
				91160 - Subtotal	**0.00**		**0**		**25,508,963**		**0**		**0**		**25,508,963**
91170 - Vendor Commissioning and Assistance															
91170-97-1.00	Vendor Reps (during construction) Allow for 4men 10 days @ $150 ph														
	400.ea	1.00	1.00	1	400.00	150.00	60,000	0.00	0	0.00	0	0.00	0	150.00	60,000
				91170 - Vendor Commissioning and Assistance Subtotal	**400.00**		**60,000**		**0**		**0**		**0**		**60,000**
98100 - Owners Cost															
98100-98-1.00	Owner's Costs allowance 2.00%														
	1.lot	0.00	0.00	1	0.00	56.00	0	7,447,088.33	7,447,088	0.00	0	0.00	0	7,447,088.33	7,447,088
				98100 - Owners Cost Subtotal	**0.00**		**0**		**7,447,088**		**0**		**0**		**7,447,088**
99110 - Project Contingency															
99110-99-1.00	Contingency Mining 20.0%														
	1.lot	0.00	0.00	1.2	0.00	56.00	0	691,731.20	691,731	0.00	0	0.00	0	691,731.20	691,731
99110-99-2.00	Contingency Process 20.0%														
	1.lot	0.00	0.00	1.2	0.00	56.00	0	36,841,177.50	36,841,178	0.00	0	0.00	0	36,841,177.50	36,841,178
99110-99-3.00	Contingency Power plant 20.0% included in directs														
	1.lot	0.00	0.00	1.2	0.00	56.00	0	0.00	0	0.00	0	0.00	0	0.00	0
99110-99-4.00	Contingency Ferro Silicon 20.0% Based on quote														
	1.lot	0.00	0.00	1.2	0.00	56.00	0	6,732,528.00	6,732,528	0.00	0	0.00	0	6,732,528.00	6,732,528
99110-99-5.00	Contingency Owners cost Included in Owners cost														
	1.lot	0.00	0.00	1.2	0.00	56.00	0	0.00	0	0.00	0	0.00	0	0.00	0

SubArea-Exp-Seq	Qty	Labour Unit Mhr	Labour Mhr	Producitivity Factor	Total Labour Manhour	Labour Rate	Labour Cost	Material Unit Cost	Material Cost	Const Eqt Unit Cost	Const Eqt Cost	Process Eqpt Unit Cost	Process Eqpt Cost	Total Unit Cost	Total Cost (USD)
		99110 - Project Contingency Subtotal			**0.00**		**0**		**44,265,437**		**0**		**0**		**44,265,437**
Scoping Study Total					**911,027.94**		**51,280,765**		**200,087,594**		**9,999,440**		**162,698,145**		**424,065,943**

WARDROP
A TETRA TECH COMPANY

*** Final ***

MOLYCOR GOLD CORP.

Project No: 1191380100 | **Tami - Mosi Project** | **Report Date: 09-Sep-11**

Client: Molycor Gold Corp. | **Scoping Study - Level 1 Summary** | **Rev 00**

		Labour Manhour	Labour Cost	Material Cost	Construction Equipment Cost	Mechanical Equipment Cost	Total Cost (USD)
	Direct Works						
10	Dolomite Quarry Site General Subtotal	1,320	73,920	193,700	8,200	200,000	475,820
20	Dolomite Quarry Open Pit Subtotal	420	23,520	8,000	1,000	987,000	1,019,520
22	Dolomite Quarry Crushing Plant Subtotal	4,680	262,080	300,000	100,000	1,300,000	1,962,080
23	Dolomite Quarry Utilities Subtotal	1,512	84,672	207,500	39,000	0	331,172
25	Dolomite Quarry Temporary works Subtotal	0	0	0	0	0	0
30	Processing Site General Subtotal	83,004	4,648,217	6,770,994	896,920	4,091,540	16,407,671
31	Processing Site Stock Piles Subtotal	14,912	835,055	1,678,974	263,768	833,567	3,611,364
40	Processing Site - Processing Facilities Subtotal	425,110	23,806,178	35,598,980	4,869,741	77,492,867	141,767,766
50	Processing Site Power Plant Subtotal	357,004	19,992,249	46,139,606	3,551,460	76,564,600	146,247,915
61	Processing Site Infrastructure Subtotal	17,386	973,594	3,182,580	269,350	1,228,571	5,654,094
71	Processing Site Off-Site Infrastructure Subtotal	0	0	0	0	0	0
81	Processing Site Temporary works Subtotal	0	0	0	0	0	0
85	Closure and Reclamation (both sites) Subtotal	0	0	5,000,000	0	0	5,000,000
	Direct Works Subtotal	**905,348**	**50,699,485**	**99,080,334**	**9,999,440**	**162,698,145**	**322,477,402**
	Indirects						
91	Indirect Costs Subtotal	5,680	581,280	49,294,735	0	0	49,876,015
98	Owners Costs Subtotal	0	0	7,447,088	0	0	7,447,088
99	Contingency Subtotal	0	0	44,265,437	0	0	44,265,437
	Indirects Subtotal	**5,680**	**581,280**	**101,007,260**	**0**	**0**	**101,588,540**

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***** Final *****

MOLYCOR GOLD CORP.

Project No: 1191380100 | **Tami - Mosi Project** | **Report Date: 09-Sep-11**

Client: Molycor Gold Corp. | **Scoping Study - Level 1 Summary** | **Rev 00**

	Labour Manhour	Labour Cost	Material Cost	Construction Equipment Cost	Mechanical Equipment Cost	Total Cost (USD)
Scoping Study Total	**911,028**	**51,280,765**	**200,087,594**	**9,999,440**	**162,698,145**	**424,065,943**