# TECHNICAL REPORT ON THE MACTUNG TUNGSTEN DEPOSIT, MACMILLAN PASS, YUKON PREPARED FOR NORTH AMERICAN TUNGSTEN CORPORATION LIMITED

Report for NI 43-101

**Authors:** 

Peter A. Lacroix, P.Eng. R. Barry Cook, P.Eng.

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SCOTT WILSON ROSCOE POSTLE ASSOCIATES INC.

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# 1 SUMMARY

#### **EXECUTIVE SUMMARY**

Scott Wilson Roscoe Postle Associates Inc. (Scott Wilson RPA) was retained by North American Tungsten Corporation Ltd. (NATCL) to prepare an updated mineral resource estimate and an NI 43-101 compliant Technical Report on the Mactung tungsten deposit, located near MacMillan Pass, Yukon. This Technical Report conforms to NI 43-101 Standards of Disclosure for Mineral Projects. Scott Wilson RPA visited the property on August 19, 2005.

The Mactung property, wholly owned by NATCL, consists of 113 mineral claims and 38 mining leases in Yukon and eight mining leases in the Northwest Territories, with a total area of 4,541.6 ha. The Mactung property is at the feasibility stage of development, and environmental and engineering studies are in progress. NATCL has obtained a Class III Yukon Land Use permit to operate a camp and do extensive diamond drilling on the Yukon side of the border. A water licence is not required for the levels of activity that are currently being undertaken.

#### **CONCLUSIONS**

Scott Wilson RPA completed a solid model, or wireframe, of the mineralized zones and a multiple-seam 2D gridded seam block model (GSM) for the Mactung deposit. The model contains two separate estimates of grade (Kriged and Polygonal) and a single estimate of vertical thickness for each block based on the solid model. Scott Wilson RPA considers the kriged estimate more appropriate for this deposit. A minimum thickness of 4.5 m has been applied to the model and grades have been diluted to the minimum thickness where necessary.

The kriged estimate contains an indicated mineral resource of 33 million tonnes grading 0.88% WO<sub>3</sub>, or 290 Kt of contained WO<sub>3</sub>. An additional resource of 11.9 million tonnes grading 0.78% WO<sub>3</sub>, or 92 Kt WO<sub>3</sub>, has been estimated for the inferred category. These estimates, which are based on assays capped at unique levels for each zone, are

reported at a block cut-off of 0.5% WO<sub>3</sub>, which Scott Wilson RPA considers appropriate for the location and cost profile that can be expected for Mactung.

CIM definitions (December 2005) were followed for the classification of the mineral resources. Scott Wilson RPA estimates an average drill spacing of 50 m based on the average distance between each composite and its four nearest neighbours. Scott Wilson RPA considers the spacing close enough to classify approximately 76% of the estimated resources as indicated.

Both the kriged and polygonal estimates are virtually identical in terms of contained metal at the stated cut-off, although the polygonal estimates are lower in tonnage and higher in grade.

The resources straddle the Yukon/Northwest Territories (NWT) border. Approximately 91% of the contained metal estimated for indicated category and 80% of the contained metal for inferred resources are located on the Yukon side of the border.

#### **RECOMMENDATIONS**

Further drilling is required to improve the reliability of the mineral resource estimates in the upper 3 zones (3D, 3E and 3F) as well as on the periphery and northerly portions of all zones. Initial efforts should focus on the areas of the deposit where the higher grades have not been entirely closed off by peripheral drilling. Assessments of grade variability indicate a maximum drill spacing in the range of 120 m to classify any portion of the resource as indicated, although this must be confirmed by further drilling for the upper 3 zones.

A phased work program is recommended, the first phase of which would be a preliminary economic assessment of the project based on the current mineral resource estimates. NATCL estimates the cost of the assessment to be approximately \$200,000. Subject to positive results from the preliminary assessment, a feasibility study should be embarked upon. Concurrent with the feasibility work, a drilling program should be carried out; however, the size and nature of the drilling program would be contingent

upon the results of the preliminary study. Should that study indicate that the project will have to draw on the inferred resources to produce a positive economic result, a component of the drilling program will have to be aimed at upgrading sufficient resources to satisfy the requirement that a feasibility (and reserve) be based on measured and indicated resources. NATCL estimates the cost of the feasibility and drilling to be in the range of \$5 million.

#### **TECHNICAL SUMMARY**

#### PROPERTY DESCRIPTION AND LOCATION

The Mactung property is located in the Selwyn Mountain Range and covers the area around Mt. Allan on the Yukon/NWT border, approximately eight kilometres northwest of MacMillan Pass. The nearest settlement accessible by road, Ross River, is 250 km away to the southwest along the Canol Road, a drive that takes about six hours. The property is located at latitude 63°17'N and longitude 130°10'W, and the Cantung Mine is approximately 160 km to the south.

#### **LAND TENURE**

The Mactung property comprises 113 mineral claims and 38 mining leases in Yukon and eight mining leases in the NWT, with a total area of 4,541.6 ha, or 11,217.7 acres. The claims and leases, none of which are patented, are contiguous and cover a single block of ground that straddles the Yukon/NWT border. The Mactung mineral resource is located on mineral leases, mainly on the Yukon side of the border. All leases and claims belong to NATCL and royalties on production are payable to the Yukon and NWT Governments under their respective mining legislation.

#### SITE INFRASTRUCTURE

The infrastructure is represented by an adit and associated underground workings that were driven into the Lower Zone (2B) ore horizon in 1973. They are located on the Yukon side of the border at an elevation of 1,900 m. A small dump of waste rock with a small amount of ore exists near the adit entrance.

#### **HISTORY**

The Mactung deposit was discovered in 1962 by James Allan, a geologist of Amax Northwest Mining Co. Ltd. (Amax), probably as a result of follow-up prospecting to a regional stream sediment survey carried out as part of the Ogilvy Reconnaissance Project. The deposit was originally known as MacMillan Pass Tungsten and then as MacMillan Tungsten before it became known as Mactung.

During the years 1963 to 1967, Amax completed geological mapping, rock geochemical sampling, magnetometer surveying, and grid geochemical soil sampling on the property. The five surface diamond drill holes completed in 1968 (1,513 m) were followed by 11 km of access road construction from the Canol Road to the property in 1970. Twenty-one surface diamond drill holes were drilled in 1971 and 48 holes in 1972. In 1973, an adit was collared at the 1,890 m elevation and 726 m of lateral development and 27 m of raising were completed in the Lower Zone. A 295 tonne bulk sample was sent for metallurgical testing. A total of 43 underground holes were drilled from the adit to better define the mineralization in the Lower Zone, stratigraphically known as the "2B" horizon. Further surface diamond drilling was done in 1979 along with another 49 m of underground development. The last surface drilling conducted by Amax was in 1980. Ongoing environmental and feasibility studies continued until 1985, when falling tungsten prices caused work on the project to stop.

Amax sold the Mactung property to Canada Tungsten Mining Corporation (CTMC) in 1986 as part of a larger sale that also included the Cantung mine. CTMC merged with Canamax Resources and Minerex Resources in 1993, to become Canada Tungsten Inc. In August 1994, Aur Resources Inc. (Aur) purchased a 48% interest in Canada Tungsten Inc. and subsequently, in January 1997, the two companies merged. In October 1997, the property, along with the Cantung Mine and other Aur assets, was sold to NATCL, the present owner.

In 2005, NATCL drilled 25 surface diamond drill holes (6,639 m) to better define the west end of the deposit and to upgrade the resource classification of some mineral resource blocks from the "Inferred" to "Indicated" category.

#### **GEOLOGY**

The Mactung deposit is located in the eastern Selwyn Basin, an outer miogeoclinal basin that formed on the then western margin of the North American continent. The dominantly thin-bedded siliciclastic rocks (shale, chert, and basinal limestone) grade to the northeast into the thick-bedded carbonate sediments of the variably subsiding Mackenzie Platform. Local stratigraphy of importance may include the Late Cambrian to Early-Middle Ordovician Gull Lake Formation (dolomitic siltstone and mudstone, slate, limestone conglomerate) and Rabbitkettle Formation (basinal silty limestone) and the Ordovician to Lower Devonian Road River Group which includes the Duo Lake Formation (black graptolitic shale, laminated chert, and minor limestone) and the overlying Steel Formation (pyritic, locally wispy laminated, siliceous, locally dolomitic mudstone to siltstone). Facies-changes between deep-water clastic rocks (shale basin) and shallow water carbonate rocks (platform) are transitional.

In Jurassic and Early Cretaceous time, the miogeocline was deformed by northeast-directed compression. The rocks of Selwyn Basin responded by thrust faulting and the development of open to tight similar folds. Structural trends generally parallel the arcuate Paleozoic shale-carbonate facies boundary. Widespread Early to Late Cretaceous granitic magmatism intruded the deformed rocks of the miogeocline. Five main intrusive suites are recognized, one of which, the Tungsten (97 ma - 92 Ma), is responsible for a string of tungsten skarn deposits along the eastern flank of the former Selwyn Basin.

The rocks in the Mactung area are part of the west-trending Macmillan Fold Belt. Stratigraphy in the general area of Mactung trends generally E-W and dips from 10° to 40° to the south. The axes of large folds also trend E-W and may have a shallow westerly plunge. Several ages of high-angle normal faulting, of various orientations, are known in the area.

A stratigraphic sequence has been established on the property, with nine mappable units distinguished and designated from oldest to youngest numerically I, 2B, 3C, 3D, 3E, 3F, 3G, 3H, and 4. At Mactung, this package is comprised of approximately 230 m of shallow southerly dipping, altered limestones, shales and siltstones of Cambrian to Silurian age. The entire sequence is overthrust to the north, producing a recumbent isoclinal fold with an axis that plunges at a shallow angle to the west and to the east, away from the deposit. The Cretaceous-aged Cirque Lake stock is intruded through this sequence. The deposit and the host stratigraphy is cut and offset by numerous steeply dipping northerly trending faults with displacements of up to 30 m or more.

#### **MINERALIZATION**

The Mactung mineralization can be characterized as a metasomatic skarn deposit formed by magmatic hydrothermal fluids originating from a Cretaceous granitic stock. The deposit comprises an Upper and Lower mineralized skarn zone separated by 100 m of hornfelsed pelitic sediments. The Lower zone, while dipping in the same general direction as the Upper zone, contains a "Z" fold with an amplitude of about 90 m.

The skarns associated with the metamorphosed limestone units may be divided into two main facies: garnet-pyroxene and pyroxene-pyrrhotite. Scheelite is the economic mineral of interest at Mactung, with wolframite reported only occasionally. Chalcopyrite is main base metal found in the deposit, but is probably not of economic significance. Scheelite occurs predominantly with pyrrhotite in the pyroxene-pyrrhotite facies, wherein the scheelite content increases and grain size decreases with pyrrhotite content. Minor scheelite also occurs in the garnet facies, and is coarser grained than that of the pyrrhotite facies.

#### MINERAL RESOURCES AND MINERAL RESERVES

Scott Wilson RPA has completed a 3D solid model, or wireframe, and 2D block model for the Mactung property. The 2D model is a gridded seam model (GSM) and contains two separate estimates of grade (Kriged & Polygonal) and a single estimate of

thickness for each block. Scott Wilson RPA considers the kriged estimate more appropriate for this deposit. Tables 1-1 and 1-2 summarize the kriged estimates.

These estimates, which are based on assays capped at unique levels for each zone, are reported at a block cut-off of 0.5% WO<sub>3</sub>, which Scott Wilson RPA considers appropriate for the location and cost profile that can be expected for Mactung. CIM definitions (December 2005) were followed for the classification of the mineral resources. Scott Wilson RPA estimates an average drill spacing of 50 m based on the average distance between each composite and its four nearest neighbours. Scott Wilson RPA considers the spacing close enough to classify approximately 76% of the resources as indicated.

Further drilling is required to improve the reliability of the mineral resource estimates for the upper three zones (3D, 3E, and 3F) as well as on the periphery and northern portions of all four zones. Initial efforts should focus on the areas of the deposit where higher grade intercepts have not been entirely closed off by peripheral drilling. Assessments of grade variability indicate a maximum drill spacing in the range of 120 m to classify any portion of the resource as indicated category, although this must be confirmed by further drilling in the upper 3 zones.

TABLE 1-1 INDICATED MINERAL RESOURCES ESTIMATES

North American Tungsten – Mactung Project

Location	Kt	% WO₃	Kt WO₃	mtu's (Millions)
Yukon	30,202	0.88	265	26.5
NWT	2,826	0.88	25	2.5
Total	33.029	0.88	290	29.0

#### Notes:

- 1. CIM definitions were followed for mineral resources.
- 2. Mineral resources are estimated at a block cut-off grade of 0.5% WO<sub>3</sub>.
- 3. An mtu is 10 kg WO<sub>3</sub>
- 4. Differences in totals due to round-off.

# TABLE 1-2 INFERRED MINERAL RESOURCES ESTIMATES North American Tungsten – Mactung Project

Location	Kt	% WO₃	Kt WO₃	mtu's (Millions)
Yukon	9,836	0.75	74	7.4
NWT	2,020	0.91	18	1.8
Total	11,857	0.78	92	9.2

#### Notes:

- 1. CIM definitions were followed for mineral resources.
- 2. Mineral resources are estimated at a block cut-off grade of 0.5% WO<sub>3</sub>.
- 3. An mtu is 10 kg WO<sub>3</sub>
- 4. Differences in totals due to round-off.

# 2 INTRODUCTION AND TERMS OF REFERENCE

Scott Wilson Roscoe Postle Associates Inc. (Scott Wilson RPA) was retained by North American Tungsten Corporation Ltd. (NATCL) to prepare an updated mineral resource estimate and an NI 43-101 compliant Technical Report on the Mactung tungsten deposit, located near MacMillan Pass, Yukon. Scott Wilson RPA visited the property on August 19, 2005.

NATCL is a Canadian mining company listed on TSX Venture Exchange. It owns two tungsten deposits, Mactung in Yukon and Cantung in the Northwest Territories. Scott Wilson RPA reviewed assets of both properties in 1992, with subsequent updates in 1997, 2000, and 2001. In December 2006, Scott Wilson RPA prepared an NI 43-101 compliant report on the operation of the Cantung mine.

The Mactung deposit has been characterized as one of the world's largest tungsten deposits and ranked as the largest undeveloped skarn-type deposit (USGS 1998). The property consists of 113 mineral claims and 38 mining leases in Yukon and eight mining leases in the Northwest Territories, with a total area of 4,541.6 ha. All leases and claims are 100% owned by NATCL and royalties on production are payable to the Yukon and Northwest Territories governments under their respective mining legislations. There is also a royalty of 4% to Aur Resources Inc., which NATCL may reduce under an option agreement to 1% by the earlier of March 30, 2015 or 60 days after receipt of a water licence issued in connection with any proposed mineral production on the property.

The Mactung property is at the feasibility stage of development, and environmental and engineering studies are in progress.

#### **SOURCES OF INFORMATION**

Mr. Barry Cook, P.Eng., Associate Geologist with Scott Wilson RPA, visited the Mactung property on August 19, 2005, accompanied by Mr. Andy Hureau, a geologist in

the employ of NATCL. Mr. Cook reviewed plans and sections of the property and looked at the drill core from the recent drilling program.

This report was prepared by Messrs Peter Lacroix, P.Eng., Associate Mining Engineer with Scott Wilson RPA, and Barry Cook, P.Eng. General property and geology information was supplied by David Tenney, C.Eng., Manager of Exploration with NATCL. In the course of preparing the Technical Report, discussions were held with the following NATCL personnel and consultants:

- Mr. Dave Tenney, C. Eng., Manager of Exploration, NATCL
- Mr. Andy Hureau, B. Sc., Project Geologist, NATCL

This report was prepared in accordance with the CIM Definition Standards on Mineral Resources and Mineral Reserves adopted by CIM Council on December 11, 2005, and incorporated in National Instrument 43-101. Since this report describes a resource estimation, operational considerations are limited to general statements and assumptions about any potential mine development that may occur at Mactung, even though very detailed reports were prepared for Amax Northwest Mining Co. Ltd. (Amax), the discoverer of the deposit, prior to its attempt to put the deposit into production in the early 1980s. Amax had completed an initial environmental evaluation and a feasibility study by the mid-1980s when falling tungsten prices made the deposit uneconomic. The present surge in tungsten prices suggests that the property is well worth reviewing for its economic potential, and some preliminary work is being undertaken by Strathcona Mineral Services to that end.

Many of the documents reviewed in the preparation of this report come from a library of Amax drawings and reports that accumulated between 1963 and 1985 and are now housed in NATCL's Whitehorse office.

The documentation reviewed, and other sources of information, are listed at the end of this report in Section 21 References.

#### LIST OF ABBREVIATIONS

Units of measurement used in this report conform to the SI (metric) system. All currency is US dollars (US\$) or Canadian dollars (C\$) as stated in the report.

П	micron	kPa	kilopascal
μ °C	degree Celsius	kVA	kilovolt-amperes
°F	degree Fahrenheit	kW	kilowatt
μg	microgram	kWh	kilowatt-hour
A	ampere	L	liter
a	annum	L/s	litres per second
bbl	barrels	m	metre
Btu	British thermal units	M	mega (million)
C\$	Canadian dollars	m <sup>2</sup>	square metre
cal	calorie	m <sup>3</sup>	cubic metre
cfm	cubic feet per minute	min	minute
cm	centimetre	MASL	metres above sea level
cm <sup>2</sup>	square centimetre	mm	millimetre
d	day	mph	miles per hour
dia.	diameter	mtu	metric ton unit
dmt	dry metric tonne	MVA	megavolt-amperes
dwt	dead-weight ton	MW	megawatt
ft	foot	MWh	megawatt-hour
ft/s	foot per second	m <sup>3</sup> /h	cubic metres per hour
ft <sup>2</sup>	square foot	opt, oz/st	ounce per short ton
ft <sup>3</sup>	cubic foot	oz	Troy ounce (31.1035g)
g	gram	oz/dmt	ounce per dry metric tonne
Ğ	giga (billion)	ppm	part per million
Gal	Imperial gallon	psia	pound per square inch absolute
g/L	gram per litre	psig	pound per square inch gauge
g/t	gram per tonne	RL	relative elevation
gpm	Imperial gallons per minute	s	second
gr/ft <sup>3</sup>	grain per cubic foot	st	short ton
gr/m <sup>3</sup>	grain per cubic metre	stpa	short ton per year
hr	hour	stpd	short ton per day
ha	hectare	t	metric tonne
hp	horsepower	tpa	metric tonne per year
in	inch	tpd	metric tonne per day
in <sup>2</sup>	square inch	US\$	United States dollar
J	joule	USg	United States gallon
k	kilo (thousand)	USgpm	US gallon per minute
kcal	kilocalorie	V	volt
kg	kilogram	W	watt
km	kilometre	wmt	wet metric tonne
km/h	kilometre per hour	yd <sup>3</sup>	cubic yard
km <sup>2</sup>	square kilometre	yr	year

# **3 RELIANCE ON OTHER EXPERTS**

This report has been prepared by Scott Wilson Roscoe Postle Associates Inc. (Scott Wilson RPA) for North American Tungsten Corporation Ltd. (NATCL). The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to Scott Wilson RPA at the time of preparation of this report,
- Assumptions, conditions, and qualifications as set forth in this report, and
- Data, reports, and other information supplied by NATCL and other third party sources.

For the purpose of this report, Scott Wilson RPA has relied on ownership information provided by NATCL. Opinions on property title have been provided by NATCL's legal counsel, Fraser Milner Casgrain LLP (FMC 2007).

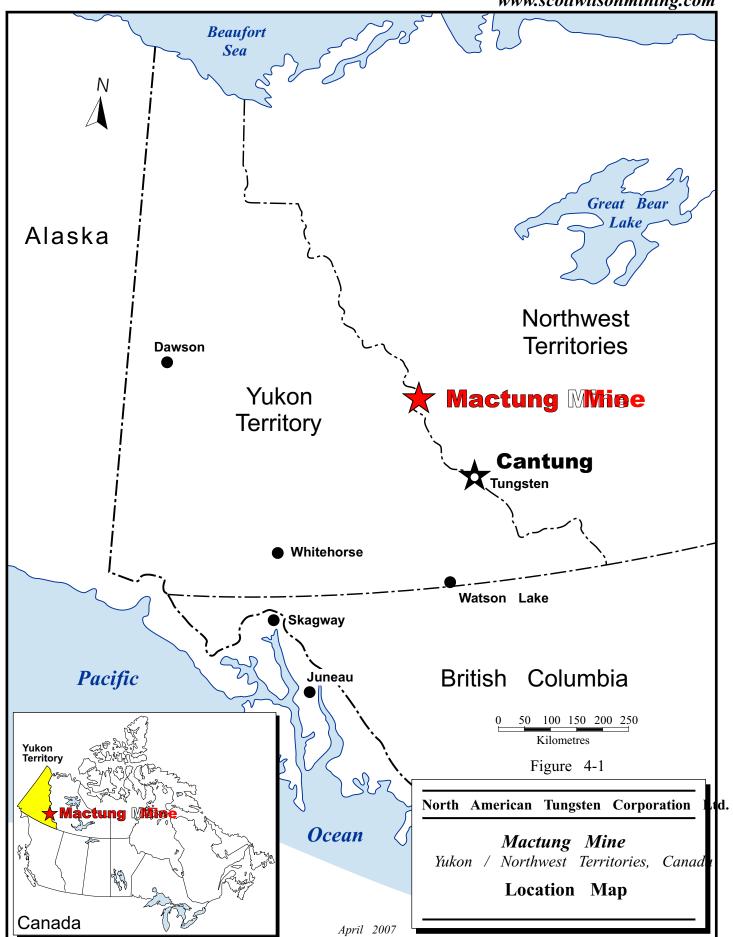
# **4 PROPERTY DESCRIPTION AND LOCATION**

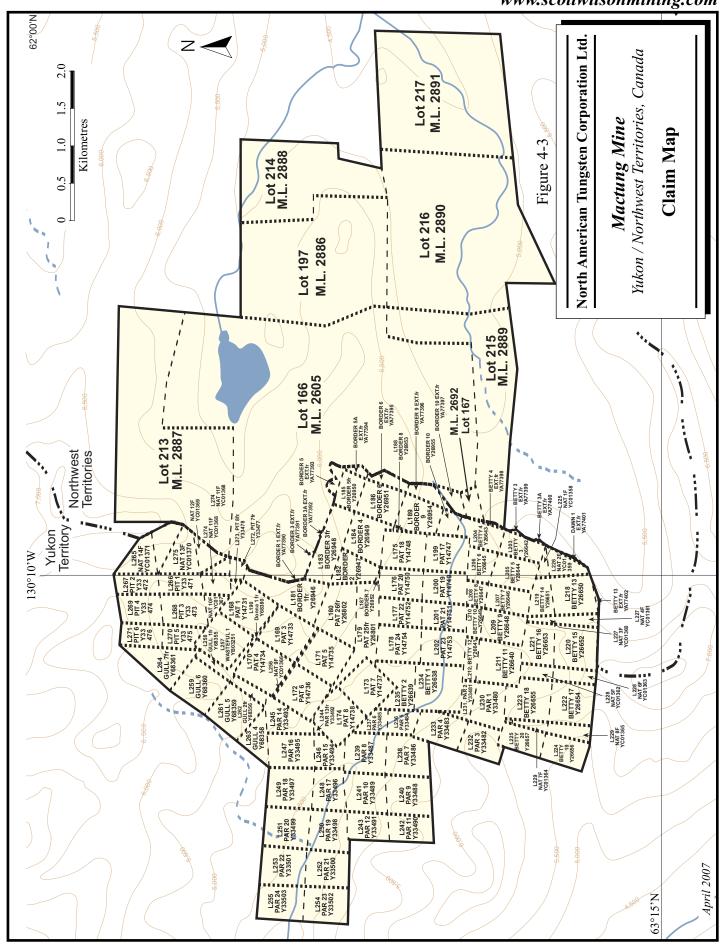
The Mactung property is located in the Selwyn Mountain Range and covers the area around Mt. Allan on the Yukon/Northwest Territories (NWT) border, approximately eight kilometres northwest of MacMillan Pass (Figure 4-1). The nearest settlement accessible by road, Ross River, is 250 km away to the southwest along the Canol Road, a drive that takes about six hours. A ferry at Ross River and the Canol Road are maintained by the Yukon Territorial Government in the summer only. The property is located at latitude 63°17'N and longitude 130°10'W, and the Cantung Mine is approximately 160 km to the south.

The Mactung property comprises 113 mineral claims and 38 mining leases in Yukon and eight mining leases in the NWT, with a total area of 4,541.6 ha, or 11,217.7 acres (Figure 4-2). Opinions on property title have been provided by NATCL's legal counsel, Fraser Milner Casgrain LLP (FMC 2007). FMC reports that all mineral claims and leases pertaining to the Mactung property are in good standing as at May 14, 2007.

In the 1970s, Amax had the then existing claims and leases surveyed by Underhill & Underhill (Now Underhill Geomatics) of Whitehorse. The Territorial border was surveyed by Paul S. Dixon C.L.S. in the period July 28 to August 5, 2003. The thirty-six Grind claims staked in 2005 using a handheld GPS unit have not been surveyed. The claims and leases, none of which are patented, are contiguous and cover a single block of ground that straddles the Yukon/NWT border. The Mactung mineral resource is located on mineral leases, mainly on the Yukon side of the border. All leases and claims belong to NATCL and royalties on production are payable to the Yukon and NWT Governments under their respective mining legislation. There was also a royalty of 4% payable to Aur Resources Inc. (Aur), which the Company may reduce to 1% by payments to Aur of \$100,000 on September 30, 2005 (paid in September 2005) and \$1,000,000 by the earlier of March 30, 2015, or 60 days after the receipt of a water licence issued in connection with any proposed mineral production on the property. If the Company has not exercised the option by March 30, 2010, it must pay an additional \$200,000 to Aur on or before this

date to extend the option. The option to buy down the royalty will terminate if the NATCL misses any of the option payments to Aur.





# 5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

#### **ACCESSIBILITY**

The Mactung property is accessible from Ross River, a settlement 250 km southwest along the Canol Road. This road is maintained by the Yukon Territorial Government as far as the NWT border in the summer only, and is only accessible while the ferry at Ross River is in operation. The short section of the Canol Road in the NWT between the border and the mine access road is not maintained and is in poor driving condition. The 11 km long access road from the Canol Road to the property itself is currently in fair driving condition.

There are two airstrips locally, one near Tom Creek at MacMillan Pass, which is maintained by the Yukon Territorial Government and can accommodate light aircraft, and another at Tsichu River, the condition of which is not known but probably poor. There is a site near the start of the mine access road in the NWT where a 2,000 m airstrip could be constructed to service the property.

#### CLIMATE

The area has a continental climate modified by the mountain setting. The Tsichu River meteorological station was operated by Amax with assistance from the Atmospheric Environment Service from October 1974 to August 1982 (Kershaw and Kershaw 1983). The mean annual temperature for this period was -7.7°C, with a mean monthly minimum ranging from -30°C in December and January up to about +4°C in July. For the same periods the average monthly maximum temperature varied from -18°C to +15°C. Temperature extremes for the Mactung property range from -42°C to 24°C, with a mean of -8.5°C. The average annual precipitation is 490 mm and snowfall 294 cm. Midwinter snow pack varies from thin discontinuous on windswept sites to greater than 2 m in drifted areas. Frosts occur in all the growing season months, but

mean daily temperatures are above freezing from late May to mid-September. Winds are most commonly from the west.

#### **INFRASTRUCTURE**

The infrastructure is represented by an adit and associated underground workings that were driven into the Lower Zone (2B) ore horizon in 1973. They are located on the Yukon side of the border at an elevation of 1,900 m. A small dump of waste rock with a small amount of ore exists near the adit entrance. There is also a core shack and two Atco trailers

#### **PHYSIOGRAPHY**

The topography is rugged and the area has been glaciated. Landforms include small glacier remnants, rock glaciers, glaciated surfaces, moraines and fluvio-glacial deposits (Kershaw 1976). Rock talus slopes are common especially on Mount Allan. The valleys on the Yukon side of the border are locally relatively narrow and steep sided, while those on the NWT side are broader and have shallower gradients. The valley floor lies at an elevation of about 1,400 m, while the peak of Mount Allan is at 2,200 m.

The region is above the tree line and can be classified as arctic/alpine tundra. The vegetation is better developed in valleys and is limited mainly to grasses, small shrubs, moss and lichen (Kershaw and Kershaw 1983). Mountains, especially at higher elevations, are extensively covered with talus and intermittently with grasses, moss, and lichen.

The predominant wildlife species in the area are moose, caribou, grizzly bears, wolves and Dall's sheep, with smaller mammals such as voles, lemmings, chipmunks, shrews, ground squirrels, hares and foxes. Over 50 species of birds have been reported in the Mactung area, with 40 species using the area for breeding purposes. No fish were discovered by surveys in 2005, but some were identified in earlier surveys by Amax.

# **6 HISTORY**

The Mactung deposit was discovered in 1962 by James Allan, an Amax geologist, probably as a result of follow-up prospecting to a regional stream sediment survey carried out as part of the Ogilvy Reconnaissance Project (Allan 1963). The deposit was originally known as MacMillan Pass Tungsten and then as MacMillan Tungsten before it became known as Mactung.

During the years 1963 to 1967, Amax completed geological mapping, rock geochemical sampling, magnetometer surveying, and grid geochemical soil sampling on the property. The five surface diamond drill holes completed in 1968 (1,513 m) were followed by 11 km of access road construction from the Canol Road to the property in 1970, and an additional twenty-one surface diamond drill holes (2,313 m) in 1971 and forty-eight holes (6,956 m) in 1972. In 1973, an adit was collared at the 1,890 m elevation and 726 m of lateral development and 27 m of raising were completed in the Lower Zone. A 295 tonne bulk sample was excavated and shipped to an Amax facility in Colorado for metallurgical testing. Every second round taken in the adit was crushed and then sampled using a Jones Riffle (tower sampler?). A total of forty-three underground holes (1,653 m) were drilled from the adit to better define the mineralization in the Lower Zone, stratigraphically known as the "2B" horizon (see Appendix 1). Further surface diamond drilling was done in 1979 (Table 6-1), and another 49 m of underground development was done in 1979, with nine 45-gallon barrels of mineralized skarn blasted for metallurgical test purposes. The last surface drilling conducted by Amax was in 1980. Ongoing environmental and feasibility studies, including an examination of local flora and fauna, archaeology, geomorphology, air quality, water quality and soil studies that commenced in the early 1970s, continued until 1985, when falling tungsten prices caused work on the project to stop.

Nearly all the diamond drill core was relogged during the period 1982 to 1985. This work was undertaken by D. Atkinson (1982, 1983); D. Baker (1982); J. MacMillan (1984, 1985); J. Mustard (1985) and L. Erdman (1985). As most drill holes have been

logged on several different occasions at differing levels of detail, it will be a challenge to summarize the information to produce a single diamond drill hole record for each drill hole. The drill core that remains, which is no longer a complete record of the drilling because it has been extensively sampled and resampled, is stored at the Cantung Mine.

Amax sold the Mactung property to Canada Tungsten Mining Corporation (CTMC) in 1986 as part of a larger sale that also included the Cantung mine. CTMC merged with Canamax Resources and Minerex Resources in 1993, to become Canada Tungsten Inc. In August 1994, Aur Resources Inc. (Aur) purchased a 48% interest in Canada Tungsten Inc. and subsequently, in January 1997, the two companies merged. In October 1997, the property, along with the Cantung Mine and other Aur assets, was sold to NATCL, the present owner.

In 2005, NATCL drilled 25 surface diamond drill holes (6,639 m) to better define the west end of the deposit and to upgrade the resource classification of some mineral resource blocks from the "Inferred" to "Indicated" category. Also one old drill hole was "twinned". The adit was rehabilitated and a bulk sample of 79 tonnes in size taken for metallurgical test purposes.

During 2005 and 2006, EBA Engineering Consultants Ltd. (EBA Consultants) restarted environmental studies partly to confirm previous work done by Amax, and partly to prepare for new environmental and mining permit applications. This work is ongoing.

# TABLE 6-1 MACTUNG DEPOSIT HISTORY OF EXPLORATION AND DEVELOPMENT

#### North America Tungsten Corporation Ltd. – Mactung Project

Year	Works	Company
1962	During work on the Selwyn Project, James Allan, a geologist working for Amax, discovered and staked the Mactung Deposit.	Amax
1963	Geological mapping and surface sampling	
1964	Geological mapping and surface sampling	
1967	Geological mapping and surface sampling	
1968	1,513 m in 5 surface diamond drill holes	Cameron M <sup>c</sup> Cutcheon Diamond Drilling
1969	Canol road reopened from Ross River to MacMillan Pass	Diamond Dilling
1970	Construction of 11 km access road to property	
1971	2,313 m surface diamond drilling in 21 holes	Canadian Mine Services
1972	6,956 m surface diamond drilling in 48 drill holes	Canadian Mine Services
1973	Excavated 9 m adit	Cameron M <sup>c</sup> Mynn Ltd.
	747 m lateral development underground and 27m of raising	Cameron M <sup>c</sup> Mynn Ltd.
	Every second round in skarn crushed in gravel plant and sampled using a Jones Riffle	
	300 ton bulk sample sent to Colorado	
	1,653 m underground diamond drilling in 48 drill holes	Canadian Mine Services
	Reserve estimate 44,517,000 tons	Amax Northwest Mining Co. Ltd.
1979	1,113 m surface diamond drilling in 7 holes.	Canadian Mina Caminas (2)
1980	668 m underground diamond drilling in 8 holes 2,305 m surface diamond drilling in 10 holes.	Canadian Mine Services (?) Amity Diamond Drilling
1981	Capital costs, scheduling, project design	Wright Engineers Ltd.
1982	Geological mapping and relogging of diamond drill core	Amax Northwest Mining Co. Ltd.
	Surface bulk samples Units 3D, 3E and 3F	
	Ore Reserve Study for the Mactung Project	Strathcona Mineral Services
	Initial Environmental Evaluation	Amax Northwest Mining Co. Ltd.
1983	Relogging diamond drill core	Amax Northwest Mining Co.
1000	rtologging diamond dim core	Ltd
	Adit reopened and two bulk samples totalling 720 tons taken	Redpath Ltd.
1984	Relogging diamond drill core	Amax Northwest Mining Co.
	Macture Project Scene Book values 1, 2, and 2	Ltd.
	Mactung Project Scope Book, volumes 1, 2, and 3	Amax Northwest Mining Co. Ltd.
1985	Canada Tungsten Mining Co. Ltd. purchased the Mactung	
	deposit from Amax	
1993	Canada Tungsten Inc. becomes the owner of the property	
1004	through company mergers	
1994 1997	Aur Resources purchases the property North American Tungsten Co. Ltd. purchased the Mactung	
1007	deposit from Aur Resources	
2005	6,639 m surface diamond drilling in 25 holes	DJ Diamond Drilling for North American Tungsten
	Environmental studies resumed	EBA Engineering
2006	Ongoing environmental studies	EBA Engineering
2007	NI 43-101 compliant resource estimate	Scott Wilson RPA
	Scoping study started	Strathcona Mineral Services

#### HISTORICAL MINERAL RESOURCE ESTIMATES

The historic mineral resource estimates referred to in the table below predate current NI 43-101 regulations and do not comply with current requirements as set out in CIM Definition Standards on Mineral Resources and Mineral Reserves. The terms "resources", "measured", "indicated", and "inferred" used in the original documents should not be construed to infer compliance with present CIM classifications and current NI 43-101 regulations.

TABLE 6-2 HISTORICAL MINERAL RESOURCE ESTIMATES
North American Tungsten Corporation Ltd. – Mactung Property

Measured & Indicated		Inferred		Total		Comments
Tons	%WO₃	Tons	%WO₃	Tons	%WO₃	
31,917,000	0.96	12,600,000	0.94	44,517,000	0.95	P.Cain, F.Harris, W.Lodder,
						Amax Exploration1973
31,917,000	0.96	31,000,000	0.92	62,917,000	0.94	R.Steininger, Climax Mine
						Evaluation Group, 1976
36,091,000	0.95	27,181,000	0.95	63,272,000	0.95	R.Steininger, Climax Mine
						Evaluation Group, 1979
9,369,800	1.17	22,400,300	0.93	31,769,100	1.00	R.Steininger, Climax Mine
						Evaluation Group, 1980
16,159,000	1.01	13,785,000	0.84	29,944,000	0.93	Strathcona Mineral
						Services, 1982
-	-	-	-	22,055,700	0.80	A.Noble 1982
-	-	-	-	31,991,700	0.92	Atkinson & McNeil (?), 1983
-	-	-	-	31,991,700	0.92	Amax Scoping report 1984
						"Geologic"
-	-	-	-	25,351,700	0.88	Amax Scoping report 1984
						"Mineable"
13,669,000	0.95	-	-	13,669,000	0.95	Roscoe Postle Associates
						Inc. 2001. "Mineable"

Note. Mineral resource estimates are not NI 43-101 compliant.

These estimates, which, except for the Roscoe Postle Associates Inc. (RPA) estimate, are summarized by Atkinson and McNeil (1983), were made from 1973 to 2001 using a cut-off grade of 0.4% WO<sub>3</sub> and minimum mining widths from 3.0 m to 4.5 m (10 ft. to 15 ft.). The Mineral Resource estimated by Strathcona (1982) forms the basis for the potentially mineable reserves reported in the Mactung Project Scope Book (1984).

In its 2001 detailed review, RPA used the Strathcona resource classifications to estimate the amount of proven and probable reserves and noted that, since the Mactung deposit had not yet been demonstrated to be economic, the potential reserves should be

classified as Measured and Indicated Resources. These resources, along with some prior estimates, are listed in Table 6-2 above. The Strathcona report also included an additional Inferred Resource of 13,785,000 t grading 0.94% WO<sub>3</sub> which is not compliant with the CIM classifications. Part of the objective for the surface drilling carried out in the summer of 2005 was to upgrade that part of these "inferred reserves" lying at the west end of the deposit to indicated resources. The drill results from this work are included in the updated mineral resource described in this report.

# 7 GEOLOGICAL SETTING

#### **REGIONAL GEOLOGY**

The Mactung deposit is located in the eastern Selwyn Basin, an outer miogeoclinal basin that formed on the then western margin of the North American continent. Selwyn Basin refers to a region of deep-water, off shelf sedimentation that persisted from late Precambrian to Middle Devonian time (Gordey and Anderson 1993). The dominantly thin-bedded siliciclastic rocks (shale, chert, and basinal limestone) grade to the northeast into the thick-bedded carbonate sediments of the variably subsiding Mackenzie Platform. Local stratigraphy of importance may include the Late Cambrian to Early-Middle Ordovician Gull Lake Formation (dolomitic siltstone and mudstone, slate, limestone conglomerate) and Rabbitkettle Formation (basinal silty limestone) and the Ordovician to Lower Devonian Road River Group which includes the Duo Lake Formation (black graptolitic shale, laminated chert, and minor limestone) and the overlying Steel Formation (pyritic, locally wispy laminated, siliceous, locally dolomitic mudstone to siltstone). Facies-changes between deep-water clastic rocks (shale basin) and shallow water carbonate rocks (platform) are transitional.

Mid-Devonian rifting and/or wrench faulting resulted in a regional marine transgression that abruptly terminated the Selwyn Basin phase of passive margin sedimentation. An influx of marine, turbiditic, chert-rich clastic rocks (Earn Group) spread to the south and east from an uplifted source in northern Yukon and to the east from uplifted western portions of Selwyn Basin. These clastics rocks, locally accompanied by mafic and less abundant felsic volcanism, blanketed all previous facies, covering Selwyn Basin sediments and onlapping onto the western Mackenzie platform. The Selwyn Basin, as a distinct topographic entity, no longer existed.

In Jurassic and Early Cretaceous time, the miogeocline was deformed by northeastdirected compression caused by plate convergence and the accretion of pericratonic terranes onto North America. The rocks of Selwyn Basin, relatively incompetent when compared to the carbonate rocks of the platforms, responded by thrust faulting and the development of open to tight similar folds. Structural trends generally parallel the arcuate Paleozoic shale-carbonate facies boundary.

Widespread Early to Late Cretaceous granitic magmatism intruded the deformed rocks of the miogeocline. Five main intrusive suites are recognized, one of which, the Tungsten (97 Ma - 92 Ma), is responsible for a string of tungsten skarn deposits along the eastern flank of the former Selwyn Basin.

#### **LOCAL GEOLOGY**

The rocks in the Mactung area are part of the west-trending Macmillan Fold Belt, which is discordant to the regional northwest structural grain. This fold belt is interpreted to reflect a deep-seated Devonian fault zone that localized facies changes within the Earn Group and also responded differently to Mesozoic deformation. Folding is tight and a narrow imbricate fault zone of southerly directed east-west trending thrust faults repeats Lower Cambrian to Devonian stratigraphy. South of the imbricate belt, open to closed folds and steep faults are the dominant structures.

Stratigraphy in the general area of Mactung trends generally E-W and dips from 10° to 40° to the south. The axes of large folds also trend E-W and may have a shallow westerly plunge. Several ages of high-angle normal faulting, of various orientations, are known in the area. Strong slaty to fracture cleavage can be developed. At least in the Paleozoic rocks, the grade of regional metamorphism is very low. The area has been glaciated.

Mactung is the most northerly of a group of W-Cu (Zn) skarn deposits strung out in a 200 km long, northwesterly trending belt which roughly follows the NWT-Yukon boundary. The Cantung deposit is about 160 km to the southeast of Mactung. These deposits are localized within thermal aureoles, typically above the altered apical zones of a suite of Late Cretaceous quart-monzonite stocks. At Mactung, the apparently related

intrusive has been referred to variously as the Cirque Lake stock (Harris 1977) or the Mactung pluton (Anderson 1982, 1983).

### **PROPERTY GEOLOGY**

The property geology has been described by Dick and Hodgson (1982), Harris and Godfrey (1975), and Atkinson and Baker (1979).

The Mactung mineralization occurs within a bedded sequence of altered limestones, shales and siltstones of Cambrian to Silurian age up to 230 m in thickness. The deposit consists of scheelite-bearing skarns developed near the south contact of a granite intrusion, the Cirque Lake stock. The main outcrop occurs in the NWT along a steep northerly sloping cliff on the north side of Mount Allan. The watershed at the top of the cliff marks the border between the Yukon and the NWT in this region. The main sedimentary sequence dips at low angles to the south. The deposit comprises an Upper and a Lower Skarn Zone, with associated calcareous and pelitic sediments and their metamorphic equivalents, separated by 100 m of pelitic sediments, now largely metamorphosed to hornfels. The hornfels is a light to dark brown or black and represents metamorphosed shales and siltstones with various amounts of muscovite, biotite and graphite. Numerous thin veinlets of quartz or quartz carbonate containing pyrite, pyrrhotite, scheelite, and molybdenite cut the unit.

A stratigraphic sequence has been established on the property, with nine mappable units distinguished and designated from oldest to youngest numerically I, 2B, 3C, 3D, 3E, 3F, 3G, 3H, and 4 (Figures 7-1 and 7-2). The following descriptions are taken from Atkinson and Baker (1979).

Unit 1, the lowermost unit exposed on the property, is a heterogeneous brown to grey, thinly to moderately bedded clastic unit composed of interbedded mudstone, shale, siltstone and greywacke. The unit is considered to be of lowermost Cambrian age,

however, confirmation of this age must await more definitive work on the Hadrynian -Cambrian contact.

Unit 2B, host to the Lower ore zone, is highly variable in thickness and composition. The unit is characterized by the presence of limestone slump breccias which appear to have formed as a series of coalescing debris fans at this stratigraphic level. The unit has been correlated with the Lower Cambrian Sekwi Formation. In outcrops on the North Face of Mount Allen, 20 m of dominantly well-bedded, fine-grained limestones and clastics with interbedded slump breccias are interpreted to represent the upslope extension of 35 m of chaotic, medium to light grey limestone slump breccia exposed in underground workings. Down dip, these slump breccias abruptly thin and fragment size decreases as the slumps grade into a few centimetres of calcareous pelite as seen in southern drill holes. South of these drill intersections, additional slump breccias also outcrop. Slumps are chiefly lime or locally mud hosted. Fragments include: limestone clasts, which may be fossiliferous containing Archaeocyathids, well-bedded or breccias; calcareous pisolites and ooids; phosphatic nodules; and various siliciclastic rocks including fragments of Unit 1. Clasts are generally elongate and range from a few millimetres up to 10 m in diameter. Slumps rest locally with erosional unconformity on Unit 1, although, in southern drill intersections, the calcareous pelites of Unit 2B appear to conformably overlie shales of Unit 1.

Unit 3C is in gradational contact with Unit 2B. It consists of 100 m of black, pyritic, carbonaceous, fine-grained clastic rocks and rare thin limestone beds. Numerous elongate clasts of mudstone, shale, siltstone, and collophane occur as separate distinct clasts, as intraformational conglomerates, and as boudinaged beds presumably disrupted by soft sediment deformation. This unit separates the Lower and Upper ore zones. Siliceous sponge spicules found in Unit 3C have been identified as Protospongia of broad Early to Middle Cambrian age.

Unit 3D consists of 20 m of repetitively intercalated 2 cm to 1 m thick beds of calcic and phosphatic limestone slump breccias, mudstone, shale and siltstone that conformably

overlie Unit 3C. Slump breccias contrast with Unit 2B in that the breccia beds are characteristically thin and contain smaller, compositionally less variable, well sorted and bedded fragments. Fragments include limestone clasts, black phosphatic nodules, and siliciclastic rocks. Metasomatized calcic limestones within Unit 3D form the basal unit of the Upper ore zone.

Unit 3E is in gradational contact with Unit 3D, as slump breccias die out and the sequence becomes dominantly pelitic. The unit consists of 60 m of finely interbanded black to brown mudstones, shales, and siltstones, with limestone beds scattered throughout. The central portion of Unit 3E, with up to 20% limestone beds, hosts the middle part of the Upper ore zone.

Unit 3F is similar to Unit 3E, consisting of 30 m of intercalated compositionally distinct layers commonly less than 10 cm in thickness. The central part of Unit 3F contains up to 35% limestone beds which are host to the upper part of the Upper ore zone.

Unit 3G, a 20 m thick cliff forming unit of light coloured talc-tremolite dolomite with thin shale interbeds, conformably caps the Upper ore zone.

Unit 3H consists of 90 m of black, carbonaceous, pyritic, fissile shale which is characterized by strong limonite staining on surface exposures.

Unit 4 consists of at least 50 m of black, carbonaceous, fossiliferous flagstones and shale. Abundant graptolite fossils include late Ordovician species (all the above from Atkinson and Baker 1979).

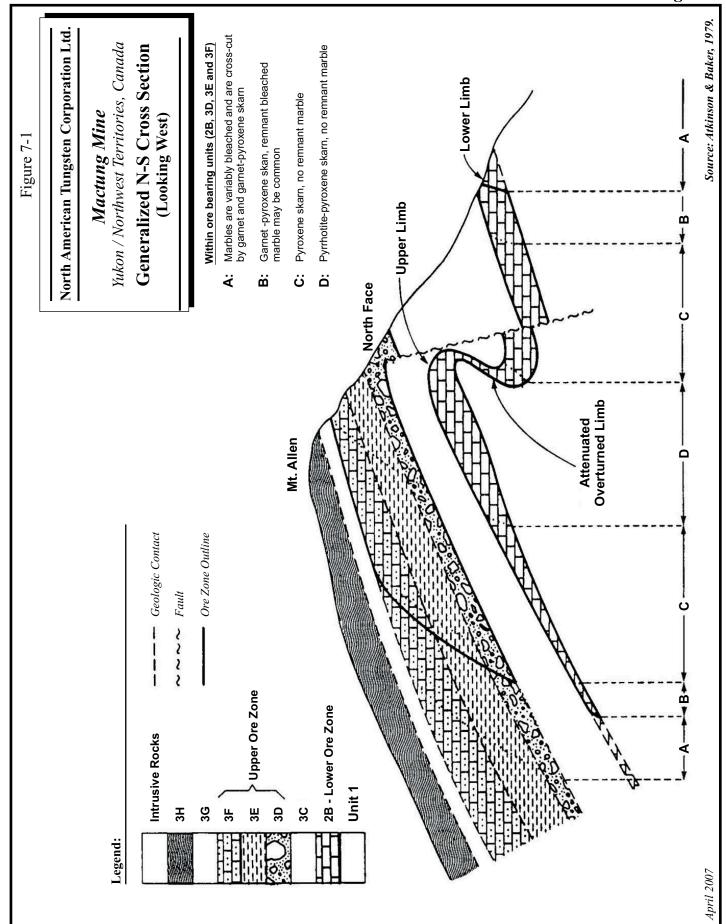
The Lower zone, while dipping in the same general direction as the Upper zone, contains a "Z" fold (viewed down plunge to the west), with an amplitude of about 90 m. It has been suggested that in fact the fold is a fault, as there is significant fault material associated with it. The Lower zone unconformably overlies the phyllite unit which

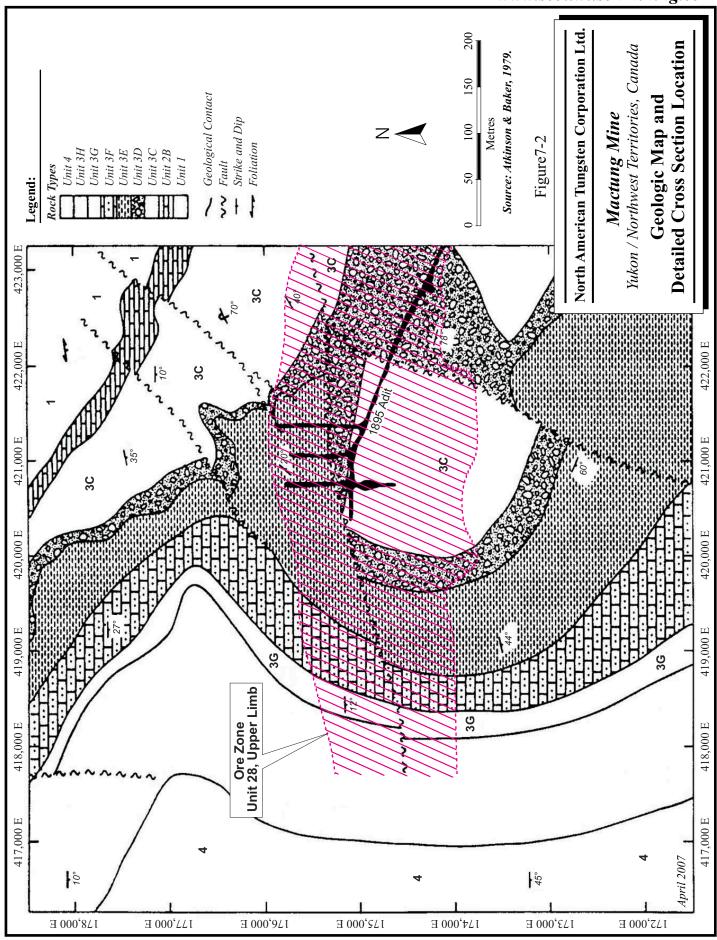
comprises a substantial thickness of folded schistose micaceous phyllite of Cambrian age. This rock forms the local base of the geological succession.

The entire sequence is overthrust to the north, producing a recumbent isoclinal fold with an axis that plunges at a shallow angle (about 16°) to the west in the west, and at a shallow angle to the east at the eastern end of the deposit. This gives the upper limb of the 2B horizon a slightly domed appearance.

The Cirque Lake quartz monzonite stock cuts across the skarn succession on the north face of Mount Allan, penetrating the succession in large apophyses, dikes, and sills. Samples taken from the granite are reported to contain from 4 ppm to 20 ppm tungsten, and variable amounts of molybdenum, beryllium, and tin.

The deposit is cut and offset by numerous steeply dipping northerly trending faults. Some of the faults have displacements of up to 30 m or more, as interpreted by Strathcona (1982), and up to 45 m as recorded in the Mactung Project Scope Book (1984). The faults are generally characterized by up to one metre of clay and sand gouge, with breccia zones of quartz, calcite, and ice-filled pore space.





# **8 DEPOSIT TYPES**

The ore genesis at Mactung is characterized as a contact metasomatic skarn formed by magmatic hydrothermal fluids originating from a Cretaceous granitic stock. The fluids migrated via channel ways to react with permeable limestone strata of Lower Palaeozoic age depositing scheelite mineralization.

# 9 MINERALIZATION

The mineralogy of the Mactung deposit was described in detail by Dick and Hodgson (1982) and the alteration facies by the Mactung Project Scope Book (1984).

The skarns associated with the metamorphosed limestone units may be divided into two main facies: garnet-pyroxene and pyroxene-pyrrhotite. Scheelite occurs predominantly with pyrrhotite in the pyroxene-pyrrhotite facies. In this facies, the scheelite content increases and grain size decreases with pyrrhotite content. Minor scheelite also occurs in the garnet facies, and is coarser grained than that of the pyrrhotite facies.

Scheelite occurs in five separate skarn horizons formed from lime rich layers in a 300m thick sequence of Lower Cambrian metasediments that lie near the margin of a Cretaceous stock. Locally, the rocks include phyllite (Unit 1), fragmental limestone (Unit 2B), hornfels (Unit 3C), calc silicate and pyrrhotite skarns, limestone, phosphatic limestone (Units 3D, 3E, 3F) and black shale (Unit 4).

Pyrite is widely disseminated in some of the phyllite layers of the lower unit, with galena and sphalerite occurring in small quartz veinlets. Scheelite is the economic mineral of interest at Mactung, with wolframite reported only occasionally in biotite skarn. Chalcopyrite is main base metal found in the deposit, but the grade of 0.2% Cu is probably too low for commercial exploitation.

The Upper Skarn unit, which is approximately 30 m thick, is composed of interbedded shale and white limestone that is often phosphatic because it contains fine grained apatite. Scheelite and pyrrhotite occur in veins, fractures, and disseminations. The limestone is generally recrystallized to white marble and varieties of skarn variably described as greenish, fine-grained diopside-hedenbergite, with local red-brown garnet with various amounts of pyrrhotite. Tremolitic amphibole and biotite-rich skarns are described as occurring in patches, derived from pyroxene skarn. The retrograde skarns

are enriched in scheelite compared to the disseminated forms found elsewhere. An argillite, siltstone and hornfels unit of indeterminate thickness, containing interbedded limestone and marble, overlies the Upper Skarn and outcrops mainly to the west of the deposit.

The main hornfels unit, which separates the Upper and Lower Skarn Zones, is approximately 100 m thick. The hornfels is a light to dark brown or black and represents metamorphosed shales and siltstones with various amounts of muscovite, biotite and graphite. Numerous thin veinlets of quartz or quartz carbonate cut the unit, containing pyrite, pyrrhotite, scheelite, and molybdenite.

The close spatial association with the tungsten deposit, the presence of abundant accessory garnet and quartz-tourmaline veins within the Cirque Lake stock led previous workers to suggest that hydrothermal fluids originated from this stock. However, Atkinson and Baker (1979) state that this simple interpretation was not compatible with critical geological observations, notably that no ore is developed in contact with the stock. They concluded that the Mactung deposit is only coincidentally located near the contact with the Cirque Lake stock and that the source of mineralizing fluids is probably a blind stock located immediately south of Mactung. Support for this theory is found in the work of Selby et al. (2003) who indicate that the U-Pb and Re-Os age data suggest that the exposed Mactung (Cirque Lake) stock is not the source of the ore-fluid for the tungsten skarns and that the progenitor pluton for the ore-fluid is unknown.

# **10 EXPLORATION**

Between 1962, when the Mactung deposit was discovered and staked, and 1985, a total of about 26 million dollars was spent by Amax on exploration and development, and a further 1.6 million was spent by NATCL in 2005.

Geological mapping, geochemical sampling, and magnetometer surveys were carried out in 1963, 1964, and 1967. The deposit gave rise to patchy magnetic readings. Surface diamond drill programs followed in 1968, 1971 and 1972, and an adit into the Lower Zone (2B) and an underground drill programme (43 drill holes totalling 1,653 m) were completed in 1973. During the years 1974 to 1978, Amax changed their emphasis away from geology to environmental, metallurgical, and engineering studies. In 1979, the adit was reopened and more bulk samples of the mineralization taken for metallurgical testing. Another eight holes (668 m) were drilled from the underground workings, and another seven holes (1,113 m) on surface. The year 1980 saw another ten surface holes completed (2,305 m). From 1982 to 1985, drill core was relogged, and extensive environmental and engineering studies completed, culminating in the Initial Environmental Evaluation in 1983 (International Environmental Consultants 1983) and the Mactung Project Scope Book (1984). The property was dormant from 1985 until 2005, when DJ Drilling of Watson Lake, under contract to North American Tungsten, carried out a 25 hole (6,639 m) surface diamond drilling programme on the west and deeper end of the deposit. At the same time, the adit was reopened and a metallurgical test bulk sample of approximately 79 tonnes blasted by Mainstreet Mining of Whitehorse. This sample is being held for possible future testing. Environmental and permitting studies started the same year by EBA Engineering are ongoing.

# 11 DRILLING

Between 1968 and 2005, a total of 169 surface and underground diamond drill holes, with an aggregate depth of 23,158 m, were completed on the property. Fifty-one of these holes (7,614 m) were drilled underground from the adit. Strathcona states that 93 of the Amax surface drill hole collars were surveyed, as well as 11 of the 51 underground drill holes (Strathcona 1982). The remaining underground hole locations were determined from the underground development survey performed in 1980 and the original diamond drill log. Four surface holes drilled in 1980 were for testing of the mill site and tailings impoundment areas. All of the 2005 drill collars were surveyed by Underhill Geomatics of Whitehorse using a differential GPS system. In 1981 and 1982, the project site was resurveyed and the local mine grid, which exists in both imperial and metric forms, was reconciled to the UTM NAD27 grid. This work was updated in 2005 by Underhill Geomatics of Whitehorse who converted the NAD 27 collars to a NAD 83 datum that is currently in use.

Most of the drill holes that intersected the deposit were collared on the south facing slopes of Mount Allan, and drilled at an angle of about seventy degrees to the north, which is approximately perpendicular to the dip of the sedimentary bedding in most of the deposit. In the earlier drilling north-south drill hole section lines were spaced at intervals of 30 m (100 ft.), but this was increased to 60 m (200 ft.) in 2005 owing to the good continuity of the mineralization along strike from east to west. Holes were generally placed from 40 m to 60 m apart up and down the dip of the mineralized horizons. The closer spacing was indicated because there was more variability of both tungsten grade and of thickness of mineralization in this direction.

# 12 SAMPLING METHOD AND APPROACH

#### 1968-1983

In plan, the Mactung deposit extends approximately 700 m from east to west with a maximum width of about 500 m from north to south. Nearly all of the diamond drilling in the current computerized diamond drill hole database is within this area. The original drilling by Amax from 1968 to 1980 was done on an imperial grid that had north-south drill section lines at 30 m (100 ft.) intervals, with holes generally spaced along the lines at 30 m to 60 m intervals. Drill core sample lengths were routinely 1.5 m (5 ft.), but varied from 0.3 m to 3.05 m with very minor exceptions.

The drill core and samples have not been examined by Scott Wilson RPA, however, sample data in the form of drill logs, assay sheets, and the computerized diamond drill hole database have been reviewed and used in the current resource estimate.

#### 2005

The 2005 drilling program was designed to test the Lower Zone (2B) at the west end of the deposit where it was open on strike to the west. All holes also incidentally intersected the Upper Zone. The objective was to upgrade a large block of mineralization designated as "inferred reserves" by Strathcona, to the Indicated Resource category, and extend the known mineralization as far to the west as possible.

The NQ size core recovered by the drillers was logged for geology and core recovery, and RQD measurements made. Recoveries were at, or close to, 100% for the most part. The core was also examined with a short wavelength ultraviolet lamp, which causes any scheelite on the surface of the drill core to fluoresce a bright bluish white, and visual estimates of the scheelite content made. These estimates were typically overstated, but did provide a relative estimate of the grade that could be used as a check against the final assay results.

Because of the good continuity of the mineralization along strike from east to west, holes were drilled on north-south section lines that were 60 m apart on a grid. This was done by extending the existing Amax grid to the west. Holes were placed at 40 m to 60 m intervals up and down the dip of the mineralized horizons, because there was more variability of both tungsten grade and thickness of mineralization in this direction, which justified the closer interval. Hole dips and bearings were measured with a "Flexit" down hole magnetic survey instrument, but only the dip was used, because the effects of any local pyrrhotite, some of which is magnetic, could not be predicted. Some acid tests were also done.

Surface diamond drill hole MS156 was collared beside old hole MT72071 and in the same direction and at the same dip. The width and grade encountered in the "2B" horizon by these two holes were very similar (35.3 m grading 1.55% WO<sub>3</sub> in hole MS156 and 32.0 m grading 1.66% WO<sub>3</sub> in hole MT72071).

#### **BULK SAMPLES**

A 300 ton underground bulk sampling was sent to Colorado for metallurgical test purposes in 1973 (Amax Exploration 1973). The average calculated grade of the 55 muck samples that were composited for this work was 1.66% WO<sub>3</sub>, while the average grade for all the muck samples in the bulk sampling area was 1.46% WO<sub>3</sub>. The averaged grade for a set of underground chip samples taken during the same summer was 1.62% WO<sub>3</sub>. Grades are higher than the average grades for the Lower Skarn unit because the underground development passed through a higher grade portion of it. Average calculated underground diamond drill hole grades were calculated by Strathcona to be highest closest to the walls of the adit at 1.73% WO<sub>3</sub> (Strathcona 1982). The average grade of the 28 channel samples taken in the adit in 2005 was also 1.73% WO<sub>3</sub>.

Metallurgical test bulk samples were taken from both surface and underground in 1979, and most recently a 79 tonne bulk sample was taken from underground in 2005. The grade and potential metallurgical recoveries of this last sample have not yet been determined.

# 13 SAMPLE PREPARATION, ANALYSES AND SECURITY

#### 1968-1980

Scott Wilson RPA has not reviewed the sampling procedures for the drill holes or bulk sampling. Based on the Strathcona report, however, no irregularities were found in the drilling or sampling procedures.

#### 2005

Diamond drill core selected for assaying was marked off in the core box using a red crayon, and a metal tag with the sample number inscribed on it, nailed to the core box at the start of the sample run. A pre-numbered paper sample tag was placed with it. A record of the sample "from" and "to" was made in the sample book on the appropriate sample ticket stub. This information was also recorded on the drill log along with the sample number and the recovered length of core, which was usually 100%. Diamond drill core, which was mainly sampled in lengths of 1.5 m, was split with a hydraulic core splitter set up in a room attached to the core storage shed on the Mactung property. Some core was split with a diamond saw. Once the sample was split, it was placed in a large polyethylene bag, which also had the sample number marked on it in black felt marker. This bag was then placed inside a second identical bag and the paper sample tag placed between the two bags, which were then sealed with a single plastic tie. The samples were transported in rice bags, each rice bag containing about five samples. The rice bags were sealed with a numbered plastic security tie and shipped by commercial carrier from Whitehorse or Watson Lake to Global Discovery Laboratories (Global Discovery) in Sample pulps were shipped by Global Discovery to ALS Chemex of Vancouver. Vancouver and Becquerel Laboratories of Toronto for further assaying. The assay methods used by these companies are given in Appendix 1.

#### **DUPLICATES**

All duplicate testing for Mactung was performed on splits from the same pulps used for the original assays. The duplicate program did not include analysis of separate splits from the core. Consequently, the results from the various check assay programs at Mactung are primarily a measure of laboratory precision and accuracy rather than sample variability and/or bias. Future programs should include analysis of separate splits of core to assess the variability in sampling. Check assays were performed by a number of laboratories over the years, including Bondar Clegg (Vancouver), Chemex (North Vancouver), Warnock Hersey (Vancouver), and Crest Laboratories (Vancouver).

Scott Wilson RPA reviewed analytical results and found that differences in the means for original and duplicate analytical results were statistically significant at a 95% confidence interval for two sets of paired original and check assays. In both cases the original assays were done at Amax's own laboratories, while the checks were performed at Chemex and Bondar Clegg respectively. A scatter chart of original versus duplicate samples for the largest data set (Chemex) is depicted in Figure 13-1, while Table 13-1 summarizes the results of *t* tests for paired duplicate samples from various labs, including the paired Amax/Chemex assays.

TABLE 13-1 DUPLICATE STATISTICS

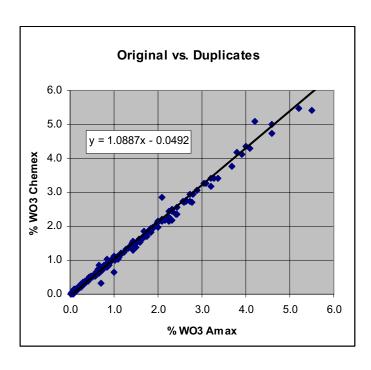
North American Tungsten – Mactung Project

		Duplicate							
	Amax Colour	Crest Colour Gravity	Chemex Colour	Bondar Clegg Colour	Amax Golden Colour	Becquerel Neutron Activation			
Original Lab	Warnock Hersey	Amax	Amax	Amax	Amax	GDL			
Original Method	Gravity	Colour	Colour	Colour	Colour	Fusion/ XRF.			
Observations	42	47	190	39	26	48			
Original % WO <sub>3</sub>	0.234	0.793	1.362	0.739	0.719	1.036			
Duplicate % WO <sub>3</sub>	0.249	0.766	1.434	0.682	0.765	1.026			
%Difference	6.3%	-3.5%	5.3%	-7.8%	6.3%	-1.0%			
t Statistic (T)	-0.955	1.481	-3.950	4.319	-0.975	0.704			
P(T<=t) 2-tail	34.5%	14.5%	0.0%	0.0%	33.9%	48.5%			
t Critical 2-tail	2.020	2.013	1.973	2.024	2.060	2.012			

Where the absolute value of the *t* statistic exceeds the critical value for a 5% level of significance, the difference is said to be statistically significant at that level (i.e., there is at least a 95% probability that the difference is significant). Those with high *t* statistics indicate a higher probability of statistically different means.

While the analysis indicated that differences in means are statistically significant at a 5% level of significance for two sets of paired data, the magnitude of the difference for the largest data set (Chemex colour) is only 5.3%. It is probable that some laboratory bias exists in both the Chemex and Bondar Clegg colour assays when compared to the original Amax assays, although the bias is in opposite directions. Irrespective of the potential for bias, the differences are not large and, in Scott Wilson RPA's opinion, not material to the mineral resource estimates contained in this report. In the 2005 duplicate program (Becquerel), the difference between the means of the original and check assays is only 1%.

FIGURE 13-1 SCATTER CHART OF ORIGINAL VERSUS DUPLICATE SAMPLES FOR AMAX/CHEMEX WO<sub>3</sub> ASSAYS



# **14 DATA VERIFICATION**

#### 2005 DATA VERIFICATION

On August 19, 2005, R.B. Cook visited the Mactung property. Andy Hureau provided an overview of the property geology and showed the writer cores of four drill holes from the surface drill program then in progress. Under Cook's direction, the half core from three previously sawn samples was quarter sawn. These samples were bagged, tagged, and sealed in a larger plastic bag by Cook and they remained in his possession for the trip back to Toronto. The bag of samples was dispatched by courier to the SGS laboratory in Don Mills. Analysis for tungsten by ICP and Au by fire assay/flame AA finish was requested and the results are listed in Table 14-1.

SGS is accredited to the ISO17025 Standard by Certificate number 456. The analytical procedures used by SGS are outlined in Appendix 1.

TABLE 14-1 ASSAYS OF QUARTER SAWN DRILL CORE, DDH MS-157
North American Tungsten Corporation Ltd. – Mactung Property

DDH	Sample Location	Sample Number	Sample Description	SGS A	Assay WO₃,%	Original Mactung Assay WO₃, %
MS-157	215.7 m – 216.6 m	70962	Sawn core	51	5.27	4.34
MS-157	218.8 m – 220.5 m	70963	Sawn core	10	8.57	6.27
MS-157	222.4 m – 223.9 m	70964	Sawn core	25	4.71	3.24
	Duplicate	70962		51	5.43	

Clearly there is a significant amount of tungsten in the material sampled. The difference between the original assays and the SGS assay values could easily be explained by the very coarse nature of the mineralization. The mineralization assayed should not be taken as representative of the grade of the mineralized zones.

#### SCOTT WILSON RPA DATA VERIFICATION

Assay data provided to Scott Wilson RPA was in the form of Excel<sup>TM</sup> spreadsheets. Scott Wilson RPA independently verified a portion of the database by randomly selecting a hole on each drill section and comparing the WO<sub>3</sub> values in the provided data with the assay certificates and/or assay sheets from the various labs. Data from the 2005 drilling program was compared against Excel<sup>TM</sup> spreadsheets provided by the labs while data from earlier drilling programs was verified by using scanned handwritten or typed assay sheets. Much of the scanned data did not identify the lab. In total, assay results for the mineralized portions of 31 holes drilled within the four interpreted zones were verified.

Other than a small transcription error in one interval, no errors were found in the data, however, the data needs to be better organized and consolidated. The database originally provided to Scott Wilson RPA did not contain the check assays and survey information was not well organized. Collar locations and azimuths were reported on a number of different grids and a few discrepancies were present in the initial data provided. The files containing the assay certificates were not labelled logically and Scott Wilson RPA did not receive some of the certificates until after the data verification exercise was complete. Consequently, some sequences of data could not be verified from the original certificates. While not material to the mineral resource estimates contained in this report, it is recommended that these deficiencies be addressed forthwith. The use of database management software such as Access<sup>TM</sup> should be considered.

# **15 ADJACENT PROPERTIES**

There are no adjacent mineral properties to the Mactung deposit. Approximately 8 km to the southeast, near MacMillan Pass, there are two Sedex Zn-Pb prospects, the Tom and Jason.

# 16 MINERAL PROCESSING AND METALLURGICAL TESTING

Previous metallurgical test work indicates that the Mactung mineralization can be processed to produce marketable concentrates, using conventional flotation and gravity separation techniques, similar to the Cantung mill flowsheet. The expected mill recovery will range from 80% to 85% depending on the feed grade from the mine and the concentrate grades produced (Olin and McAndrew 1980). Operational design parameters have been identified including mesh of grind, flotation conditioning times and temperatures, reagent consumptions plus consideration of pre-flotation of sulphides and sulphide depression techniques. Both an all flotation circuit and a more conventional gravity/flotation circuit have been evaluated in the past. With advances in new gravity recovery equipment over the past 20 years, the final decision as to which circuit is selected will have to be re-evaluated. Both processes will produce high quality concentrates as well as intermediate to low grade products. Technology exists to convert all concentrates to ammonium paratungstate, the next intermediate step in producing tungsten powder.

# 17 MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES

#### MINERAL RESOURCES

#### **SUMMARY**

Scott Wilson RPA has completed a 3D solid model, or wireframe, and 2D block model for the Mactung property. The 2D model is a gridded seam model (GSM) and contains two separate estimates of grade (Kriged & Polygonal) and a single estimate of thickness for each block. Scott Wilson RPA considers the kriged estimate more appropriate for this deposit. Tables 17-1 and 17-2 summarize the kriged estimates.

These estimates, which are based on assays capped at unique levels for each zone, are reported at a block cut-off of 0.5 % WO<sub>3</sub>, which Scott Wilson RPA considers appropriate for the location and cost profile that can be expected for Mactung. CIM definitions (December 2005) were followed for the classification of the mineral resources. Scott Wilson RPA estimates an average drill spacing of 50 m based on the average distance between each composite and its four nearest neighbours. Scott Wilson RPA considers the spacing close enough to classify approximately 76% of the resources as indicated.

Further drilling is required to improve the reliability of the mineral resource estimates for the upper 3 zones (3D, 3E, and 3F) as well as on the periphery and northern portions of all four zones. Initial efforts should focus on the areas of the deposit where higher grade intercepts have not been entirely closed off by peripheral drilling. Assessments of grade variability indicate a maximum drill spacing in the range of 120 m to classify any portion of the resource as indicated category, although this must be confirmed by further drilling in the upper 3 zones.

# TABLE 17-1 INDICATED MINERAL RESOURCES ESTIMATES

#### North American Tungsten - Mactung Project

Location	Kt	% WO₃	Kt WO <sub>3</sub>	mtu's (Millions)
Yukon	30,202	0.88	265	26.5
NWT	2,826	0.88	25	2.5
Total	33,029	0.88	290	29.0

#### Notes:

- 1. CIM definitions were followed for mineral resources.
- 2. Mineral resources are estimated at a block cut-off grade of 0.5% WO<sub>3</sub>.
- 3. An mtu is 10 kg WO<sub>3</sub>
- 4. Differences in totals due to round-off.

# TABLE 17-2 INFERRED MINERAL RESOURCES ESTIMATES

#### North American Tungsten – Mactung Project

				mtu's
Location	Kt	% WO₃	Kt WO <sub>3</sub>	(Millions)
Yukon	9,836	0.75	74	7.4
NWT	2,020	0.91	18	1.8
Total	11,857	0.78	92	9.2

#### Notes:

- 1. CIM definitions were followed for mineral resources.
- 2. Mineral resources are estimated at a block cut-off grade of 0.5% WO<sub>3</sub>.
- 3. An mtu is 10 kg WO<sub>3</sub>
- 4. Differences in totals due to round-off.

#### **DATABASE – GENERAL DESCRIPTION**

The mineral resource estimates for the Mactung project are based on information from surface and underground drilling supplemented in part by surface and underground mapping. The collar database provided to Scott Wilson RPA contains 168 drill holes, of which 161 were used for grade interpolation. Those drill holes within the modeled area cover a 1,000 m (E-W) by 700 m (N-S) area. Holes vary in length from 5 m to 450 m and the average spacing in plan is estimated at 50 m based on the average distance between each composite and its four nearest neighbours. Most surface holes are drilled toward the north at -50 degrees to -90 degrees (vertical), with the majority drilled at -70 degrees. Underground holes are drilled at various horizontal and vertical angles (up and down) from the underground drifting in the upper 2B horizon.

#### **ASSAYS**

The assay database provided to Scott Wilson RPA for the Mactung Project contains 6,311 assay intervals, of which all but 414 contain assay values of 0.01% WO<sub>3</sub> or greater. A total of 3,738 intervals are located within the interpreted mineralized zones. Assay intervals vary from 0.3 m to over 8 m in length, although most are 1.5 m. The data approximate a normal distribution when transformed to natural log values (lognormal). A brief statistical summary of WO<sub>3</sub> assays within the interpreted mineralized zones is provided in Table 17-3.

TABLE 17-3 WO<sub>3</sub> ASSAY STATISTICS, North American Tungsten – Mactung Project

Zone	Count	Grade (% WO <sub>3</sub> )		
		Average	Std. Dev.	
2B	1,904	1.238	1.111	
3D	823	0.692	0.589	
3E	529	0.604	0.602	
3F	482	0.862	0.829	
Total	3,738	0.980	0.958	

Note: Only those assays within the interpreted mineralized zones are reported.

#### **GEOLOGICAL MODEL**

For the purpose of resource estimates, the Mactung deposit has been modeled as four sheet-like mineralized envelopes dipping roughly S30°W at -20°. Thickness averages 18 m and varies from less than 1 m to over 50 m. The four main zones have been further subdivided by three main faults and a fold structure to produce 12 individual lenses. Scott Wilson RPA based its interpretation primarily on the previous historic estimate (Strathcona 1982), although subsequent drilling has led to some changes, particularly around the fault structures. Scott Wilson RPA modeled the hanging wall and footwall surfaces for each lens using an external cut-off of 0.4% WO<sub>3</sub>, creating 3D solids, or wireframes, representing the 12 mineralized envelopes. These envelopes were used to control compositing and block selection in subsequent interpolation runs.

#### **ASSAY CAPPING (CUTTING)**

In order to reduce the influence of statistically anomalous sample data on resource estimations, a number of higher-grade assay values are often capped prior to compositing at levels determined by various means, including examination of probability distribution data. Scott Wilson RPA produced plots of the WO<sub>3</sub> distribution for each of the four zones using the assay data provided. The distribution curves, which can be found in Appendix 2, exhibit obvious breaks or inflection points in the upper parts of the curves and a general tailing off beyond these points. These breaks often indicate the existence of several distinct populations within the grouped data, with upper values representing a very small fraction of the total population.

Scott Wilson RPA selected the upper break in the distribution curve as caps for assay data. In total, 37 assay intervals were capped. These intervals represent less than 1% of the total number of assays  $\geq 0.01$  % WO<sub>3</sub>. The net impact of the capping was to reduce the average assay grade within the interpreted zones by 0.7% of the uncapped mean grade. Table 17-4 provides a summary of capping statistics for the Mactung data. All data above the stated capping levels were set back to these levels prior to compositing.

TABLE 17-4 ASSAY CAPPING LEVELS
North American Tungsten – Mactung Project

#### Grade (%WO<sub>3</sub>)

Zone	Сар	No. SD's	Population Maximum	No.	Avg. Before	Avg. After
Zone	Cap	30.8	Maximum	Capped	Delote	Aitei
2B	6.2	4,5	8.40	9	1.238	1.234
3D	2.8	3.6	4.30	8	0.692	0.689
3E	3.0	4.0	4.78	7	0.604	0.594
3F	3.2	2.8	7.53	13	0.862	0.840
Total			8.40	37	0.980	0.973

**Notes:** Values within the interpreted mineralized zone ≥0.01% WO<sub>3</sub> only.

No. SD's is the number of standard deviations that the capping level is from the mean.

#### **COMPOSITES**

Composites, which were produced by Scott Wilson RPA for a "gridded seam" or 2D model, are based on single intercepts for each drill hole that pierces a lens. Assay

intervals for each drill hole were composited down the hole from the top of the interpreted mineralized envelope to the point of exit, producing a single length-weighted average grade for each intercept. The composites were tagged with a unique code for each lens to control composite selection in subsequent grade interpolation runs. In Scott Wilson RPA's opinion, the 2D method is ideally suited to the Mactung deposit because of the limited thickness of each lens. A summary of composite statistics is provided in Table 17-5.

TABLE 17-5 ASSAY COMPOSITE STATISTICS

North American Tungsten – Mactung Project

			Avg			
		Unca	pped	Cap	Length	
Zone	Count	Grade	Std Dev	Grade	Std Dev	(m)
2B	164	1.124	0.653	1.121	0.648	17.1
3D	84	0.622	0.322	0.619	0.318	15.3
3E	61	0.503	0.317	0.492	0.287	14.6
3F	42	0.705	0.408	0.688	0.376	20.0
Total	351	0.846	0.575	0.84	0.568	16.6

#### BLOCK MODEL AND GRADE ESTIMATION PROCEDURES

Scott Wilson RPA built a "gridded-seam" model (GSM) based on blocks with fixed EW and NS dimensions and variable vertical thickness. Individual block dimensions are 10 m EW by 10 m NS in plan. In the Mactung GSM model, each block carries an interpolated "vertical thickness" value based on the difference between the elevations of the modeled hanging wall and footwall surfaces at block centre. Often, the thickness is interpolated along with grade, using the composite thicknesses. In the case of Mactung, some of the holes were drilled from development within the upper 2B horizon, resulting in a number of composites which are shorter than the actual thickness of the lens. As well, some surface holes did not exit the mineralized horizons. Use of these composites to interpolate thickness would have inevitably resulted in an underestimate of block thickness. As an alternative, the 3D location of the hanging wall and footwall pierce points were used to model the two surfaces. For drilling that did not completely pierce a

particular lens (both underground and surface holes), only the point of contact with the hanging wall or footwall was used.

Each block with its centre located within the interpreted zone was assigned a zone code that matched the composites. A separate "seam" is reserved for each lens, resulting in a total of 12 seams, or 2D matrices, representing the various components or fault/fold blocks of the four mineralized horizons (2B, 3D, 3E, 3F). Each seam is assigned a unique code and grades estimated using only those composites with matching codes. For reporting purposes, the estimated grades for each block are weighted by their corresponding thickness values and assigned densities.

Ordinary kriging and polygonal methods were utilized to estimate grades for each block. The polygonal method assigns each block within a particular seam the grade of the closest matching composite while the kriged grade is based on a weighted average of the surrounding matching composites. Grade estimates were based on 2D searches with the distance in the XY plane only considered. Scott Wilson RPA reviewed the variography for the deposit and a reasonable model was developed, however, the nugget value is relatively high, indicating high grade variability between closely spaced holes. Small-scale faulting may be, in part, responsible for the variability. More close-spaced drilling, particularly in the three upper horizons, would help in providing a more definitive assessment of the spatial continuity for the grades and structures within this deposit. Table 17-6 summarizes the parameters for the variogram model used for Mactung. Models for 3D and 2B are depicted graphically in Figures 17-1 and 17-2.

TABLE 17-6 WO<sub>3</sub> VARIOGRAM MODEL North American Tungsten – Mactung Project

Parameter	Value
Model Type	Spherical
Nugget C <sub>0</sub>	0.55
Sill C <sub>0</sub> +C <sub>1</sub>	1.05
Range (m) – Major (Y)	120
Range (m) – Minor (X)	120
Range (m) – Vertical (Z)	NA

FIGURE 17-1 MACTUNG VARIOGRAM MODEL - 3D

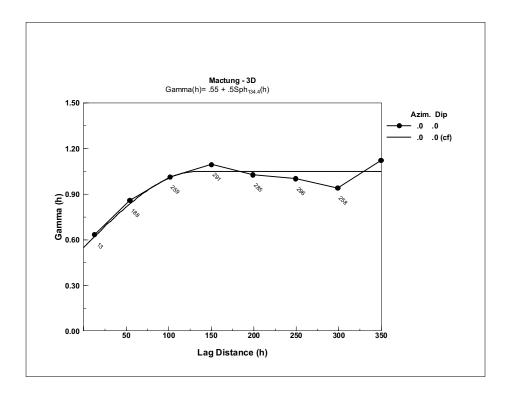
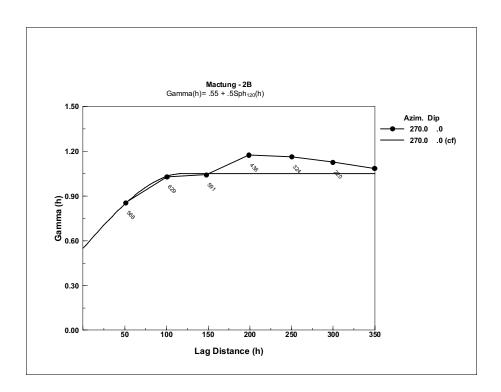


FIGURE 17-2 MACTUNG VARIOGRAM MODEL - 2B



The minimum and maximum numbers of composites used in kriging interpolations were set at 2 and 4, respectively. This allows a grade to be estimated for any block with two or more holes within the search area but prevents over-smoothing the estimate by using too many composites. The search strategy employed by Scott Wilson RPA was based on two passes with a maximum search distance of 120 m (major) x 120 m (minor) on the first pass and 80 m (major) x 80 m (minor) on the second pass. The second pass also required that the closest composite be no more than 60 m from the block centre. Those blocks that meet the search criteria in the second pass are overwritten while leaving other blocks unchanged from the first pass. The two-pass strategy allows most blocks within the interpreted envelopes to receive grade estimates on the first pass, while using a tighter search on the second pass to reduce the influence of distant composites on grade estimates close to the drill holes. Grade estimates were made using only the composite values derived from the capped assays.

Finally, after completing the grade interpolations, overall grades were calculated by weighting the block grades by the thickness of each block within the interpreted mineralized envelopes. A minimum vertical thickness of 4.5 m was applied to each block, diluting the grade accordingly, if required. The tonnage is estimated by multiplying their respective volumes by the SG. For the purposes of the estimates, an SG of 2.99 was used for 3D, 3E and 3F, while a value of 3.14 was used for 2B. The latter is based on densities established by the underground bulk sample taken from 2B. Scott Wilson RPA has not reviewed any data or calculations related to the SG determination. Strathcona used identical values in their estimates while the preceding study (Steininger 1980) used an SG of 3.08 for the upper horizons. Application of the methodology described above resulted in the estimates of mineral resources summarized in Tables 17-7 and 17-8.

### **TABLE 17-7 INDICATED MINERAL RESOURCE ESTIMATES** North American Tungsten – Mactung Project

	Kriged				Polygonal			
Zone/Lens	Kt	% WO <sub>3</sub>	Vertical Thick. (m)	Kt WO <sub>3</sub>	Kt	% WO <sub>3</sub>	Vertical Thick. (m)	Kt WO <sub>3</sub>
3F South	4,053	0.77	23.7	31.2	3,757	0.84	23.9	31.4
3F North	2,299	0.69	26.3	15.8	2,422	0.73	27.7	17.7
3E South	3,364	0.64	22.2	21.5	2,875	0.74	23.7	21.3
3E North	1,705	0.65	26.1	11.0	1,485	0.74	25.9	11.0
3D SE	16	0.60	13.5	0.1	165	0.63	13.2	1.0
3D S Wedge	177	0.74	6.8	1.3	143	0.90	6.6	1.3
3D South	6,037	0.75	23.3	45.3	5,781	0.79	23.8	45.9
3D North	2,576	0.75	20.9	19.3	1,764	0.93	18.7	16.4
2B Upper	9,174	1.09	26.9	100.2	8,400	1.14	27.8	96.2
2B Middle	-	-	-	-	-	-	-	-
2B Lower South	2,310	1.38	21.8	32.0	2,277	1.51	22.3	34.3
2B Lower North	1,318	0.93	20.0	12.2	725	1.22	18.1	8.8
Totals	33,029	0.88	24.1	289.9	29,794	0.96	24.6	285.4

#### Notes:

- 1. CIM definitions were followed for mineral resources.
- Mineral resources are estimated at a block cut-off grade of 0.5% WO<sub>3</sub>.
   Polygonal estimates shown for comparison purposes only.
   Differences in totals due to round-off.

TABLE 17-8 INFERRED MINERAL RESOURCE ESTIMATES

North American Tungsten – Mactung Project

		Kri	ged		Polygonal			
Zone/Lens	Kt	% WO <sub>3</sub>	Vertical Thick. (m)	Kt WO <sub>3</sub>	Kt	% WO <sub>3</sub>	Vertical Thick. (m)	Kt WO <sub>3</sub>
3F South	1,398	0.72	17.3	10.1	1,228	0.94	17.7	11.5
3F North	2,316	0.77	25.6	17.8	2,366	0.98	26.5	23.1
3E South	333	0.54	25.3	1.8	835	0.63	23.9	5.2
3E North	1,163	0.62	25.7	7.3	1,339	0.69	25.0	9.2
3D SE	648	0.79	11.0	5.1	636	0.81	11.0	5.2
3D S Wedge	-	-	-	-	-	-	-	-
3D South	2,436	0.77	26.8	18.8	2,393	0.81	26.9	19.4
3D North	905	0.66	21.1	6.0	315	0.94	18.9	3.0
2B Upper	743	0.61	23.6	4.5	218	0.79	25.9	1.7
2B Middle	230	1.06	6.6	2.4	185	1.26	6.4	2.3
2B Lower South	719	1.16	18.4	8.3	719	0.94	18.4	6.7
2B Lower North	965	1.02	23.3	9.8	544	1.58	24.1	8.6
Totals	11,857	0.78	22.6	92.0	10,778	0.89	23.0	96.0

#### Notes:

- 1. CIM definitions were followed for mineral resources.
- 2. Mineral resources are estimated at a block cut-off grade of 0.5% WO<sub>3</sub>.
- 3. Polygonal estimates shown for comparison purposes only.
- 4. Differences in totals due to round-off.

In Scott Wilson RPA's opinion, a cut-off of 0.5% WO<sub>3</sub> would be appropriate for reporting purposes. The current cut-off for North American Tungsten's operating mine is 0.75% WO<sub>3</sub>; however, should the Mactung property be put into production, it is likely that its larger resource would allow significant gains in economy of scale. Based on current prices, a case could certainly be made for a lower cut-off, however, from a long-term price and cost perspective, 0.5% WO<sub>3</sub> is reasonable. Tables 17-9 and 17-10 provide estimates at increasing block cut-off grades; however, caution is advised in the use of higher cut-offs, because the resource breaks up into smaller clusters of blocks as the cut-off increases and may be difficult to mine without encompassing some of the surrounding lower grade material reported at lower cut-off grades.

# TABLE 17-9 INDICATED MINERAL RESOURCE ESTIMATES SHOWN AT INCREASING CUT-OFFS

North American Tungsten – Mactung Project

		ged		Polygonal				
Cut-off % WO <sub>3</sub>	Kt	% WO <sub>3</sub>	Vertical Thick. (m)	Kt WO <sub>3</sub>	Kt	% WO₃	Vertical Thick. (m)	Kt WO <sub>3</sub>
0.5	33,029	0.88	24.1	290.0	29,794	0.96	24.6	285.4
0.6	27,927	0.94	24.2	262.2	26,246	1.01	24.5	266.0
0.7	22,198	1.01	24.4	224.8	22,042	1.08	24.4	239.0
0.8	15,571	1.13	24.7	175.6	17,268	1.18	24.2	203.1
0.9	10,423	1.27	25.7	132.2	12,521	1.30	24.3	163.1
1.0	8,245	1.36	26.7	111.8	9,321	1.42	24.9	132.5

#### Notes:

- 1. CIM definitions were followed for mineral resources.
- 2. Mineral resources are estimated at a block cut-off grade of 0.5% WO<sub>3</sub>.
- 3. Polygonal estimates shown for comparison purposes only.
- 4. Differences in totals due to round-off.

# TABLE 17-10 INFERRED MINERAL RESOURCE ESTIMATES SHOWN AT INCREASING CUT-OFFS

North American Tungsten – Mactung Project

		Kri	ged		Polygonal			
Cut-off % WO₃	Kt	% WO <sub>3</sub>	Vertical Thick. (m)	Kt WO <sub>3</sub>	Kt	% WO₃	Vertical Thick. (m)	Kt WO <sub>3</sub>
0.5	11,857	0.78	22.6	92.0	10,778	0.89	23.0	96.0
0.6	9,260	0.84	23.0	78.0	9,115	0.95	23.3	86.5
0.7	6,614	0.92	22.8	60.9	7,447	1.01	22.9	75.6
0.8	4,631	1.00	21.4	46.1	5,433	1.11	23.7	60.3
0.9	2,929	1.08	22.1	31.7	3,099	1.30	22.5	40.3
1.0	1,658	1.20	21.1	19.9	2,356	1.41	22.8	33.3

#### Notes:

- 1. CIM definitions were followed for mineral resources.
- 2. Mineral resources are estimated at a block cut-off grade of 0.5% WO<sub>3</sub>.
- 3. Polygonal estimates shown for comparison purposes only.
- 4. Differences in totals due to round-off.

#### **MODEL VALIDATION**

As part of the block model validation process, polygonal grade estimates were also produced and are provided in Tables 17-7 through 17-10 for comparison purposes. The polygonal estimates are generally lower in tonnage and higher in grade at lower cut-offs, however, metal content is virtually identical at the selected cut-off of 0.5% WO<sub>3</sub>.

In addition to producing parallel estimates of grade by polygonal methods, Scott Wilson RPA conducted a series of point validation exercises where the grade at each composite location is estimated from the surrounding composite data by kriging (using the variogram model produced by Scott Wilson RPA) and inverse distance methods and compared to the actual composite values at those locations. Results are shown in Table 17-11. Only those composites that had a minimum of four surrounding composites within the variogram range (120 m) were used in the analysis. In all, 309 points were estimated from the surrounding data. While kriging did not model the extremes, as well due to the high nugget value, the mean and median values are closer to the actual values when compared to inverse distance weighting.

TABLE 17-11 POINT VALIDATION, COMPOSITES

North American Tungsten – Mactung Project

 $% WO_3$ 

ltem	IDW Power	Mean	Std. Dev.	Minimum	Maximum	Median
ACTUAL	N/A	0.893	0.559	0.000	2.810	0.810
KRIGING	N/A	0.893	0.420	0.120	2.120	0.800
1ST IDW	1	0.890	0.437	0.070	2.500	0.790
2ND IDW	2	0.887	0.462	0.050	2.690	0.780
3RD IDW	3	0.886	0.480	0.050	2.710	0.780
4TH IDW	4	0.886	0.493	0.030	2.710	0.790
5TH IDW	5	0.887	0.504	0.010	2.710	0.790

Inverse distance cubed (ID<sup>3</sup>) is often used as an alternative to kriging because grade estimates for blocks that are very close to a composite generally show good agreement with the composite values, while block grade estimates between composites are not

overly smoothed like those for inverse distance (ID<sup>1</sup>) and inverse distance squared (ID<sup>2</sup>). A power of 4 or higher generally produces grade estimates similar to polygonal models, as can be observed in the reported minimums and maximums in Table 17-11. Scott Wilson RPA also analyzed the point validation results for ID<sup>3</sup> and kriging by linear regression. As can be seen in Table 17-12, kriging shows marginally better results with a higher correlation coefficient, a lower intercept value, and a slope closer to 1. A perfect linear correlation would have a 0 Y intercept and a slope of 1.

TABLE 17-12 POINT VALIDATION, REGRESSION ANALYSIS
North American Tungsten – Mactung Project

ITEM	IDW Power	Intercept A	Slope B	Correlation Coefficient
3RD IDW	3	0.2890	0.6559	0.5902
KRIGING	N/A	0.2174	0.7253	0.5957

**Note:** Y=A+BX where Y is Actual, X is ID<sup>3</sup> or Kriging

Based on the comparisons of means and medians for actual versus predicted composite grades as well as the results of the regression analysis discussed above, it is Scott Wilson RPA's opinion that the kriged estimates provide superior assessments of grade variability and distribution compared to inverse distance weighting and polygonal interpolation.

#### **CLASSIFICATION**

CIM definitions (December 2005) were followed for the classification of the mineral resources. Scott Wilson RPA analyzed the drill spacing within the modeled area by estimating the average distance between each composite and its four closest neighbours. For Mactung, this was determined to be 50 m (this is skewed by the higher density of drilling in 2B). A common approach is to use a threshold for the maximum spacing of 4/3 the variogram range in order to classify a particular area as indicated and 2/3 as measured. Because of the numerous faults and high nugget values observed in the variography, it is Scott Wilson RPA's opinion that the maximum drill spacing for indicated should be no more than the variogram range for indicated. Given a maximum

variogram range of 120 m, which should be confirmed by more drilling for the upper 3 zones, the maximum distance from the block centre to the closest composite used in the block grade estimate was set at 60 m (i.e., 120 m spacing) for indicated. No blocks were classified as measured. A small portion of the upper 2B lens where the bulk sample was taken could be justifiably upgraded to measured, however, Scott Wilson RPA has not reviewed the bulk sample data. The 2B middle zone, which is interpreted as the middle limb of a z-fold, has been classified entirely as inferred due to the limited number of intercepts and the presence of abundant fault material that may suggest the limb is actually a fault zone rather than the limb of a fold.

# 18 OTHER RELEVANT DATA AND INFORMATION

#### **ENVIRONMENTAL**

Preliminary baseline environmental studies, including surveys of avifauna (Amax 1983, Hayes and. Mossop 1981), terrestrial fauna (Gill 1978), fish (Kershaw and Kershaw 1983), geomorphology (Kershaw 1976), vegetation (Kershaw and Gill 1979), archaeological considerations (Gotthard 1981), water quality (Orecklin et al. 1981), air quality and meteorology (International Environmental Consultants 1983), were carried out by a variety of consultants for Amax in the late 1970s and early 1980s. An initial environmental evaluation (Amax 1983) for the Mactung Project was prepared by Amax in 1982. In 2005, EBA Engineering undertook an update of the earlier environmental studies and installed a weather station at the site and initiated new field surveys to examine the wildlife, vegetation, fish, avifauna, hydrology, weather and archaeology of the area, on both the Yukon and NWT sides of the border. These studies are ongoing.

NATCL has obtained a Class III Yukon Land Use permit to operate a camp and do extensive diamond drilling on the Yukon side of the border. A water licence is not required for the levels of activity that are currently being undertaken.

# 19 INTERPRETATION AND CONCLUSIONS

The following interpretations and conclusions are made with respect to the Mactung mineral resource estimated completed by Scott Wilson RPA.

- 1. Scott Wilson RPA completed a solid model, or wireframe, and multiple-seam 2D GSM block model for Mactung: The 2D model contains two separate estimates of grade (Kriged and Polygonal) and a single estimate of vertical thickness for each block based on the solid model. Scott Wilson RPA considers the kriged estimate more appropriate for this deposit. A minimum thickness of 4.5 m has been applied to the model and grades have been diluted to the minimum thickness where necessary.
- 2. The kriged estimate contains an indicated mineral resource of 33 million tonnes grading 0.88% WO<sub>3</sub>, or 290 Kt of contained WO<sub>3</sub>. An additional resource of 11.9 million tonnes grading 0.78% WO<sub>3</sub>, or 92 Kt WO<sub>3</sub>, has been estimated for the inferred category. These estimates, which are based on assays capped at unique levels for each zone, are reported at a block cut-off of 0.5% WO<sub>3</sub>, which Scott Wilson RPA considers appropriate for the location and cost profile that can be expected for Mactung.
- 3. CIM definitions (December 2005) were followed for the classification of the mineral resources. Scott Wilson RPA estimates an average drill spacing of 50 m based on the average distance between each composite and its four nearest neighbours. Scott Wilson RPA considers the spacing close enough to classify approximately 76% of the estimated resources as indicated.
- 4. Both the kriged and polygonal estimates are virtually identical in terms of contained metal at the stated cut-off, although the polygonal estimates are lower in tonnage and higher in grade.
- 5. The resources straddle the Yukon/NWT border. Approximately 91% of the contained metal estimated for indicated category and 80% of the contained metal for inferred resources are located on the Yukon side of the border.

### 20 RECOMMENDATIONS

Scott Wilson RPA makes the following recommendations:

- 1. Further drilling is required to improve the reliability of the mineral resource estimates in the upper 3 zones (3D, 3E and 3F) as well as on the periphery and northerly portions of all zones. Initial efforts should focus on the areas of the deposit where the higher grades have not been entirely closed off by peripheral drilling. Assessments of grade variability indicate a maximum drill spacing in the range of 120 m to classify any portion of the resource as indicated, although this must be confirmed by further drilling for the upper 3 zones.
- 2. A phased work program is recommended, the first phase of which would be a preliminary economic assessment of the project based on the current mineral resource estimates. NATCL estimates the cost of the assessment to be approximately \$200,000.
- 3. Subject to positive results from the preliminary assessment, a feasibility study should be embarked upon. Concurrent with the feasibility work, a drilling program should be carried out; however, the size and nature of the drilling program would be contingent upon the results of the preliminary study. Should that study indicate that the project will have to draw on the inferred resources to produce a positive economic result, a component of the drilling program will have to be aimed at upgrading sufficient resources to satisfy the requirement that a feasibility (and reserve) be based on measured and indicated resources. NATCL estimates the cost of the feasibility and drilling to be in the range of \$5 million.

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# **22 SIGNATURE PAGE**

This report titled "Technical Report on the Mactung Tungsten Deposit, MacMillan Pass, Yukon", originally submitted on April 18, 2007, and revised on May 18, 2007, was prepared and signed by the following authors:

(Signed & Sealed)

Dated at Toronto, Ontario May 18, 2007

Peter A. Lacroix, P.Eng. Associate Mining Engineer

(Signed & Sealed)

Dated at Toronto, Ontario May 18, 2007

R. Barry Cook, P.Eng. Associate Geologist

# 23 CERTIFICATE OF QUALIFICATIONS

#### PETER A. LACROIX

I, Peter A. Lacroix, P.Eng., as an author of this report entitled "Technical Report on the Mactung Tungsten Deposit, MacMillan Pass, Yukon", prepared for North American Tungsten Corporation Ltd., originally submitted on April 18, 2007, and revised on May 18, 2007, do hereby certify that:

- 1. I am an Associate Mining Engineer with Scott Wilson Roscoe Postle Associates Inc. of Suite 304, 595 Howe Street, Vancouver, BC, V6C 2T5 and Principal, Lacroix & Associates, 1931 128 Street, Surrey, BC, V4A 3V5.
- 2. I am a graduate of the University of Alberta, Edmonton, Alberta, Canada in 1983 with a Bachelor of Science degree in Mining Engineering with Distinction.
- 3. I am registered as a Professional Engineer in the Province of British Columbia (Reg.# 1168). I have worked as a mining engineer for a total of 23 years since my graduation. My relevant experience for the purpose of the Technical Report is:
  - Mineral Resource and Reserve estimation, mine planning, feasibility studies, economic analysis, due diligence, independent review and audit on numerous mining projects and operations world wide
  - Various engineering and mining-related positions at three Canadian mines
  - Various senior positions at the corporate offices of a middle tier base metal and gold producer including Manager Engineering, Manager Operations and Manager Acquisitions & Project Development
  - Principal Mining Consultant for two international consulting firms
  - Associate Mining Consultant for various mining consulting firms on numerous mining projects and operations world wide
  - Principal, Lacroix & Associates, an independent wholly-owned mining consulting firm providing mining consulting services since 1997.
- 4. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI43-101.
- 5. I have not visited the Mactung Project.
- 6. I am responsible for preparation of Sections 16 through 20 and collaborated on Section 1 of the Technical Report.
- 7. I am independent of the Issuer applying the tests set out in Section 1.4 of National Instrument 43-101.

- 8. I have had no prior involvement with the property that is the subject of the Technical Report.
- 9. I have read National Instrument 43-101, and the Technical Report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1.
- 10. To the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.
- 11. I consent to the filing of this Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of this Technical Report.

Dated this 18<sup>th</sup> day of May, 2007.

(Signed & Sealed)

Peter A. Lacroix, P. Eng.

#### R. BARRY COOK

- I, R. Barry Cook, P.Eng., as an author of this report entitled "Technical Report on the Mactung Tungsten Deposit, MacMillan Pass, Yukon", prepared for North American Tungsten Corporation Ltd., originally submitted on April 18, 2007, and revised on May 18, 2007, do hereby certify that:
- 1. I am Associate Geologist with Scott Wilson Roscoe Postle Associates Inc. of Suite 501, 55 University Ave., Toronto, ON, M5J 2H7.
- 2. I am a graduate of Queen's University, Kingston, Ontario, Canada, in 1962 with a Bachelor in Science degree in Geological Engineering and in 1964 with a Master of Science degree in Geological Engineering.
- 3. I am registered as a Professional Engineer in the Province of Ontario (Reg.# 9202011) and as a Professional Engineer/Professional Geologist in the Northwest Territories. I have worked as a professional geologist for a total of 40 years since my graduation. My relevant experience for the purpose of the Technical Report is:
  - Review and report as a consultant on numerous exploration and mining projects around the world for due diligence and regulatory requirements.
  - Geological Consultant on field and drilling programs to major Canadian and international mining companies.
  - Exploration Manager, Eastern Canada, with a mandate to find and acquire mineral deposits.
  - Assistant Manager, Exploration Eastern Canada, in charge of technical programs, budget development, and exploration work.
  - Assistant Manager Europe and Africa with a major Canadian mining company responsible for project supervision in a wide variety of cultural, linguistic, political, and geological environments.
- 4. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI43-101.
- 5. I visited the Mactung Project on August 19, 2005.
- 6. I am responsible for preparation of Sections 2 through 15 and collaborated on Section 1 of the Technical Report.
- 7. I am independent of the Issuer applying the test set out in Section 1.4 of National Instrument 43-101.
- 8. I have had no prior involvement with the property that is the subject of the Technical Report.

- 9. I have read National Instrument 43-101, and the Technical Report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1.
- 10. To the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated this 18<sup>th</sup> day of May, 2007

(Signed & Sealed)

R. Barry Cook, P.Eng.

## DESCRIPTION OF ANALYTICAL PROCEDURES

Listed below are the analytical procedures used by the various laboratories to determine the elements indicated:

#### SGS CANADA INC.

#### FAA 313 – LEAD COLLECTION / FIRE ASSAY, FLAME AA FINISH FOR LOW LEVEL GOLD

#### Purpose:

This procedure applies to all low level geological samples to be analyzed for gold by lead collection fire assay / AA finish.

#### Procedure:

Weigh an assay ton (30 grams) or other weights as per client's instructions into a crucible with 150 grams (or more) of flux, Mix sample, add 1 mg of silver nitrate, cover with borax. Place crucible in furnace for 45 minutes at 1080 C. Pour into cast iron mold, cool, hammer lead button free of slag. Place lead button on pre-heated cupel at 950 C all lead is removed. Remove from furnace and cool. Digest dore bead by adding 0.5 mls of 1:1 HNO3 and place in a hot water bath for 15 minutes. Add 0.5 mls HCL and return to bath for 60 minutes. Bring to final volume of 5 mls with distilled water.

#### Instrumentation:

Samples are analyzed on a Flame AA Instrument equipped with an auto sampler and automatic data capture.

#### **Quality Control:**

A reference material is digested and analyzed with each batch of 28 samples or less to ensure batch accuracy. Duplicates are digested and analyzed every 12th. sample or less to ensure batch precision. A blank is also analyzed in every batch of 28 to monitor contamination.

Data will be deemed acceptable if recovery of gold is  $\pm 20\%$  at 5X the L.O.D. and the calculated RSD of duplicates is no more than 15%

### Reporting:

Results from the instruments are processed automatically, loaded into the LIMS where the QC parameters are checked before final reporting.

## **Elements and Reporting Limits:**

Detection limits Upper Limits

Au3 5ppb 10,000 ppb

# ICA50: ORE GRADE ANALYSIS OF BASE METALS (TUNGSTEN) BY SODIUM PEROXIDE FUSION AND ICP-OES.

#### 1. Parameter(s) measured, unit(s):

Cobalt (Co); Copper (Cu); Nickel (Ni); tungsten (WO3)

### 2. Typical sample size:

0.20 g

### 3. Type of sample applicable (media):

Crushed and Pulverized rocks, soils and sediments

### 4. Sample preparation technique used:

Crushed and pulverized rock, soil and /or sediment samples are fused by Sodium peroxide in zirconium crucibles and dissolved using dilute HNO3.

### 5. Method of analysis used:

The digested sample solution is aspirated into the inductively coupled plasma Optical Emission Spectrometer (ICP-OES) where the atoms in the plasma emit light (photons) with characteristic wavelengths for each element. This light is recorded by optical spectrometers and when calibrated against standards the technique provides a quantitative analysis of the original sample.

## 6. Data reduction by:

The results are exported via computer, on line, data fed to the Laboratory Information Management System (LIMS CCLAS EL) with secure audit trail.

## 7. Figures of Merit:

Element	Limit of Quantification (LOQ) %	Element	(LOQ) %
Со	0.001	Pb	0.007
Cu	0.004	Zn	0.004
Ni	0.005		

## 8. Quality control:

The ICP-OES is calibrated with each work order. An instrument blank and calibration check is analyzed with each run. One preparation blank and reference material is analyzed every 46 samples, one duplicate every 12 samples.

All QC samples are verified using LIMS. The acceptance criteria are statistically controlled and control charts are used to monitor accuracy and precision. Data that falls outside the control limits is investigated and repeated as necessary.

### 9. Accreditation:

The Standards Council of Canada has accredited this test in conformance with the requirements of ISO/IEC 17025. See www.scc.ca for scope of accreditation

### **ALS CHEMEX**

GEOCHEMICAL PROCEDURE - ME-ICP41
TRACE LEVEL METHODS USING CONVENTIONAL ICP-AES ANALYSIS

**Sample Decomposition:** Nitric Aqua Regia Digestion

**Analytical Method:** Inductively Coupled Plasma - Atomic Emission

Spectroscopy (ICP - AES)

A prepared sample (0.50 grams) is digested with aqua regia for at least one hour in a graphite heating block. After cooling, the resulting solution is diluted to 12.5 ml with demineralized water, mixed and analyzed by inductively coupled plasma-atomic emission spectrometry. The analytical results are corrected for inter-element spectral interferences.

		Detection	Upper	Units
Element	Symbol	Limit	Limit	Onits
Aluminum*	Al	0.01	15	%
Antimony	Sb	2	10,000	ppm
Arsenic	As	2	10,000	ppm
Barium*	Ва	10	10,000	ppm
Beryllium*	Be	0.5	100	ppm
Bismuth	Bi	2	10,000	ppm
Boron*	В	10	10,000 ppm	ppm
Cadmium	Cd	0.5	500	ppm
Calcium*	Ca	0.01	15	%
Chromium*	Cr	1	10,000	ppm
Cobalt	Co	1	10,000	ppm
Copper	Cu	1	10,000	ppm
Gallium*	Ga	10	10,000	ppm
Iron	Fe	0.01	15	%
Lanthanum*	La	10	10,000	ppm
Lead	Pb	2	10,000	ppm
Magnesium*	Mg	0.01	15	%
Manganese	Mn	5	10,000	ppm
Mercury	Hg	1	10,000	ppm
Molybdenum	Mo	1	10,000	ppm

## TRACE LEVEL METHODS USING CONVENTIONAL ICP-AES ANALYSIS (CON'T)

Element	Symbol	Detection Limit	Upper Limit	Units
Nickel	Ni	1	10,000	ppm
Phosphorus	P	10	10,000	ppm
Potassium*	K	0.01	10	%
Scandium*	Sc	1	10,000	ppm
Silver	Ag	0.2	100	ppm
Sodium*	Na	0.01	10 %	%
Strontium*	Sr	1	10,000	ppm
Sulfur	S	0.01	10	%
Thallium*	T1	10	10,000	ppm
Titanium*	Ti	0.01	10	%
Tungsten*	W	10	10,000	ppm
Uranium	U	10	10,000	ppm
Vanadium	V	1	10,000	ppm
Zinc	Zn	2	10,000	ppm

<sup>\*</sup>Elements for which the digestion is possibly incomplete.

### ME-ICP51

## **SCOPE**

This method utilizes the high boiling point and low volatility of phosphoric acid and its effective component, pyrophosphate, formed at high temperature for a more complete dissolution of Nb, Ta, U and W.

## **Applicable Analyte Ranges:**

Element	W	Ta	Nb	U
Detection limit	0.05	0.01	0.01	0.01
Upper limit	25.00	25.00	15.00	15.00
Unit	%	%	%	%

## ORE GRADE ANALYSIS BY XRF - ME-XRF10

**Sample Decomposition:** 50% Li2B4O7 – 50% LiBO2 (WEI-GRA06)

**Analytical Method:** X-Ray Fluorescence Spectroscopy (XRF)

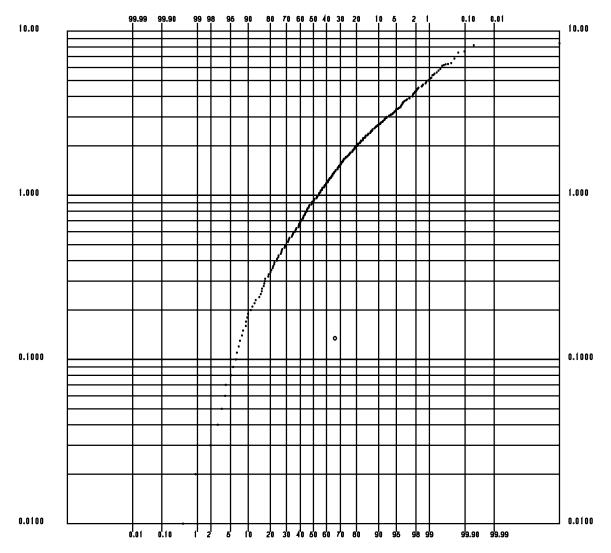
A calcined or ignited sample (0.9 g) is added to 9.0 g of Lithium Borate Flux (50 % - 50 % Li2B4O7 - LiBO2), mixed well and fused in an auto fluxer between  $1050 - 1100 ^{\circ}\text{C}$ . A flat molten glass disc is prepared from the resulting melt. This disc is then analysed by X-ray fluorescence spectrometry.

Element	Symbol	Units	Lower Limit	Upper Limit
Barium	Ba	%	0.01	50
Niobium	Nb	%	0.01	10
Antimony	Sb	%	0.01	50
Tin	Sn	%	0.01	60
Tantalum	Ta	%	0.01	50
Thorium	Th	%	0.01	15
Uranium	U	%	0.01	15
Tungsten	W	%	0.01	50
Zirconium	Zr	%	0.01	50

#### **BECQUEREL**

Neutron Activation Analysis (NAA) is a physical technique that is based on nuclear reactions whereby the elemental content is determined by irradiating the subject sample with neutrons, creating radioactive forms of the desired target element in the sample. As the sample becomes radioactive from the interaction of the neutron particle source and the nuclei of the element's atoms, radioisotopes are formed that subsequently decay, emitting gamma rays unique in half-life and energy. These distinct energy-signatures provide positive identification of the targeted element(s) present in the sample, while quantification is achieved by measuring the intensity of the emitted gamma rays that are directly proportionate proportional to the concentration of the respective element(s) in the sample. Since the neutrons activate the nucleus of the atom, this allows the total elemental content to be observed regardless of the oxidation state, physical location, or chemical form of the desired element. Since neutrons possess the ability to pass through most materials with little difficulty, this allows the center of the sample to become as radioactive as the surface, thereby reducing or even eliminating the potential for matrix effects. Because neutron activation can be applied to any element with an appropriated isotope, nearly 70% of elements in the Periodic Table can be analyzed by NAA.

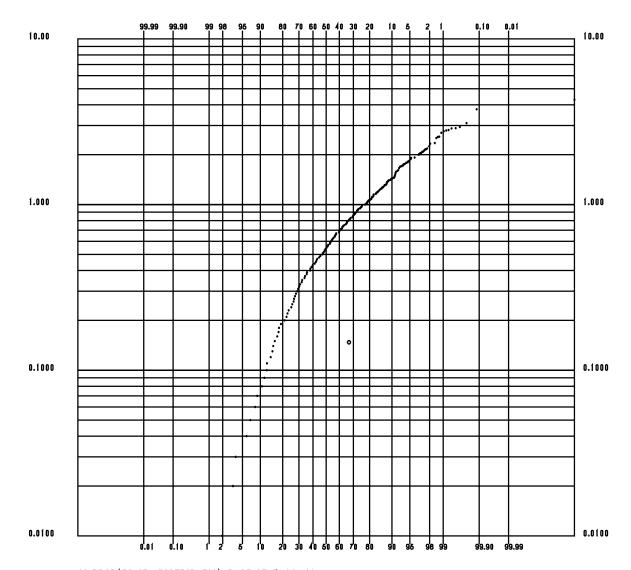
## PROBABILITY DISTRIBUTION PLOTS OF % WO<sub>3</sub>



\*\* PROBABILITY DISTRIBUTION PLOT OF %WO3 \*\*

ITEM	<b>%</b> W03	<u>NATURAL LOGS</u>		
NUMBER	1890	NUMBER	1890	
MEAN	1.2410	MEAN	-0.2530	
MINIMUM	0.0100	MINIMUM	-4.6050	
MAXIMUM	8.4000	MAXIMUM	2.1280	
VÁRIÁNCE	1.2400	VARIANCE	1.2640	
ST.DEV.	1.1130	ST.DEV.	1.1240	

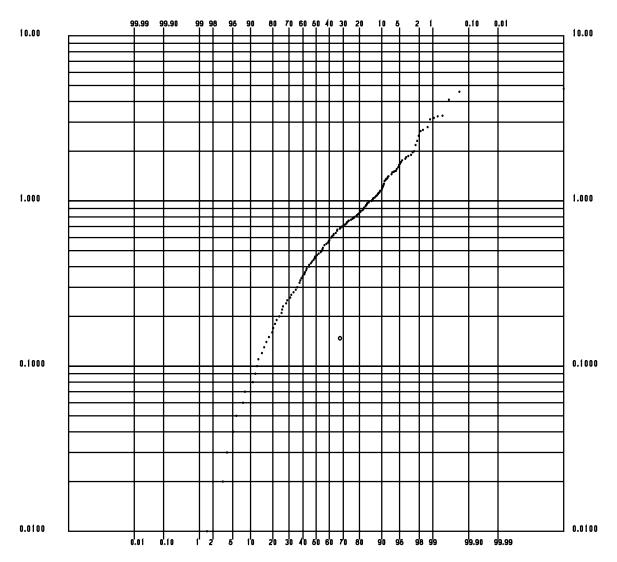
MACTUNG 2B



\*\* PROBABILITY DISTRIBUTION PLOT OF %W03 \*\*

ITEM	%w03	NÁTURÁL LOGS		
NUMBER	823	NUMBER	823	
MEAN	0.6920	MEAN	-0.8350	
MINIMUM	0.0100	MINIMUM	-4.6050	
MAXIMUM	4.3000	MAXIMUM	1.4590	
VARIANCE	0.3470	VÁRIÁNCE	1.3480	
ST.DEV.	0.5890	ST.DEV.	1.1610	

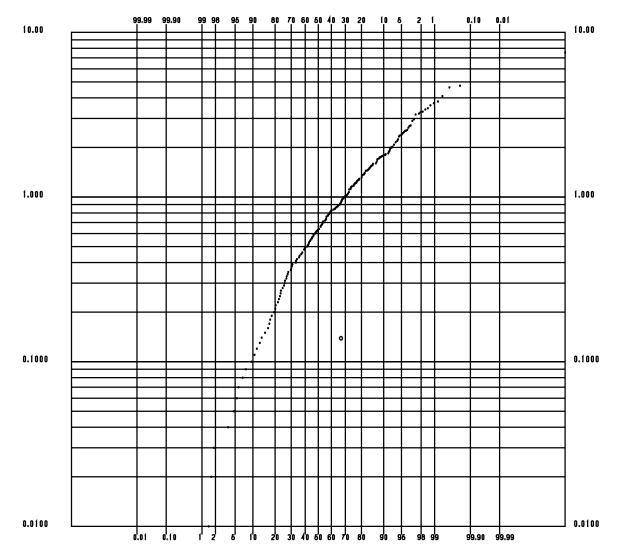
MACTUNG 3D



\*\* PROBABILITY DISTRIBUTION PLOT OF %WO3 \*\*

ITEM	%W03	NATURÁL LOGS	ATURAL LOGS	
NUMBER	529	NUMBER	529	
MEAN	0.6040	MEAN	-0.9730	
MINIMUM	0.0100	MINIMUM	-4.6050	
MAXIMUM	4.7800	MAXIMUM	1.5640	
VÁRIÁNCE	0.3630	VARIANCE	1.2240	
ST.DEV.	0.6020	ST.DEV.	1.1060	

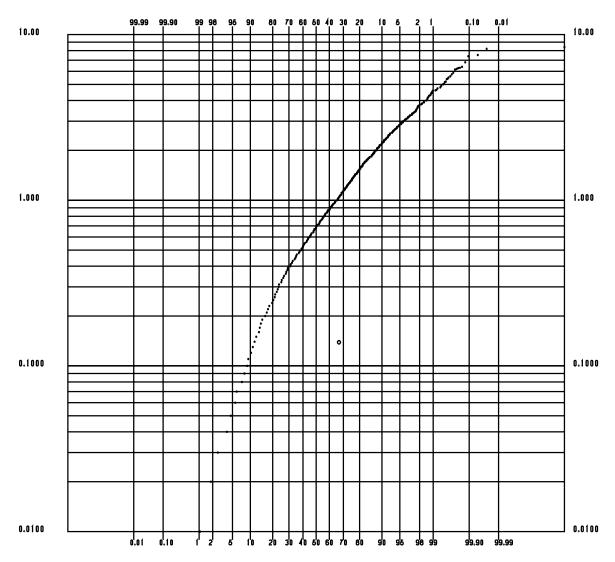
MACTUNG 3E



\*\* PROBABILITY DISTRIBUTION PLOT OF %WO3 \*\*

ITEM	%W03	NÁTURÁL LOGS		
NUMBER	483	NUMBER	483	
MEAN	0.8600	MEAN	-0.6380	
MINIMUM	0.0100	MIŅIMUM	-4.6050	
MAXIMUM	7.5300	MAXIMUM	2.0190	
VÁRIÁNCE	0.6870	VARIANCE	1.3010	
ST.DEV.	0.8290	ST.DEV.	1.1410	

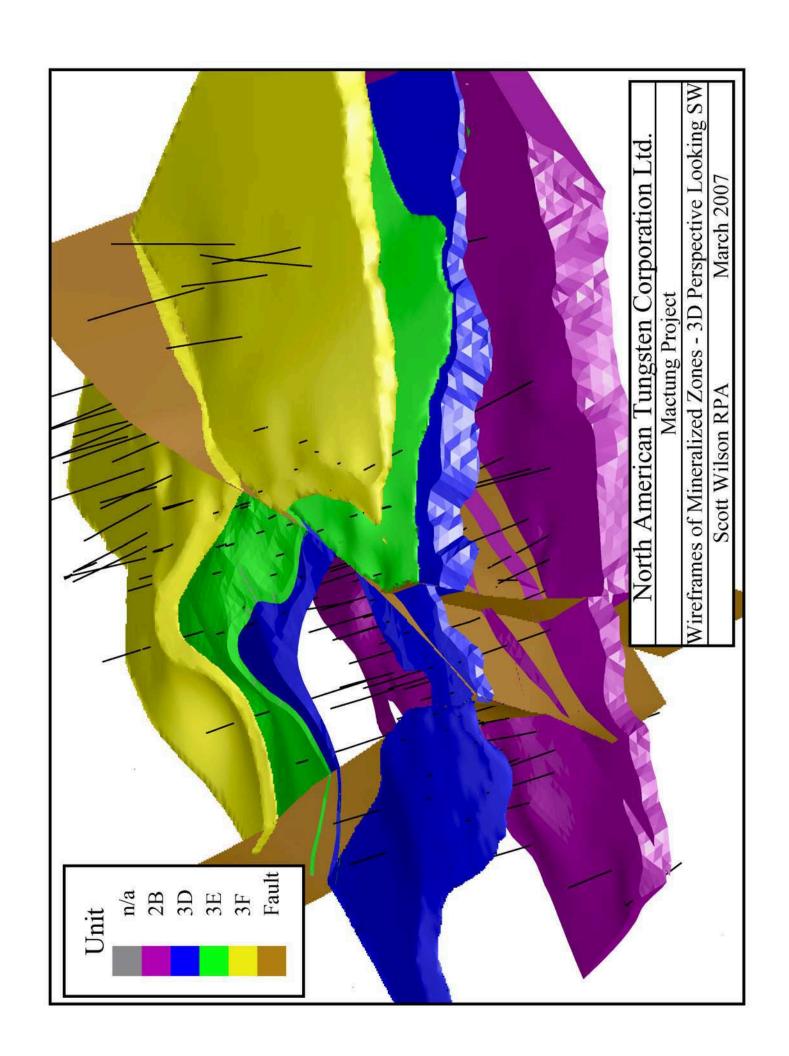
MACTUNG 3f

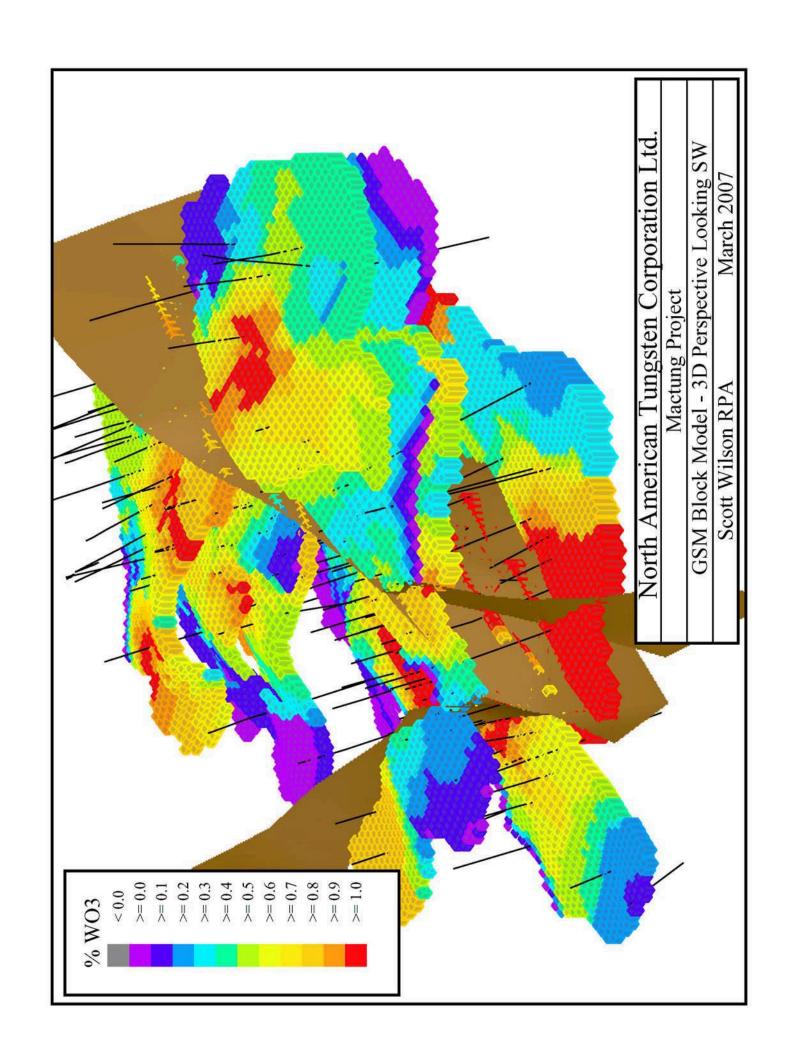


\*\* PROBABILITY DISTRIBUTION PLOT OF %WO3 \*\*

ITEM	<b>%</b> ₩03	NATURAL LOGS		
NUMBER	3725	NUMBER	3725	
MEAN	0.9800	MEAN	-0.5340	
MINIMUM	0.0100	MINIMUM	-4.6050	
MAXIMUM	8.4000	MAXIMUM	2.1280	
VÁRIÁNCE	0.9200	VÁRIÁNCE	1.3700	
ST.DEV.	0.9590	ST.DEV.	1.1700	

MACTUNG 2B, 3D, 3E, 3F





## **GSM CROSS SECTIONS**

