PRELIMINARY GEOLOGY REPORT

ON THE

THUNDER BAY AGATE MINE,

ONTARIO, CANADA

NTS 52 A/10

Balmertown, Ontario
December 4, 1998

Timothy J. Twomey
H.BSc. Geology
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SUMMARY

The agate consists of delicate-ringed stalactites and stalagmites formed within open spaces in the Fe-carbonate sediments. The first stage of mineralization is a dark-brown to red-brown amorphous silica followed by rhythmic finely layered alternating dark and light coloured amorphous silica. These colour bands are 1 to 5 mm wide. The stalactites are 2 to 10 cm in diameter and their length is usually two to four times their diameter. The stalactites are often accompanied by a whitish chalky matrix (clay alteration?) surrounding coarse-grained white quartz. The final stage is open-space filling of clear to white quartz crystals elongated along the C-axis in vugs and is indicative of near-surface deposition. The vugs are also partly filled with a black, brittle amorphous powder (manganese oxide or carbon).

The genesis of the deposit is problematic. The open spaces were caused by apparent delamination of bedding which grades into angular breccia and can be fit back together. Agate stalactites are always oriented vertically, even within the areas between rotated breccia fragments. This appears to be indicative of near-surface open-space filling in an extensional environment caused by either thrust faulting or folding. If this were due to acidic karsting of the carbonate host rock then the breccia should also be affected and would be rounded rather than angular.

The timing of mineralization is poorly constrained and may be considerably younger than it’s Gunflint formation host-rock. There is a fairly close spatial relationship between the agate deposit of the TBAM as well as the other agate lenses in the region with 065 degree basin-margin faults, silver-amethyst deposits, diabase sills and the Archean/Animikie unconformity. However, there has so far been no direct contacts observed between the above features, so no genetic relationships can be put forth at this time.

The amethyst and lead-zinc-barite deposits of the area are believed to have been formed by basinal brines expelled from Sibley Group sediments into basin-margin faults during diagenesis and compaction. These were low temperature, near-surface brines and amethyst was deposited where these fluids mixed with meteoric water (McArthur et. al., 1993). The silver and agate deposits are found within the Animikie Group which is conformably older than the overlying Sibley Group. All of these deposit types show a close spatial relationship with basin-margin faults and may have formed from similar processes. The variations of silica, CO2 and metals within these deposits may simply be variations of a single genetic process.
INTRODUCTION

The property contains a producing agate mine, the Thunder Bay Agate Mine (TBAM) 1 km northeast of the City limits of Thunder Bay, in Northern Ontario. The author mapped the property between August 1 and August 2, 1998. The following geology report of the property is preliminary as mining has only started recently and rock exposures are limited.

PROPERTY DESCRIPTION

The property consists of six mining claims and contains approximately 240 hectares (600 acres). The claims are recorded in the name of Dennis H. Seargeant, 88 Carl Ave. Thunder Bay, Ont. It is located within MacGregor Township of the Thunder Bay Mining Division and requires the following assessment work:

TB.1205293, 1 unit, Part of East Part Mining Location 8, $400 due by July 19, 2002.
TB.1205302, 1 unit, Part of East Part Mining Location 8, $400 due by June 30, 2002.
TB.1215712, 1 unit, Part of East Part Mining Location 8, $400 due by June 30, 2002.
TB.1215713, 4 units, South Part Mining Location 1, $1,600 due by January 7, 1999.
TB.1215714, 2 units, Pt of E. Pt Min Loc. 8 and NW 1/4 of Loc. 3E, $800 due by Jan. 7, 1999.
TB.1215715, 4 units, Mining Location 5, MacGregor Township, $1,600 due by January 7, 1999.

The Mine is located in the north part of TB.1205302 and the south part of TB.1205293.

LOCATION AND ACCESS

The property is located within MacGregor Township, claim map G-673, latitude 48° 30", longitude 89° 11'. It is approximately 1 km northeast of the City Limits of Thunder Bay, Ontario and is 2 km east of the Terry Fox Memorial, the Region’s most important ambassador. Access to the property is provided by travelling 1 km north on Highway 527 from Highway 11-17.

GENERAL GEOLOGY

Tanton (1931) published Map 214A and described the veins and prospects in the area which experienced a minor exploration resurgence at that time. MacGregor Township was most recently mapped by Scott (1981) at a scale of 1 inch to 1/4 mile. It was released as an uncoloured preliminary map. Scott mapped Archean-aged basement rocks of metavolcanics, metasediments and granitoids. These basement rocks are unconformably overlain by Animikie Group sedimentary rocks consisting of near flat-lying Gunflint formation chert, taconite and Fe-carbonate rocks overlain by Rove formation shales. These were deposited in a shallow sea in Proterozoic times. The flat-lying Animikie-aged sediments indicate that at that time (1,900 m.y.)
Figure 1: Claim map showing location of the Thunder Bay Agate Mine property. Scale 1" to 1/2 mi
submarine sediments progressively onlapped the flat to sloping Archean peneplane from the south. All of the rocks were then intruded by dikes and sheets of diabase termed Logan sills.

MacGregor Township contains numerous normal faults derived from basinal downwarping to the south of the flat-lying Animikie-aged sedimentary rocks. Thus, the faults often define granite/sedimentary rock contacts and strike at 060 degrees to 090 degrees. The faults are variably occupied by composite quartz-calcite veins containing minor amounts of amethyst, pyrite, galena, sphalerite, chalcopyrite and silver.

According to Moorehouse (1960) p.25, the rocks of the Current River area belong to the Upper Gunflint Formation with intercalated chert and carbonate iron formation. In the iron formation ferroan dolomite is the most common carbonate mineral. This unit occurs most commonly as 1) interbeds with chert in thin, finely laminated beds 2-3 cm thick, 2) massive beds of fine-grained to medium grained clastic sediment, and 3) fragments and matrix in intraformational breccias and conglomerate. There is also minor organic matter in the iron formation (p.26) where stylolites at contacts of chert and iron-carbonate beds are coated with carbonaceous material. Diabase shows typical massive equigranular texture of medium-grained olivine diabase and locally forms cliff-bound mesas from dikes and sheets.

REGIONAL SETTING

The area was first prospected for silver in the late 1800's. The following summaries of important locations within a few miles of the TEAM are described from west to east. The Shuniah (or Duncan) silver Mine is located 3.8 km southwest of the TEAM. It was discovered by prospecting in the summer of 1868 and was worked intermittently between 1868 and 1881 with 2 shafts, 11 levels and a small mill. Trenching explored the vein system for a length of 1.5 miles (2.4 km) and underground workings explored the vein for a length of 1/4 mile (400 m) to a maximum depth of 650 feet (200m). About 20,000 ounces of silver were mined, mostly from the upper levels within 60 feet (20 m) of surface. Quartz-calcite veins in a 20 foot (6 m) wide fault zone strikes east-west and dips 80 degrees south. Veining consisted of composite-banded quartz and calcite with minor green fluorite, sphalerite, galena, chalcopyrite and pyrite. The silver occurred as erratic leaves and bunches of native silver and argentite. The center of the vein was vuggy and contained minor amethyst. It was reported that the vugs and weathered cavities near surface in the vein were encrusted with black manganese oxide (Tanton, 1931). The fault is normal with the south side displaced down 100 feet (30 m). This is one of the typical basin-margin faults in the region associated with the Proterozoic-aged basin to the south. The deposit was within 500 foot (150 m) thick flat-lying sediments with a 100 foot (30 m) thick diabase sill capping it which dips 10 degrees southward. Archean metavolcanic basement rocks lie unconformably below the sedimentary rocks. The shafts have now been filled in with waste rock. Remnants of two waste dumps are found 600 feet (200 m) east-west from each other and are located 800 feet (250 m) north of the Thunder Bay Expressway (Highway 11-17).
Figure 2: Regional Geology map from Moorehouse (1960), scale 1 inch to 1 mile.
Figure 2b: Legend to Regional Geology map from Moorehouse (1960).
Thunder Bay Agate has long been collected as small boulders from the bed of the Current River and was known locally as “Current River Agate”. It was collected by members of the Thunder Bay Lapidary Club but became scarce in later years. The agate stalactites were often cut perpendicular to the long axis and were made into beautiful concentric-ringed cabochons (1983, personal communication, the Late Bob Heywood, then President of the Thunder Bay Lapidary Club). The Expressway was widened to double-lanes in the early 1990's and a new rock-cut exposed flat-lying chert interbedded with iron-carbonate. About 2000 feet (0.6 km) west of the Current River bridge, on the north side of the rock cut is exposed a 1 foot (0.3 m) wide vuggy quartz vein containing minor lavender-colored amethyst. It strikes north-northeast, dips vertically and is also of the silver-bearing type. Nearby to this are thin discontinuous agate pods and veins composed of Thunder Bay Agate conformable to the chert-carbonate layers. The agate is not seen in contact with the quartz vein and was not observed within the vein. Therefore, genetic relationships of Thunder Bay Agate with silver-type quartz veining is unknown. Further west the sedimentary rocks are capped by a diabase sill which was removed by erosion at the quartz vein location and would have been approximately 2-5 m above the present rock cut.

Tanton (1931) observed more than twenty silver-type veins around Current River between the Shuniah Mine and the Thunder Bay silver Mine. Some of these were also mapped by Moorehouse in 1950 (Map No. 1960o) which shows eleven veins within faults, eight of which are oriented in a northeast strike direction and three that are east-west. These are associated with a major fault trend that has brecciated and cut the diabase, displacing the south side downward. The faulting is parallel to the shore of Lake Superior at azimuth 065 degrees and is a typical basin-margin fault zone of the region. The fault trend hosts the Thunder Bay silver mine and is the same prominent lineament that is associated with the TBAM further northeast.

The Thunder Bay silver Mine is located 1.6 km southwest of the TBAM. The silver mine was discovered by prospecting in the fall of 1866 and was worked intermittently between 1867 and 1874. The vein was traced by test pits for 1/2 mile (800 m) along a northeast trending diabase capped cliff which is on the east side of the entrance from the Expressway to the Terry Fox Memorial. An old access trail is seen following the base of the cliff east of the entrance to the Memorial for about 600 feet (150 m) which leads up to one of the collapsed adits and a number of trenches of the old Mine. Development consisted of four shallow shafts, a cross-cut at the 60 foot level and minor drifting. Ore was mined on a 10 foot (3m) wide zone of composite veinlets in a fault, striking 064 degrees and dipping 65 degrees northwest, for a length of 60 feet (20m) between the two furthest shafts. Veining consisted of white quartz with traces of galena, sphalerite and pyrite. Small amounts of pink to white calcite occupied the central parts of the larger veinlets. Argentite and native silver were reported to occur as leaves and grains in pockets 3 to 18 inches thick (6 to 60 cm) by 6 to 40 feet (2 to 12 m) in length. Only about 2,500 ounces of silver was recovered from the composite vein. A calcite vein was found parallel to the other 20 feet (7m) away in another fault zone but was barren of silver. The host rock is chert-Fe-carbonate iron formation overlain by shales which dip shallowly to the southeast. These are capped by a diabase sill 40 feet (12 m) thick (Tanton, 1931). Remnants of the muck piles contain vein material which is dominantly snow-white quartz showing beautiful delicate crystal terminations.
Flat-lying vugs lined with amethyst are found in a rock-cut on the north side of the Expressway, just west of the entrance to the Terry Fox Memorial. These measure up to 1.5 m wide by 2 m deep by 0.5 m high within flat-lying chert and iron-carbonate sedimentary rocks. The vugs contained moderate to good quality amethyst and druzy quartz. One specimen collected from the largest flat-lying vug is an elongated double-sided amethyst lined “protrusion”. The center of the protrusion exhibits multi-layered mineralized zones. The core is composed of brown, white and reddish layers of agate, surrounded by grey to reddish-brown layered agate, surrounded by layered fine-grained disseminated to semi-massive pyrite, surrounded by stubby terminated quartz and amethyst followed by minor encrustations of fine-grained purple fluorite crystals (see Figure 7). This agate has a similar color as the agate at the TBAM and suggests a similar age. The Ministry of Transport covered over the vugs with asphalt as rockhounds were known to crawl into them (which was a tight squeeze crawling on your belly). Towards the Terry Fox Memorial, 200 feet (50 m) from the vugs, these rocks are capped by flat-lying diabase that forms a mesa on top of which is the Memorial itself.

Outcrop on the east side of the entrance to the Memorial, contains a small conformable lens of agate measuring 7 in by 4 in (20 cm by 10 cm) within a fragmental Fe-carbonate unit of the Upper Gunflint formation near the contact with overlying Rove Formation shales, capped by diabase (Patterson, 1984).

Small boulders of Thunder Bay Agate were discovered and collected by local rock-hounds from a gravel pit adjacent to the Expressway. No outcrop was observed in the pit which is located immediately south of the Thunder Bay Agate Mine and is the likely source of the boulders.

North of the fault trend 2 miles (3.2 km) north-northeast from the Shuniah Mine is the Mount Baldy amethyst occurrence. It is located 150 feet (50 m) south of Mount Baldy Ski Resort Road, 1000 feet (300 m) east of Highway 527. It consists of a 10 foot to 30 foot (3-10m) wide zone of quartz-amethyst veinlets containing traces of galena and chalcopyrite. These occupy a fault zone that has an arcuate strike of 045 degrees to 060 degrees and dips steeply southeast. It is a normal fault where Archean mafic volcanics and granite occupy the northwest side and Gunflint chert and shale occur on the southeast side. Old trenches and pits are from the silver exploration era of the 1800’s.

About 12 km on-strike further to the northeast of the TBAM along the fault trend is located the Beck (or Silver Harbour) mine. The geology of this deposit is similar to the previously mentioned silver occurrences. It was worked between 1870 to 1872 with a 12 m deep shaft and some surface trenching. Some 10,000 ounces of silver were recovered with the adjacent 3A mine, at that time. Veining consisted of quartz and some calcite with minor fluorite, barite, galena, pyrite and sphalerite. The vein was located in a fault zone, 1.5 to 2.4 m wide, along a cliff edge in flat-lying Rove Formation shales capped by a diabase sill.

PROPERTY HISTORY

A bulldozer uncovered agate in outcrop at the mine while building a logging access road in the early 1980’s. The property was staked by a Mr. Van Bailey in 1983. George Patterson, then
Government Resident Geologist, conducted a property visit and described the agate in 1984. The property was restaked by Tim Twomey in 1992 and then staked again in 1995 by Dennis Seargeant. In November 1995, three short vertical diamond drill holes were put down in an attempt to define the extent of the flat-lying agate, with mixed results. In 1996, Seargeant made an agreement with the surface rights owner, Mr. Neil Mannula, and they conducted surface stripping that fall and in 1997. Mining commenced shortly thereafter with an aggregate permit in order to develop the mine, and the gift shop was built. In 1998, approximately 9,000 people visited the mine from as far away as Australia.

PROPERTY GEOLOGY

The agate at the TEAM property is found within an Fe-carbonate unit of the Upper Gunflint sedimentary formation near the contact with overlying Rove Formation shales. These are capped by diabase which forms a prominent mesa on the west part of the property. The area beside the steep-sided hill below the mesa is where the agate is located and mined. This steep-sided hill forms a prominent lineament at 065 degrees which is the basin-margin fault zone mapped by Moorehouse (1960) and also hosts the Thunder Bay silver mine to the southwest. About 1,500 feet further northeast from the TBAM along the fault, Moorehouse mapped an old trench with fault breccia in ferruginous chert of the Gunflint formation. This is located in the middle of claim TB.1215713, east of Highway 527 but was not relocated.

The upper part of the diabase cliff and on top of the mesa shows typical equigranular texture of medium-grained olivine diabase. The contact of the diabase with the underlying rocks is obscured by talus and glacial till. The Gunflint sediments dip about 10° to the southeast towards Lake Superior. The Fe-carbonate unit weathers rusty brown and the agate is found throughout this unit as a layer of varying thickness conformable to bedding and as discontinuous lenses. The host rock has generally weathered down to the upper surface of the hard, siliceous agate which is now the present erosional surface. The agate deposit has been exposed by stripping off an area of approximately 3.8 acres (1.5 hectares) and is open on all sides.

The agate consists of delicate-ringed stalactites and minor stalagmites formed within open spaces in the Fe-carbonate sediments. The first stage of mineralization is a dark-brown to red-brown amorphous silica followed by rhythmic finely layered alternating dark and light coloured amorphous silica. These colour bands are 1 to 5 mm wide. The stalactites are 2 to 10 cm in diameter and their length is usually two to four times their diameter. The agate also contains patchy areas of grey to blue-grey rhythmic finely layered color bands of silica. The only sulphide observed has been trace amounts of fine-grained anhedral pyrite. The stalactites are often accompanied by a whitish chalky matrix (clay alteration?) surrounding coarse-grained white quartz. The final stage is open-space filling of clear to white 1 cm long quartz crystals elongated along the C-axis in vugs and is indicative of near-surface deposition. The vugs are also partly filled with black, brittle amorphous powder (manganese oxide or carbon). Quartz crystals contain minor inclusions of the amorphous black mineral which indicates similar timing of deposition. Minor hair-line cross-fractures also contain the black mineral and are post-
Figure 4: Cross-Section in Outcrop, Thunder Bay Agate Mine.
Agate occurs within brecciated horizontally bedded Granular-Fe-carbonate unit of the Upper Gunflint Formation. This exhibits open-space filling textures mainly by apparent de-lamination of bedding into angular fragments. If this were due to acidic karsting of the carbonate host rock then the breccia should also be affected and would be rounded rather than angular.
Figure 5: Cross-Section in Outcrop, Thunder Bay Agate Mine. Agate stalactites are always oriented vertically, even within the areas between rotated breccia fragments. Note delaminated bedding grades into angular breccia and can be fit back together. This is indicative of near-surface open-space filling in an extensional environment caused by either thrust faulting or folding, rather than acidic karsting of the carbonate host rock.
Figure 6: Cross-Section in Outcrop, Thunder Bay Agate Mine. Vugs in agate are lined with clear terminated quartz crystals elongated along the C-axis. Last stage of mineralization in open-space filling is indicative of near-surface deposition. Vugs are also partly filled with black, brittle amorphous powder (manganese oxide or carbon). Quartz crystals contain minor inclusions of amorphous black mineral which indicates similar timing of deposition. Minor hair-line cross-fractures contain black mineral and are post-mineralization.
Figure 7: Cross-Section of Hand Specimen, Entrance to Terry Fox Memorial.
Cut face shown here is perpendicular to elongated double-sided amethyst lined “protrusion” within a large, flat-lying vug. The center of the protrusion exhibits multi-layered mineralizing events. The core is composed of brown, white and reddish layers of agate, surrounded by grey to reddish layered agate, surrounded by layered fine-grained disseminated to semi-massive pyrite, surrounded by stubby terminated quartz and amethyst followed by minor encrustations of fine-grained purple fluorite crystals. Sample is 1.5 times actual size.
Figure 8: Cross-Section of Hand Specimen, Thunder Bay Agate Mine. Cut face shown here is parallel to the agate/host-rock contact and the bedding plane and is perpendicular to stalactites. This shows the internal structures of the stalactites very close to their contact with the host-rock above them. Sample is shown actual size.
Figure 9: Cross-Section of Hand Specimen, Thunder Bay Agate Mine.
Cut face shown here is perpendicular to the agate/host-rock contact and the bedding plane and is parallel to stalactites. This shows the position of the stalactites and stalagmites relative to their upper and lower host-rock contacts. Sample is shown 1.5 times actual size.
mineralization as they cut all the mineralization types. Along the bottom contact of the agate are seen a regular vertical fracture pattern with a 10 to 20 cm separation. These are infilled with agate 1 to 5 mm wide and rarely penetrate the underlying rocks more than a few 10’s of cm. No vertical faulting was observed near the agate in spite of its location adjacent to the prominent 065 degree lineament along the diabase cliff. No rebrecciation textures in the agate was observed and all the stalactites are near vertical. Therefore, it appears that there has been no deformation of the agate deposit subsequent to the original brecciation. This is in sharp contrast to the local silver and amethyst deposits which are associated with vertical faults that were active before and after a number of mineralizing events producing mineralized breccias (McArthur, et al., 1993).

**DISCUSSION**

The genesis of the deposit is problematic. The open spaces were caused by apparent delamination of bedding which grades into angular breccia and can be fit back together. Agate stalactites are always oriented vertically, even within the areas between rotated breccia fragments (see Figure 5). This appears to be indicative of near-surface open-space filling in an extensional environment caused by either thrust faulting or folding. There is insufficient bedrock exposure in three dimensions to test this hypothesis. If the deposit were due to simple acidic karsting of the carbonate host rock then the breccia should also be affected and would be rounded rather than angular. It would be possible that the angular wall-rock fragments in the agate is collapse breccia from karsting only if the mineralizing fluids changed from an acidic character to neutral or reducing at that time.

This breccia structure at the TBAM may be analogous to brittle textures observed in a roadcut along the rerouted road to Sleeping Giant Park, blasted in the 1980’s. This outcrop of flat-lying Gunflint sediments exhibits brittle “thin-skinned tectonics” from near-surface folding and faulting (Personal communication, Dr. Steve Kissin, 1998).

Patterson (1984) speculates that the agate may have formed by solutions heated by the overlying diabase encountering carbonate rocks. However, John Scott, District Geologist with the Ministry of Northern Development and Mines, has observed xenoliths of agate in diabase in a quarry on the North Copenhagen Road just northeast of Highway 11-17 (personal communication, 1998).

According to Dennis Seargeant, a vertical white quartz vein was present below the agate in one location which is now mined out and suggested that it was a feeder vein to the agate (personal communication, 1998).

The timing of mineralization is poorly constrained and may be considerably younger than it’s Gunflint formation host-rock. There is a fairly close spatial relationship between the agate deposit of the TBAM as well as the other agate lenses in the region with 065 degree basin-margin faults, silver-amethyst deposits, diabase sills and the Archean/Animikie unconformity. However, there has so far been no direct contacts observed between the above features, so no genetic relationships can be put forth at this time.
The amethyst and lead-zinc-barite deposits of the area are believed to have been formed by basinal brines expelled from Sibley Group sediments into basin-margin faults during diagenesis and compaction. These were low temperature, near-surface brines and amethyst was deposited where these fluids mixed with meteoric water (McArthur et. al., 1993). The silver and agate deposits are found within the Animikie Group which is conformably older than the overlying Sibley Group. All of these deposit types show a close spatial relationship with basin-margin faults and may have formed from similar processes. The silver and agate deposits have a close spatial relationship with diabase sheets and McArthur et. al., (1993) consider the silver deposits to be somewhat older than the amethyst and lead-zinc-barite deposits of the area. However, the Caribou Mine amethyst-lead-zinc deposit in the north half of McTavish Township also has a close spatial relationship with diabase. The variations of silica, CO2 and metals within these deposits may simply be variations of a single genetic process.

RECOMMENDATIONS

Further stripping and mining of the agate deposit, especially towards the notch in the diabase mesa to the southwest, will test the area of Moorehouse' basin-margin fault (see Figure 3). The location of the old trench in fault breccia within the same hostrock as the agate deposit 1,500 feet (410m) to the northeast of it should be relocated and prospected to look for more agate. Government geologists from the Thunder Bay office of the Ministry of Northern Development and Mines have agreed to visit the property in the spring of 1999 and will map the co-ordinates of the pit with a GPS instrument. The questions raised herein would make a good thesis topic and it is suggested that Dr. Steve Kissin of Lakehead University in Thunder Bay be contacted to facilitate this.
CERTIFICATE OF QUALIFICATIONS

I, Timothy J. Twomey, of Box 88, Balmertown, Ontario, P0V 1C0, do hereby certify as follows concerning my Preliminary Geology Report on the Thunder Bay Agate Mine, dated December 4, 1998:

1. I am a 1983 graduate of Lakehead University, Thunder Bay, Ontario, holding a Bachelor of Science (Honours) degree in Geology.

2. This report is based on my personal examination of the property in August 1998 and other information cited in the references.

2. I have a 10% carried interest in the Thunder Bay Agate Mine.

December 4, 1998
Balmertown, Ontario

Timothy J. Twomey
B.Sc (Hons) Geology
REFERENCES


Moorehouse, W. W.
1960: Gunflint Iron Range in the Vicinity of Port Arthur, Ontario Department of Mines Volume LXIX, Part 7, with maps, scale 1 inch to 1 half Mile.

Patterson, G.C.

Scott, J.

Tanton, T.L.
1931: Fort William and Port Arthur, and Thunder Cape Map Areas, Thunder Bay District, Ontario; Canada Department of Mines, Memior 167, with maps, Scale 1 inch to 1 mile.
### Declaration of Assessment Work Performed on Mining Land

**Instructions:**
- For work performed on Crown Lands before recording a claim, use form 0240.
- Please type or print in ink.

### 1. Recorded holder(s) (Attach a list if necessary)

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<th>Name</th>
<th>Telephone Number</th>
<th>Fax Number</th>
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<td>192-835</td>
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### 2. Type of work performed:

- **Geological Survey**

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Please remember to:
- obtain a work permit from the Ministry of Natural Resources as required;
- provide proper notice to surface rights holders before starting work;
- complete and attach a Statement of Costs, form 0212;
- provide a map showing contiguous mining lands that are linked for assigning work;
- include two copies of your technical report.

### 3. Person or companies who prepared the technical report (Attach a list if necessary)

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<td>FOVICO</td>
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### 4. Certification by Recorded Holder or Agent

**Dennis Seargeant**, do hereby certify that I have personal knowledge of the facts set forth in this Declaration of Assessment Work having caused the work to be performed or witnessed the same during or after its completion and, to the best of my knowledge, the annexed report is true.

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<td>807-767-8215</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>88 Carl Ave, THUNDER BAY, ON</td>
<td>807-767-8215</td>
</tr>
<tr>
<td>P7B 4Z5</td>
<td></td>
</tr>
</tbody>
</table>
5. Work to be recorded and distributed. Work can only be assigned to claims that are contiguous (adjoining) to the mining land where work was performed, at the time work was performed. A map showing the contiguous land must accompany this form.

<table>
<thead>
<tr>
<th>Mining Claim Number, Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.</th>
<th>Number of Claim Units. For other mining land, list hectares.</th>
<th>Value of work performed on this claim or other mining land.</th>
<th>Value of work applied to this claim.</th>
<th>Value of work assigned to other mining claims.</th>
<th>Bank. Value of work to be distributed at a future date.</th>
</tr>
</thead>
<tbody>
<tr>
<td>eg</td>
<td>TB 7827</td>
<td>16 ha</td>
<td>$26,825</td>
<td>N/A</td>
<td>$24,000</td>
</tr>
<tr>
<td>eg</td>
<td>1234567</td>
<td>12</td>
<td>0</td>
<td>$24,000</td>
<td>0</td>
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<tr>
<td>eg</td>
<td>1234568</td>
<td>2</td>
<td>$8,892</td>
<td>$4,000</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1205293</td>
<td>1</td>
<td>$1348.00</td>
<td>$1348.00</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1205293</td>
<td>4</td>
<td>$1348.00</td>
<td>$1348.00</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td></td>
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<td>4</td>
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<td>5</td>
<td>4</td>
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<td>6</td>
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<tr>
<td>7</td>
<td>4</td>
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<td>8</td>
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<td>9</td>
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<tr>
<td>10</td>
<td>4</td>
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<tr>
<td>11</td>
<td>4</td>
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<td>4</td>
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<tr>
<td>14</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Column Totals: $1,348.

I, [Name], do hereby certify that the above work credits are eligible under subsection 7 (1) of the Assessment Work Regulation 6/96 for assignment to contiguous claims or for application to the claim where the work was done.

Signature of Recorded Holder or Agent Authorized in Writing

Date

6. Instructions for cutting back credits that are not approved.

Some of the credits claimed in this declaration may be cut back. Please check (✓) in the boxes below to show how you wish to prioritize the deletion of credits:

- [ ] 1. Credits are to be cut back from the Bank first, followed by option 2 or 3 or 4 as indicated.
- [ ] 2. Credits are to be cut back starting with the claims listed last, working backwards; or
- [ ] 3. Credits are to be cut back equally over all claims listed in this declaration; or
- [ ] 4. Credits are to be cut back as prioritized on the attached appendix or as follows (describe):

Note: If you have not indicated how your credits are to be deleted, credits will be cut back from the Bank first, followed by option number 2 if necessary.

For Office Use Only

[Stamp] Received

Deemed Approved Date

Date Notification Sent

Date Approved

Total Value of Credit Approved

Approved for Recording by Mining Recorder (Signature)
Ontario Ministry of Northern Development and Mines

Statement of Costs for Assessment Credit

2.19154

Transaction Number (office use) W99400000

Personal information collected on this form is obtained under the authority of subsection 6(1) of the Assessment Work Regulation 6/96. Under section 8 of the Mining Act, the information is a public record. This information will be used to review the assessment work and correspond with the mining land holder. Questions about this collection should be directed to the Chief Mining Recorder, Ministry of Northern Development and Mines, 6th Floor, 933 Ramsey Lake Road, Sudbury, Ontario, P3E 6R5.

<table>
<thead>
<tr>
<th>Work Type</th>
<th>Units of Work</th>
<th>Cost Per Unit of work</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geological mapping and report</td>
<td>4 days</td>
<td>$250/day</td>
<td>$1000</td>
</tr>
</tbody>
</table>

Associated Costs (e.g. supplies, mobilization and demobilization).

Transportation Costs

Vehicle: Thunder Bay - $348

Food and Lodging Costs

Total Value of Assessment Work $1348

Calculations of Filing Discounts:

1. Work filed within two years of performance is claimed at 100% of the above Total Value of Assessment Work.
2. If work is filed after two years and up to five years after performance, it can only be claimed at 50% of the Total Value of Assessment Work. If this situation applies to your claims, use the calculation below:

   \[
   \text{Total value of work claimed} = \text{Total Value of Assessment Work} \times 0.50
   \]

Note:
- Work older than 5 years is not eligible for credit.
- A recorded holder may be required to verify expenditures claimed in this statement of costs within 45 days of a request for verification and/or correction/clarification. If verification and/or correction/clarification is not made, the Minister may reject all or part of the assessment work submitted.

Certification verifying costs:

I, (please print last name), do hereby certify, that the amounts shown are as accurate as may reasonably be determined and the costs were incurred while conducting assessment work on the lands indicated on the accompanying Declaration of Work form as (recorded holder, agent, or state company position with signing authority) I am authorized to make this certification.

Signature Date

Certification verifying costs:

1. (please print last name), do hereby certify, that the amounts shown are as accurate as may reasonably be determined and the costs were incurred while conducting assessment work on the lands indicated on the accompanying Declaration of Work form as (recorded holder, agent, or state company position with signing authority) I am authorized to make this certification.

Signature Date
March 12, 1999

DENNIS HAROLD SEARGEANT
88 CARL AVE.
THUNDER BAY, Ontario
P7B-4Z5

Dear Sir or Madam:

Submission Number: 2.19154

Subject: Transaction Number(s):
W9940.00003 Deemed Approval

We have reviewed your Assessment Work submission with the above noted Transaction Number(s). The attached summary page(s) indicate the results of the review. WE RECOMMEND YOU READ THIS SUMMARY FOR THE DETAILS PERTAINING TO YOUR ASSESSMENT WORK.

If the status for a transaction is a 45 Day Notice, the summary will outline the reasons for the notice, and any steps you can take to remedy deficiencies. The 90-day deemed approval provision, subsection 6(7) of the Assessment Work Regulation, will no longer be in effect for assessment work which has received a 45 Day Notice. Allowable changes to your credit distribution can be made by contacting the Geoscience Assessment Office within this 45 Day period, otherwise assessment credit will be cut back and distributed as outlined in Section #6 of the Declaration of Assessment work form.

Please note any revisions must be submitted in DUPLICATE to the Geoscience Assessment Office, by the response date on the summary.

If you have any questions regarding this correspondence, please contact Steve Beneteau by e-mail at steve.beneteau@ndm.gov.on.ca or by telephone at (705) 670-5855.

Yours sincerely,

Blair Kite
Supervisor, Geoscience Assessment Office
Mining Lands Section
### Work Report Assessment Results

**Submission Number:** 2.19154  
**Date Correspondence Sent:** March 12, 1999  
**Assessor:** Steve Beneteau

<table>
<thead>
<tr>
<th>Transaction Number</th>
<th>First Claim Number</th>
<th>Township(s) / Area(s)</th>
<th>Status</th>
<th>Approval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>W9940.00003</td>
<td>1205293</td>
<td>MACGREGOR</td>
<td>Deemed Approval</td>
<td>March 03, 1999</td>
</tr>
</tbody>
</table>

**Section:**  
12 Geological GEOL

**Correspondence to:**  
Resident Geologist  
Thunder Bay, ON

**Assessment Files Library**  
Sudbury, ON

**Recorded Holder(s) and/or Agent(s):**  
DENNIS HAROLD SEARGEANT  
THUNDER BAY, Ontario
REFERENCES

NOTICE:
The information that appears on this map has been compiled from various sources, and accuracy is not guaranteed. Those wishing to stake mining claims should consult with the Mining Recorder, Ministry of Northern Development and Mines, for additional information on the status of the lands shown on it.

AREAS WITHDRAWN FROM DISPOSITION

M.R.O. - MINING RIGHTS ONLY
S.R.O. - SURFACE RIGHTS ONLY
M.+ S. - MINING AND SURFACE RIGHTS

DESCRIPTION ORDER No. Date Definition Point

SURFACE AND MINING RIGHTS WITHDRAWN FROM SIMONS ORDER W-43/75. AUG 1982.
SEE MACGREGOR TWP. LANDS ORDER SUB. 200(4) THE MINNMO ACT.

LEGEND

HIGHWAY AND ROUTE No
OTHER ROADS
TRAILS
SURVEYED LINES:
TOWNSHIPS, BASE LINES, ETC.
LOTS, MINING CLAIMS, PARCELS, ETC.

UNSURVEYED LINES:
LOT LINES
PARCEL BOUNDARY
MINING CLAIMS ETC.

RAILWAY AND RIGHT OF WAY
UTILITY LINES -
NON-PERENNIAL STREAM
FLOODING OR FLOODING RIGHTS
SUBDIVISION OR COMPOSITE PLAN
RESERVATIONS
ORIGINAL SHORELINE
MARSH OR MUSKEG
MINES
TRAVERSE MONUMENT

DISPOSITION OF CROWN LANDS

TYPE OF DOCUMENT

PATENT, SURFACE & MINING RIGHTS...
SURFACE RIGHTS ONLY
MINING RIGHTS ONLY
LEASE, SURFACE & MINING RIGHTS
SURFACE RIGHTS ONLY
MINING RIGHTS ONLY
LICENCE OF OCCUPATION
ORDER IN-COUNCIL
RESERVATION
CANCELLED
SAND & GRAVEL
LAND USE PERMITS FOR COMMERCIAL TOURISM, OUTPOST CAMPS

NOTE: MINING RIGHTS IN PARCELS PATENTED PRIOR TO MAY 6, 1913, VESTED IN ORIGINAL PATENTEE BY THE PUBLIC LANDS ACT, R.S.O. 1970, CHAP. 380, SEC. 03.

SCALE: 1 INCH = 40 CHAINS
1000 2000 4000 8000 2000 4000 8000 16000
1 KM) 2 KM (2 KM)

TOWNSHIP
MACGREGOR
M.N.R. ADMINISTRATIVE DISTRICT
THUNDER BAY
MINING DIVISION -
THUNDER BAY
LAND TITUS/REGISTRY DIVISION
THUNDER BAY
Ministry of Northern Development
Ministry of Natural Resources and Mines

OCTOBER, 1986.
In Service July 27/93.

MACGREGOR
THUNDER BAY
LAND TITUS/REGISTRY DIVISION
THUNDER BAY

TOWNSHIP
MACGREGOR
M.N.R. ADMINISTRATIVE DISTRICT
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G-672