

**INTERPRETIVE REPORT  
ON  
BC GOVERNMENT  
AIRBORNE GEOPHYSICS  
AND  
REGIONAL STREAM SEDIMENT SAMPLING  
WITHIN AND AROUND THE  
CHACO BEAR PROPERTY  
DRIFTWOOD RIVER, BEAR LAKE AREA  
OMINECA MINING DIVISION, BRITISH COLUMBIA**

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**BC Geological Survey  
Assessment Report  
33150**

**PROPERTY LOCATION:** 155 km north of the town of Smithers  
56° 16' N Latitude, 126° 92' W Longitude  
NTS: 92D/02, 03BCGS: 94D.015, 94D.016

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## **SUMMARY and CONCLUSIONS**

The Chaco Bear Property is located in the Omineca Mining Division, approximately 4 kilometers west of Bear Lake and 155 kilometers due north of Smithers.. The property is comprised of 12 contiguous tenures that total 4,310 hectares.

The government-funded RGS sampling program has seven sites around and within the Chaco Bear Property for which anomalous results may be caused by mineralization with the property. One of the strongest anomalous results occurs at the Driftwood River site which occurs south of the property and which drains its central part where mineralization is known to occur. This site is strongly anomalous in copper, zinc, arsenic, and lead; and moderately anomalous in gold, silver, and molybdenum.

Also sample sites south, west, and north of the property as well as two sample sites within the eastern part of the property indicate mineralization of economic interest may occur within the southern, western, northern and eastern parts of the property.

The airborne magnetic survey shows that a magnetic high underlies much of the property which is probably due to basic to ultrabasic volcanic rock-types. The western part of the property has a stronger magnetic feature which may be caused by an ultra-basic rock-type.

The gravity survey shows that the property occurs on the eastern edge of a gravity high anomaly occurring to the west. This may be caused by an intrusive, much of which would occur below the surface and which may belong to the Bulkley Plutonic Suite. This intrusive may be the source of mineralization on the property as well as possibly being the heat engine causing the mineralization.

## **RECOMMENDATIONS**

Recommendations have been given in previous reports but have not been followed up on due to lack of funding. It consists of MMI soil sample, magnetic, and induced polarization/resistivity surveying as well as geological mapping.

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**INTRODUCTION AND GENERAL REMARKS**

This report discusses the results of government-funded regional geochemistry sampling, specifically stream sediment type, that occur on and around the Chaco Bear Property, as well as government-flown magnetic and gravity surveys over the property.

The purpose of the exploration program on this property is to look for (1) calc-alkalic porphyry copper type mineralization, possibly associated with gold and silver values, especially underlying the Core Alteration Zone, and (2) epithermal gold/silver vein-type mineralization.

Sections of this report are taken from John Ashton's 2010 report (AR31325).

**PROPERTY AND OWNERSHIP**

The property is comprised of 12 contiguous tenures that comprise an area of 4,310 ha and is located within the Omineca Mining Division as shown on figures #2 and #3: These tenures occur on NTS map sheet 93D/02, 03 and on BCGS map sheets 094D.015 and 094D.016.

<u>Tenure Number</u>	<u>Type</u>	<u>Claim Name</u>	<u>Good Until</u>	<u>Area (ha)</u>
561260	Mineral	CHACO BEAR 12	2012-11-26	306.4422
561261	Mineral	CHACO BEAR 13	2012-11-26	324.2965
598583	Mineral	CHACO BEAR 21	2012-12-02	378.2379
598586	Mineral	CHACO BEAR 22	2012-10-02	108.0675
598587	Mineral	CHACO BEAR 24	2012-10-02	162.0489
598588	Mineral	CHACO BEAR 23	2012-12-02	378.1161
598589	Mineral	CHACO BEAR 25	2012-10-02	252.0168
836222	Mineral	CHACO BEAR 1	2012-07-23	450.4767
312052	Mineral	CHACO BEAR 2	2013-01-17	500
312053	Mineral	CHACO BEAR 3	2013-01-17	500
312054	Mineral	CHACO BEAR 4	2013-01-17	500
561258	Mineral	CHACO BEAR 11	2012-11-26	450.4757
<b>Total Area: 4310.1783 ha</b>				

The expiry dates shown assume that the work discussed within this report will be accepted for assessment credits.

The claims are owned by David Mark and are being optioned by Sitka Holdings Ltd. of Vancouver, British Columbia.

### **LOCATION AND ACCESS**

The centre of the Chaco Bear tenures is approximately 4 kilometers west of Bear Lake, British Columbia, at Longitude 126°92'28" West and Latitude 56°16'15" North. UTM NAD 83 coordinates are Zone 9, 629000 East, 6226000 North. The NTS Map Sheet is 94D.

The property is located about 155 km due north of Smithers and 350 km north-northwest of Prince George. The Kemess Mine is located about 100 km north-northeast of Chaco Bear, and the deep-sea seaport town of Stewart is 225 km west.

The actively operated rail line of the Canadian National Railway (CNR) (formerly the British Columbia Railway) passes on the east side of Bear Lake. Similarly logging roads along the east side of Bear Lake provide access from Fort St. James which is serviced by the provincial highways system. Subject to permitting and construction issues, it appears that if the need arises road access to the Chaco Bear property can be readily provided. Speculatively, the British Columbia government has contemplated the feasibility of construction of the Stewart-Omineca Road that would provide access from the Sustut/Bear Lake area to the deep sea port of Stewart for the benefit of the Kemess Mine and other mineral prospects in that region.

Access to the Chaco Bear property is by road or railroad to Bear Lake and thence by helicopter to the property. The more practical route is by helicopter using services that are

available on a seasonal basis from Lovell Cove on Takla Lake, and year-round from Smithers and Fort St. James. A rough airstrip at Bear Lake may be used by suitably equipped aircraft.

## **PHYSIOGRAPHY AND VEGETATION**

The prevailing climate in the Driftwood River valley may be characterized as "Interior Wet Belt" - winters are cold, with heavy snowfall (2 to 6 metres, with on-the-ground snowpack of 2 metres) and summers are pleasantly warm, with extended rain-free periods but occasional thunderstorms. Even though much of the Chaco Bear is situated above treeline, forest fires are a summer hazard and smoke accumulations may interfere with aircraft usage.

The Driftwood Valley is located in mountainous terrain, with nearby slopes rising to 2,200 metres above the valley floor that lies at 1500 metres. Mountains west of the Valley are ragged with serrated and knife edge-like ridges and peaks; to the east, ridge lines are lower and more gently defined. The Driftwood River is an immature fast-flowing stream with large variation in seasonal flows.

Treeline in the Chaco Bear area is at about 1,500 m: the majority of the tenures are near or above that elevation and stable slopes support alpine vegetation with grasses and tanglefoot conifers. Lower, forested areas support an abundant growth of small alpine fir, white and black spruce, and lodgepole pine. Talus slopes are present in much of the area.

Rock outcroppings are abundantly present in most parts of the Chaco Bear tenures, sufficient to allow gathering of "good" geological data. The exception is along the valley bottom of Driftwood River where talus, ferricrete, organic soils and marshy ground are dominant. Geological reconnaissance and mapping of the east-facing slope along the west side of the River is particularly frustrated by the presence of ferricrete.

According to research by the Geological Survey of Canada (Lord, 1948), the best evidence for the direction of movement of the ice-sheet was found only in the northeast half of the map area, NTS 94D, where ice movement was dominantly from west to east and southeast. U-shaped valleys at the headwaters of Driftwood River, particularly on Chaco Bear 4 claim, were created by alpine glaciers that flowed southeasterly.

## **HISTORY OF PREVIOUS WORK**

This section is taken from Ashton's report.

Early mineral exploration data for the Bear Lake-Chaco Bear area are poorly preserved. It is known that, among others, Cominco (now Teck), Noranda and Canadian Superior conducted prospecting-type surveys but much of their work was never submitted in accessible form. Work of scientists of the Geological Surveys of Canada and British Columbia and that of Suncor Inc. in 1985 and 1986, and Imperial Metals Corporation in 1996 and 1997 are preserved in publications and ARIS files. Numerous prospects on the tenures preserve signs



of early trenches and test pits that may be as old as the 1930's. Verifiable work and the operators include but may not be limited to the following:

**1930's or 1940's?** An area measuring about 2.4 km (1.5 miles) north-south by 1.6 km (1.0 mile) east-west at the north end of the Chaco Bear 1 to 4 mineral claims was claimed by 14 mineral claims that were surveyed for the purpose of applying for Crown Grant status. The application did not go forward. These claims are shown on NTS Map 94 D/2, Salix Creek south of Mount Coccola, east of the north end of Bear Lake.

**1948** The Driftwood River area was mapped by C. S. Lord as part of a regional geological survey (McConnell Creek Area; Geological Survey of Canada; Memoir 251).

**1968** Cominco (now Teck) staked the Dave Claims at the south end of "Big Lake" in the upper portion of Driftwood River. Anomalous stream sediment geochemistry guided the company to the area. They completed 7.8 line-miles of horizontal loop electromagnetic survey but the survey was unsuccessful in locating any conductors and it was concluded that the highly oxidized nature of the sulphides in the limited area of the survey insulated the sulphide grains from contiguous grains and blocked EM induction effects. The claims were abandoned.

**1984** Suncor Inc. of Calgary, Alberta, staked the Peteka 1-4 claims and completed stream sediment sampling, prospecting, and rock sampling. Their survey results identified highly anomalous gold and copper values in the stream sediments and from intensely altered rock samples.

Suncor's work resulted in recognition of areas of strongly developed veining with abundant specular hematite and significant values in copper, gold and silver. Free gold was reported in association with specularite in quartz veins. Geochemical soil survey work, a VLF-EM survey, and a total field magnetometer survey were also completed. Samples returned assays of up to 16.5% Cu, 0.255 oz/ton Au and 13.44 oz/ton Ag. Suncor interpreted the "mappable structural features" (the mineralized ones) "as major joint fractures and shear zones" striking 140° to 150° degrees azimuth (320° to 350° azimuth) and dipping 50° to as much as 70° southwest. A second set of mineralized structures striking between 40° to 45° azimuth with dips 60 to 70 degrees northwest, and northwest and northeast striking shears were identified as host structures of mineralization. The geochemical soil survey showed that "most" of the surveyed area is anomalous in copper and gold (ARIS #24882). A large copper, zinc, and lead in-soils anomaly with a contiguous gold anomaly was delineated in the northwest quadrant of CB 4 claim.

At least ten prominent very-low frequency (VLF) electromagnetic (EM) anomalies were found in what was later mapped as the core alteration zone of a hydrothermal system. The EM anomalies strike more or less northwesterly (approximately 325° azimuth).

Suncor's total field ground magnetometer survey resulted in the discovery of a strong magnetic anomaly, up to 2,000 gammas in amplitude, which occupies the central part of the Driftwood Creek valley west of the creek (ARIS #14424). The anomaly coincides with one of the most heavily altered areas in the valley and is interpreted to be the central core zone of the classic magnetite-rich potassium-silicate alteration zone of a concealed porphyry copper deposit. Suncor also noted vuggy quartz-specularite with chalcopyrite veins in this vicinity and elsewhere which contain massive chalcopyrite and specularite: the massive chalcopyrite occurs locally with the specular hematite, both adjacent to the hematite and as open space vug fillings within the hematite. Assays from several occurrences showed significant copper with gold and silver. Thin section analyses by Suncor showed that gold in the specularite occurs as free gold in quartz. Vuggy quartz vein/breccia with grey massive specular hematite with free gold in quartz in the hematite is one of the main diagnostic features of the top of a fully preserved high-sulphidation epithermal mineralizing system.

**1985** Suncor Inc. continued prospecting, a limited amount of geological mapping, geochemical soil sampling, rock sampling, a VLF-EM survey, and a total field magnetic survey in a 1 square mile intensely altered area bisected by the Driftwood Valley that is now mostly covered by Chaco Bear 4 claim. Their results showed coincident or nearly coincident anomalous responses from all the survey programs in this central area of interest. In addition, many quartz, quartz-carbonate, carbonate and specularite veins, many of which contained high values in copper, gold and silver, were examined. Mapping identified a breccia pipe within the intensely altered area.

Suncor Inc. abandoned the property when their mineral exploration division was closed.

**1992** J. M. Ashton, P. Eng. acquired the Chaco Bear property by staking; and completed a shallow-probe reconnaissance-type induced-polarization (IP) survey over the northeastern part of the alteration zone. A high-chargeability, low-resistivity anomaly with its long axis oriented north-northwesterly was found coincident with one of ten VLF-EM anomalies identified by Suncor. The IP anomaly also coincided with the Suncor's strongest copper-zinc-lead-gold geochemical anomaly. The multi-element geochemical anomaly has a strike length of about 1,200 metres (4,000 feet).

A two line reconnaissance induced polarization (IP) survey completed by J. M. Ashton & Associates in 1992 over the most northeasterly EM anomaly of the ten identified by Suncor was reported in ARIS #22958. The EM target is concealed by overburden and was one of three EM anomalies which were coincidental to Suncor's large multi-element (Cu, Au, Pb, Zn) geochemical anomaly located in the northwest quadrant of CB 4 claim. The anomalous geochemical feature is 1,200 m in strike length and up to 160 m wide. The IP survey showed high-chargeability with corresponding moderately low-resistivity that was interpreted as an indication of the presence of significant amounts of sulphides; possibly semi-massive to massive sulphides. The IP anomaly is open to depth and to the southeast and the coincidental IP response suggests that the conductive material responsible for the EM anomaly is electronic and not ionic. The core zone of intense hydrothermal alteration was

mapped (by B. Mackie, P. Eng.) and found to envelop the largest and the strongest EM anomalies.

A geological examination of the property by a specialist geologist working with Ashton confirmed the extensive zone of alteration and identified classic alteration facies and zonation symmetry of a transitional geological environment that has the potential for discovery of mineralization from epithermal to a high level porphyry system. Economic minerals include those associated with gold-rich porphyry copper, high sulphidation copper-gold lodes and low sulphidation gold lodes.

**1996/97** Imperial Metals Corporation in 1996 optioned the claims and conducted two small exploration programs consisting of rock and soil geochemical sampling. The first program of rock sampling confirmed the presence of anomalous gold and copper mineralization from areas previously sampled by Suncor Inc. in 1984 and 1985. Results included a high of 22.16 grams/t Au and 6.81% Cu from one rock sample. Prospecting in the Chaco Bear area by Imperial Metals Corporation in 1997 (see below) showed several narrow, mineralized felsic dikes containing chalcopyrite, specularite and magnetite. One sample assayed 3% copper and 0.10 oz/t gold. A soil survey over a small grid in CB 1 claim did not return any anomalous results in copper or gold.

Imperial's 1996 prospecting work found grab samples that returned assay values as high as 25.5 g/t gold, 10,530 g/t silver and 36.9% copper (ARIS #24567). Imperial also directed work to one of Suncor's vein targets located in CB1 claim. They completed a Max-Min geophysical survey followed by a five hole drilling program that which was unsuccessful in explaining the anomalous results. A second 1996 program consisted of further prospecting, geological mapping, and rock sampling throughout the property, and on CB 1 claim (now expired), a horizontal-loop max-min electromagnetic survey and some drilling. The prospecting and sampling program outlined numerous areas with narrow brecciated quartz-carbonate veins with anomalous gold, copper and silver values. Grab samples assayed as high as 0.744 ounces/t Au, 307 ounces/t Ag and 36.9% Cu. Five exploratory holes were drilled on CB 1 into a fault bounded quartz-carbonate vein system. One hole of this program was drilled on a Max-Min electromagnetic anomaly. All drill holes returned copper, gold, and silver mineralization but mostly low, uneconomic, metal values. The best hole, CB96-1, returned assays of 0.45 g/t Au, 5.61 g/t Ag, and 0.6% Cu over a width of 6.8 metres.

Imperial Metal's 1997 exploration program included claim staking, prospecting and rock sampling, reconnaissance and detailed geological mapping, a limited amount of VLF-EM geophysical surveying and 1,382 m of diamond drilling. Most of the drilling was directed to outlier vein systems away from the central alteration area. Although drilling widths and grades were uneconomic, prospecting discovered numerous vein showings which were mapped, sampled, and assayed and returned assays as high as 16.8% Cu, 0.82 oz/t Au and 34.3 oz/t Ag. An area of altered, brecciated, and mineralized rhyolite dikes was found to contain anomalous gold values, averaging about 0.75 grams/t Au over an aggregate width of 73 m (ARIS #25270).

**1997** Imperial engaged Geotex Consultants Ltd. (P.B. Read) who completed extensive geological mapping, established the geological formations and confirmed the large zone of alteration in the central southern section of the property. Late in the exploration program as a result of drilling shear hosted copper-gold-silver mineralization in the northeast part of the property, strongly altered rhyolite dikes with similarly altered andesitic wall rocks were discovered. These lithological intersections which were fractured and brecciated contained geochemically anomalous gold values throughout.

Geological mapping by Dr. Read for Imperial showed that the lower section of volcanics is made up of an incomplete sequence of the Hazelton Series consisting of a restricted Telkwa Formation that is unconformably overlain by a sequence of felsic extrusive rocks consisting of andesites, dacites, and rhyolites up to 600 metres thick. The Telkwa Formation contains andesites, andesite tuffs, rhyodacite breccias and basalt, many of which exhibit fragmental textures. Rock geochemistry shows shoshonitic or potassic composition. Dr. Read named the section of felsics the "Unnamed Formation", a unit that comprises porphyritic dacite, rhyolite flows and tuffs, dacite flows and aphyritic andesite. The rhyolite is significant in that it includes a sequence of welded and unwelded tuff that is as much as 300 metres thick. The unconformity shows that there was a hiatus in the evolution of the volcanic pile with the felsic stage of eruptives temporally delayed.

In addition to geological mapping, extensive prospecting and rock sampling was undertaken over several prospective areas. Two small VLF-EM surveys, totalling about 6.5 line-km, were conducted and four target areas were tested by eleven diamond drill holes drilled from seven sites for a total length of 1,382.2 metres (Raven, 1997). Imperial relinquished their option late in 1997.

**1997** the British Columbia Geological Survey Branch released the results of a multi-element stream-sediment Regional Geochemical Survey which covered the entire NTS 94D, McConnell Creek map sheet. The results show a large and strong precious metals pathfinder anomaly of Au + Sb + As + Ag + Hg in a large proportion of the Chaco Bear claim area. This anomaly is coincident with the largest and strongest base metal pathfinder anomaly of Cu + Pb + Zn + Ag + Ba.

Read reported that shear zones and faults are widespread below the Unnamed Formation and that the major faults strike northwesterly and northerly and have a "...subvertical or westerly component of dip, are probably pre-vein in age, and provided channelways and open space for the vein mineralization" (Read, 1997, p. 6).

At one location close to the sub-Unnamed Formation unconformity, float boulders with vuggy-quartz veins containing bomite, chalcopyrite and specularite, assayed up to 10.6% copper, 0.57 oz/t gold, and 42 oz/t silver. Several other locations along the unconformity contain vuggy quartz-carbonate veins with significant gold, silver, and copper minerals. Read (op. cit., 1997) described a mineralized vein exposure in a creek, in the meadows southwest of "Rusty" Lake that features vuggy quartz-specularite veining cutting

hydrothermally altered bedded tuffs. Alteration consists of disseminated pyrite-quartz ± sericite.

Suncor and Imperial identified a large zone of surficial "ferruginate" (compacted limonite/goethite of transported or local derivation) that appeared to be 3 to 4 metres thick, and possibly thicker, along both sides of Driftwood River. The ferruginate is present in most of the western half of CB4 tenure and extends upslope into CB3, covering an area at least 1.3 km by 1.3 km. Its western upslope origin it is bounded by a large gossan zone. The core hydrothermal alteration area of disseminated pyrite-quartz ± sericite in felsic volcanics is largely concealed by the ferruginate and is the site of seven of the ten EM anomalies. Suncor tested seven anomalies by conventional geochemical sampling: correspondence of anomalies geochemistry within the ferruginate zone with the EM anomalies was poor, however where ferruginate was absent, e.g. the three north easternmost EM anomalies, the correspondence was very good. All EM-anomalous areas showed anomalous MMI metal values, including in some areas, significant base metal values (Ashton, 2008, ARIS #29590). Two of Suncor's largest and strongest EM anomalies are concealed beneath ferruginate: the effect of the ferruginate with respect to conventional geochemistry is unknown. One EM anomaly has 1 km strike length and 100 metre width: its characteristic crossover wave form may represent a steeply dipping tabular body, possibly accompanied by semi-massive or massive sulphide mineralization (Ashton, 2007, op. cit.). The anomaly strikes 325° azimuth, similar to observed mineralized veins with "high grade" values.

**2004** a geological mapping program in the western three-quarters of McConnell Creek map area was completed and released in 2004 by the Geological Survey of Canada (Evanchick and Porter, 1993). It showed that "Uppermost Hazelton Group" strata in north McConnell Creek map area (the area partly occupied by the Chaco Bear minerals claims) although of Callovian age (Upper Middle Jurassic), are lithologically similar to (and in the same stratigraphic position as) strata which host the Eskay Creek Au-Ag deposit on the west side of the Bowser Basin

**2007** Sitka Holdings Ltd., owner of the Chaco Bear mineral claims, optioned them to Houston Minerals Inc. (Houston) in 2007. Houston conducted a reconnaissance multi-element Mobile Metal Ion (MMI) geochemical survey over two areas of interest on the claims and obtained strongly anomalous precious and base metals analyses over three of the VLF-EM anomalies that had been identified in 1985 by Suncor Inc. One large gold anomalous area was indentified in an area of favourable lithology that had not been included in the VLF-EM survey

Historic data, as outlined and summarized above, suggest that the hydrothermally altered area may contain (several) structurally controlled fully preserved high-sulphidation gold and/or gold copper deposits. In addition there is evidence of low-sulphidation epithermal mineralization within this same altered system that could enrich the former with overprinting by the latter. A structural interpretation using satellite imagery should supplement the existing structural knowledge, or confirm the structural sites occupied by

the EM anomalies and boost the understanding of the ore genesis within this well mineralised system. Using this tool to identify other nearby structurally prepared sites that could host epithermal deposits related to this magmatic hydrothermal event is well justified.

## **GEOLOGY**

This section is taken from Ashton's report.

### **Regional**

The Driftwood River region was geologically mapped in 1941 - 1945 by C. S. Lord for the Geological Survey of Canada (Lord, 1948). The rocks were assigned to the Upper Jurassic division of the Takla Group volcanics. Richards, also of the GSC, in 1976 re-classified the rocks as forming part of the Hazelton Group volcanics. Read, in 1997, further subdivided the Hazelton Group rocks of Lower to Middle Jurassic age into an upper unit of mostly sedimentary rocks and a lower unit of mostly volcanic rocks. The Chaco Bear claims are underlain primarily by the lower unit rocks. Figure 3, from BC Geology Map (Map Place website) illustrates the regional geology of the Chaco Bear -Bear Lake area.

### **Property**

The Chaco Bear property was geologically mapped in 1997 by Geotex Consultants Limited (P. B. Read) for Imperial Metals Corporation.

Much of the Chaco Bear property is underlain by a thick succession of intermediate to basic metavolcanic rocks of the Telkwa Formation, the lowest member of the Hazelton Group which occupies the western and central portions of the property. Most of the units are of andesitic composition and comprise red and green coloured aphyric andesite flows, fine and coarser grained plagiophyric andesite flows, grey and maroon coloured basaltic flows and andesitic lithic ash tuffs, and flow breccias.

The eastern portion of the Chaco Bear claims is underlain by felsic metavolcanic rocks comprising flow-layered rhyolite flows, rhyolite welded and unwelded lapilli ash tuffs, porphyritic dacite flows and tuffs, and lesser aphyric andesite flows.

The only intrusive body of any size was located in the western part of the claims: a leucogranite to leucosyenite body that extends beyond the western property boundary.

All of the volcanic units are cut by mafic and felsite dikes, primarily volcanic in appearance and texture, with minor diabase intrusive dikes. The felsite dikes are fine grained, white to greenish-white, and are commonly flow banded, particularly at the margins. They are likely rhyolitic in composition and may be related to the thicker felsic volcanics on the east ridge, or possibly to the Kastberg intrusions that are found elsewhere in the district. The parent source of the dikes is uncertain. Mafic dikes occur throughout the property and are

compositionally similar but with a variety of textures, from massive coarse grained, to layered feldspar phyric types.

The youngest units mapped are found on the ridge east of upper Driftwood River in the Unnamed formation of the Hazelton Group and comprise light to medium grey dacite flows with fine plagioclase laths. The unit is underlain by grey-green aphyric andesite flows of undetermined thickness that occur within a thick succession of rhyolitic flows and tuffs. The rhyolite assemblage is up to 300 metres thick and comprises tuff, lapilli tuff, and local spherulitic flows with coarse grained spherules up to 3-4 cm in cross section. This distinctive unit occurs over the length of the property and serves as a prominent marker horizon. It overlies porphyritic dacite flows and tuffs which were distinguished in the northern portion of the property. These latter flows appear to disappear to the southeast.

In summary, the majority of units mapped are of andesitic composition and occur in a northwest trending belt that extends through the length of the property.

## **Mineralization**

Large parts of the Chaco Bear tenures have zones of hydrothermal alteration comprising a porous assemblage of finely disseminated pyrite, quartz and sericite.

The alteration has produced similar mineral suites irrespective of the host formation.

An alteration assemblage located at the basal unconformity of a rhyolite member of the "Unnamed" formation (per Read, 1997, p. 4) occurs on the east side of Driftwood Creek. It includes disseminated pyrite and weathers to a strongly coloured gossan.

A 600 metre long canyon in the Driftwood River north and south of "Rusty" Lake exposes zones of strongly disseminated pyrite-quartz±sericite alteration in undivided volcanics.

The so-called "Cigar Lake" zone is located on the east side of Tsaytut Spur immediately south of Cigar Lake (Gossan Zone) on CB 3 Claim. Mineralization comprises disseminated pyrite in felsic dikes and andesitic volcanics. The zone borders the Gossan Zone (see below) upslope to the west to the ridge top of Tsaytut Spur and the Ferruginate zones (see below), downslope to the Driftwood Creek valley near Rusty Lake.

The "Gossan Zone" to the west is manifested by three prominent limonite altered gossanous knobs aligned northwesterly over a length of 1.3 kilometres. Geologically this area is complex due to the presence of mafic and felsic dikes that crosscut andesitic flows and tuffs, and to pink leucogranite to leucosyenite dikes that intrude the area. The felsic dikes are found mostly as white to pale green coloured variably flow layered units that crosscut the volcanic stratigraphy and are impregnated with pyrite, quartz and sericite.

The "Ferruginate Zone" comprises a series of prominent gossans developed on rusty weathering agglomerate located both in the Driftwood River and along tributaries that drain

easterly from the Gossan Zone into the Driftwood River. The host unit is either a tuffaceous dacite or quartz-sericite altered andesite tuff with widespread disseminated pyrite, up to 10%. The characteristic feature of this zone is the development of a thick cap of ferricrete which outcrops both sporadically and prominently in the creek beds down to the Driftwood River itself and partway up the eastern side of the valley. On the west side of the Driftwood River it appears as a cap up to 4 metres thick on a less iron altered andesitic agglomerate. In outcrops beside Driftwood River, the ferricrete appears to be 30 metres thick.

A meadowed bench southwest of Rusty Lake exposes very strongly altered plagiophyric meta-andesite dikes and rocks of unknown protolith. Intense pyrite-quartz  $\pm$  sericite alteration accompanies these closely fractured rocks.

In summary, the Chaco Bear property hosts many areas of vein mineralization, in joints, shears, fractures, and faults. Though narrow, the veins can carry significant amounts of copper, gold, and silver, with previously reported assay values of trace up to 16.8% Cu, 0.82 ounces/t Au and 42 ounces/t Ag (reference: Raven and van Damme, 1997). Mineralized vein types are found throughout the area and include but are not limited to: quartz-carbonate veins, carbonate veins, specularite-carbonate veins, specularite veins, vuggy silica chalcopryite-specularite veins, massive specularite veins, massive sulphide veins, veinlets of chalcopryite, gold, pyrite, galena, sphalerite, specularite, crustified quartz and calcite. Reported mineral species include specularite, chalcopryite, gold, pyrite, bomite, chalcocite, argentite? galena, sphalerite, quartz, calcite, and ferroan dolomite. Veins range from a few centimetres to 0.5 metres in width with some specularite veins as much as 1.5 metres in width. The zones include both high- and low-sulphidation epithermal systems.

A propylitic zone peripheral to the core alteration zone hosts many of the above-listed vein types in shears, joints and fault structures. The zone extends as far as 1.5 km from the core area. Assays from these veins are as high as 16.8% copper, 0.82 ounces gold per tonne and 4.67 ounces silver per tonne (Raven and von Damme, 1997, and others). Of possible special interest are vuggy quartz-specularite veins that consistently carry significant gold values.

Hartley, in 1986 for Suncor, stated that generally massive chalcopryite occurs locally with specular hematite both adjacent to the hematite and as open space vug filling within the hematite (ARIS #14424). His microscope-aided examination of the gold in the hematite veins showed it to occur as free-gold in quartz with no preference for association with sulphides, either pyrite or chalcopryite. Frequently free gold in quartz in high-sulphidation vein systems is diagnostic of proximity to the top of the system: hence it is possible that at Chaco Bear the system is fully preserved.

Sampling of several altered and mineralized rhyolite dikes that form part of a mineralized shear zone located below the Unnamed Formation on CB 4 claim showed anomalous gold values. The rhyolites, which pre-date the mineralizing event, are inherently brittle and may have been brecciated and fractured by the mineralizing event. The resulting fractured rock



acts as a conduit for passage of magmatic-hydrothermal fluids to deposit sites and makes the rhyolite a preferred host to mineralization.

### **STREAM SEDIMENT SAMPLING**

The stream sediment sampling was carried out by the government with each sample being tested for 36 elements. Eight were chosen by the writer, being arsenic, copper, gold, lead, molybdenum, nickel, silver, and zinc, and are shown on the accompanying maps, figures 6a to 6h, inclusive.

### **AIRBORNE GEOPHYSICS**

The airborne geophysics consists of gravity and magnetics with the following five maps given:

1. Total Magnetic Field, figure 5a – As the name suggests, this is the entire magnetic field from all sources
2. First Derivative Magnetic Field, figure 5b – This is the calculation of the rate of change in the magnetic field. Thus anomalous areas would indicate higher rates of change, that is, where the magnetic field is changing more quickly. Anomalous areas often occur along the edges of strong total magnetic field anomalies.
3. Residual Total Magnetic Field, figure 5c – This is the total magnetic field map with the regional magnetic field subtracted from it. The result is the residual magnetic field which consists of localized magnetic features.
4. Gravity Free Air Anomaly, figure 5d – This is the gravity field with the elevation effects subtracted from it so that what is left is a gravity field as it would be a one elevation, which is often sea level.
5. Gravity Isostatic Residual Field, figure 5e – This is the gravity field with the effect of the low density roots of mountains subtracted in order to balance the effect of the topography.

### **DISCUSSION OF RESULTS**

There are seven RGS sample sites either within or around the Chaco Bear Property that could be affected by mineralization within the property, as shown on figures 6a to 6h. Almost all are anomalous in seven of the elements, being arsenic, copper, gold, lead, molybdenum, silver, and zinc, and varying in anomalous strength from weak to strong.

One of the strongest sample sites is the one occurring on Driftwood River to the south of the property. This river drains the west central part of the property, including Big Lake. This site is strongly anomalous in copper, zinc, arsenic, and lead; and moderately anomalous

in gold, silver, and molybdenum. It is known that mineralization occurs along this drainage system within the property. Also, the MMI soil sampling grid was emplaced on the north side of Big Lake, and that is contained highly anomalous results in copper and lead, and moderately anomalous results in gold and silver.

Three sample sites occur to the south and west of the property and these are moderately to strongly anomalous in gold, copper and lead. They are also moderately anomalous in zinc, molybdenum, and arsenic; and weakly anomalous in silver. The central sample of these three occurs at the southwest corner of the property and thus its causative source very likely occurs within the southwest part of the property. Therefore, there is a strong indication of mineralization of economic interest occurring within the southwestern part of the property.

One sample site occurs on a creek that drains the northern part of the Chaco Bear Property and that is a tributary of Patcha Creek. This site is strongly anomalous in lead, silver, copper, and zinc; moderately anomalous in arsenic, and weakly anomalous in gold and molybdenum. It therefore indicates the possibility of mineralization occurring within the northern part of the property.

Two sample sites occur within the eastern part of the property. The northern sample site drains the northern part of the property including the Round Lake area and is strongly anomalous in arsenic; moderately anomalous in lead, zinc, and silver; and weakly anomalous in gold, copper, and molybdenum. The southern sample site drains the eastern part of the property and is strongly anomalous in gold (strongest in the area) and arsenic; moderately anomalous in lead, silver, copper, and zinc; and weakly anomalous in molybdenum. This site strongly indicates that mineralization, especially gold and arsenic, occur within the eastern part of the property.

The three government airborne magnetic maps, figures 5a, 5b and 5c, indicate a northwest to north-northwest trend through the property, which correlates with the geology maps. The property is underlain by a magnetic high which would be due to the calc-alkaline (basic to ultra-basic) volcanic rocks which underlie almost all the property. The regional total magnetic field map and the 1<sup>st</sup> derivative magnetic map indicate the western side of the property has a particularly strong magnetic field indicating a rock-type with a higher magnetic intensity, perhaps an ultra-basic volcanic rock-type.

The gravity free air anomaly map, figure 5d, shows the property occurring on the edge of a gravity high that occurs to the west. This may be reflecting a deeper, below-surface feature, perhaps an intrusive probably belonging to the Bulkley Plutonic Suite. This may be the source of mineralization on the Chaco Bear Property as well as possibly being the heat engine causing the mineralization.

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## **GEOPHYSICIST'S CERTIFICATE**

I, DAVID G. MARK, of the City of Surrey, in the Province of British Columbia, do hereby certify that:

I am registered as a Professional Geoscientist with the Association of Professional Engineers and Geoscientists of the Province of British Columbia.

I am a Consulting Geophysicist of Geotronics Consulting Inc, with offices at 6204 – 125<sup>th</sup> Street, Surrey, British Columbia.

I further certify that:

I am a graduate of the University of British Columbia (1968) and hold a B.Sc. degree in Geophysics.

I have been practicing my profession for the past 41 years, and have been active in the mining industry for the past 44 years.

This report is compiled from geophysical and RGS geochemistry data obtained from the BC government web-site, MapPlace.

I do not hold any interest in Houston Minerals Ltd, nor in the property discussed in this report, nor in any other property held by this company, nor do I expect to receive any interest as a result of writing this report.

David G. Mark, P.Geo.  
Geophysicist

June 12, 2012

## AFFIDAVIT OF EXPENSES

Interpretation of BC government stream sediment sampling and airborne geophysics over the Chaco Bear Property, which occurs 15 km north of the town of Smithers, B.C, during the period of August 7<sup>th</sup> to October 7<sup>th</sup>, 2011 to the value of the following:

Senior Geophysicist	\$1,050.00	
Data reduction and map preparation	1,375.00	
	\$2,425.00	\$2,425.00
GRAND TOTAL		\$2,425.00

Respectfully submitted,  
Geotronics Consulting Inc.

David G.  
Geophysicist July 27, 2010

Mark,

P.Ge,



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**CHACO BEAR PROPERTY**

DRIFTWOOD RIVER, BEAR LAKE AREA, OMINECA MD, BC

**BC LOCATION MAP**

DRAWN BY:	JOB NO.:	NTS:	DATE:	FIG NO.:
DGM	11-19	92D/02	DEC 11	1



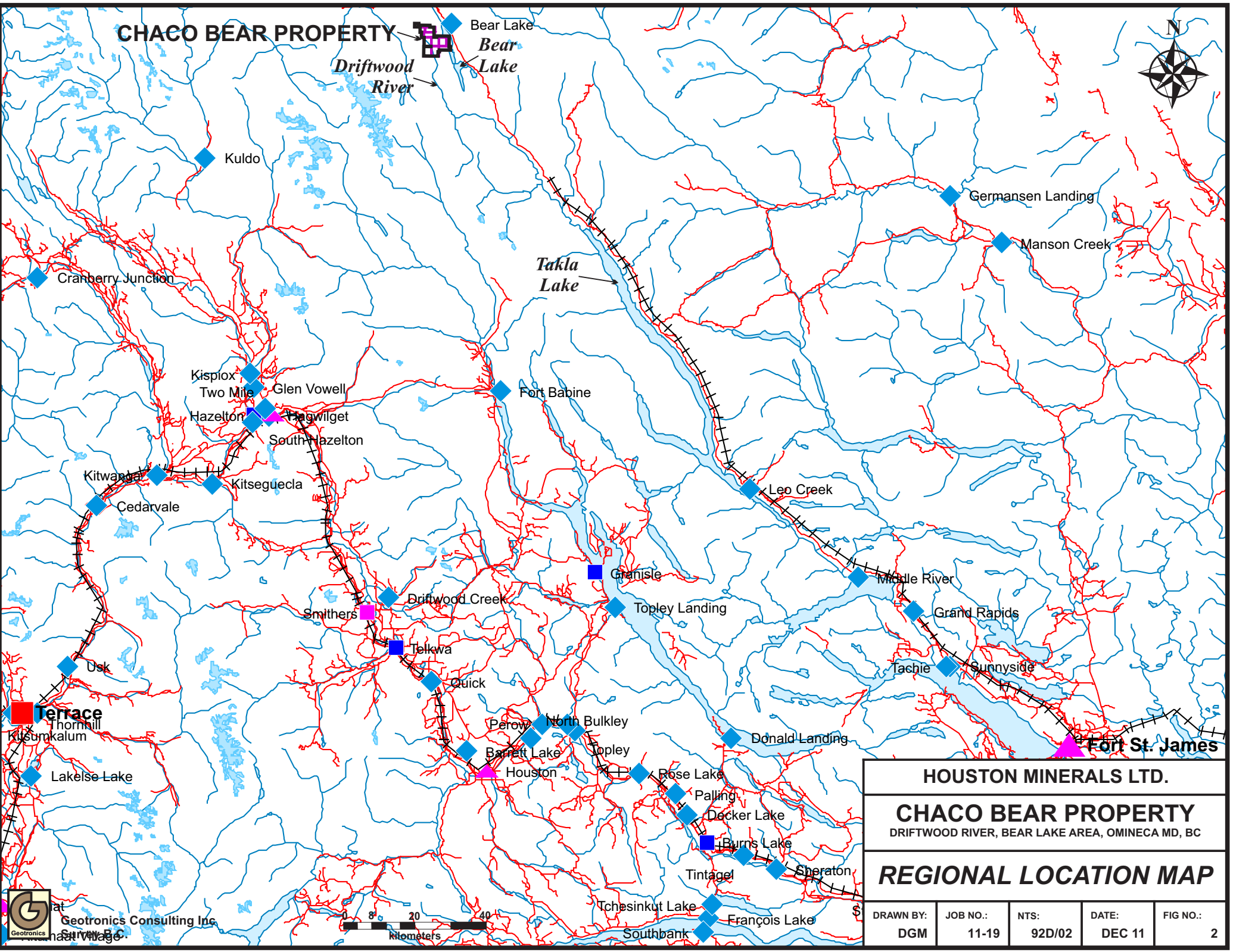
**Chaco Bear Property**



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# CHACO BEAR PROPERTY



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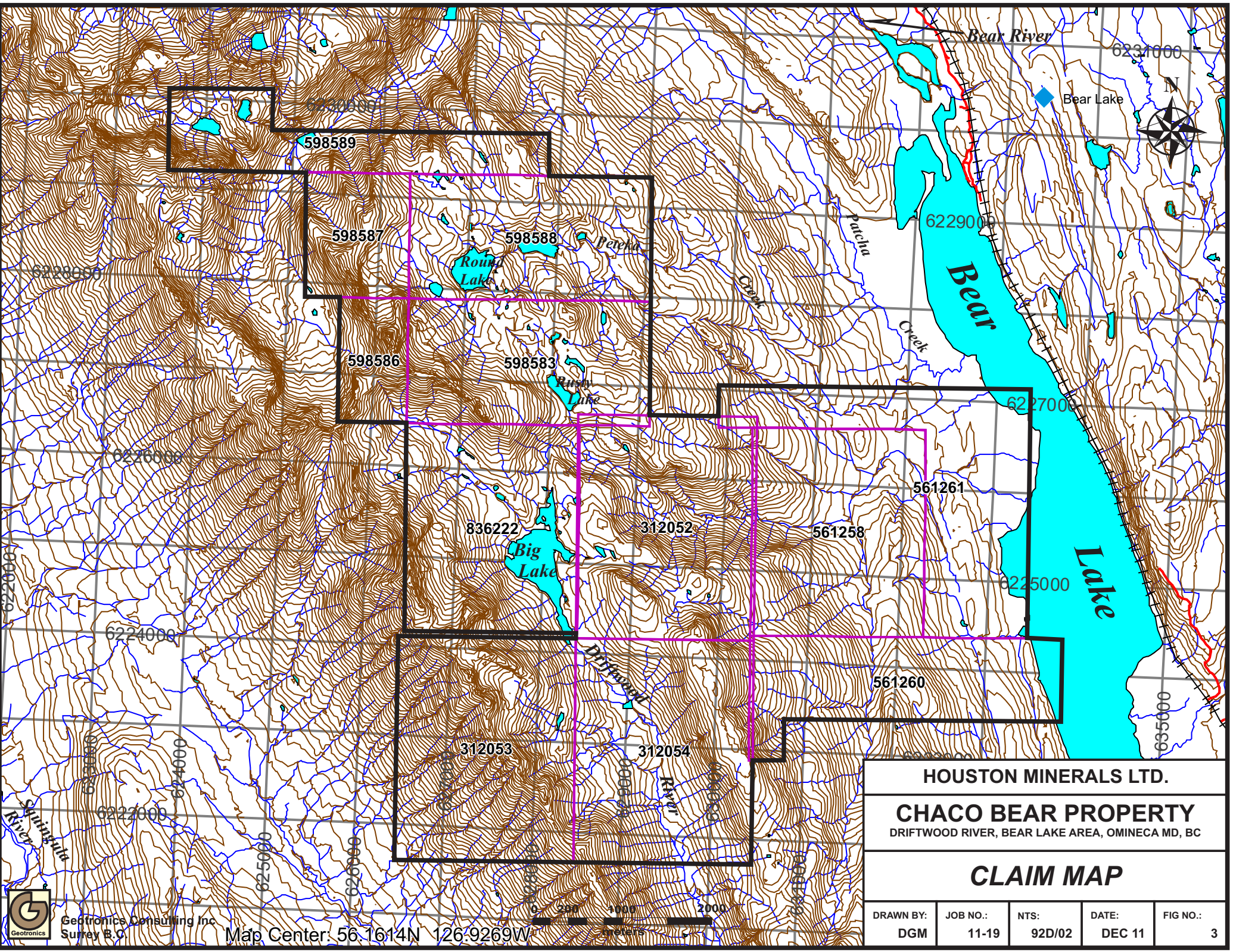
**CHACO BEAR PROPERTY**  
DRIFTWOOD RIVER, BEAR LAKE AREA, OMINICA MD, BC

## REGIONAL LOCATION MAP

DRAWN BY:	JOB NO.:	NTS:	DATE:	FIG NO.:
DGM	11-19	92D/02	DEC 11	2







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**CHACO BEAR PROPERTY**  
 DRIFTWOOD RIVER, BEAR LAKE AREA, OMINECA MD, BC

**CLAIM MAP**

DRAWN BY:	JOB NO.:	NTS:	DATE:	FIG NO.:
DGM	11-19	92D/02	DEC 11	3



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 Surrey B.C.

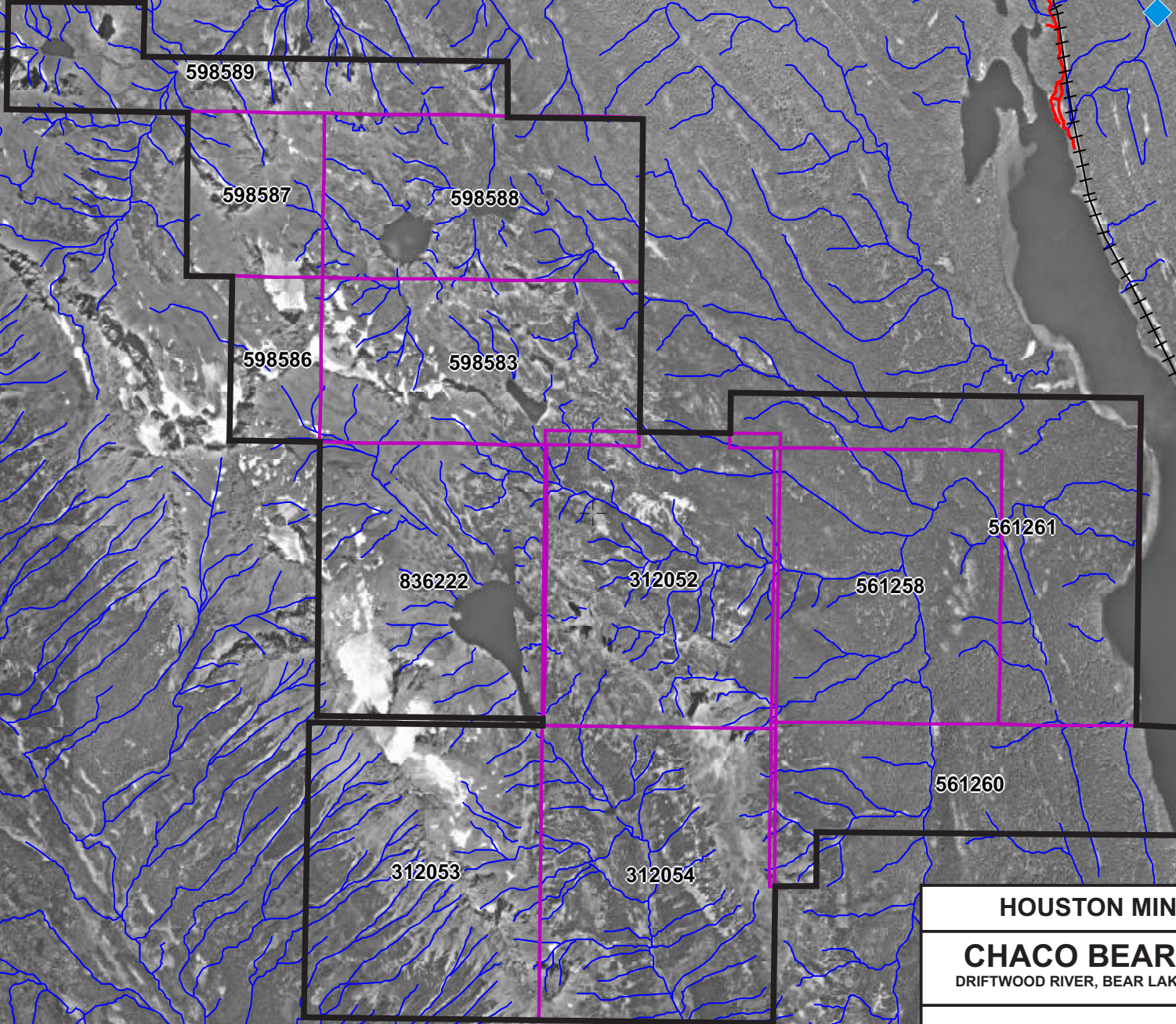
Map Center: 56.1614N 126.9269W







Bear Lake



**HOUSTON MINERALS LTD.**

**CHACO BEAR PROPERTY**  
DRIFTWOOD RIVER, BEAR LAKE AREA, OMINECA MD, BC

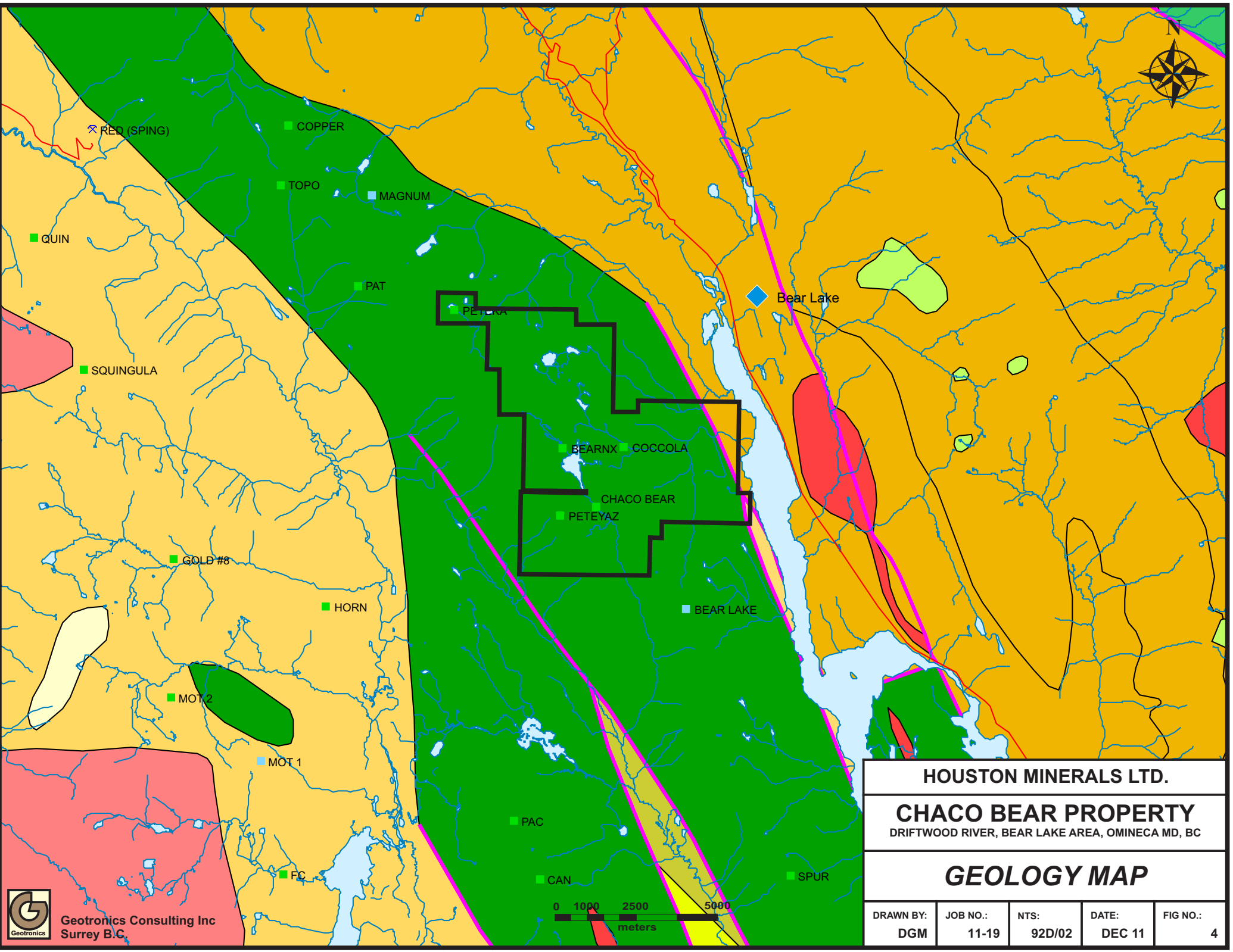
**ORTHOPHOTO CLAIM MAP**

DRAWN BY:	JOB NO.:	NTS:	DATE:	FIG NO.:
DGM	11-19	92D/02	DEC 11	3a



Geotronics Consulting Inc  
Surrey, B.C.  
Center 56.1614N 126.9269W





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**CHACO BEAR PROPERTY**  
DRIFTWOOD RIVER, BEAR LAKE AREA, OMINECA MD, BC

**GEOLOGY MAP**

DRAWN BY:	JOB NO.:	NTS:	DATE:	FIG NO.:
DGM	11-19	92D/02	DEC 11	4



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Surrey B.C.





HAZELTON GROUP - TELKWA FORMATION Lower Jurassic  
calc-alkaline volcanic rocks



HAZELTON GROUP - SMITHERS FORMATION Middle Jurassic  
undivided sedimentary rocks



HAZELTON GROUP Middle Jurassic to Upper Jurassic  
mudstone/laminite fine clastic sedimentary rocks



BOWSER LAKE GROUP Middle Jurassic to Late Cretaceous  
undivided sedimentary rocks



BOWSER LAKE GROUP Upper Jurassic  
undivided volcanic rocks



BOWSER LAKE GROUP - ASHMAN FORMATION Upper Jurassic  
mudstone, siltstone, shale fine clastic sedimentary rocks



BOWSER LAKE GROUP - UNDIVDED Upper Jurassic to Lower Cretaceous  
undivided sedimentary rocks



BULKLEY PLUTONIC SUITE Late Cretaceous  
intrusive rocks, undivided



SUSTUT GROUP - BROTHERS PEAK FORMATION Upper Cretaceous to Eocene  
undivided sedimentary rocks



KASTBERG PLUTONIC SUITE Eocene  
high level quartz phyric, felsitic intrusive rocks



UNNAMED Pleistocene to Holocene  
basaltic volcanic rocks

**HOUSTON MINERALS LTD.**

**CHACO BEAR PROPERTY**  
DRIFTWOOD RIVER, BEAR LAKE AREA, OMINECA MD, BC

***GEOLOGY LEGEND***

DRAWN BY: DGM	JOB NO.: 11-19	NTS: 92D/02	DATE: DEC 11	FIG NO.: 4a
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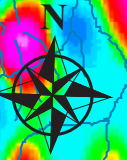


Bear Lake

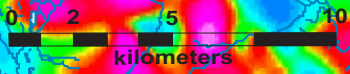


<b>HOUSTON MINERALS LTD.</b>				
<b>CHACO BEAR PROPERTY</b> DRIFTWOOD RIVER, BEAR LAKE AREA, OMINECA MD, BC				
<b>TOTAL MAGNETIC FIELD</b>				
<b>DRAWN BY:</b> DGM	<b>JOB NO.:</b> 11-19	<b>NTS:</b> 92D/02	<b>DATE:</b> DEC 11	<b>FIG NO.:</b> 5a





Bear Lake



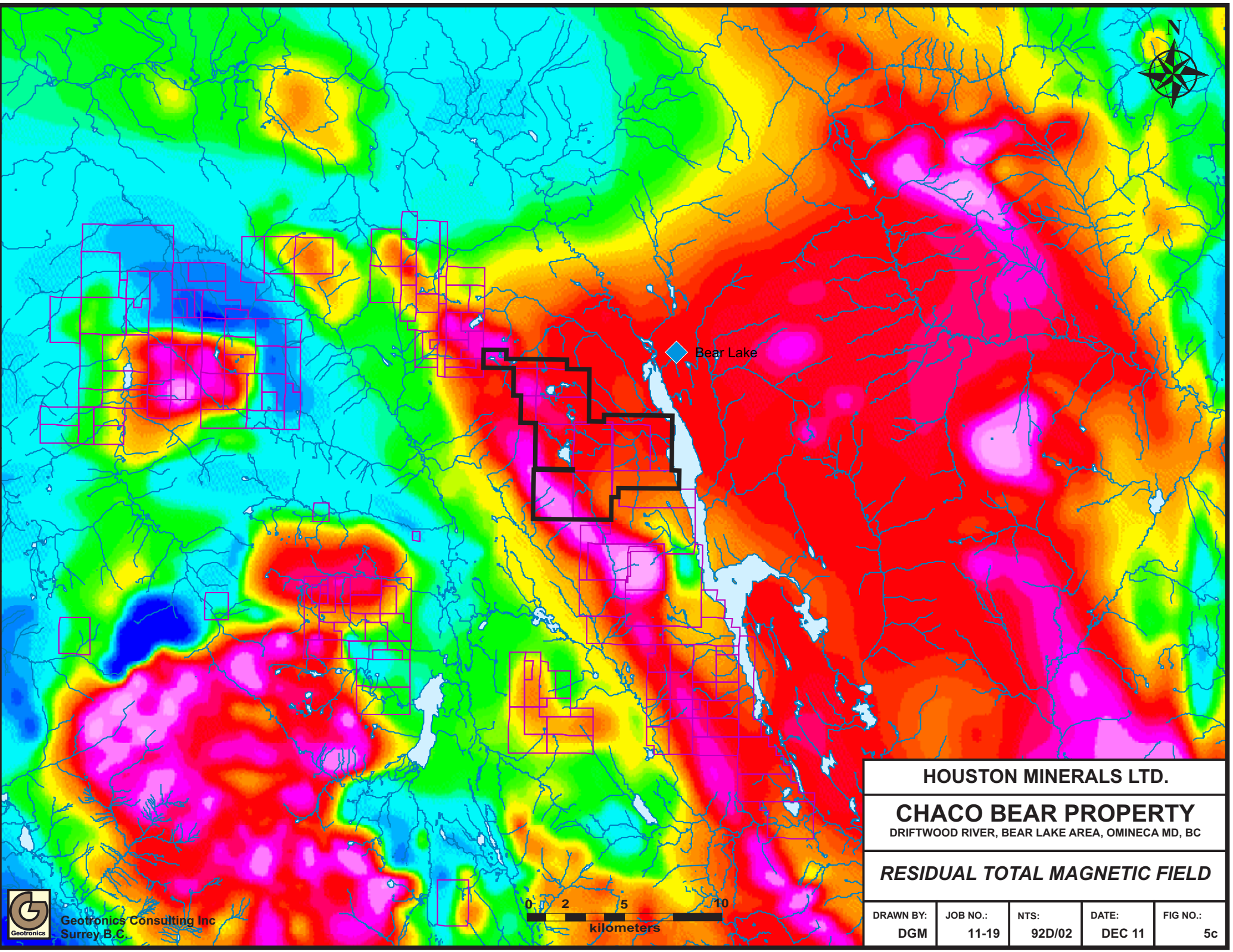
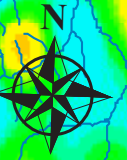
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**CHACO BEAR PROPERTY**  
DRIFTWOOD RIVER, BEAR LAKE AREA, OMINECA MD, BC

*1st DERIVATIVE MAGNETIC FIELD*

DRAWN BY:	JOB NO.:	NTS:	DATE:	FIG NO.:
DGM	11-19	92D/02	DEC 11	5b





Bear Lake

**HOUSTON MINERALS LTD.**

**CHACO BEAR PROPERTY**  
DRIFTWOOD RIVER, BEAR LAKE AREA, OMINECA MD, BC

***RESIDUAL TOTAL MAGNETIC FIELD***



Geotronics Consulting Inc  
Surrey, B.C.

DRAWN BY:	JOB NO.:	NTS:	DATE:	FIG NO.:
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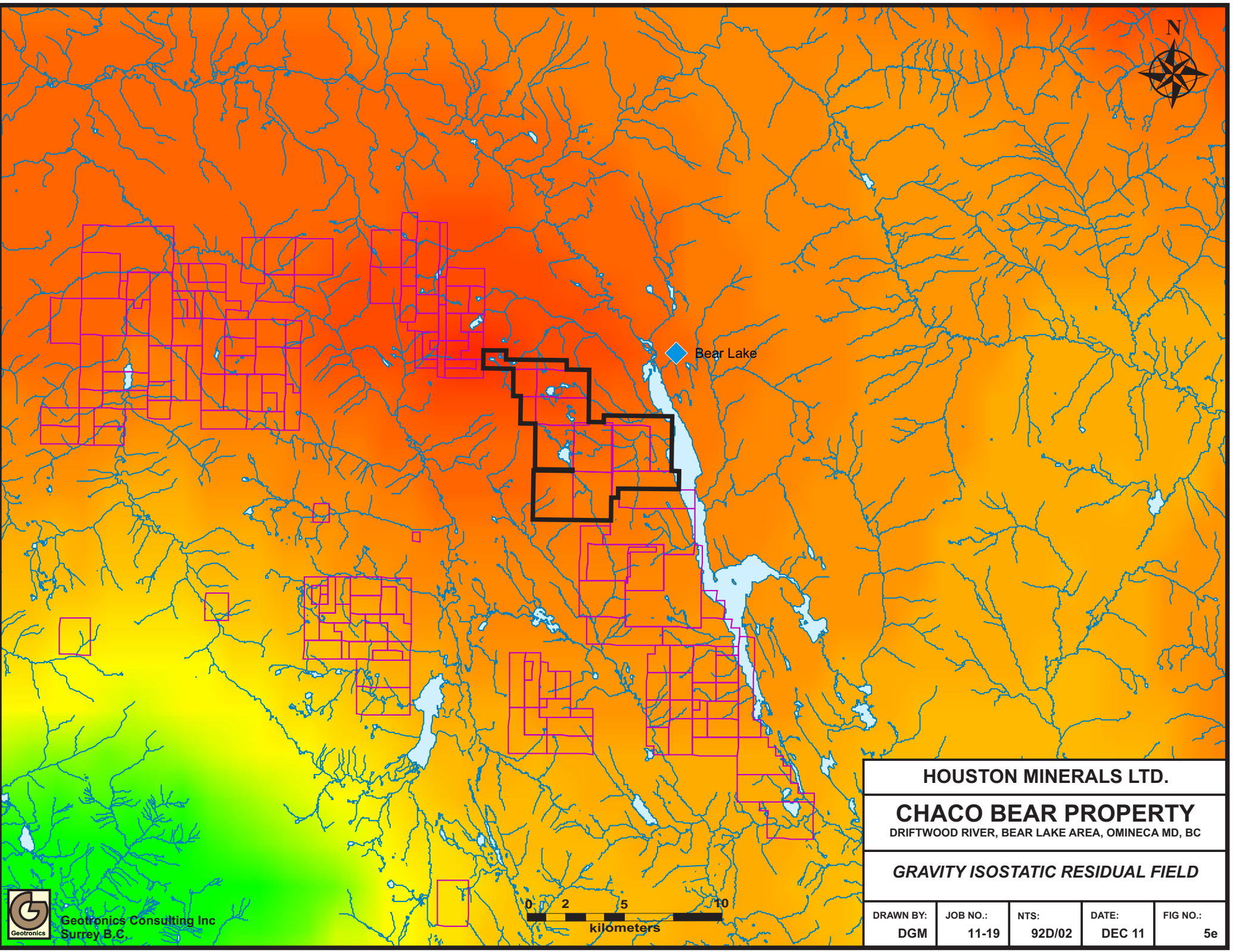


Bear Lake



<b>HOUSTON MINERALS LTD.</b>				
<b>CHACO BEAR PROPERTY</b> DRIFTWOOD RIVER, BEAR LAKE AREA, OMINECA MD, BC				
<b>GRAVITY FREE-AIR ANOMALY</b>				
DRAWN BY:	JOB NO.:	NTS:	DATE:	FIG NO.:
DGM	11-19	92D/02	DEC 11	5d





Bear Lake

**HOUSTON MINERALS LTD.**

**CHACO BEAR PROPERTY**

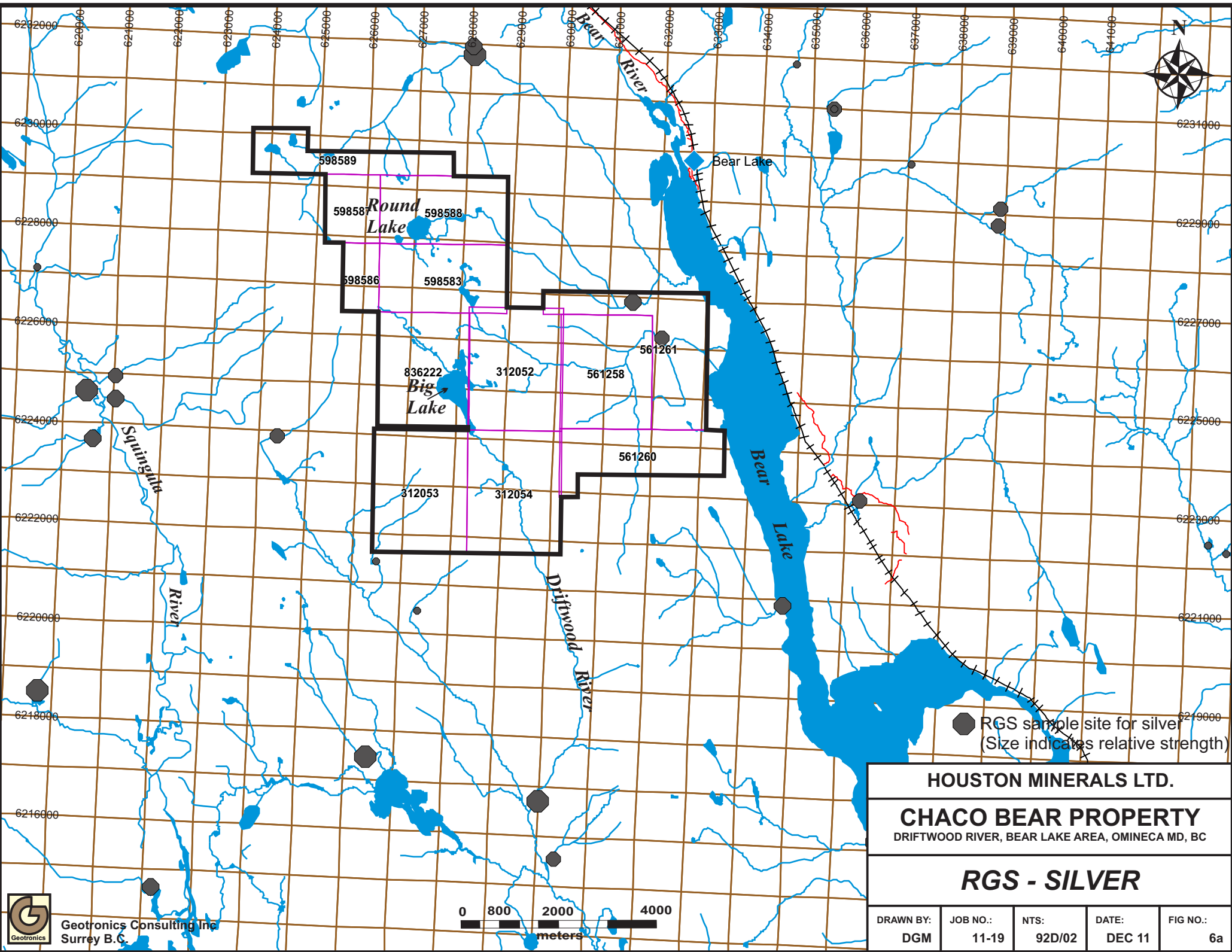
DRIFTWOOD RIVER, BEAR LAKE AREA, OMINECA MD, BC

*GRAVITY ISOSTATIC RESIDUAL FIELD*



Geotronics Consulting Inc  
Surrey B.C.

DRAWN BY:	JOB NO.:	NTS:	DATE:	FIG NO.:
DGM	11-19	92D/02	DEC 11	5e




 RGS sample site for silver  
 (Size indicates relative strength)

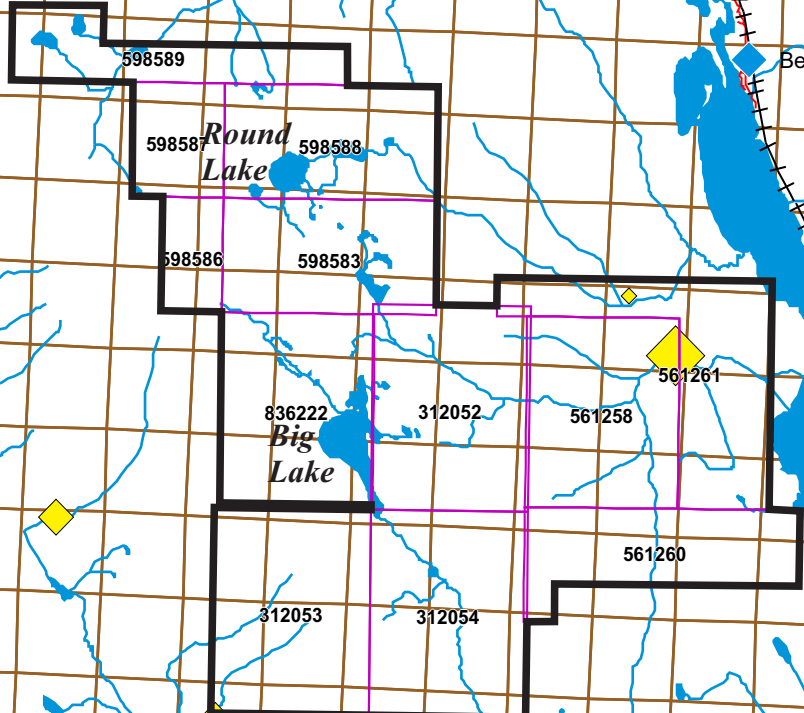
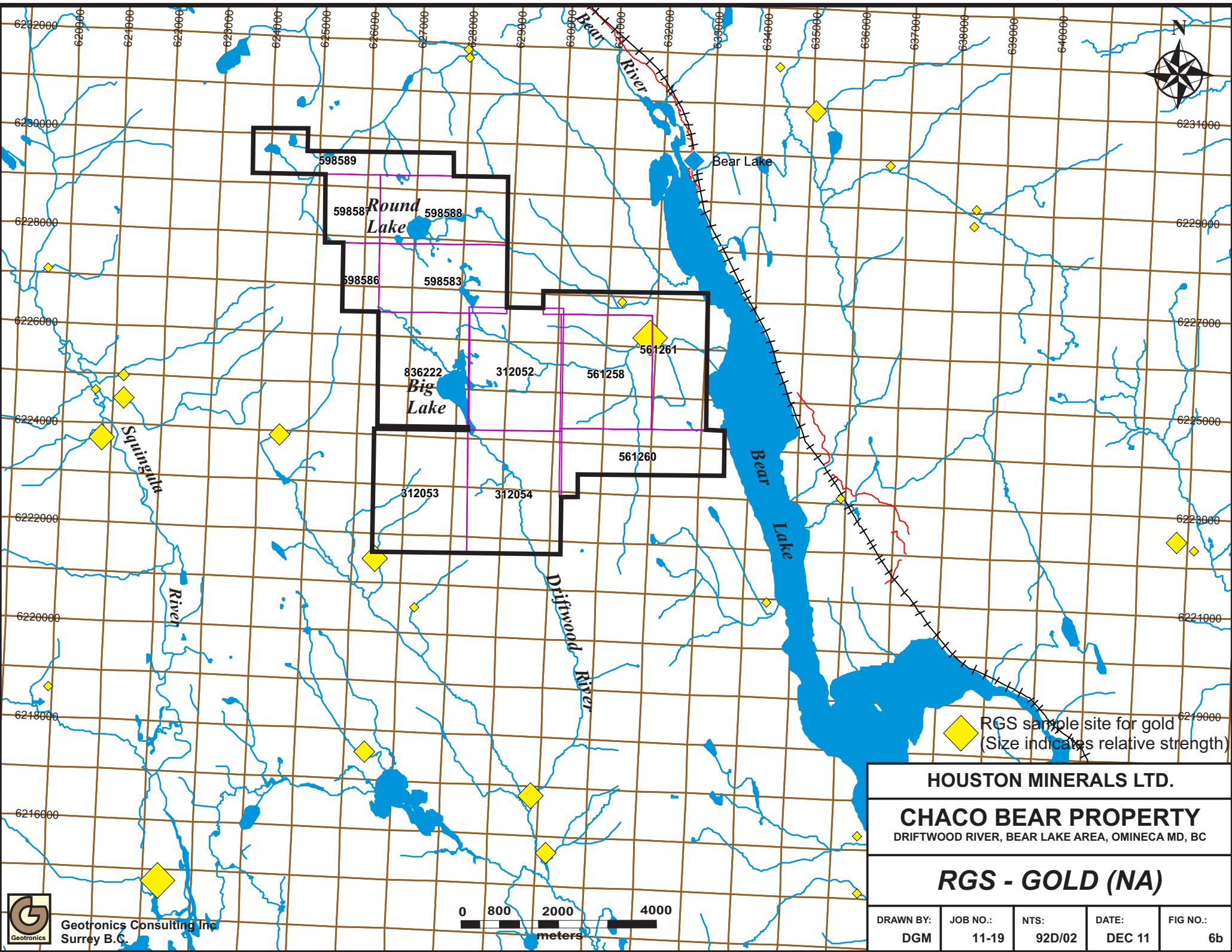
**HOUSTON MINERALS LTD.**

**CHACO BEAR PROPERTY**  
 DRIFTWOOD RIVER, BEAR LAKE AREA, OMINICA MD, BC

**RGS - SILVER**

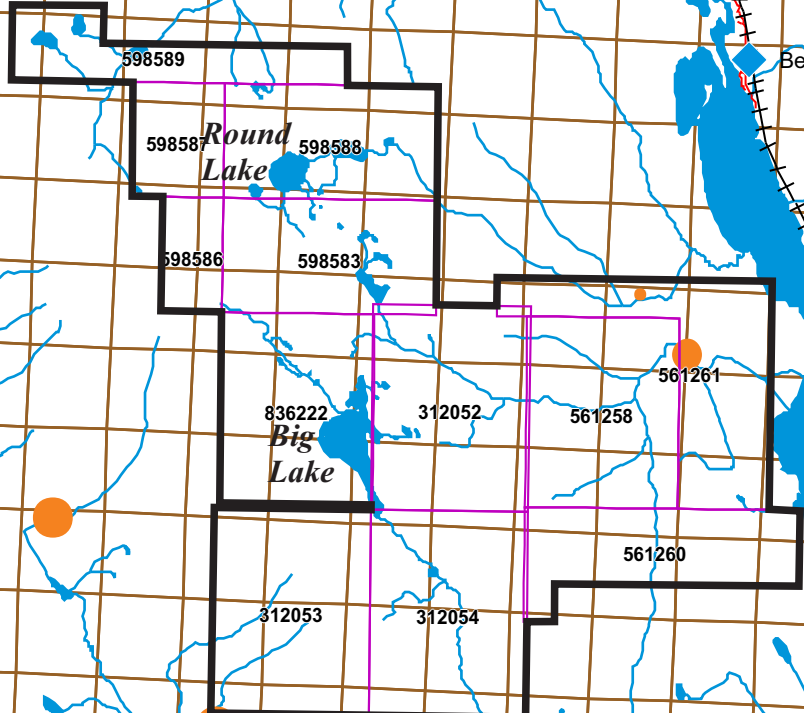
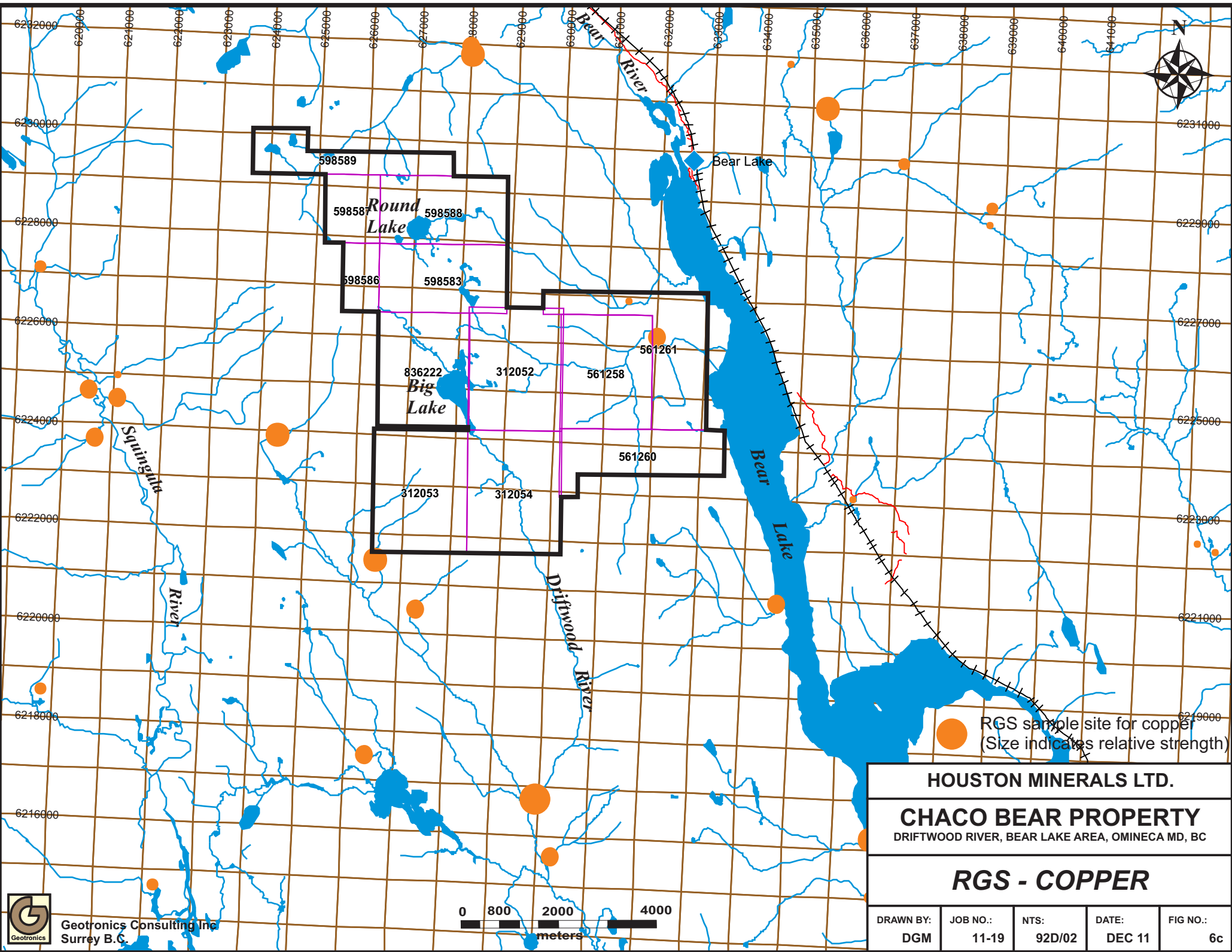
DRAWN BY: DGM	JOB NO.: 11-19	NTS: 92D/02	DATE: DEC 11	FIG NO.: 6a
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 RGS sample site for gold  
 (Size indicates relative strength)

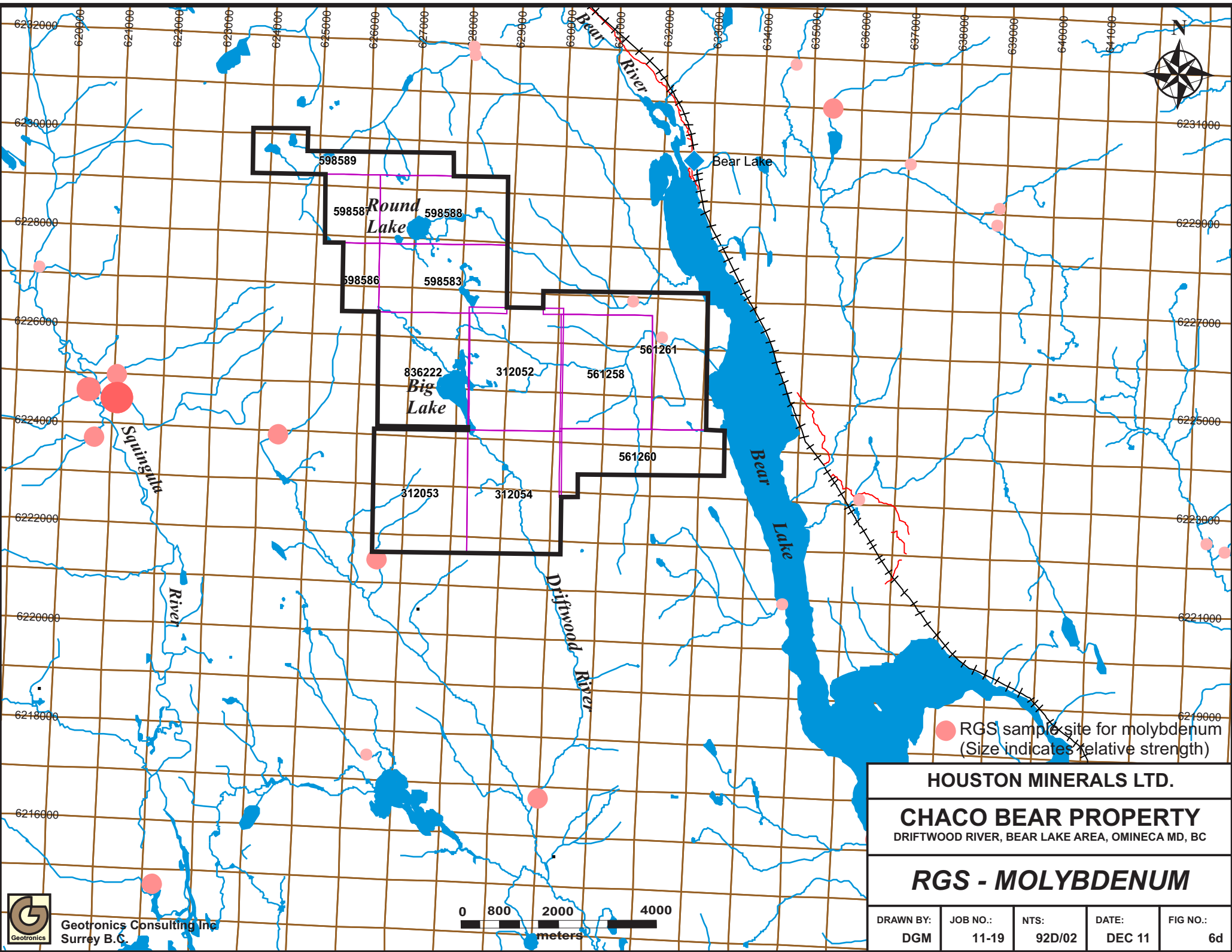
<b>HOUSTON MINERALS LTD.</b>				
<b>CHACO BEAR PROPERTY</b> DRIFTWOOD RIVER, BEAR LAKE AREA, OMINICA MD, BC				
<b>RGS - GOLD (NA)</b>				
DRAWN BY:	JOB NO.:	NTS:	DATE:	FIG NO.:
DGM	11-19	92D/02	DEC 11	6b



 RGS sample site for copper  
 (Size indicates relative strength)

<b>HOUSTON MINERALS LTD.</b>				
<b>CHACO BEAR PROPERTY</b> DRIFTWOOD RIVER, BEAR LAKE AREA, OMINICA MD, BC				
<b>RGS - COPPER</b>				
DRAWN BY:	JOB NO.:	NTS:	DATE:	FIG NO.:
DGM	11-19	92D/02	DEC 11	6c





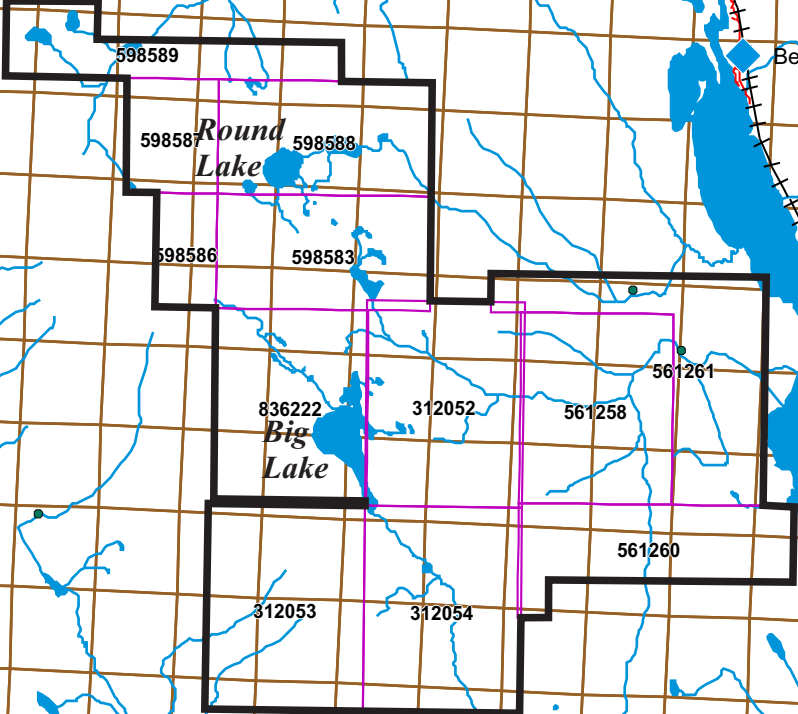
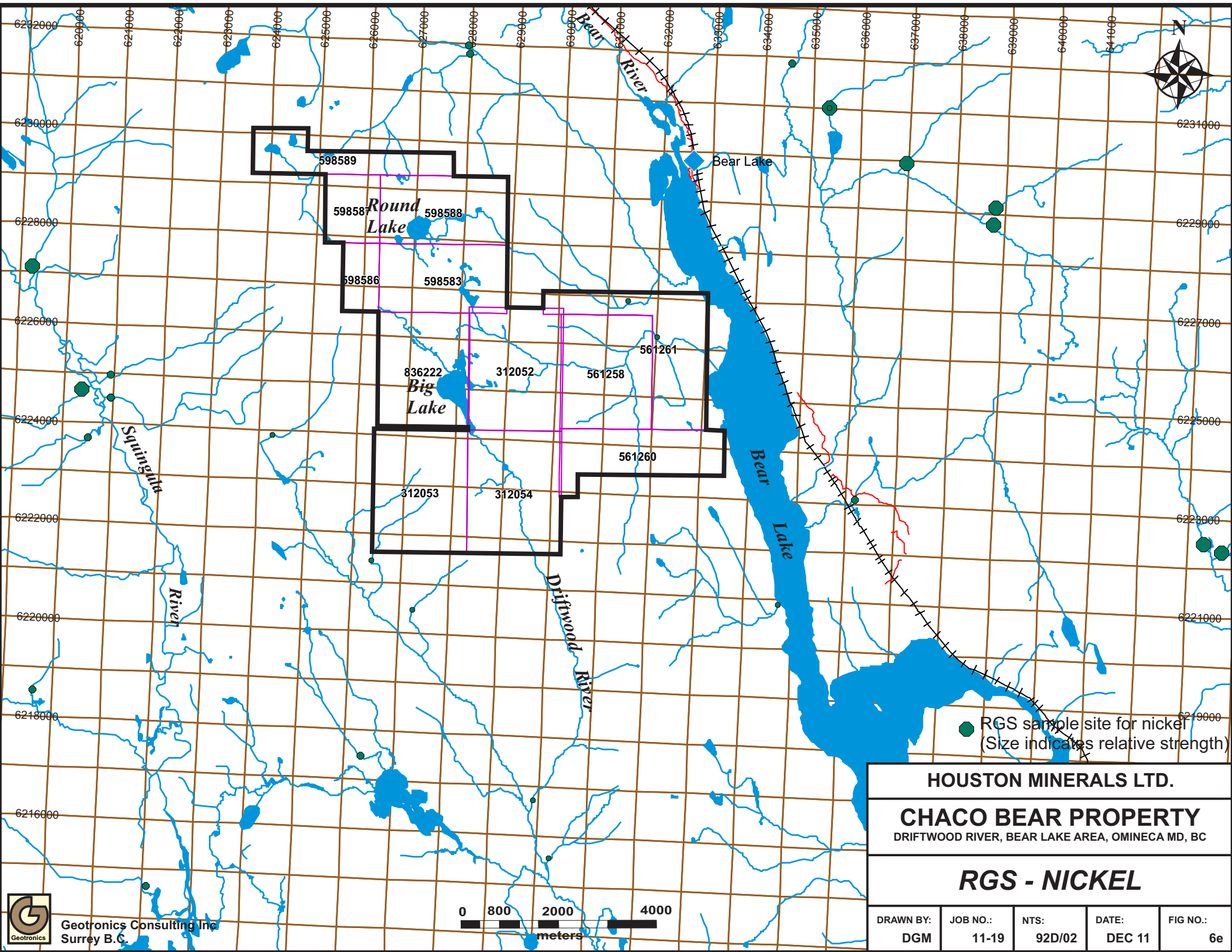
● RGS sample site for molybdenum  
(Size indicates relative strength)

**HOUSTON MINERALS LTD.**

**CHACO BEAR PROPERTY**  
DRIFTWOOD RIVER, BEAR LAKE AREA, OMINECA MD, BC

**RGS - MOLYBDENUM**

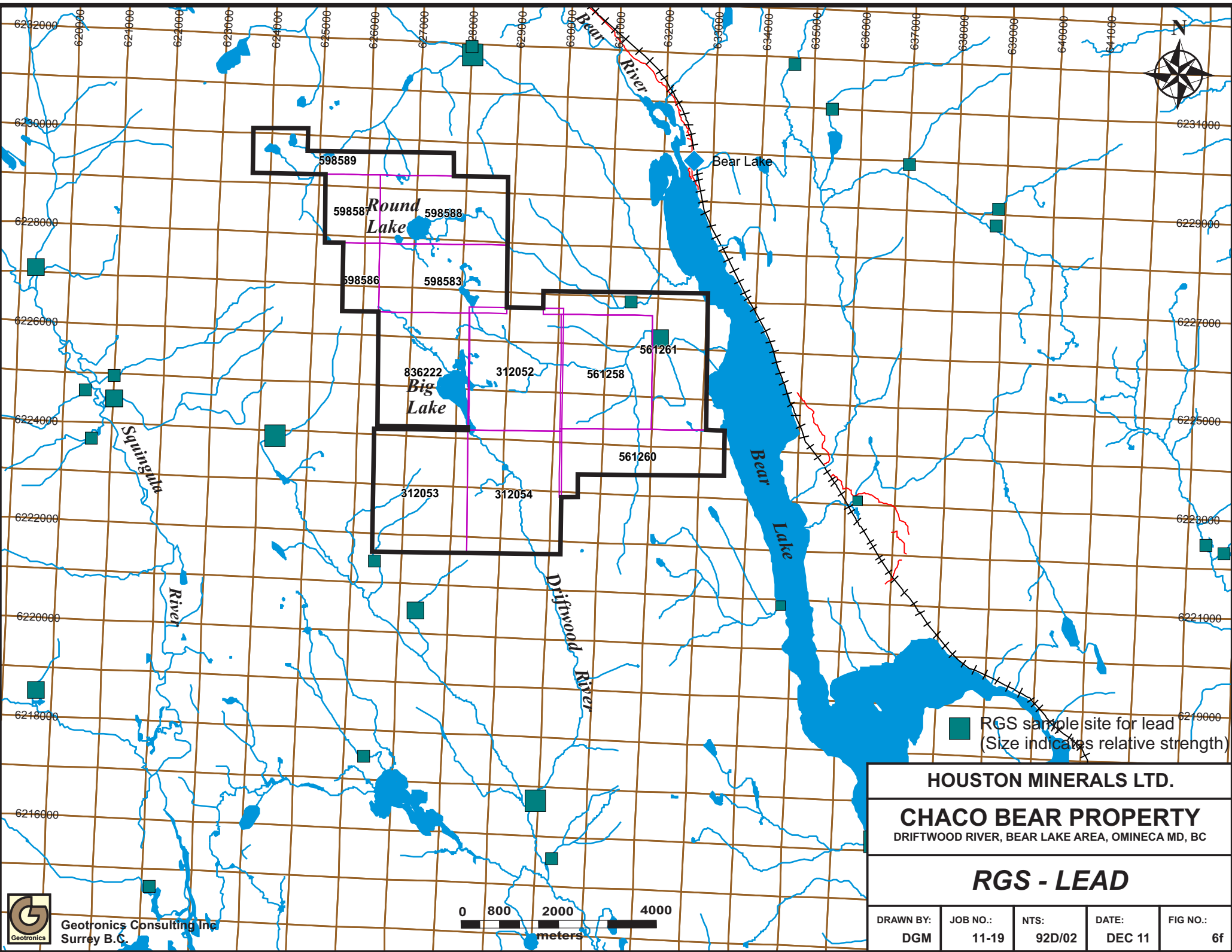
DRAWN BY: DGM	JOB NO.: 11-19	NTS: 92D/02	DATE: DEC 11	FIG NO.: 6d
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● RGS sample site for nickel  
(Size indicates relative strength)

<b>HOUSTON MINERALS LTD.</b>				
<b>CHACO BEAR PROPERTY</b> DRIFTWOOD RIVER, BEAR LAKE AREA, OMINICA MD, BC				
<b>RGS - NICKEL</b>				
DRAWN BY: DGM	JOB NO.: 11-19	NTS: 92D/02	DATE: DEC 11	FIG NO.: 6e





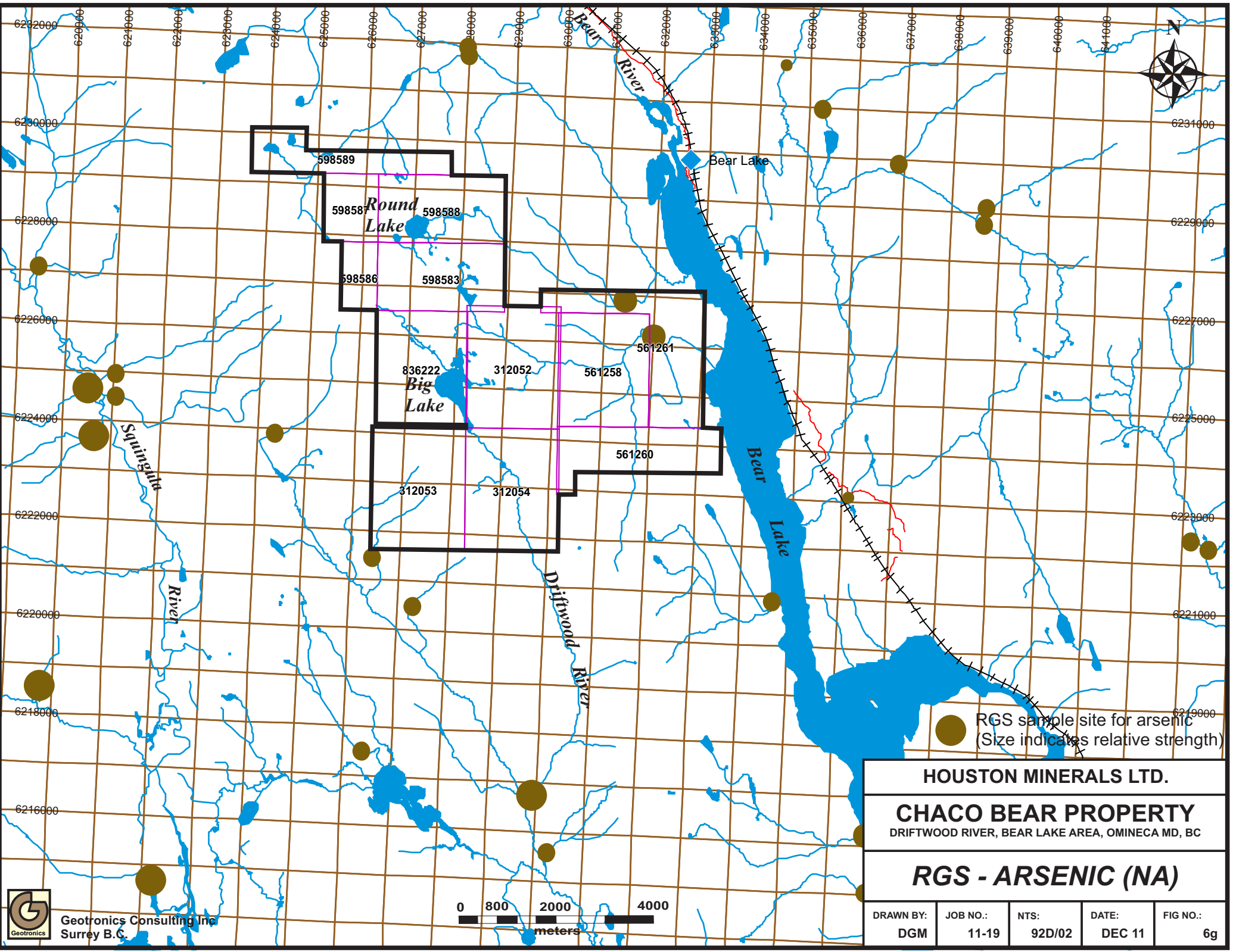
 RGS sample site for lead  
 (Size indicates relative strength)

**HOUSTON MINERALS LTD.**  
**CHACO BEAR PROPERTY**  
 DRIFTWOOD RIVER, BEAR LAKE AREA, OMINICA MD, BC

**RGS - LEAD**

DRAWN BY: DGM	JOB NO.: 11-19	NTS: 92D/02	DATE: DEC 11	FIG NO.: 6f
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● RGS sample site for arsenic  
(Size indicates relative strength)

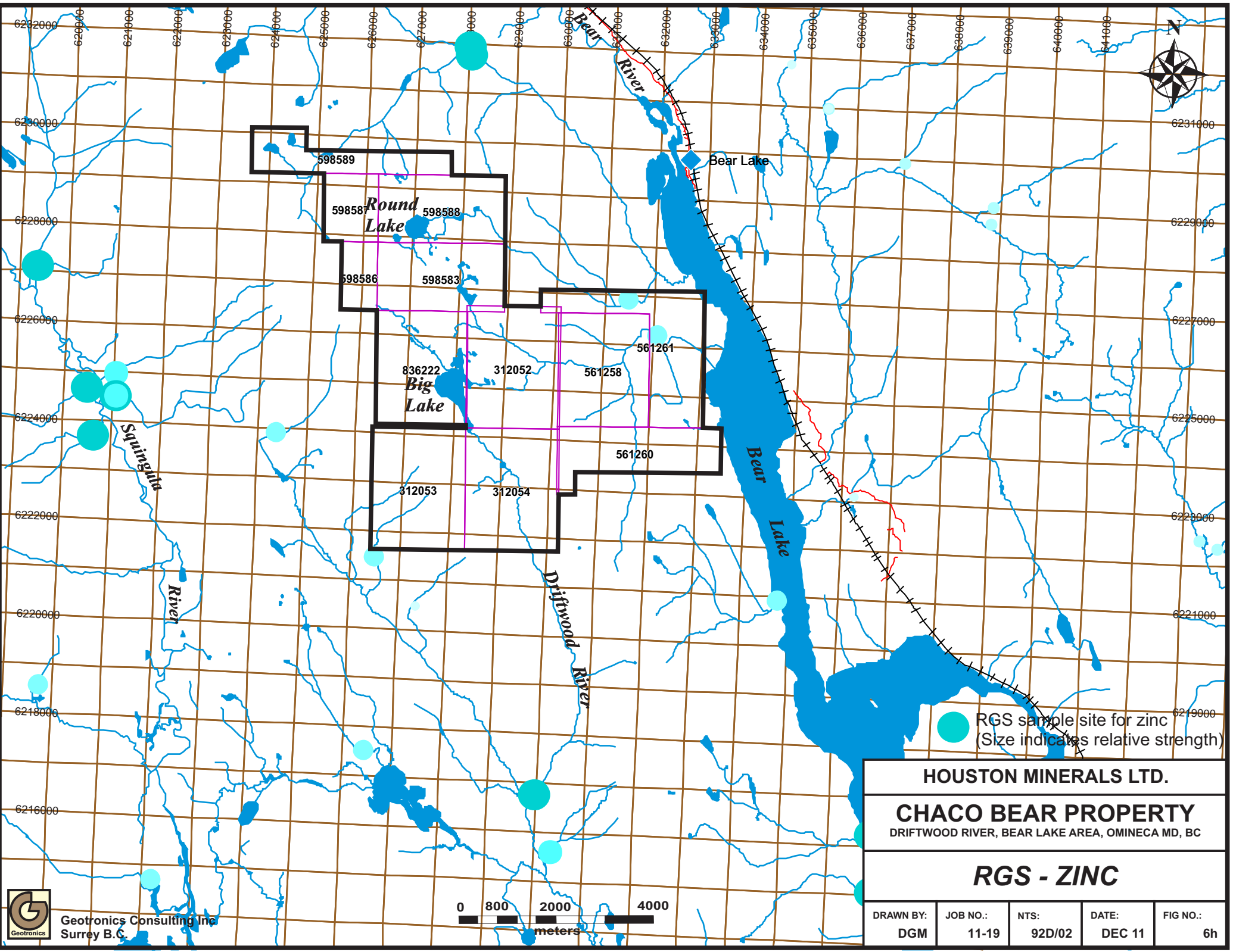
**HOUSTON MINERALS LTD.**

**CHACO BEAR PROPERTY**  
DRIFTWOOD RIVER, BEAR LAKE AREA, OMINICA MD, BC

**RGS - ARSENIC (NA)**

DRAWN BY: DGM	JOB NO.: 11-19	NTS: 92D/02	DATE: DEC 11	FIG NO.: 6g
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 RGS sample site for zinc  
 (Size indicates relative strength)

<b>HOUSTON MINERALS LTD.</b>				
<b>CHACO BEAR PROPERTY</b> DRIFTWOOD RIVER, BEAR LAKE AREA, OMINICA MD, BC				
<b>RGS - ZINC</b>				
DRAWN BY:	JOB NO.:	NTS:	DATE:	FIG NO.:
DGM	11-19	92D/02	DEC 11	6h

