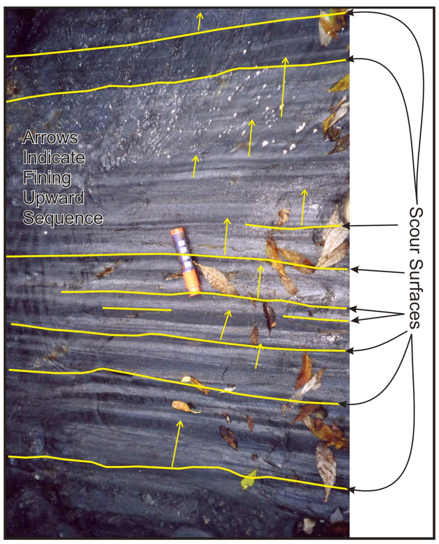
Geology of the Chandalar Mining District, East-Central Brooks Range, Northern Alaska



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CAPTIONS FOR COVER PHOTOS

Top Photo: F1 isoclinal folds in Upper Plate Rocks (unit Dum) in northwest corner of study area @ 06BT443

Lower Left: Relict graded bedding in rhythmically layered quartz-feldspathic and mica dominant zones, and relict scour features of Upper Plate Dut schist unit, interpreted to be meta-turbidites; near station 06BT101 in a smooth bedrock surface along a stream cut. Arrows point to fining upward sequences, based on texture.

Lower Right: High Grade gold-arsenopyrite-quartz vein-fault @ 200 foot level, Little Squaw Gold Mine @ 06BT066; foot wall zone on right side of quartz body contains, locally, > 10.0 oz/ton in gold.

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Introduction, Geography, and Purpose

On April 10, 2007, Pacific Rim Geological Consulting, Inc. (PRGCI) entered into a contractual agreement with Little Squaw Gold Mining Company (LSGMC) to produce a geologic map, structure sections, and a geologic report of the Chandalar Mining District of Northern Alaska.

The Chandalar mining district is centered on approximately 67°32' Latitude and 148°10' Longitude, in the east-central part of the southern Brooks Mountain Range, about 190 miles (162 km) due north of Fairbanks, Alaska and 100 miles (162 km) north of the Arctic Circle (figure 1). The district occurs in an east-west, elongate, rugged hill complex 65 miles east of Wiseman on the Dalton Highway. Elevations range from 2,102 feet (641 m) on Squaw Lake to 5,549 feet (1,661 m) at the summit of McNett Peak. The district is bounded on the north by west-flowing Lake Creek, on the east by northeast-flowing McLelland Creek, on the south by southwest-flowing Tobin and Big Creeks, and on the west by south-flowing Chandalar River (and lake). The entire area is within the upper Yukon River basin.

Although not connected to Alaska's secondary road network, approximately 13 miles (21 km) of mining roads connect the mine developments in Little Squaw Creek basin with those in Big Creek and Tobin Creeks to the south. A 65-mile-long (104 km) winter trail that has official RS-2477 surface access status connects Coldfoot on the Dalton Highway with the Chandalar camp. Three airstrips provide access to the area at Tobin Creek, Big Creek, and Big Squaw Creek. Of these, the 4,000-foot-long, seasonably maintained airstrip at Big Squaw Creek provides for aircraft landings, including commercial freighting two and four-engine airplanes; e.g., DC-3, D-C4, and 'Flying Box Cars' models.

The Chandalar mining district, which was discovered in 1905, has produced an estimated 84,100 ounces (2,615 kg) of gold, with 9,039 ounces (281 kg) of gold recovered from four (4), high grade gold-quartz vein-faults, and the remaining 75,061 ounces (2,334 kg) of gold won from several placer sources (Bundtzen and others, 1996; Barker and Bundtzen, 2004).

Figure 1 Location of Chandalar Mining District, showing general geographic features and past productive hardrock mines; from Barker and Bundtzen (2004)

LSGMC has been actively exploring, developing and mining both placer and lode gold deposits in the Chandalar district for more than five decades. As of December, 2006, LSGMC held 426.5 acres of Federally Patented mining claims and 9,993 acres of unpatented Alaska State Mining claims (see Barker, 2007). Additional claims were acquired by LSGMC during 2007. A more complete discussion of the history of LSGMC activities in the Chandalar mining district is provided in Barker and Bundtzen (2004).

During 2003, LSGMC underwent a complete change in management, with Richard C. Walters becoming the new President and CEO of the firm. A new LSGMC Board of Directors was also appointed. The new LSGMC management decided to acquire a modern geological base map for the Chandalar district that would assist in the exploration and development of LSGMC mining properties. PRGCI was contacted to complete the geologic map product. During negotiations with PRGCI, a decision was made to produce a geological map of about 60 square miles (152 km^2) at a scale of 1:20,000, which would depict both bedrock and surficial geological units. The principle product of the 2006 PRGCI-LSGMC mapping contract is the geologic map and cross sections

Methodology

Thomas K. Bundtzen (hereafter referred to as the ‘writer’ in this report) and Gregory M. Laird spent a total of 50 man days in the Chandalar Mining district of northern Alaska. Geological mapping was conducted from June 28-to-July 18 and from September 3-to-6, 2007. Despite inclement weather that characterized the summer months, the PRGCI team managed to traverse every day during both time periods (no days off). Much of the mapping took place during the June-July part of the program. The PRGCI team was based out of a company camp on Little Squaw Creek about two miles south of Big Squaw Creek airstrip.

Because of the lack of helicopter support for the bulk of the project, the June-July work was conducted on foot and accomplished with the use of LSGMC 4-wheeler all terrane vehicles (ATVs). The ATVs transported both geologists to initiation points for field traverses along the road system. The bulk of the central part of the mapped area was successfully mapped in this manner. Two spike camps were placed by the company in Little McLelland Creek on the east and Boulder Creek on the west. Six man-days were spent by PRGCI working out of each camp. By mid-July, the field area that could be reasonably accessed, using the existing road system and the spike camps, was completed. Areas northwest of Boulder Creek and southeast of Little McLelland Creek, which were well beyond the road system network and spike camps, were not mapped.

PRGCI returned to the Chandalar camp on September 3rd, and took advantage of an R-44 helicopter leased by LSGMC to: 1) extend the map area to the east and northwest; 2) field check problem areas identified during the June-July work; and 3) retrieve rock sample caches left in the field during earlier investigations. The four day (September 3-6), helicopter-supported mapping extended the map area and significantly improved the map product.

During the 2007 Chandalar mapping project, a total of 486 field stations were occupied by PRGCI in the Chandalar mining district. PRGCI located each station coordinate using Garmin™ 12 Channel CX and Etrex GPS units, and acquired this information in NAD-27 format; the GPS units also provided altitude estimates expressed in meters. Brunton™ compasses were used to acquire structural data on the outcrop. The information acquired at field stations is provided in Appendix I, which includes UTM location information, date of station collection, the geologist that collected the data, structural data from outcrops, map unit descriptions, geomorphologic observations, and petrographic examinations from thin sections.

Forty-six (46) rock samples were selected for petrographic analyses and submitted to Vancouver Petrographics™ for standard 25mm X 40mm thin sections using transmitted and reflected light. Abbreviated descriptions are presented in Appendix I and utilized during descriptions in the text below. PRGCI selected 37 samples of meta-igneous and meta-sedimentary rocks for whole rock-XRF and 38-element trace element fusion ICP analyses. These analyses, which were acquired to better understand the petrogenesis of the rock units in the area, were analyzed by ALS Chemex. Certified analytical results of these analyses appear in Appendix II. Table 1 correlates the major oxide data in Appendix II with rock unit designations, and includes brief descriptions of each rock type. The major oxide and trace element data is depicted in various diagrams in this report.

PRGCI utilized 1:63,360 scale high altitude infra-red ‘U-2’, publicly accessible, aerial photography for photo-geologic interpretation of surficial map units as well as structural analysis. Hydrochloric acid was utilized to identify the presence or absence of calcium carbonate in rock units. A few samples of mineralization were given to James C. Barker, Chief geologist for LSGMC, for metals assay work.

Eleven (11) samples of mineralization and alteration have been submitted to Cannon Microprobe Inc. (Seattle, Washington) in order to better understand mineralogical compositions of known mineral deposits. One sample of meta-gabbro has been submitted to an isotopic age dating laboratory using U/Pb age dating techniques. No results for these latter two investigations are available at the time of this writing.

Table 1 List of samples that underwent 37 major oxide and trace element analyses with unit designations and brief descriptions; additional descriptive data appears in Appendix I; analytical data is in Appendix II.

Field Number	*Rock Unit*	*Description*
06BT350	MzPzg	Medium green, non-foliated meta-gabbro, Boulder Creek, southern belt
06BT358	MzPzg	Large body of massive greenstone, in Boulder Creek, southern belt
06BT431	MzPzg	Dark green, pyroxene-rich, meta-gabbro 2 km south of Boulder Creek, southern block
06BT441	MzPzg	Coarse-grained meta-turbidite schist; near 5259 peak NW of McNett Peak
06BT448	Dlc	Green tuffaceous schist with abundant albite porphyroblasts; resorbtion channels
06BT449	MzPzg	Sub-schistose meta-gabbro; near hill 2460 in NW corner of map area
06BT451	MzPza	Dark green altered mafic agglomerate (field interpretation)
06BT478	MzPzg	Dark green, massive meta-gabbro near Crystal Peak
06GL314	Dlq	Light gray, micaceous quartzite in lower plate east of Chandalar Lake
06GL316	Dlb	Black schist with strong crenulations and shearing
06GL28a	Dup	Fissle schist of Mikado Phyllite in Eneveloe area
06GL16	Dum	Silvery gray, quartz-rich, upper plate schist
06GL21	Dlq	Blocky impure quartzite of lower plate, St. Mary's Creek
06GL23a	Dul	Calc-schist above 22 ft level, Little Squaw gold mine
06GL29	Dus	Quartz-rich, blocky, high rank meta-turbidite schist, Little McLelland Creek Valley
06GL33a	Dlc	Feldspathic felsic (feldspar) schist with resorption channels (meta-volcanic)
06GL34	Dut	Coarse-grained meta-turbidite schist @ hill 5440, head of Tobin Creek
06GL35	Dlq	Light gray quartzite of lower plate 1 km north of Little Squaw mine
06GL36a	MzPzg	Coarse-grained meta-gabbro in lower plate north of Mello Bench camp
06GL37c	Dlq	Black quartzite of lower plate north of Mello Bench camp
06BT115a	MzPzg	Massive, non-foliated meta-gabbro with carbonate alteration; NE of camp
06BT82	Dlb	Black schist on ridge west of Big Squaw Creek
06BT94	Dlf	K-spar felsic schist with resorption channels in grains; is a meta-volcanic rock
06BT98	Dut	Coarse grained, meta-turbidite schist with graded bedding near Mello Bench camp; near contact with northern belt of lower plate
06BT150	MzPzg	Epidote-rich, massive meta-gabbro in Pedro Gulch area
06BT238	Dul	Strongly calcareous, actinolite schist; hanging wall, Little Squaw Mine
06BT233	MzPzg	Massive meta-gabbro body near St. Mary's Creek
06BT129	MzPzg	Massive greenstone northeast of Nugget Creek
06BT176a	Dul	Moderately calcareous schist west of Big Squaw Creek; not plotted
06BT127	MzPzg	Massive Greenstone near Pallesgren prospect
06BT383a	MzPzg	Massive greenstone with possible blue amphibole.

06BT175	Dul	Strongly calcareous schist west of Big Squaw Creek
06BT187	Dul	Strongly calcareous schist on south flank, Little Squaw Peak
06BT165	Dum	Coarse-grained schist near Summit Mine
06BT119	MzPzg	Massive greenstone body west of Nugget Creek
06BT153a	Dum	Medium grained, quartzose schist with relict graded bedding?
06BT213a	Dul	Structurally lowest calc-schist south of Mikado Mine

Bedrock Geologic Units

Introduction and Previous Work

The regional geologic setting of the east-central Brooks Range, including the Chandalar Mining district, was summarized by Barker and Bundtzen (2004) and will only be briefly summarized here. The Chandalar district is underlain by regionally metamorphosed rocks that were originally referred to as part of the "southern Brooks Range Schist Belt" by Brosge and Reiser, (1964), Fritts and others (1971), Wiltse (1975), and Hitzman and others, (1986). This east-west-trending belt of poly-metamorphic rocks extend across the southern Brooks Range from the Kobuk River basin to the upper Sheenjek River drainage about 50 miles (80 km) west of the Alaska-Yukon border.

All of the bedrock units that underlie the Chandalar map area are assigned to the Coldfoot terrane, which consists of regionally metamorphosed, Proterozoic-to-Paleozoic, meta-sedimentary and minor meta-igneous schist. The Coldfoot terrane contains the 'Ambler sequence', which hosts significant massive sulfide deposits in the Ambler River area more than 250 miles (400 km) west of the Chandalar district.

Several geologic interpretations of the Chandalar mining district, and three were judged to contain the most important information. Brosge and Reiser (1964) completed the first modern mapping of the Chandalar district at 1:250,000 and 1:63,360 scales respectively. These workers provided the first modern isotopic ages of igneous and metamorphic minerals in the southern Brooks Range, and mapped a thrust surface within Devonian quartz mica schist in the Chandalar mining district. Duke (1975) produced geologic mapping products of the district on behalf of Callahan Mining Corporation. Rock unit descriptions and a geologic map (figure 2) from Chipp (1970) provide descriptions of the Chandalar area published at 1:40,000 scale. He subdivided the rock units into *Lower Plate* and *Upper Plate* sequences, which are separated by a major décollement surface (thrust fault).

The *Lower Plate* consists of black schist, phyllite, slate, and quartzite that has been intruded locally by greenstone/gabbro sills or dikes. The lower plate sequence is

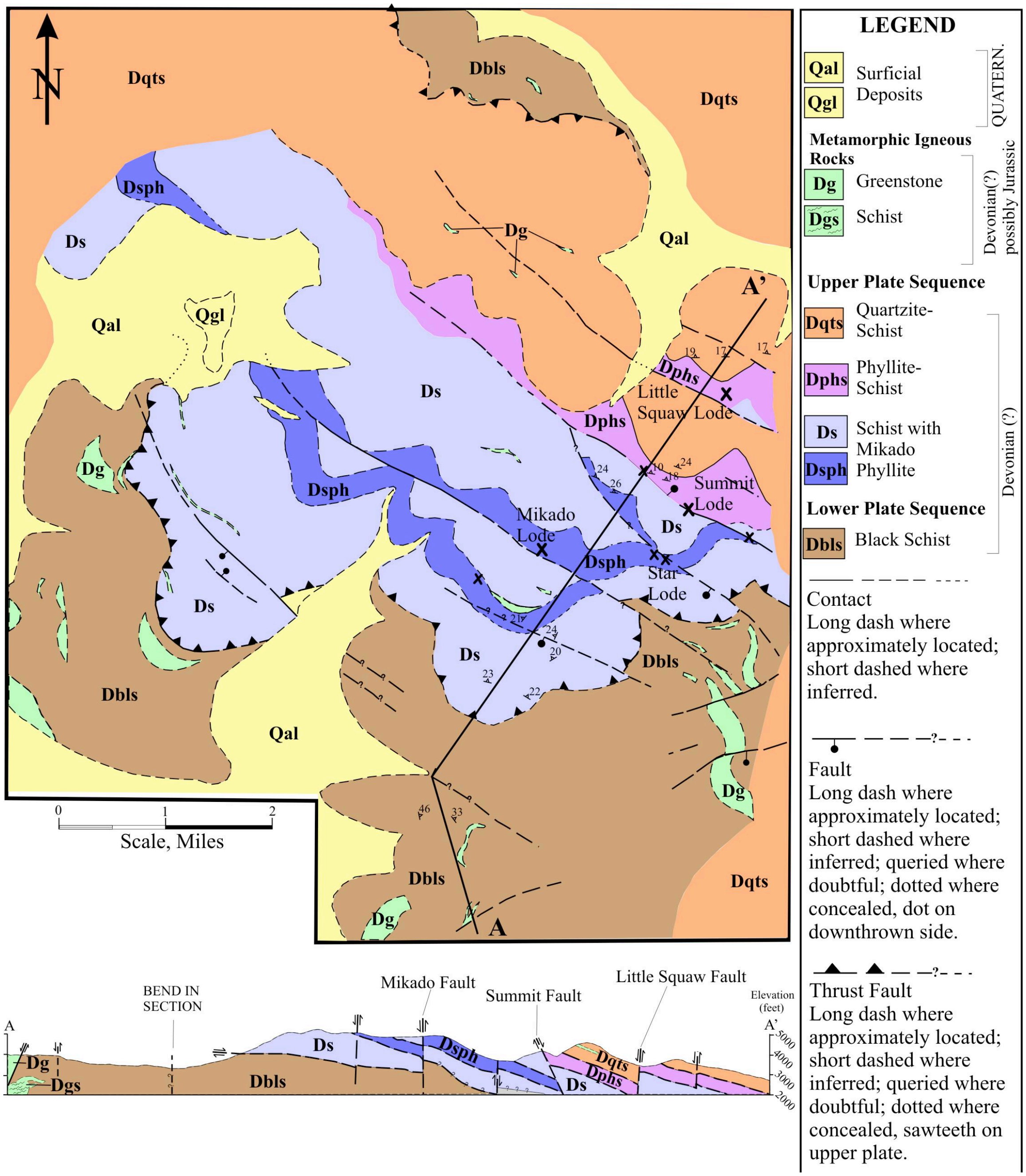


Figure 2 Simplified geological summary of the Chandalar Mining District by Chipp (1970)

equivalent to the quartz-muscovite-chlorite-schist unit of Brosge and Reiser (1964). The black schist-dominant unit (pCPzbs; figure 2) is in thrust contact with the overlying schist section in the upper plate sequence.

The *Upper Plate* forms the core of the northwest-trending ridgeline that separates the north-flowing, Big Squaw Creek drainage basin from the southwest-flowing, Tobin and Big Creek drainage basins. The *Upper Plate* is probably equivalent to the Devonian-age Dqm unit of Brosge and Reiser (1964). The lowest unit of the upper plate sequence is the dominant quartz-muscovite schist unit interbedded with the

‘Mikado Phyllite’ unit. Chipp (1970) believed that the highest member of the *Upper Plate* is in thrust contact with the *Lower Plate* sequence black schist unit along the lower slopes in the Lake Creek basin.

The 2007 PRGCI mapping contradicts some of the interpretations presented by previous workers; however, PRGCI has incorporated key elements of the very useful work of Chipp (1970) during the 2007 mapping campaign. Importantly, we have incorporated the concept of a *Lower Plate* and an *Upper Plate* being separated by a décollement surface in the southern portion of the map area. The reader is referred to sheet I during the following geological discussions.

Lower Plate Rock Units

During the 2007 geologic mapping, six metamorphosed rock units comprise the *Lower Plate*: 1) Medium to dark gray, quartz-graphite-chlorite ‘black schist’ (Dlb, sheet 1); 2) greenish gray, chlorite-rich, locally calcareous tuffaceous schist (Dlc); 3) micaceous quartzite (Dlq), 4) potassium feldspar rich meta-felsic tuff (Dlf), 5) heterogeneous, light to dark, greenish gray, sub-to-non-foliated greenstone, meta-diorite and meta-gabbro; and 6) nearly un-metamorphosed, dark greenish-gray, meta-volcanic agglomerate. *Lower Plate* units occur in two northwest-trending belts that are in structural contact with the *Upper Plate*, which forms the core of the study area.

Black schist (Dlb) forms more than 50 percent of the lower plate, and generally defines it’s extent in the project area. It consists of generally medium to dark gray, finely laminated, graphite-rich, muscovite-chlorite schist. Unit Dlb forms flat, platy scree on hill slopes and outcrops are generally non-resistant. Although many exposures of black schist were judged to be quartz deficient in the field, thin section examination indicated that finely grained quartz lamina, locally comprising up to 40 percent of the rock type, form inter-layers with more mica-dominant (pelitic) layers (Appendix III). White mica where identified is generally the iron rich variety phengite. The distinctive feature of black schist is the nearly ubiquitous presence of finely disseminated pyrite and pyrrhotite mainly in foliation and cleavage surfaces. In key localities a sooty, nearly black carbon film composed mostly of graphite forms on ‘black schist’ outcrops, a diagnostic feature for most exposures of unit Dlb (figure 3).

Figure 3 Exposure of black schist (unit Dlb), lower plate, Boulder Creek area, @ Station # 06BT344; note sooty graphitic material on foliation surfaces.

Greenish gray, chlorite-rich, locally calcareous tuffaceous schist (Dlc) comprises subordinate but important parts of the lower plate, mainly in the northern belt. Unit Dlc ranges from light to medium greenish gray, and is schistose to sub-schistose, outcropping in semi-resistant exposures (figure 4). In thin section, unit Dlc contains quartz (35%), albitic plagioclase (20%), chlorite (20%), white mica (10%), Fe-carbonate (8%), isolated actinolite grains (5%), and epidote and opaques (2%) in a granoblastic matrix. It appears to be frequently interbedded with felsic, meta-igneous schist of the Dlf unit, and hence both units could be related. Some of the more massive exposures superficially resemble calcareous schist of the Dul unit of the upper plate unit, but is mineralogically distinct from the latter rock type.

Felsic or Intermediate meta-igneous schist (Dlf) was recognized and mapped in two areas in the northern belt of the lower plate, where it appears to be interbedded with unit Dlc locally. It consists of plagioclase and albite-rich, quartzose, chlorite-white mica schist. The distinctive light gray-to-tan, granoblastic textures in outcrop distinguish unit Dlf from most other foliated schist types of the Chandalar district. The unit is fairly non-resistant and only outcrops where it is interbedded with more competent rock units. In thin section, a meta-igneous parentage is apparent, with plagioclase and quartz grains exhibiting resorption textures suggesting that they originally formed in a crystalline magma prior to regional metamorphism. Quartz makes up to 35 percent of the groundmass, followed by plagioclase and K-spar (25%), make up about 18% of the groundmass, followed by chlorite (12%), ankerite-carbonate (8%), and opaques (2%). One thin section (06BT124) contained a few grains of what was identified optically as hyperstene, which would suggest a more mafic parentage.

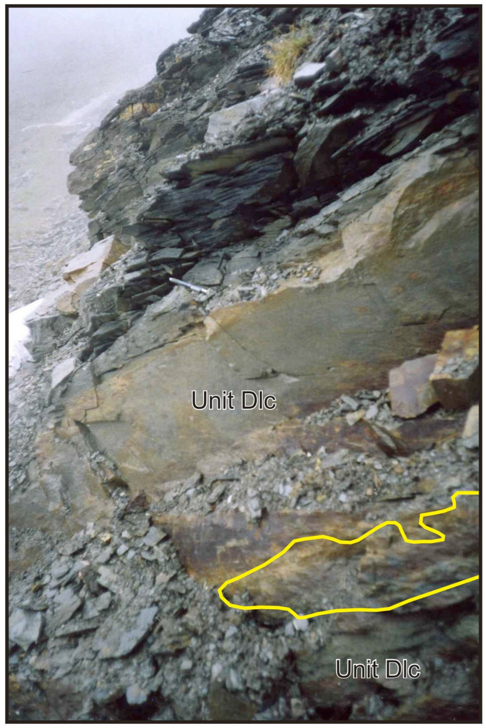


Figure 4 Outcrop of greenish, semi-massive, calcareous, tuffaceous schist (unit Dlc) at 06BT478 east of Little Squaw Creek valley.

<u>*Micaceous quartzite (Dlq)*</u> Forms a distinctive, blocky unit in the northwest corner of the mapped are on the north side of Boulder Creek. It also exists in both the northern and southern belts of the Lower Plate, where it occurs as thin, un-mappable, inter-layered zones in Black schist (Dlb) or as discontinuous rubble areas where it's lateral extensions are not well understood. Micaceous quartzite is resistant and forms very light gray, blocky scree and locally resistant outcrops along steep slopes and ridgelines. In thin section, unit Dlq contains more than 75 percent quartz as anhedral, interlocking aggregates, followed by yellow-green chlorite (10%), phengitic white mica (10%), ilmenite or magnetite (3%), and small epidote? grains (2%). The massive, quartz anhedral grain concentration occurs in bands, with thin, mica-bearing layers in between. The appearance of unit Dlq dispels the notion that lower plate units are quartz-deficient, as has been suggested by some previous workers.

<u>*Massive, non-foliated greenstone (MzPzg)*</u> constitutes a heterogeneous group of discontinuous bodies of rock believed to be exclusively of mafic, meta-igneous parentage. Unit MzPzg appears to be wholly localized in Lower Plate rocks although there are some localities of green schist that occur in the Upper Plate and could be related to the unit. The discontinuous nature of the unit, coupled with locally coarse grained, textures have led others to argue for an exclusively meta-plutonic provenance. Both meta-gabbro and meta-diorite were suggested from both field and thin section examinations. However, we are unsure whether all of the unit MzPzg occurrence are meta-plutonic rocks, and some could have a meta-volcanic provenance. Massive varieties of MzPzg weather out of outcrop areas as large equant masses, superficially resembling erratic boulders (figure 5).

Figure 5 Greenstone boulder from MzPzg unit in Big Creek valley near mouth of St. Mary's Creek.

The large MzPzg bodies in: 1) east of Big Creek airstrip; 2) in Boulder Creek (three bodies); and 3) on the ridgeline east of Little Squaw Creek and near the Pallesgren deposit are coarse-grained and blasto-porphyritic, that exhibit very little if any schistosity. The Pedro Gulch MzPzg occurrence, which is probably related to the Big Creek body, is more schistose, especially near its borders, and more altered. Other smaller MzPzg occurrences, especially along the north flank of the mountain range, are essentially greenish schist. Although textures vary, all are mineralogically similar. They contain variable amounts of primary hyperstene usually altered to actinolite or chlorite, clinozoisite, and epidote, which collectively comprise 60-80 percent of the rocks. Minor but consistent amounts of sphene, ferro-carbonate (siderite), sulfides, usually pyrrhotite, ilmenite, and other undetermined opaque minerals. Alteration occurs near greenstone bodies. Increased amounts of albite was recognized in thin section in wall rock schist as much as 10 meters away from the Pedro Gulch MzPzg body. Quartz veining and carbonate alteration occurs in greenstone near the Pallesgren prospect and in Boulder Creek.

Mafic Agglomerate (MzPza) was found at only one locality in the map area. Unit MzPza occurs along the edge of an ice-marginal meltwater channel along the north-dipping slope that forms the edge of the mountain range, about two miles (3 km) due west of Squaw Lake. Although occurring in a belt containing several MzPzg localities, unit MzPza is believed to be a relatively unaltered, mafic agglomerate probably of volcanic origin. It forms blocky to crumbly outcrops with a distinctive high angle cleavage throughout the outcrop area. Bombs (?) of basalt up to 30 cm in diameter are found floating in a dark green fine grained matrix.

Geochemistry and Age of Meta-Igneous rocks in Lower Plate

Seventeen (17) 'fresh', rock samples from units judged to be of igneous origin were selected for major oxide 'whole rock' and trace element analyses in order to better understand their petrogenesis and origins. Appendix II contains certified analytical results for the laboratory results. The writer has constructed several discrimination diagrams that will aid in classification schemes.

Fourteen (14) samples of unit MzPzg from both the northern and southern belts of the lower plate contain SiO_2 values ranging from 42.30 to 46.51 percent (average=44.30 percent); MgO values ranging from 6.71-9.91 percent (average=7.75 percent); Fe_2O_3 values ranging 8.85 to 13.18 percent (average=10.25 percent), and TiO_2 values ranging from 1.23 to 2.15 percent (average=1.65 percent). Na_2O values range from 2.17-to-3.89 percent (average=3.55 percent). These major oxide constituents would indicate a mafic, even transitional ultramafic parentage, and not the meta-diorite (intermediate) compositions suggested by other workers and by PRGCI during 2006 field and thin section investigations. The high Na_2O values probably indicate albitization processes taking place during regional metamorphism. High Loss on Ignition (LOI) ranging up to 11.40 percent but averaging 3.48 percent also indicates alteration during regional metamorphism.

Four samples of felsic metamorphosed tuff (Dlf) and chloritized intermediate meta-tuff (Dlc) contain SiO_2 values ranging from 74.18-to-83.56 percent (average=75.88 percent); Na_2O values ranging from 0.83-to-6.14 percent (average=3.44 percent); K_2O values ranging from 0.78-to-3.36 percent (average=1.85 percent); and generally low TiO_2 (<0.75 percent), MgO (<2.00 percent), and Fe_2O_3 (<6.00 percent), and LOI Values as high as 3.36 percent. High and variable LOI and alkali values, and obvious silicification in samples with >80 percent SiO_2 probably suggest that some oxides may have been modified by regional metamorphism.

Samples from units MzPzg and MzPza straddle the alkaline and sub-alkaline fields of an alkali-silica diagram (figure 6). All samples from units Dlc and Dlf (felsic tuffs) plot in the subalkaline field. Meta-tuffs of 'intermediate' composition are not documented with this data.

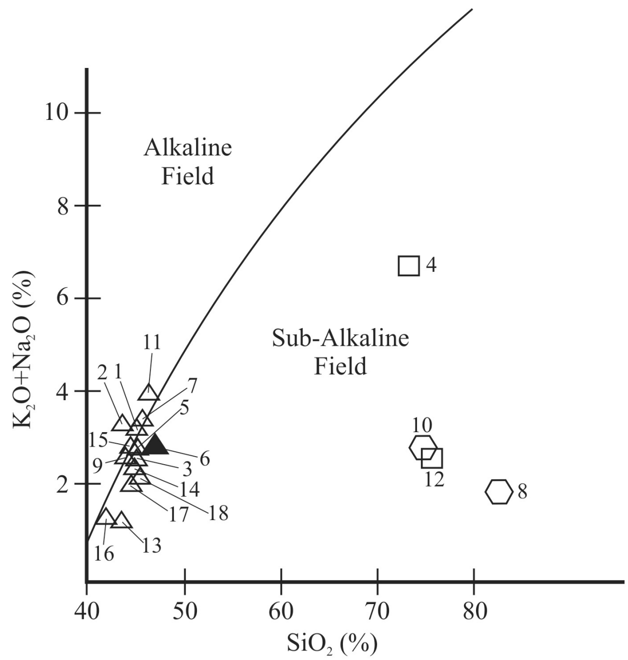
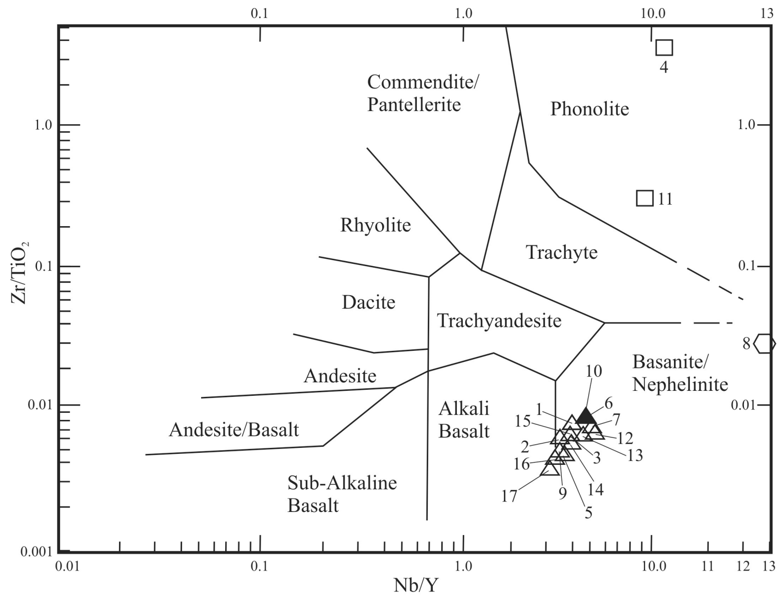


Figure sample #	Field sample #	(Rock Unit)
1	06BT350	(MzPzg)
2	06BT358	(MzPzg)
3	06BT431	(MzPzg)
4	06BT448	(Dlf)
5	06BT449	(MzPzg)
6	06BT451	(MzPza)
7	06BT478	(MzPzg)
8	06GL33	(Dlc)
9	06GL036	(MzPzg)
10	06GL037	(Dlc)
11	06BT115	(MzPzg)
12	06BT094	(Dlf)
13	06BT150	(MzPzg)
14	06BT233	(MzPzg)
15	06BT129	(MzPzg)
16	06BT127	(MzPzg)
17	06BT383	(MzPzg)
18	06BT119	(MzPzg)

△ = metabasite
□ = metafelsite tuff
⬡ = meta-intermediate tuff
▲ = mafic agglomerate

Figure 6 Mafic to Felsic, Meta-Igneous Rocks of the Chandalar Mining District Plotted on an Alkali-Silica Diagram as Advocated by Irvine and Barager (1971).

Following the general approach of other researchers, PRGCI used immobile trace elements to better classify the meta-igneous rocks of the Chandalar mining district and understand their tectonic setting and petrogenetic implications for mineral resource potential. When plotted on a Zr/TiO_2 versus Nb/Y discrimination diagram of Winchester and Floyd (1977), units MzPzg and MzPza straddle the fields of alkali basalt (alkali gabbro) and Basanite/Nephelinite (clinopyroxene-feldspathoid-bearing mafic rocks), indicating the mafic magmas are primitive, alkaline, and fractionated (figure 7).



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6	06BT451	(MzPza)
7	06BT478	(MzPzg)
8	06GL033	(Dlc)
9	06GL036	(MzPzg)
10	06BT115	(MzPzg)
11	06BT094	(Dlf)
12	06BT150	(MzPzg)
13	06BT233	(MzPzg)
14	06BT129	(MzPzg)
15	06BT127	(MzPzg)
16	06BT383	(MzPzg)
17	06BT119	(MzPzg)

△ = metabasite
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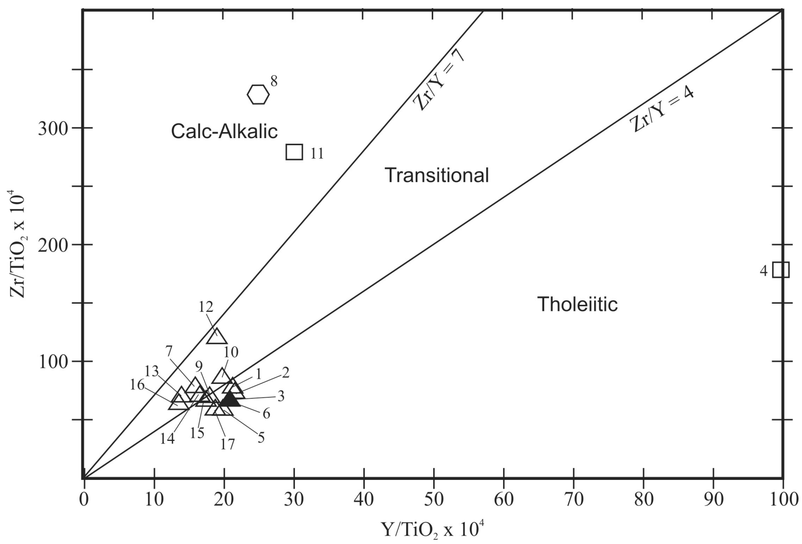
⬡ = meta-intermediate tuff
▲ = mafic agglomerate

Figure 7 Mafic to Felsic, Meta-Igneous rocks of the Chandalar Mining District Plotted on Immobile Element (Zr/TiO2 versus Nb/Y) Discrimination Diagram as Advocated by Winchester and Floyd (1977).

More felsic meta-igneous rocks from units Dlf and Dlc plot in widely scattered patterns in the Phonolite and Trachyte fields. The lack of a consistent grouping for the latter rock suite indicates a variable source or magma contamination may have taken place.

When displayed on a Y/TiO_2 versus Zr/TiO_2 Tectono-Magmatic Discrimination Diagram (figure 8), units MzPzg and MzPza plot in the tholeiite and transitional tholeiite fields and when combined with the Nb/Y versus Zr/TiO_2 diagram presented above, resemble titanium-enriched, mafic magmas associated with back-arc regions such as the Tertiary Kamchatka arc (Kepezhinskas et. al., 1997).



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3	06BT431	(MzPzg)
4	06BT448	(Dlf)
5	06BT449	(MzPzg)
6	06BT451	(MzPza)
7	06BT478	(MzPzg)
8	06GL033	(Dlc)
9	06GL036	(MzPzg)
10	06BT115	(MzPzg)
11	06BT094	(Dlf)
12	06BT150	(MzPzg)
13	06BT233	(MzPzg)
14	06BT129	(MzPzg)
15	06BT127	(MzPzg)
16	06BT383	(MzPzg)
17	06BT119	(MzPzg)

△ = metabasite
□ = metafelsite tuff
⬡ = meta-intermediate tuff
▲ = mafic agglomerate

Figure 8 Mafic to Felsic Meta-Igneous Rocks of the Chandalar Mining District Plotted on Y/TiO2 versus Zr/TiO2 Tectono-Magmatic Discrimination Diagram as advocated by Lentz (1998)

On the other hand, meta-felsic and intermediate tuffs (units Dlf and Dlc) plot in both the tholeiitic and calc-alkaline fields with a good deal of scatter.

Meta-igneous protoliths of Chandalar district are plotted on a primitive mantle-normalized trace element discrimination diagrams (figure 9 A, B). The multi-element diagram is arranged in order of decreasing incompatibility during mantle melting. The metabasites (MzPzg; MzPza) plot in a tight, consistent trend that shows a nearly flat, melt-progression with steep niobium and tantalum depletion anomaly, moderate lanthanum and cerium enrichment, modest europium depletion, and significant titanium enrichment.

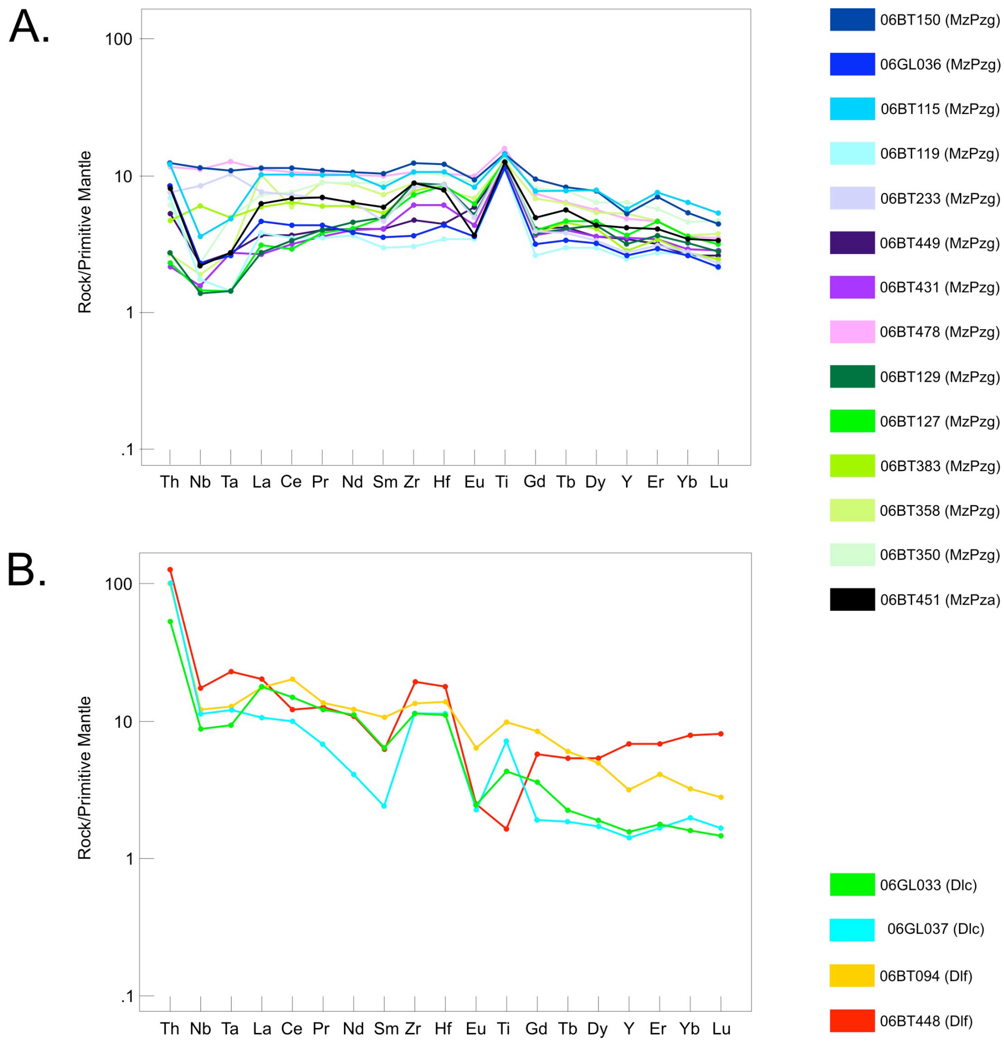

Figure 9 Meta-Igneous Rocks of the Chandalar Mining District Plotted Rock/Primitive Magma Trace Element Spider Diagram; A.—mafic units MzPzg; MzPza; B.--Felsic and Intermediate units Dlf and Dlc; Normalized Primitive Mantle Data from Sun and McDonough (1989)

The remarkably tight sample cluster exhibited by metabasite samples and shown in figure 9, as well as in other trace element and oxide plots (figures 6-8), surprised the writer, because of the wide variety of color, texture, and mineralogical content found in unit MzPzg throughout the study area—both from field and thin section observations. Because of this heterogeneity, it was predicted that more than one sample population and multiple compositions of MzPzg would be encountered. The primitive mantle-trace element discrimination diagram clearly indicates a close geochemical association with all of the sampled MzPzg unit outcrops in both the northern (n=6 samples) and southern (n=8 samples) belts of lower plate rocks. The mafic agglomerate unit (MzPza), which contrasts in composition, texture and metamorphic history with the greenstone bodies of the (MzPzg), also appears to be geochemically related to the latter unit.

The primitive mantle-normalized trace element discrimination plots of the intermediate and felsic units (Dlf, Dlc) show a very significant decreasing progression of heavy to light elements during magmatic differentiation; e.g., a strong niobium, tantalum, and neodymium depletion (somewhat like those in mafic rocks), but strong samarium, zirconium, and hafnium enrichment, and a very strong europium depletion anomaly. The discrimination pattern resembles calc-alkaline island arc magmas documented in the Brooks Range schist belt (Hitzman and others, 1986), and the Bonnifield mining district of Alaska (Dusel-Bacon and others, 2004), or the Finlayson district of south-central Yukon, Canada (Piercey and others, 2004).

The mafic and intermediate to felsic metamorphosed meta-igneous rocks in the Chandalar district exhibit geochemical contrasts (figures 6-9), which may indicate that magma suites are not related. Several different interpretations are possible for the petrogenesis and age of the mafic suite in the Chandalar district. The age of the greenstone bodies (MzPzg) is poorly constrained. Brosge and Reiser (1964) assigned greenstone bodies throughout the Chandalar quadrangle as Devonian, the same age as felsic meta-volcanic rocks of the Ambler sequence described later by Hitzsman and others (1986). However, Reiser and others (1964) obtained Early or Middle Jurassic K-Ar ages from mafic meta-igneous complexes in the Christian quadrangle; these workers also believed that they had found Triassic fossils in inclusions in the mafic rocks. Mull and others (1989) believed that diabasic-to-gabbroic bodies in the Killik-Itkillik region could be either Triassic or Jurassic in age. One of the problems with age designation is the general lack of ability to obtain a reliable crystallization age for a metamorphosed mafic rock. Similar problems also exist for dating meat-diabase-gabbro complexes in the Delta District of the eastern Alaska Range (Lange and others, 1993) or the Kantishna Hills in the north central Alaska Range (Bundtzen, 1981). The mafic units (e.g., units MzPzg or MzPza) could conceivably be as young as mid-Cretaceous and be involved in the hydrothermal alteration and formation of structurally controlled vein-fault, gold mineralization in the Chandalar district.

Because of the importance of determining the age of the mafic rocks in the study area, the writer collected two samples of meta-gabbro from the north and south belts respectively. Both samples contain sphene, which could conceivably be dated using the U/Pb isotopic method. This dating effort is in progress.

The writer believes that the intermediate to felsic meta-igneous tuff units (Dlf, Dlc) are correlative with the Ambler sequence, which is known for hosting important volcanogenic massive sulfide deposits further to the west. Although comprising only a few percent of the rock section, exposures of units Dlf and Dlc in the study area are probably remnants of submarine volcanic centers active during Devonian time.

Upper Plate Rock Units

During the 2007 geologic mapping (see sheet 1), five metamorphosed rock units comprise the *Upper Plate*: 1) Gray, carbonaceous, 'fissle' platy schist and phyllite (Dup); 2) Fine to coarse grained, quartz chlorite muscovite schist, with local meta-turbidite schist (Dum); 3) Fine to coarse grained, layered, meta-turbidite schist (Dut), 4) light gray, actinolite-bearing calcareous meta-sandstone and schist (Dul), and 5) Light gray, blocky, quartz-rich, muscovite oligoclase schist (Dus) with local garnets.

Gray, fine to coarse grained, quartz chlorite muscovite schist, with local meta-turbidite schist (Dum)
Makes up about 65 percent of the upper plate in the map area. It forms relatively roughed mountain peaks, coarse angular scree slopes, and bedrock exposures in steam ravines mainly due to its high quartz content. In thin section, unit Dum contains 45-55 percent quartz, 15-20 percent pennine chlorite, 10 percent phengite, 8-10 percent opaques—mainly ilmenite and magnetite, albitic plagioclase (10%), and locally stilpnomelane (2%). In some areas, rhythmic layering of darker gray mica-rich and lighter gray quartz rich variants are interpreted to be meta-turbidites, which are better developed in the Dut unit (see discussion below). Unit Dum is in low angle structural contact with the underlying Dlb unit along the entire southern length of the study area, which was first interpreted to be a north-dipping, low angle décollement by Chipp (1970). Detailed examination by PRGCI in 2007 confirms this interpretation. Foliations and compositional banding in the underlying Dlb unit versus overlying Dum unit are often discordant; this discordant relationship is best observed west of St. Mary's Creek and east of Big Creek. However, the contact between Dum (and Dut) versus the Dlb unit in the north part of the study area is interpreted during this study to be a high angle fault.

Fine to coarse grained, layered, meta-turbidite schist (Dut Forms one of the most distinctive units in the Chandalar mining district and makes up about 15 percent of the upper plate. Like the Dum unit, the Dut unit forms resistant ridgelines and peaks, rugged outcrops in stream cuts, and coarse, angular rubble, mainly due to relatively high quartz content. In thin section, Dut is very similar to unit Dum; and is composed of 50-55 percent quartz, 10-12 percent pennine chlorite, 8 percent phengite, 8-10 percent opaques—mainly ilmenite and magnetite, albite-oligoclase plagioclase (10%), and locally stilpnomelane (2%). The chief mineralogical difference between Dum and Dut is that there is more quartz in the latter. Although unit Dut has been completely recrystallized during metamorphism, the writer believes that the unit is composed largely of metamorphosed turbidites, or originally sedimentary rocks formed by turbidity currents. This interpretation is based on the recognition of: 1) relict rhythmic Bouma cycles; e.g., $Bouma_{ab}$ and $Bouma_{a\text{-}d}$; 2) moderate sorting; 3) grains size differences in layers that are interpreted to be graded bedding; and 4) relict scour bases. Figures 10-12 illustrate the textural evidence for this interpretation. Units Dum and Dut grade into each other; e.g., there are meta-turbidite sections in the Dum unit that are identical to those found in the Dut unit.

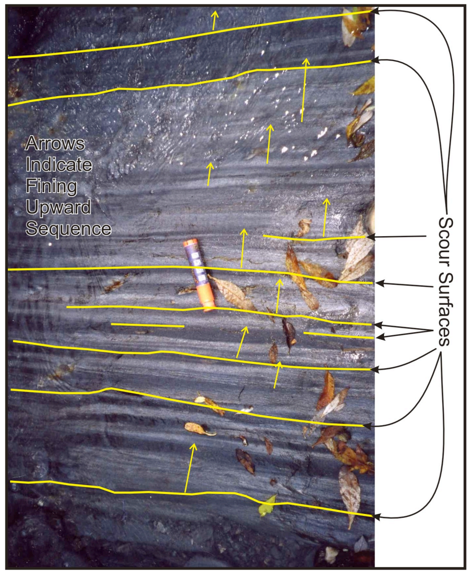

Figure 10 Relict graded bedding in rhythmically layered quartz-feldspathic and mica dominant zones and relict scour features in unit Dut near station 06BT101 in a smooth bedrock surface along stream cut. Arrows point to fining upward grain size.

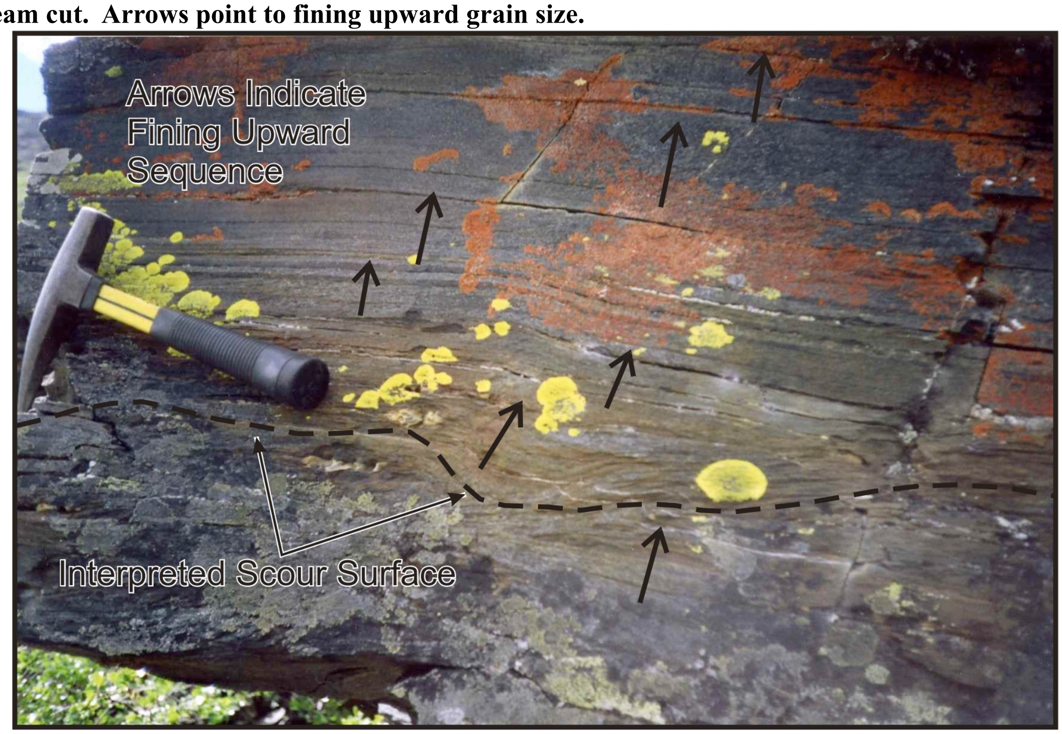

Figure 11 Meta-Turbidite schist (unit Dut) @ station 06BT192, which exhibits relict graded bedding (Bouma$_{a\text{-}d}$?, and interpreted scour surface.

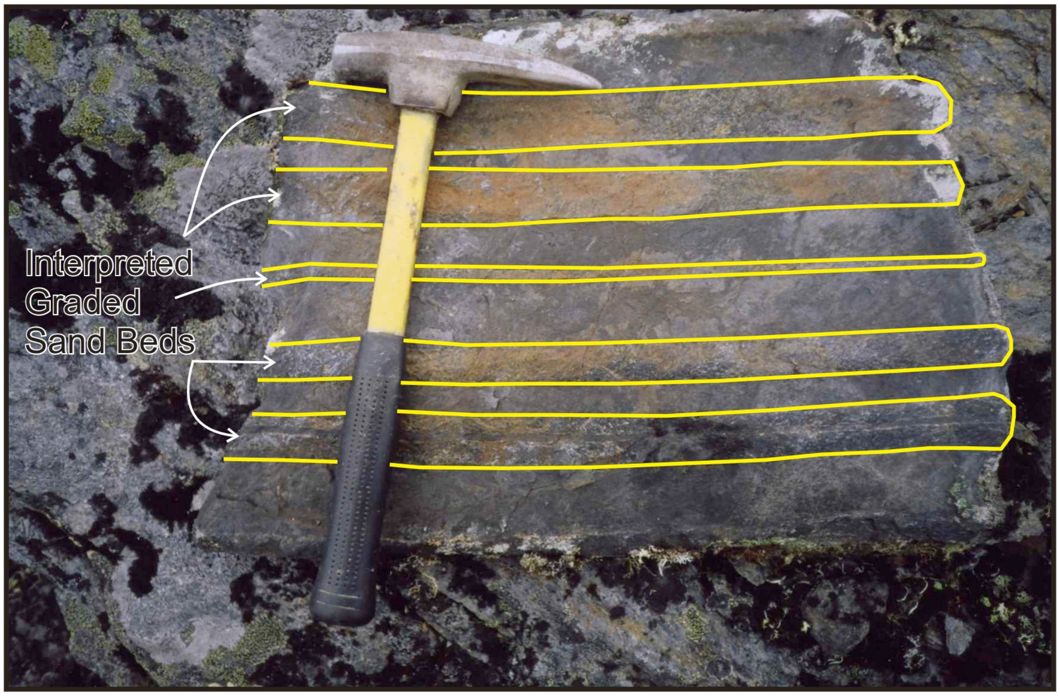

Figure 12 Meta-turbidite schist @ station 06BT140 (unit Dum), which exhibits rhythmic layering of quartzo-feldspathic (relict graded sand) and carbonaceous mica (relict mud), each about 10 cm thick.

Gray, carbonaceous, 'fissle' schist and phyllite (Dup) forms a distinctive unit near the base of the Upper Plate. It forms very non-resistant outcrop exposures along the road system on the ridgeline between Little Squaw, Big, and Tobin Creeks, along the trace of the Mikado vein-fault system, and in slippery, scree slopes. Locally, unit Dup is the principle constituent of rock glacier and land slide block deposits in the study area. In thin section, unit Dup is composed of dark gray to brown layers averaging 3 cm thick of chlorite and graphite (55%), thinner 0.5 to 1.0 cm layers of Fe-white mica (phengite) (20%), quartz-feldspar anhedra layers about 0.5 cm thick (15%), and isolated grains of opaques (1-2%). Pyrrhotite is ubiquitous near the head of Little Squaw Creek. This distinctive unit has been referred to by previous workers; e.g., Chipp (1970), as the 'Mikado Phyllite' due to its apparent association with the Mikado mine. PRGCI also included unit Dup with another phyllitic section exposed near the Eneveloe-Chandalar vein-fault, which Chipp (1970) maps as separate phyllite unit exposed structurally higher in the section. The writer is unsure about the specific origin of unit Dup. It may be of meta-sedimentary provenance, being a unit with exceptionally high mica content, resulting in its incompetent nature. However, the near ubiquitous association with unit Dup and known vein-fault systems; e.g., the Mikado and Eneveloe and Little Squaw deposits, suggests that unit Dup may have formed in zones of structural disruption. In other words, unit Dup could be a mylonite.

Light gray, actinolite, calcareous meta-sandstone and schist (Dul) is one of the most distinctive rock units in the entire map area. It forms very light gray, schistose to sub-schistose, to locally massive outcrops in several distinctive linear bands across the central part of the map area. As such, unit Dul served as a valuable marker unit during geologic mapping. In the central portion of the map area, unit Dul is interpreted to be structurally repeated by a large scale, overturned syncline (sheet 1). All exposures of unit Dul exhibit various degrees of effervescence during the application of HCl, due to moderate or even high $CaCO_3$ content. A typical thin section (06BT176 or 06BT143; Appendix III) contains equant calcite grains/cement (30%), chlorite (23%), actinolite (12%) inclusion-rich quartz and albite (20%), clinozoisite (4%). Unit Dul appears in both the footwall of the Mikado and Little Squaw vein-fault systems and was encountered in underground workings of both past productive gold deposits. An isoclinally folded exposure of unit Dul along the south flank of Little Squaw Peak is shown in figure 13.

Light gray, blocky, quartz-rich, muscovite oliogclase schist (Dus) was mapped exclusively in the eastern part of the map area in structural contact with other upper plate units. It consists of very resistant, blocky, quartzose schist difficult to distinguish mineralogically from either the Dum or Dut units. The chief difference is the apparent higher metamorphic grade of Dus. A typical thin section (O6BT271) contains quartz anhedra (50%); oligoclase (10%), muscovite (10%); chlorite (10%); actinolite (8%); opaques (6%); small incipient garnets (6%); and sphene. Two mineralogical criteria indicate a higher metamorphic rank: 1) appearance of higher calcium content of plagioclase, based on twinning; and 2) small incipient retrograded garnets. This mineral assemblage oligoclase-chlorite-actinolite-muscovite in unit Dus probably indicates upper greenschist facies conditions, in contrast to the middle-greenschist facies metamorphic conditions identified in other Upper Plate units.

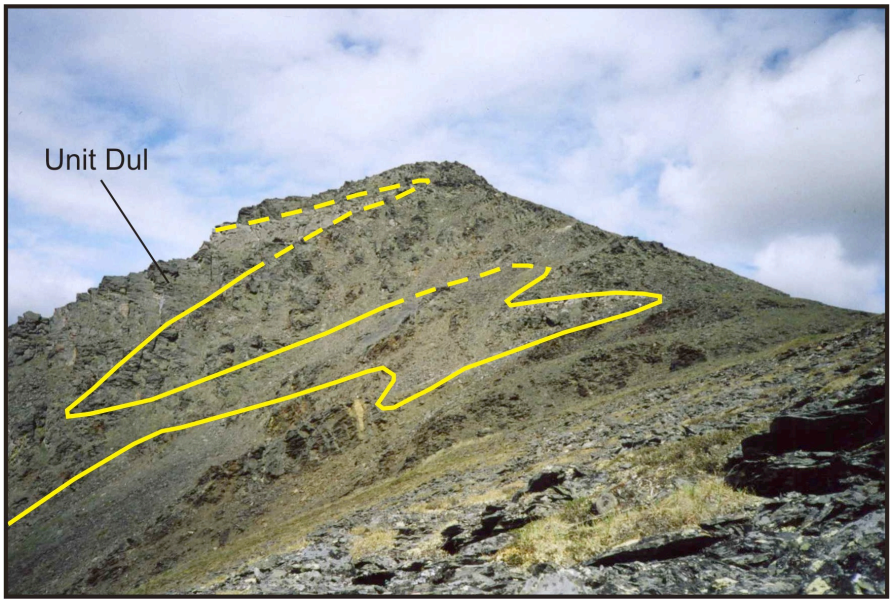

Figure 13 Exposures of isoclinally folded, calcareous schist of the Dul unit on the flanks of Little Squaw Peak

<u>*Undifferentiated Bedrock Schist (Bx*</u> Is shown on sheet 1 on the ridgeline east of McLelland Creek. Our limited knowledge of this are is based on two stations located near the end of the mapping program. Exposures were similar to the Dus unit previously described. It is likely that most of this ridgeline is underlain by Upper Plate rock units; however, its subdivision will have to await future geological mapping investigations.

Geochemistry, Petrogenesis, and Age of Meta-Sedimentary Rocks in Chandalar District

Provenance of meta-sedimentary rocks (schist units) of the study area are difficult to determine because: 1) original textures have been modified or even obliterated by regional metamorphism, thus eliminating typical provenances study approaches such as point counts, and sedimentary textural comparisons; 2) geochemical classification schemes are not as well developed for sedimentary rocks as those in igneous provinces; and 3) oxide components, especially alkalis, may have changed during metamorphism. PRGCI analyzed sixteen (16) samples of samples from both the Lower and Upper plates for major oxide and trace element geochemistry in order to characterize and classify the meta-sedimentary rocks types of the study area. Selected data from Appendix II shown in table 3 compares selected meta-sedimentary rocks of the study area with un-metamorphosed sedimentary rock types reported in the literature. Hence these comparisons assume general isochemical conditions during regional metamorphism.

Table 2 Comparisons of selected major oxide analyses from meta-sedimentary rocks in the study area with selected world-wide examples; all analyses in percent [3]

Oxides	*06GL314 (Dlq)*	*06GL316 (Dlb)*	*06GL028 (Dup)*	*06BT098 (Dut)*	*06BT175 (Dul)*	*06BT187 (Dul)*	*06GL029 (Dus)*	*06GL034 (Dut)*	*06BT165 (Dum)*	*Graywacke Blatt and others [1]*	*Graywacke Pettijohn [2]*	*Calc-Graywacke [3]*
SiO2	79.15	66.15	58.50	64.56	53.81	42.65	73.10	59.61	62.36	66.70	64.70	65.05
Al2O3	7.62	15.11	19.64	16.82	4.73	15.34	11.55	19.05	17.58	13.50	14.80	13.89
Fe2O3	4.69	6.75	7.73	7.07	3.40	9.61	5.26	8.26	7.30	5.60	5.40	4.34
CaO	0.30	0.33	0.24	0.18	18.60	8.91	0.53	0.20	0.19	2.50	3.10	5.62
MgO	1.20	1.72	2.46	1.79	0.61	5.94	1.63	2.17	2.14	2.10	3.10	3.13
Na2O	0.88	0.64	1.08	0.89	0.47	3.01	0.61	1.02	0.86	2.90	1.90	1.41
K2O	0.84	2.75	3.25	2.87	0.02	0.05	1.95	3.03	2.67	2.00	----	----
Cr2O3	0.01	0.01	0.01	0.01	<0.01	0.03	0.01	0.02	0.02	-----	----	----
TiO2	0.70	1.00	1.25	1.00	0.50	1.40	0.91	1.25	1.02	0.04	0.50	0.46
MnO	0.05	0.05	0.06	0.03	0.55	0.16	0.06	0.06	0.04	0.01	0.01	0.11
P2O5	0.13	0.17	0.15	0.14	0.12	0.14	0.20	0.14	0.12	0.01	0.40	0.15
SrO	0.02	0.02	0.01	0.01	0.07	0.04	0.01	0.01	0.01	-----	----	----
BaO	0.03	0.08	0.08	0.10	<0.01	0.01	0.06	0.09	0.12	-----	----	----
CO2 +LOI	2.59	3.95	3.98	3.54	16.05	10.95	3.01	3.88	4.27	1.10	7.10	5.38
Total	98.20	98.72	98.44	99.02	98.93	98.23	98.88	98.78	98.70	96.50	101.00	99.54

[1] Average of 61 graywackes in Blatt and others (1972)
[2] Average of 30 graywackes from Pettijohn (1957)
[3] Average Cretaceous calcareous graywacke from Olympic Mountains, Washington; from Pettijohn and others (1987)
[4] Additional geochemical data for meta-sedimentary rock units in Appendix II

The chemical composition of the meta-sedimentary rocks from the Chandalar district necessarily reflects complex mineralogical compositions derived from sedimentary source terranes. Units Dup, Dum, Dus, and Dut average 63.45 percent SiO_2, which compares fairly closely with graywacke provinces (average=64.70 percent) as reported from Pettijohn (1957) and Pettijohn and others (1987), with detrital quartz as the main constituent. Graywacke generally contains lower than average silica contents than more typical sublithic or arkose sandstone provinces, due to interstitial detritus acquired during formation. Alumina content in Chandalar rock units average 16.75 percent, which is also in the range of graywacke compositions. Most graywacke provinces contain elevated K_2O and Na_2O. The Chandalar rocks also contain elevated alkalis that average 3.65 percent, but mostly in the form of K_20 (average=2.78 percent). Two samples of black schist from the lower plate (unit Dlb) average 65.95 percent SiO_2, 15.76 percent Al_2O_3, and 3.39 percent alkalis, which is similar to the geochemical signature of the meta-turbidite schist in Upper Plate units. The impure quartzite mapped in the lower plate (unit Dlq) averages about 79.15 percent SiO_2, only 7.95 percent Al_2O_3, and 1.72 percent alkalis (n=2), which distinguishes this unit from the meta-turbidites.

The calcareous schist (unit Dul) contains up to 18.60 percent CaO (average=12.15 percent; n=4), but averages only 48.23 percent SiO_2 and 1.77 percent alkalis; these data contrasts with the chemical signature of other meta-clastic rocks in the Lower and Upper plates. Utilizing the Calcium Carbonate Equivalence (CEE) formula of Barksdale (2001), which estimates $CaCO_3$ content in rocks using major oxide data, unit Dul ranges from 15.85 to 33.10 percent CEE, and averages 21.62 percent CEE (n=4). Where present, unit Dul could provide a significant buffer for ascending acidic solutions.

Figure 14 plots data from 16 samples of meta-sedimentary rocks from both lower and upper plate rocks on a Fe-Mg-Na_2O-K_2O triangular diagram. This diagram was selected, because it has been used to classify flysch sediments into tectonic settings (e.g., Blatt and others(1972); Pettijohn and others (1987). Meta-sedimentary rocks from the Chandalar area plot in the field of 'Ferro-Magneisum flysch sediments'. Most graywacke provinces plot in the field of sodic enrichment. The writer believes that the tight cluster of units Dum and Dut on the triangular diagram (figure 14) suggests that the Chandalar district meta-graywacke is K_20 enriched WRT Na_2O.

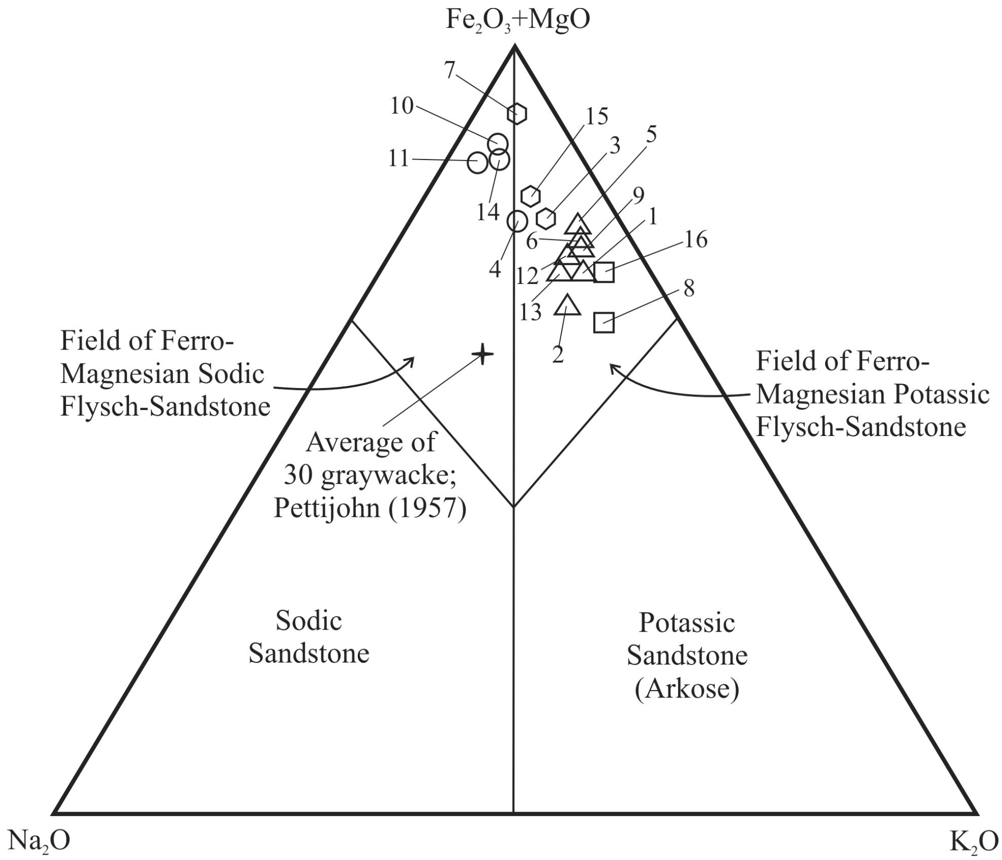

Figure sample #	Field sample #	(Rock Unit)
1	06GL028	(Dup)
2	06GL016	(Dum)
3	06GL021	(Dlq)
4	06GL023	(Dul)
5	06GL029	(Dus)
6	06GL034	(Dut)
7	06GL035	(Dlq)
8	06BT082	(Dlb)
9	06BT098	(Dut)
10	06BT175	(Dul)
11	06BT187	(Dul)
12	06BT165	(Dum)
13	06BT153	(Dum)
14	06BT213	(Dul)
15	06GL314	(Dlq)
16	06GL316	(Dlb)

△ = Upper Plate meta-turbidite schist

○ = Upper Plate calc-schist

□ = Lower Plate black schist

⬡ = Lower Plate quartzite

Figure 14 Triangular Fe2O3+MgO-Na2O-K2O Plot Illustrating Classification of Chandalar Mining District Meta-Sedimentary Rocks Based on Tectonic Settings; as Advocated by Blatt and Others (1972) and Pettijohn and others (1987).

Unconsolidated Deposits

Previously published Quaternary geologic studies of the study area have been conducted at a scale of 1:250,000 or larger, mainly from studies of the Chandalar Quadrangle during the USGS AMRAP program. PRGCI found the glacial stratigraphy established by Hamilton (1978, 1979, 1986) to be very useful during the 2007 investigations. The excellent descriptions of the Quaternary geology of the area by Mertie (1925), especially as they relate to formation of placer gold resources, were also valuable sources of data. In addition to ground based traverses conducted during 2007, PRGCI utilized 1:63,360 'U-2' aerial photographs to map Quaternary units throughout the study area. Fourteen (14) Quaternary units are shown on sheet 1.

Glaciogenic Deposits

Five deposits of glacial origin were identified: 1) glacial till and outwash of the Sagavanirktok River (or older) Glaciation (Qgt1); 2) glacial till and outwash of the Itkillik I Glaciation (Qgt2); 3) glacial till and outwash of the Itkillik II Glaciation (Qgt3); 4) Late Wisconsin to Holocene till (Qgt4); and 5) rock glacier deposits (Qrg).

Glacial till and outwash of the Sagavanirktok River (or older) Glaciation (Qgt1) in isolated patches along hill slopes generally above 3,000 feet (915 m) elevation and in eroded, west or south-facing cirques. All glacial morphology in Qgt1 deposits has been completely removed by erosion, and exposures are mainly composed of till patches often associated with etched glacial erratic boulders. Till of the Sagavanirktok River (or older) Glaciation is believed to be Middle Pleistocene in age (Hamilton (1986), based on minimum radiocarbon ages (>50,000 yrs bp) identified in correlative till sheets west of the Chandalar district. Qgt1 till is thin ad averages about 2-3 meters in thickness.

Glacial till and outwash of the Itkillik I Glaciation (Qgt2) occurs mainly in the trunk valleys of the Chandalar River on the west and Lake Creek to the north. Glacial morphology in the form of hummucky diamicton, kettles (about 3 per km^2) and prominent lateral moraines at an average elevation of about 2,700 feet (825 m). During the Itkillik I Glaciation, ice moved south down the main Chandalar River and left a prominent lateral moraine nearly 20 meters in thickness within upper Boulder Creek valley; the drift served as a buttress against older Qgt1 drift. Ice trunks of Itkillik I age were rigorous and backed into the tributaries on Boulder and McLelland Creeks, which are locally marked by prominent erratic trains composed of granodiorite. In Lake Creek valley, a series of ice marginal meltwater channels that flowed in a easterly direction (figure 15). Hamilton (1986) assigned the drift of Itkillik I age an early Wisconsin age, based in radio-carbon and pollen age control in the type Itkillik River Valley.

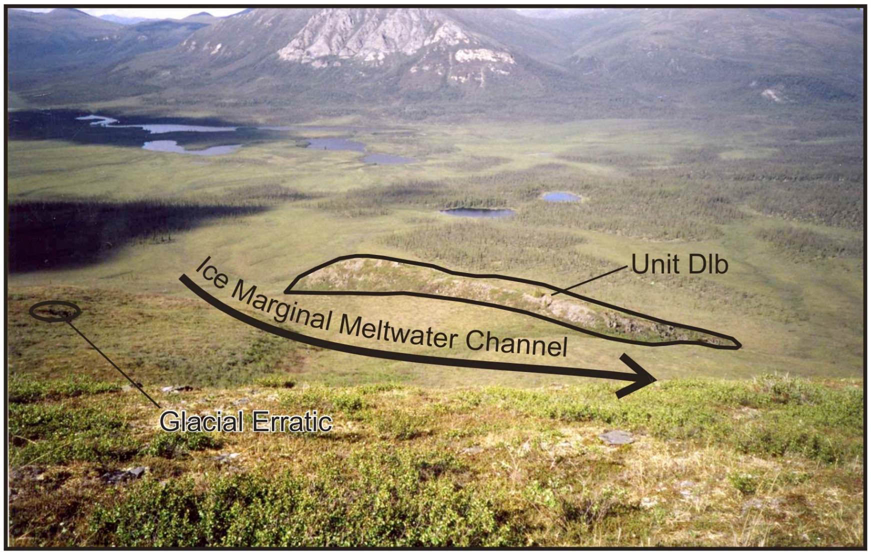

Figure 15 Ice Marginal Meltwater Channel and glacial erratic of Itkillik I age along south valley wall of Lake Creek about 2 km east of Mello Bench Camp. North side of notch is black schist (Dlb) of lower plate and locally meta-gabbro of unit MzPzg to the left of the photo.

Glacial till and outwash of the Itkillik II Glaciation (Qgt3) occurs in the main trunk valley of Lake Creek and Chandalar River and in second order tributary valleys of the Chandalar uplands. Glacial till of Itkillik II age is fresh and exhibits steep fronts, numerous kettles (8-10 per km^2), contains fresh glacial erratics of both local and distal provenance, and ranges in thickness from 2-10 meters. Both Chandalar and Squaw Lakes formed behind terminal ice positions of Itkillik II age (Qgt3 deposits). The terminal position in Lake Creek basin is marked by Little Squaw Lakes complex of glacial kettles. Glacial till of Qgt3 age occurs in many of the north-facing, northeast-facing, and east-facing, 'protected' valleys of the study area. Small valley glaciers 2-4 kilometers long occupied McNett, Big Squaw, Little McLelland, and McLelland Creek valleys. Small cirque glaciers of Qgt3 age occur in tributaries of MClelland Creek, and importantly, in the east fork of Tobin Creek below the Mikado low-sulfide, auriferous, vein-fault system. Previous studies by Hamilton (1978, 1979, 1986) described in some detail the limits of Itkillik II age drift in the trunk valleys of Chandalar River and Lake Creek, but does not describe the localized cirque and valley glaciation originating in the Chandalar upland.
Locally, Qgt3 drift in Big Squaw creek is up to 10 meters in thickness but averages about 5 meters thick.

This restricted cirque and valley, and trunk glaciation of Qgt3 age had a substantial impact on the distribution of heavy mineral-gold placer deposits originating from the well known, high grade, gold-bearing vein-fault systems of the study area. Heavy mineral placers were buried and diluted by drift of Itkillik II age in Little Squaw and Big Squaw Creek basins. Shallow placer gold deposits occur only below the snout of a Qgt3 cirque in Tobin Creek. The ancestral channel of Big Squaw Creek originally flowed northeast through a gap of 'Spring Creek'; after Qgt3 drift was deposited, the stream was diverted toward the present direction of Squaw Lake.

Glacial deposits of Itkillik II age from the Chandalar quadrangle have yielded radio-carbon dates ranging from 15,000-to-35,000 (Hamilton, 1979), which confirm a late Wisconsin age estimate for Qgt3 deposits in the study area.

Late Wisconsin to Holocene till (Qgt4) is recognized only near the top of Little Squaw Creek basin. Qgt4 deposits occur in a very well preserved, cirque basin nearly unmodified in shape, despite significant and recent mass wasting taking place in its headwall by landslide block failure (Qcl) and active rock glacier deposits (Qrg). Figure 16, which is taken from a 1:63,360 scale air photo, illustrates the 'U' shaped profile of upper Little Squaw Creek. Qgt4 till consists of nearly completely unmodified diamicton, and includes a small tarn on its eastern edge. PRGCI dug a 1.7-meter-deep trench at station 06BT159 (Appendix I) in the Qgt4 deposit into the small tarn basin, where a 1.2-meter-thick section of lacustrine silt and clay was encountered below a thin matte of vegetation and rock debris (figure 17). Three thin zones of peat encountered in the tarn section were submitted to Beta-Analytic, Inc. of Miami, Florida, USA for radiocarbon age determinations. A 2-cm-thick peat layer 80 cm below the surface did not yield a radiocarbon age. A-3-cm thick peat layer 115 cm below the surface yielded a radiocarbon age of 1,450 +/- 40 BP (Appendix III). A 1.5-to-2.0 cm-thick peat layer 145 cm below the surface and near the bedrock interface yielded a radio-carbon age of 1,460 +/- 40 BP. Although these results do not necessarily date the age of the initial Qgt4 glaciation, they do document a period of lake (tarn?) impoundment probably associated with ice melting activity in Late Holocene time.

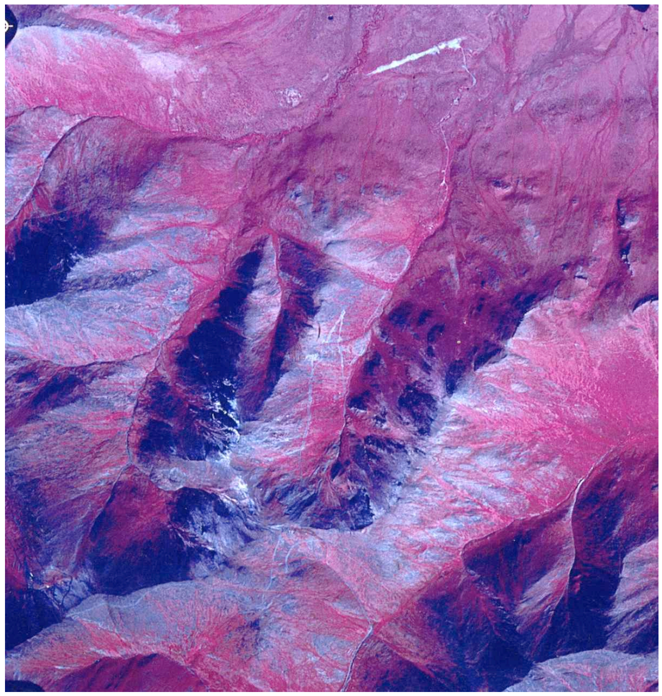

Figure 16 Head of Little Squaw Creek (center of photo), partially underlain with drift of Qgt4 age. Despite recent and significant mass wasting caused by erosion of incompetent rock units (unit Dup), the cirque has maintained its classic 'U' shaped profile, the best preserved in the Chandalar district . Note the Pioneer Fault to the north.

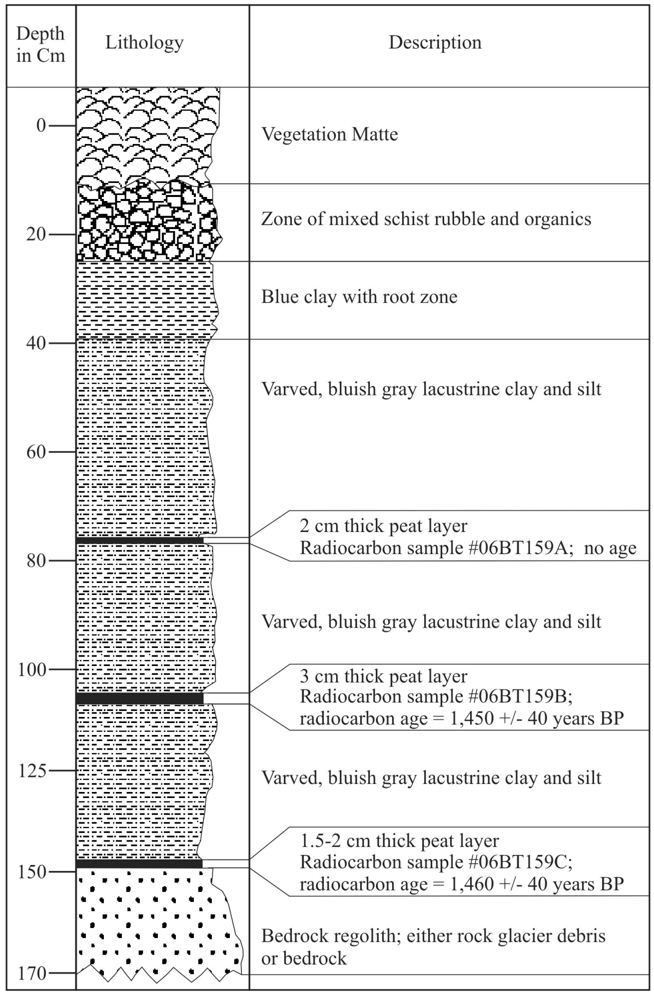

Figure 17 Quaternary section in Qgt4 cirque, upper Little Squaw Creek basin, illustrating lacustrine silt and clay buildup and location of radiocarbon ages. For further analytical data, see Appendix III.

Inactive to active rock glacier deposits (Qrg) occur in cirque basins at the head of Little McLelland Creek, Little Squaw Creek, and an unnamed creek in the northwest corner of the Chandalar district. All of the rock glacier deposits are spatulate in shape and composed completely of rock debris (and interstitial ice?) of local derivation. The rock glacier deposits in the Little Squaw and Little McLelland Creek are composed of materials derived from the erosion of the incompetent 'Mikado Phyllite', which we have designated unit Dup. These rock glaciers are actively modifying the cirque headwall in Little Squaw Creek valley previously described (figure 18). Two parallel rock glaciers at the head of Little McLelland Creek transport eroded materials from the Mikado Phyllite into the lower slopes nearly to creek level. The rock glacier in the northwest corner of the study area is not active and composed mainly of localized rock debris derived from the upper plate Dum unit. Some talus deposits shown on sheet I as unit Qct may include older rock glacier deposit materials now incorporated into talus and other mass wasting events.

Figure 18 Active rock glacier at the head of Little Squaw Creek valley, illustrating mass wasting of unit Dup (Mikado Phyllite), which is exposed in the ridgeline at the head of the valley. Note high level Qgt4 cirque and in-filled tarn in upper right hand corner of photo.

Alluvial, Colluvial, and Lacustrine Deposits

Nine (9) alluvial, colluvial, and lacustrine deposits have been mapped in the Chandalar mining district: 1) lacustrine (lake) deposits (Ql); 2) colluvial landslide blocks (Qcl); 3) solifluction lobe or 'step' deposits (Qsl); 4) undifferentiated colluvial and alluvial deposits (Qca); 5) colluvial talus deposits (Qct); 6) alluvial terrace deposits (Qat); 7) alluvial fan deposits (Qaf); 8) Holocene alluvium Qa); and 9) placer mine tailings (Qht). Much of the distribution of these deposits, in part, reflect responses to base level changes after successive glacial advances.

Lacustrine (lake) deposits (Ql) were mapped in the valleys of Lake Creek and the Chandalar River. They consist of planar, deposits of fine pea gravels and varved silts and clays. In both areas, they represent former extensions in area of Chandalar Lake and Squaw Lake. Hamilton (1979) has dated, varved deposits in Chandalar River valley as Late Wisconsin in age.

Colluvial landslide blocks (Qcl) are shown on sheet 1 in Little Squaw Creek valley and in the main trunk valley of Lake Creek west of Mello Bench. These deposits are composed of chaotic blocks of bedrock derived regolith. In the former locality, they are the result of erosion and failure of the incompetent Mikado Phyllite. In the latter locality, they are the result of landslide failure of the black schist of the lower plate that likely began shortly after de-glaciation in late Wisconsin time.

Solifluction lobe(step) deposits (Qsl) were recognized and mapped along the westerly faces of upper Little McLelland Creek. These areas are zones of soil and regolith creep down slope and are related to the colluvial landslide blocks (Qcl) previously described. Although only shown in one general area, smaller solufluction lobes also occur in little Squaw Creek, in McNett Creek, Boulder creek, and in the lower slopes of the main McLelland Creek. Most Qsl deposit likely postdate the Late Wisconsin maximum (Qgt3 event).

Undifferentiated colluvial and alluvial deposits (Qca) are mainly mapped along the southern flank of the map area in the lower valleys of Tobin and Big Creeks. Unit Qca consists of poorly exposed slope colluvium, alluvium in first order gulches, all covered by tundra vegetation. Unlike most of the study area, the area underlain by unit Qca does not show evidence of occupation by glacial ice and related processes. Frozen silt muck that covers the Qca deposits is thawed in areas where man has constructed roads and trails. The age of Qca deposits is widely variable; it could be quite old in the southern portion of the map area and quite young in local gulches.

Colluvial talus deposits (Qct) are mapped in steep upland areas of the Chandalar district, where unit Qct is composed mostly of locally derived talus. Most of the areas underlain by unit Qct were occupied by glacial ice in the past and subsequently in-filled through mass wasting processes. Some Qct deposits in these localities could include older glacial drift. Some of the Qct deposit on lower slopes contain reworked glacial diamicton. Most of the Qct deposits probably postdates Late Wisconsin glaciation in the study area.

Alluvial Terrace Deposits (Qat) form important ancestral alluvial deposits mainly in the northern part of the map area. The left limit slope of Little Squaw Creek is underlain by ancestral fluvial deposits that have been mined for placer gold using underground drift mining methods. This 'Mello Bench' system, which constitutes one of the largest single sources of placer gold in the Chandalar district, blends in with alluvial terrace deposits further to the north in Lake Creek valley. Although no fresh exposures of the gravel were examined, the writer did examine washed pay gravels from placer mining activities, which contain locally derived gravel from the Chandalar upland. The much larger system of alluvial terraces gravels (Qat) merges with glacial outwash gravel most likely associated with Itkillik II glaciation (late Wisconsin age). No exposures of this alluvium was examined and its distribution is based on photo-geological techniques.

Alluvial Fan deposits (Qaf) generally form broad aprons along the lower reaches of second and third order streams. They are composed of moderately well sorted, silt, and sand, and gravel deposited by local area ancestral streams. The largest alluvial fan in the Chandalar district drapes the northern slope of the study area immediately west of Squaw Lake, where it's formation reflects re-establishment to a new base level following cessation of Late Wisconsin Glaciation in Lake Creek valley.

Holocene alluvium (Qa) was mapped in all first second, and third order stream basins. It consists nearly exclusively of silt, sand, and gravel of local derivation. In all cases, unit Qa works and reworks alluvial materials in respective stream basins during Holocene time.

Placer mine tailings (Qht) are found in stream basins where placer gold has been commercially produced. They are comprised of rock and stream sediments that have been artificially worked by mechanical methods using water to remove gold from unconsolidated materials. They occur in Big, Tobin, Little McLelland, and Little Squaw Creeks and their second order tributaries and gulches. Placer drift mining also occurred on Big Squaw Creek, mainly as drift prospecting efforts and some minor open-cut activity near the junction of Caribou Gulch and the main stream, but Qht tailings are not depicted there on sheet 1. Most Qht tailings on Big Little Squaw, and Tobin Creeks occur in V-shaped valley incisions, which formed subsequent to cirque and valley glaciation, but placer tailings on Little McLelland Creek is apparently derived from glacial outwash immediately below a terminal ice position of Late Wisconsin (Qgt3) age. The placer gold paystreak on the east fork of Tobin Creek begins immediately below the snout of a small cirque glacier just below the Mikado gold mine, although the valley walls below the glacial snout are distinctly 'V shaped in profile. The Mello Bench deposits on Little Squaw Creek likely formed by the erosion of auriferous mineralized zones in Little Squaw Creek, but during a period of stream readjustment that postdated Itkillik II glaciation.

Structural Geology and Metamorphic History

The Chandalar Mining district has undergone a complex structural history including at least one period of regional dynamo-thermal metamorphism to upper greenschist facies conditions locally, two or more periods of penetrative deformation, at least two periods of isoclinal folding and finally overprinted by post-metamorphic brittle deformation. PRGCI confirmed that the region has undergone a complex deformational and metamorphic history that include the following observations: 1) small folds and crenulations appear in both Lower and Upper Plate rocks but are more dominant in the Upper Plate; 2) textural deformation is more pronounced in Upper Plate rocks; 3) there appears to be a pronounced low angle discordance between Upper and Lower Plate rocks in the southern part of the map area and in a high angle structural contact in the northern area; and 4) a conjugate system of northwest trending and northeast trending high angle faults dominate the brittle deformational episode of the Chandalar mining district. During the following discussion, PRGCI also utilizes the excellent structural summary of Chipp (1970), as well as data acquired and described by Duke (1975).

Regional Metamorphism

Thin section examinations from 46 stations occupied during 2007 indicates that rock units in both the upper and lower late have undergone middle to upper greenschist facies metamorphic conditions. Table 4 summarizes mineral assemblages identified in the various rock types. Most of the mineral assemblages are indicating general greenschist facies conditions. However, there are two significant exceptions. Two samples of metabasite (06GL038; 06BT383) contain bluish amphibole—possibly glaucophane--along with small garnets--both extensively retrograded. This might be evidence of an older blueschist facies event that has been retrograded during greenschist facies metamorphism. The tentative identification of glaucophane, however, has not been confirmed and awaits microprobe work. Two thin sections of unit Dus contain small incipient garnets as well as oligoclase or possible andesine. This unit in the field is also more blocky and deformed. The write speculates that unit Dus underwent somewhat higher metamorphic grade—probably upper greenschist facies conditions. Many thin sections contain mineral assemblages with crosscutting

Table 3 Metamorphic Mineral Assemblages in Rock Units From Selected Thin Sections, Chandalar district, Alaska

Rock Type	*Station #*	*Metamorphic Mineral Assemblages*	*Indicated Metamorphic Grade*	*Comments*
Dlb	06BT073; 06BT077; 06BT318; 06GL016; 06GL017	(1) Chlorite+quartz+phengite +quartz (2) Calcite+quartz+phengite +chlorite+opaques	Middle greenschist facies	Crenulated texture developed as secondary cleavage
Dlq	06BT104; 06GL018; 06GL021; 06GL027; 06GL030	(1) coarse chlorite+Fe-white mica +quartz (2) phengite+yellowish epidote +albite	Greenschist facies	Most sections >70% quartz
Dum	06BT084; 06GL020; 06GL026; 06GL028	(1) pennine+stilpnomelane+albite +graphite (2) phengite+chlorite+albite+quartz	Middle greenschist Facies	Two generations of chlorite; two periods of metamorphism
Dut	06BT090; 06BT092; 06BT097; 06BT101; 06BT139; 06BT154; 06BT179; 06BT217	(1) chlorite+muscovite+albite +quartz (2) chlorite+muscovite+clinozoisite +albite (3) muscovite+brown chlorite +clinozoisite	Middle greenschist Facies	Quartzose rocks with few reactive minerals; but nothing in disequilibrium
Dul	06BT102; 06BT143; 06BT176; 06BT203; 06BT213; 06BT370; 06GL023	(1) calcite+phengite+actinolite +albite+chlorite (2) Fe-carbonate+muscovite+albite +epidote	Middle greenschist facies	Two crenulation surfaces in all samples examined; fabric is very deformed in thin section.
MzPzg	06BT115; 06BT149; 06GL019; 06GL025; 06GL036; 06GL038; 06BT383	(1)hyperstene+epidote+actinolite +ankerite+sphene (2) blue amphibole (glaucophane?)+ garnet+ oligoclase+sphene +carboante+ilmenite+pyrrhotite (3) hornblende+epidote+oligoclase	Middle to upper greenschist facies; possible prograde blueschist facies from one station (06GL036)	Original igneous mineralogy largely recrystallized; one sample may have blue schist facies assemblage
Dlf	06BT118; 06BT298; 06GL32	(1) albite-oligoclase+ankerite +quartz (2) muscovite+chlorie+graphite +albite (3) phengite+biotite+albite +carbonate	Middle greenschist facies	Small incipient biotite grains in some sections
Dlc	06BT124;	(1) yellow chlorite+actinolite +quartz+muscovite	Upper Greenschist facies	Unusual chlorite color
Dus	06BT153; 06BT274	(1) chlorite+actinolite+garnet +oligoclase+quartz	Upper greenschist facies	Garnet + oligoclase suggests higher rank than Dut or Dum
Dup	06GL024	(1) actinolite+chlorite+'red' carbonate+pyrite	Greenschist Facies	Uncertain of red carbonate ID

relationships (although not in disequilibrium), which suggest two distinct periods of regional metamorphism.

Metamorphic mineral assemblages generally are parallel to compositional banding (primary S1 foliation; on sheet 1), but secondary cleavage oblique to compositional banding is also observed in many outcrop (secondary S2 cleavage surface on sheet 1).

Folding

The dominant trend of fold axis is east-west to northwest, which largely defined the distribution of rock units in the Chandalar district. These folds are open to overturned isoclinal folds that range from small outcrop-scale f1 folds (see cover photo; sheet 1) to larger overturned synclines and anticlines with amplitudes of up to 2 kilometers. An overturned syncline repeats the calcareous schist unit (Dul) in the central portion of the map area. A parallel, overturned anticline probably repeats the unit north of McNett Peak, but is cut off by the high angle, Pioneer Fault.

Secondary, north-northeast-trending folds are mapped in both lower and upper plate rocks but is best preserved in lower plate units in the upper Big Creek area. Folds in this area are mostly open, with large amplitudes and wave lengths (see Chipp, 1970, page 14 for additional discussion). Compression along a generally east-west direction produced these secondary north-northeast trending folds. The east-west compression, which produced the primary s1 foliation observed in the rock units, may have been synchronous with regional greenschist facies metamorphism. Pyrrhotite and very conspicuous quartz segregations (boudins) parallel to foliation were probably produced during this event. Chipp (1970, page 16) plotted up: 1) plunges of folds and crenulations (equal to ‘c’ on sheet 1); and 2) plunges of pyrrhotite and quartz segregations (equal to Ml on sheet 1) on an equal area projection, which demonstrate this relationship (figure 19). Our work corroborates this structural interpretation of Chipp (1970); secondary structural data is shown in Appendix I.

Thrust Faults

We are in agreement with Chipp (1970), who believed that a thrust fault forms the contact between the Lower and Upper Plates in the southern part of the map area. The

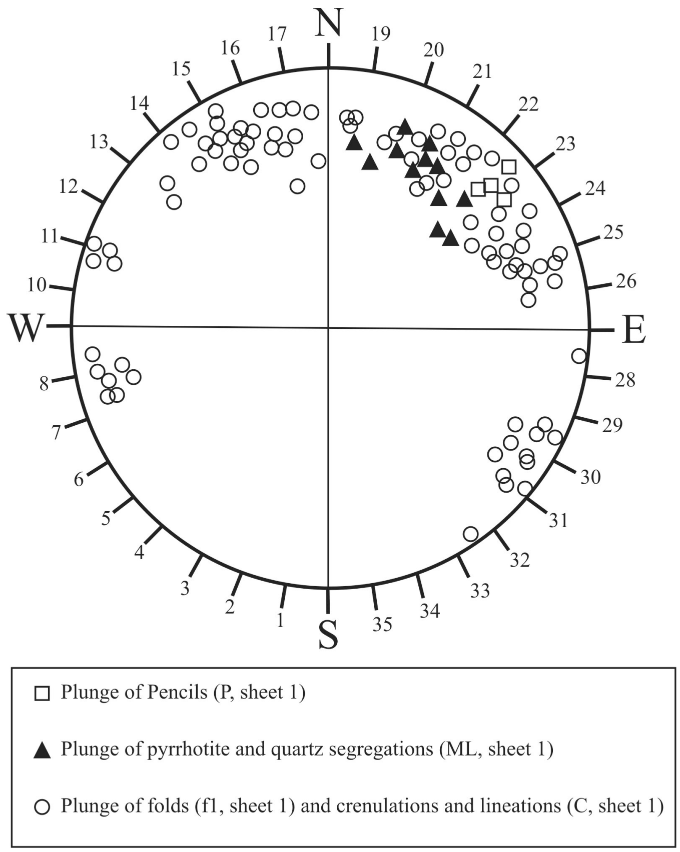

Figure 19 Equal area projection of lineations: 1) plunge directions of f1 fold s and crenulations (n=86), 2) plunge directions of pyrrhotite and quartz segregations n=12); and 3) plunge directions of pencils (n=4); data from both this study and from Chipp (1970).

lines of evidence for the thrust plane (décollement surface) are: 1) the low angle nature of the contact between lower and upper plate units is documented chiefly in the southern part of the study area; 2) an angular compositional discordance exists between lower and upper plate units along a this boundary; 3) fold patterns between the lower and upper plate rocks appear to be discordant; 4) upper plate rocks appear to exhibit at least two orientations of mica whereas the lower plate only has one well defined mica surface; and 5) meta-igneous greenstone bodies (MzPzg; MzPza) appear to be exclusively confined to the lower plate.

The thrust fault may have initiated movement along this contact because rocks of the upper plate appears to be more resistant. However, in order to this faulted contact to be a true thrust fault, the upper plate must be older. Because we have no age evidence to that can document the relative ages of the upper and lower plates, this interpretation is provisional. A chief disagreement with Chipp (1970) is our interpretation that the northern belt of ‘lower plate’ rocks is juxtaposed against ‘upper plate’ units long the high angle Pioneer Fault. We could not document the existence of a low angle contact in this area. It is possible, however, that the thrust plane as been folded into a high angle configuration. But the most likely interpretation is that the northern boundary brings the lower plate upward along the high angle structure (see structural cross section B-B1, sheet 1).

High Angle Faults

A conjugate set of high angle faults occurs throughout the Chandalar Mining district. The most prominent and so far the most important in terms of economic geology North 60^{o} to North 85^{o} West striking, steeply or vertically dipping faults that trend across the central portion of the map area. These faults host significant high grade, low sulfide, gold-quartz deposits along the Mikado, Summit, Eneveloe, Little Squaw, Pioneer, and at least a dozen other structures in the study area. Where the northwest-trending high angle faults carry mineralization, they are referred to as 'vein-faults'. Two of these faults, the Mikado and Pioneer faults, can be traced across the district for at least ten (10) kilometers (figure 20).

Most of the northwest-trending faults have had recurrent movement. Detailed mining company analysis and mapping by Chipp (1970) indicates that the Mikado Fault displaces the Mikado Phyllite (unit Dup) more than 500 vertical feet (152 m) on its southwest footwall. The Mikado fault also obliquely truncates a section of calcareous schist (unit Dul) near Woodchuck Creek (sheet 1). The Summit fault truncates the Mikado Phyllite (unit Dup) at its southwest extension; this phyllite unit reappears in the headward valley of Little Squaw Creek. The Little Squaw and Uranus high-angle vein-faults juxtapose a section of lower plate units against upper plate units along the ridgeline east of Little Squaw Creek in a classic structural horst. A similar structural horst juxtaposes Lower Plate black schist against quartz-rich blocky schist of the upper plate in lower McLelland Creek valley (see sheet 1).

Textures observed in mineralized vein-faults show some of the best evidence of movement history along the northwest striking vein-faults (figure 21). High grade vein-fault mineralization as observed in the 200 foot level of the Little Squaw mine does not

Figure 20 Trace of the Mikado fault system as it crosses St. Mary's Creek and upper Big Creek Valley; photo looking to the northwest.

show much evidence of post-mineral movement although other splays of this fault system are brecciated. The same is true for the Eneveloe-Chandalar auriferous vein-fault about 1 km to the south of the Little Squaw structure. In contrast is the Mikado vein-fault system, the longest and largest mineralized structure, which shows evidence of recurrent movement along the fault zone after emplacement of the quartz ore bodies. The Mikado fault zone also shows the most evidence for splays and widened zones of stress. In St Mary's Creek, at least five sub-parallel splays combine for a width of about 50 meters. In the divide between Boulder and Tobin Creeks, a similar splay system appears to about 40 meters wide.

An important observation made by PRGCI during the course of field investigations was the recognition of a conjugate system northeast- and northwest-striking striking, high angle faults, which occurs across the entire width of the map area. It should be noted that studies conducted during AMRAP studies of the Chandalar quadrangle (Albert and others (1978) recognized a conjugate system of linear features during inspection of Landsat data. Barker and Bundtzen (2004) speculated on this conjugate structural relationship, based on the work Albers and others (1978) and Duke (1975). A consultant for LSGMC (Turner, 2004) also recognized conjugate linear features in the general Chandalar area during inspection of aerial photographic information. One of the most extensive of the

Figure 21 Textures in mineralized vein-faults showing evidence of various degrees of pre- and post-mineral movement. TOP PHOTO--massive quartz-gold-arsenopyrite in Little Squaw vein-fault showing some slickenside development along footwall of the vein; MIDDLE PHOTO—brecciation and crackled texture in main Mikado mine ore body that was mined from 1980-1982, indicating that the quartz bodies were stressed after emplacement into the fault zone; BOTTOM PHOTO—extensive Fe-fault breccia in Mikado vein-fault in St. Mary's Creek about 2 km southeast of the Middle photo, which suggests significant movement and brecciation after emplacement of auriferous quartz bodies.

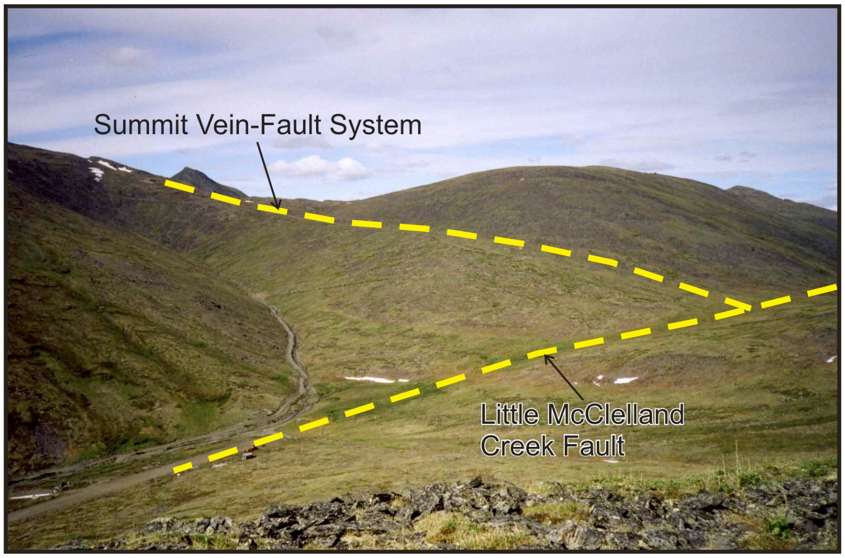

Figure 22 The NE-striking Little McLelland Fault is interpreted to truncate the NW-striking Summit fault system at the divide between Big Creek and Little McLelland Creek.

NE structures is the north 55-60^o east-striking Little McLelland Creek Fault, which juxtaposes higher rank metamorphosed section of the upper plate (unit Dus) on the east against more typical upper plates on the west (sheet 1). The Little McLelland Creek Fault can be traced from Little McLelland Creek valley southwestward into Big Creek for at least 7 km (figure 22).

The north 40-55^o east striking Woodchuck Fault trends across the Tobin Creek on the south and McNett Creek on the north for a distance of about 5 km (3 miles), before disappearing under Quaternary fill to the northeast and southwest.

The nature and timing of movement varies along the northeast-trending high angle fault structures. The Summit vein-fault structure is interpreted to be at least locally truncated by the northeast-trending Little McLelland Creek structure (figure 22). An unnamed, north-northeast high angle fault system in Little Squaw Creek may truncate the NW high angle structures such as the Little Squaw and Eneveloe-Chandalar vein-fault systems, although the actual amount of offset may be small.

In contrast, the northwest-striking high angle Mikado vein-fault system clearly truncates: 1) the northeast-striking McLelland Creek Fault southeast of Pedro Gulch; 2) smaller northeast-striking structures at the top of the east fork Tobin Creek above the Mikado mine; and 3) the northeast-striking Woodchuck Fault. These lines of evidence reinforce the contention that the Mikado structure has had a complex history of movement that occurred before, during, and after injection of hydrothermal gold-bearing quartz lodes. The northwest extension of the Mikado Fault, in the Boulder Creek area, however, is uncertain. Our interpretation is that the Mikado fault is left-laterally offset by an unnamed northwest striking fault that trends in the general direction of Squaw Lake (see sheet 1). The Mikado structure then continues in a northwest direction across the notched slope north of hill top 4061 before continuing into vegetated and glaciated slopes flanking Chandalar River valley.

Notes on Economic Geology and Recommendations for Future Work

The Chandalar mining district contains 1) high grade, low sulfide gold-quartz lodes that have been exploited mainly by underground mining methods; and 2) placer gold deposits largely derived from the lodes that have been exploited by both underground and open pit methods. The known gold-quartz lodes are interpreted to be classic, 'orogenic', gold deposits hosted in metamorphic rocks in the general absence of plausible plutonic source for the generation of hydrothermal fluids and bear resemblances to other 'orogenic' or 'Mother Lode' type gold deposits worldwide (Goldfarb and others, 2001). The writer and James C. Barker previously summarized most of the available public and private company information that describe and classify the lode and placer gold deposits of the Chandalar area in an independent technical review for LSGMC (Barker and Bundtzen, 2004). Barker (2006) significantly updated and improved the general data base for the lode deposits during field work conducted in 2005. No attempt is made here to duplicate this previous work, and the reader is encouraged to review both documents for familiarization of the economic potential of LSGMC mineral properties.

Because the focus of PRGCI investigations was the creation of a 1:20,000 scale geologic framework map, examination of lodes and placers was somewhat limited in scope. Much of the prospect-level investigations was undertaken by other consulting geologists employed by LSGMC. On June 29th^th^, LSGMC Project Manager Jim Barker provided the writer and Laird an informative tour of past productive gold-sulfide-quartz deposits in the district including the Mikado, Summit, Eneveloe-Chandalar, and Little Squaw properties, as well as an examination of the Star, Kiska, and other prospects. On July 2nd, Barker accompanied the writer and Laird on a traverse to the Pallesgren lode, where he shared his observations and interpretations concerning mode of mineralization and geologic framework of that area. On July 10th, the writer and Laird visited the Mikado and Little Squaw lode systems with consulting economic geologist Lane Griffin, and discussed the geologic controls at both deposits. Finally, on September 6th, the writer and Laird visited the 'Ratchet' lode Au-As occurrence with LSGMC President Dick Walters and later examined lode prospects and rock units along the ridgeline east of Little Squaw Creek.

Eleven samples of mineralization from the Chandalar district are in the process of being examined in a microprobe laboratory for mineralogical identification. These results will be forwarded to LSGMC by PRGCI when they are completed. During the course of geologic mapping, a number of observations were made that bear on the mineral endowment of LSGMC properties and on the Chandalar district as a whole. These observations and recommendations are summarized below.

1) The Upper Plate, where a majority of the high angle gold-quartz vein fault deposits occur, is dominated by metamorphosed turbidites. Turbidite-hosted, orogenic gold districts contain some of the largest and most prolific gold deposits that have been and are currently being mined in Australia, Canada, Asia, Africa, and North America (Goldfarb and others, 2005). Focusing on Alaskan examples, the lodes of the Chandalar district are very similar to the meta-turbidite-hosted, quartz-carbonate gold lodes of the Cape Nome district in western Alaska (Bundtzen and others, 2006).

2) Calcareous meta-sandstone turbidite (e.g., unit Dul) in mapped thicknesses occur in the vicinity of the Mikado vein-fault structure, near the Little Squaw gold deposit, and near the Eneveloe-Chandalar vein-fault system. Examination of unpublished data collected in LSGMC archives indicates that calcareous units were recognized by other workers, although it's significance may have not been understood. Calcareous wall rock could provide for a significant CO_2 buffering system capable of precipitating metals out in zones much wider than has been previously recognized. CO_2 buffering systems are believed to be responsible for deposition of gold in the Carlin trend of Nevada, the Donlin Creek system in Alaska and in various auriferous greenstone belts throughout the world. As an add-on to this, the calcareous meta-sandstone resource might conceivably serve as local acid mitigation applications should mineral development be contemplated in the future.

3) A conjugate system of northwest and northeast striking, high angle faults cut the metamorphic section in the study area. This finding is important to mineral resource endowment potential on claims held by Little Squaw Gold Mining Company. To date, almost all of the vein-faults thus far developed have been derived from the set of northwest-trending fractures. Attention should be focused on the intersection of northwest and northeast trending, high angle fracture systems at the Mikado, Summit, Eneveloe-Chandalar, Little Squaw, and Pallasgren vein-faults. Significantly wider zones of auriferous mineralization than what has been documented in the narrow but high grade vein-fault ore shoots could be found in zones presently known for high grades but limited tonnage. Northeast-trending fracture systems occur in all of these areas as well as others (e.g., the Uranus system). Importantly, the conjugate system of northwest/northeast fractures appears to be a regional structural regime that extends significantly beyond the claim group held by LSGMC. Many of northeast-trending faults appear to be truncate the northwest-trending structures, but the Mikado system appears to truncate the northeasterly structures. PRGCI noted a need to trench and explore the NE-fracture system above the Mikado mine, which has not been opened up sufficiently for proper analysis.

4) PRGCI documented significant extensions of the known northwest-trending vein-faults of the study area. For example, PRGCI traced with some assurance the Mikado and Pioneer vein-fault systems for 6 miles (10 km) each of strike length and the Little Squaw, and Eneveloe systems for up to 3 miles (5 km) of strike length. Judging from the general lack of evidence, extensions of these faults beyond the areas of past exploration work have not been well prospected.   PRGCI recommends that additional grassroots prospecting continue along these fracture systems.

5) The Mikado Phyllite ('fissle' schist unit Dup) is associated with the Mikado and Eneveloe-Chandalar vein-fault systems. PRGCI does not know if the distinctly 'fissle' nature of this rock type is controlled by structure, composition, or metamorphic conditions. It should be considered in terms of host-rock applicability for hydrothermal fluid movement. One conspicuous feature of the Mikado Phyllite is the association of kill zones in organic cover and aqueous springs (figure 23 a, b). Zones of ferricrete bleeding occur in association with upper Little Squaw Creek, the head of Big Squaw Creek, and the upper end of Boulder Creek. These ferricrete zones might signature undiscovered mineralization.

6) Although most gold-bearing vein-faults deposits occur in the metamorphosed turbidites of the upper plate, the Pallasgren Au prospect and it's westward offset component, the Drumlummon prospect, occur in Lower Plate rocks. It has been suggested that the sulfide-bearing greenstone of the lower plate rocks could be a metal source for the veins in the upper plate. We note that the black schist in the lower plate is conspicuously sulfide-bearing--usually contains 1-3 percent pyrite or pyrrhotite.   A very similar sulfide-rich black schist and greenstone terrane occurs in the Coldfoot area near Wiseman. Sulfide-rich 'black schist' and greenstone are also thought to be metal sources for auriferous-base metal veins in the Wiseman area, except there, the auriferous veins are hosted in these rocks. During petrographic analysis, DePangher (2005) interpreted rocks near the Pallesgren prospect contained 'metamorphosed' alteration, based on the presence of veins of ferroan dolomite and dolomitic calcite deformed by regional metamorphism.   PRGCI examined these thin sections, and observed fuzzy carbonate veins that could be interpreted to be pre-metamorphic. This textural evidence does suggest that older hydrothermal events could subtly exist in the rock section.

7) During the drilling of the 'Ratchet' prospect (DH RR 06-33), geologists with LSGMC encountered a 30 meter thick zone of altered green mineral in association with disseminated sulfide and elevated gold

values (figure 24). In the field, the writer and Griffin (2006) believed that the alteration might constitute listwanite—or a mixture of dolomite, magnesite, talc, and limonite in association with altered mafic protolith. The writer submitted a sample of the green alteration to a microprobe laboratory, but analyses are still pending. The Ratchet prospect is hosted in the Mikado Phyllite which appears to be associated with mineralized ferricrete seeps in fault zones.

Figure 23 Zones of anomalous gossan in moss 'kill zones'—left photo (a) is from head of Big Squaw Creek; right photo (b) is from head of Boulder Creek along Mikado Fault zone. Both are bleeding ferricrete deposits from 'Mikado Phyllite'.

Figure 24 RC Drill Rig at the Ratchet prospect (RR 06-33) at the head of Little Squaw Creek, Chandalar district, Alaska, September 6, 2006.

8) The presence of both mafic and felsic meta-volcanic schist in the northern unit of the lower plate suggests a correlation with the Ambler sequence of the southern Brooks Range, which hosts significant VHMS mineral deposits. Because of the limited outcrop area of these rocks in the Chandalar area, the mineral potential must be regarded with these limitations in mind. VHMS potential could constitute a more regional exploration target for LSGMC or joint venture partners in future years.

9) Glaciation has significantly modified heavy mineral placer development in the Chandalar mining district. The Tobin Creek placer occurs in a 'V' shaped, valley incision below the snout of a Pleistocene glacier. The most prolific placers on the southern flank at Big and Saint Mary's Creeks occur in a terrane that shows no evidence of glaciation. Conversely, the valley of Big Squaw Creek, which contain a number of the strongest hard rock lode mineralized zones, has not yielded significant placer gold, because most of the valley was glaciated in Wisconsin time. The placer deposit in Lower McLelland Creek occurs below a terminal ice position of probably early Wisconsin age.   The left limit bench of Little Squaw Creek, which yielded placer gold from high grade concentrations, probably formed in response to base level changes due to trunk glaciation in Squaw Lake Valley, similar to better studied Alaskan examples such as Nolan Creek and Valdez Creek. Recognition of glacial landforms and deposits will affect how exploration geochemical data is interpreted. For example, the absence of placer gold in stream drainages does not imply absence of a significant lode resource in a valley that has been glaciated. Recognition of till sheets in an exploration area may require modification in sampling techniques or sample site locations.

10) Late in the 2006 exploration cycle, Jim Barker recognized what he believes to be a different style of schist-hosted sulfide mineralization not associated with massive quartz vein emplacements. This schist-hosted mineralization, which is associated with strong gold-in-soil anomalies, occurs with Fe-alteration in Aurora Gulch 0.5 km downstream from the Ratchet prospect. J.C. Barker (pers. commun., 2006) believes that there could be an association between gold-sulfide zones in schist with nearby meta-mafic sills of the MzPzg unit. Although Chipp (1970) could not demonstrate a relationship between gold mineralization and greenstone, more geochemical studies should be conducted in areas of altered greenstone such as at the Aurora Gulch prospect area.   Features such as albite segregations and albitization in MzPzg units suggest that sodic metasomatism is associated with emplacement of the MzPzg bodies. Such a parent rock composed of alkali gabbro as documented during this work cold provide for a significant hydrothermal system while it is being emplaced during a waning metamorphic event. Samples of the new style of mineralization found by Barker have been submitted by PRGCI for microprobe study, but the results are pending. We hope to succeed in dating the mafic body east of Little Squaw Creek.

11) Most of the diligent exploration, development, and production activities in the Chandalar district has historically focused on small but high grade gold-bearing ore shoots at four deposits: the Mikado, Summit, Eneveloe-Chandalar, and Little Squaw mines.   In addition to the need to examine other vein-faults that have only received desultory exploration work, there is now evidence that new styles of mineralization occur in the Chandalar district. The writer recommends that LSGMC conducts a systematic soil geochemistry survey over the entire claim group held by the company and possibly even in areas beyond their claim holdings. Such a geochemical grid should include not only gold and silver but other pathfinder elements such as Bi, As, Sb, and Hg as well as base metals Cu, Pb, Ni, Co, Ni, and Zn. Acquiring an adequate geochemical survey grid will require the collection of thousands of soil and rock chip samples likely over a period of several years. Use of the geologic map completed by PRGCI during this study should help interpret the analytical results from such a geochemical grid as well as assist in the interpretation and assessment of known and undiscovered gold-bearing mineral zones on LSGMC properties. Composition, depth, and age of the Quaternary units where samples are taken will affect how geochemical data is to be interpreted. The major oxide and trace element data from rock units collected during this study and others collected by LSGMC should provide background data for interpretation of metal concentrations.

12) Un-logged and un-assayed core exists at the Mikado mine. In particular, interesting wall rock types were observed during brief inspection by PRGCI during 2006, including strongly calcareous schist and chlorite-rich green schist. Carefully logging and analyzing this core might be of benefit to understanding the mineralized system and wall rock relationships to ore bodies in what is the largest known, Au-bearing system in the Chandalar district--provided that collars and orientations could be located.

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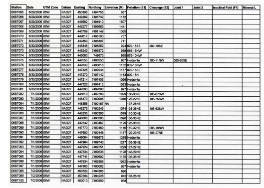
Appendix I EXCEL Spread Sheet Showing Station Location Information For 2007 Chandalar Geologic Mapping Project



Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
06BT101	7/2/2006	06W	NAD27	449786	7493386	1015	090-09N					
06BT102	7/2/2006	06W	NAD27	449799	7493266	1012						
06BT103	7/2/2006	06W	NAD27	449775	7492936	1060	165-08NE					
06BT104	7/2/2006	06W	NAD27	449721	7493440	1061	153-38NE					
06BT105	7/2/2006	06W	NAD27	449739	7493823	1095	117-25NW					
06BT106	7/2/2006	06W	NAD27	449691	7493782	1104	92-32NW					
06BT107	7/2/2006	06W	NAD27	449613	7493628	1120	75-22NW	095-16NE			120-10NW	
06BT108	7/2/2006	06W	NAD27	449547	7493456	1138	118-30NE	136-20NE			110-15SE	
06BT109	7/2/2006	06W	NAD27	449439	7493095	1175	082-27NW				120-16NW	
06BT110	7/2/2006	06W	NAD27	449430	7492943	1193	100-22SE					
06BT111	7/2/2006	06W	NAD27	449438	7492833	1199	108-71NE				105-20SE	
06BT112	7/2/2006	06W	NAD27	449355	7492549	1230	145-35NE				108-20NW	
06BT113	7/2/2006	06W	NAD27	449715	7491964	1307	159-40NE					
06BT114	7/3/2006	06W	NAD27	451078	7494922	875						
06BT115	7/3/2006	06W	NAD27	451258	7495082	890	115-27SW		120-vertical	25-75SE		
06BT116	7/3/2006	06W	NAD27	451553	7495066	875	095-24NE				110-30SE	
06BT117	7/3/2006	06W	NAD27	451789	7494816	930						
06BT118	7/3/2006	06W	NAD27	451792	7494718	963						
06BT119	7/3/2006	06W	NAD27	451904	7494338	1043			100-vertical	170-75NE		
06BT120	7/3/2006	06W	NAD27	452057	7494300	1088	115-27NE					
06BT121	7/3/2006	06W	NAD27	452154	7494284	1076						
06BT122	7/3/2006	06W	NAD27	452460	7494261	1045	077-18SE					
06BT123	7/3/2006	06W	NAD27	452579	7494297	1069	080-16SE					
06BT124	7/3/2006	06W	NAD27	452578	7494248	1067						
06BT125	7/3/2006	06W	NAD27	452540	7494410	1047	075-22SE					
06BT126	7/3/2006	06W	NAD27	452800	7494331	1055						
06BT127	7/3/2006	06W	NAD27	453198	7494198	1088	072-08SE	165-40NE				
06BT128	7/3/2006	06W	NAD27	453136	7494673	938						
06BT129	7/3/2006	06W	NAD27	453366	7494830	886			030-Vertical	138-75SW		
06BT130	7/3/2006	06W	NAD27	452585	7494795	916	090-06S					
06BT131	7/3/2006	06W	NAD27	452422	7494815	897			045-Vertical	135-80SW		
06BT132	7/3/2006	06W	NAD27	451993	7494930	877			080-Vertical	165-Vertical		
06BT133	7/4/2006	06W	NAD27	449689	7491806	1373	163-33NE					
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06BT135	7/4/2006	06W	NAD27	449458	7491693	1374						
06BT136	7/4/2006	06W	NAD27	449899	7491532	1316	144-40SW					140-30SE

Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
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06BT138	7/4/2006	06W	NAD27	450152	7491279	1275						
06BT139	7/4/2006	06W	NAD27	449799	7491231	1197	152-33NE				015-16NE	
06BT140	7/4/2006	06W	NAD27	449969	7490935	1162	136-36NE				010-20NE	
06BT141	7/4/2006	06W	NAD27	450150	7490612	1156	138-35NE					
06BT142	7/4/2006	06W	NAD27	450299	7490506	1177	149-33NE					012-08NE
06BT143	7/4/2006	06W	NAD27	450450	7490553	1220	132-16NE				018-06NE	
06BT144	7/4/2006	06W	NAD27	450476	7490393	1225	112-31NE					
06BT145	7/4/2006	06W	NAD27	450251	7490215	1255	110-25NE					
06BT146	7/4/2006	06W	NAD27	450263	7490042	1247	080-18NW					
06BT147	7/4/2006	06W	NAD27	450286	7489872	1267	120-27NE					
06BT148	7/4/2006	06W	NAD27	450125	7489531	1307	128-29NE					
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06BT151	7/5/2006	06W	NAD27	449056	7490772	1445	070-28NW		030-80SE			
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06BT153	5-Jul	06W	NAD27	448857	7491641	1539	085-29NW					
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06BT156	7/5/2006	06W	NAD27	449121	7491306	1456	110-20NE					
06BT157	7/5/2006	06W	NAD27	449192	7491677	1460	124-35NE					017-20NE
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06BT159	7/5/2006	06W	NAD27	449766	7492205	1271						
06BT160	7/5/2006	06W	NAD27	449921	7492199	1266	122-22NE					
06BT161	7/6/2006	06W	NAD27	447120	7491084	1505	072-21NW					012-08NE
06BT162	7/6/2006	06W	NAD27	447176	7491260	1493	090-21N		117-80SW	035-80NW		
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06BT164	7/6/2006	06W	NAD27	447139	7491408	1501	074-23NW		110-70SW			
06BT165	7/6/2006	06W	NAD27	447073	7491445	1493	076-23NW		112-80SW			
06BT166	7/6/2006	06W	NAD27	447012	7491526	1510	086-16NW		070-Vertical			
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06BT171	7/6/2006	06W	NAD27	446781	7492103	1520	110-33NE				085-20NE	
06BT172	7/6/2006	06W	NAD27	446707	7492214	1547	115-25NE				082-15NE	

Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
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06BT177	7/6/2006	06W	NAD27	446186	7492900	1644	122-24NE					
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06BT183	7/6/2006	06W	NAD27	445068	7492900	1166	135-35NE					
06BT184	7/6/2006	06W	NAD27	447796	7492503	NA	140-30NE					
06BT185	7/7/2006	06W	NAD27	448838	7492311	1446	118-06NE				085-02NE	
06BT186	7/7/2006	06W	NAD27	448775	7492410	1451	Horizontal					
06BT187	7/7/2006	06W	NAD27	448757	7492602	1470	115-10NE					
06BT188	7/7/2006	06W	NAD27	448811	7492657	1506	110-25NE					
06BT189	7/7/2006	06W	NAD27	448857	7492777	1583	122-32NE		160-50NE		080-15NE	
06BT190	7/7/2006	06W	NAD27	448565	7492485	1409	160-25NE					
06BT191	7/7/2006	06W	NAD27	448431	7492472	1399	115-14NE					
06BT192	7/7/2006	06W	NAD27	448569	7492569	1380	125-38NE					
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06BT203	7/8/2006	06W	NAD27	447309	7493370	1081	106-28NE				072-14NE	
06BT204	7/8/2006	06W	NAD27	447080	7493150	1182	096-29NE					
06BT205	7/8/2006	06W	NAD27	447750	7493165	993	102-18NE				096-10NW	
06BT206	7/8/2006	06W	NAD27	447685	7493057	990	120-27NE					
06BT207	7/8/2006	06W	NAD27	447616	7492703	1038	095-22NE					

Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
06BT208	7/8/2006	06W	NAD27	447610	7492451	1060	086-24NW					
06BT209	7/8/2006	06W	NAD27	447840	7492215	1112	087-22NE					
06BT210	7/8/2006	06W	NAD27	447974	7492034	1145	120-30NE					
06BT211	7/9/2006	06W	NAD27	447091	7490912	1538	149-30NE					
06BT212	7/9/2006	06W	NAD27	446966	7490843	1535	084-35NW				015-25NE	
06BT213	7/9/2006	06W	NAD27	446859	7490751	1559	070-35NW					
06BT214	7/9/2006	06W	NAD27	446596	7490604	1595	147-43NE					
06BT215	7/9/2006	06W	NAD27	446505	7490533	1588	128-40NE					
06BT216	7/9/2006	06W	NAD27	446451	7490329	1552	112-16NE					
06BT217	7/9/2006	06W	NAD27	446657	7490100	1559	045-20NW					
06BT218	7/9/2006	06W	NAD27	446484	7489967	1561	038-25NW					
06BT219	7/9/2006	06W	NAD27	446234	7489840	1550	065-35NW					
06BT220	7/9/2006	06W	NAD27	446115	7489624	1567	120-40NE					
06BT221	7/9/2006	06W	NAD27	445266	7489507	1319	150-35NE					172-20NW
06BT222	7/9/2006	06W	NAD27	444704	7489829	1246	115-27NE					160-16NW
06BT223	7/9/2006	06W	NAD27	444133	7490950	965	105-27NE				080-16NE	
06BT224	7/9/2006	06W	NAD27	444527	7491928	1042	175-16NE					
06BT225	7/9/2006	06W	NAD27	444671	7491625	1064	108-22NE					
06BT226	7/9/2006	06W	NAD27	444968	7491750	1130	122-25NE					
06BT227	7/9/2006	06W	NAD27	445456	7491993	1178	124-32NE					
06BT228	7/9/2006	06W	NAD27	445937	7492090	1238	128-33NE					
06BT229	7/9/2006	06W	NAD27	446410	7491805	1280	155-16NE					
06BT230	7/9/2006	06W	NAD27	446681	7491324	1334	165-27NE					
06BT231A	7/10/2006	06W	NAD27	447010	7491223	1431	118-33NE					
06BT231B	7/10/2006	06W	NAD27	446927	7491203	1411	112-55NE					
06BT232	7/10/2006	06W	NAD27	446826	7491277	1366	133-62NE					
06BT233	7/10/2006	06W	NAD27	449480	7489586	1099			080-Vertical	175-80SW		
06BT234	7/10/2006	06W	NAD27	449464	7493612	1144	035-16NW					
06BT235	7/10/2006	06W	NAD27	449461	7493726	1161	078-22NW					
06BT236	7/10/2006	06W	NAD27	449551	7493907	1163	Horizontal		110-Vertical	070-80NW		
06BT237	7/10/2006	06W	NAD27	449437	7493579	1174						
06BT238	7/10/2006	06W	NAD27	449245	7493493	1199	070-22NW					
06BT239	7/10/2006	06W	NAD27	449250	7493338	1240	122-32NE					
06BT240	7/11/2006	06W	NAD27	450162	7491742	1428	153-40NE					
06BT241	7/11/2006	06W	NAD27	450301	7491972	1442	115-34NE					
06BT242	7/11/2006	06W	NAD27	450384	7492115	1441	145-21NE					

Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
06BT243	7/11/2006	06W	NAD27	450435	7492164	1433	115-38NE					
06BT244	7/11/2006	06W	NAD27	450521	7492403	1392	122-27NE					
06BT245	7/11/2006	06W	NAD27	450606	7492527	1403	114-20NE				016-10NE	
06BT246	7/11/2006	06W	NAD27	450633	7492617	1422	075-29NW					
06BT247	7/11/2006	06W	NAD27	450670	7492735	1465	099-16NE					
06BT248	7/11/2006	06W	NAD27	450791	7493025	1413	105-22NE					
06BT249	7/11/2006	06W	NAD27	450924	7493149	1430	115-26NE					
06BT250	7/11/2006	06W	NAD27	451103	7493364	1349	125-27NE					
06BT251	7/11/2006	06W	NAD27	451248	7493398	1330	118-30NE					
06BT252	7/11/2006	06W	NAD27	451363	7493597	1275						
06BT253	7/11/2006	06W	NAD27	451489	7493661	1306	Horizontal	155-04NE				
06BT254	7/11/2006	06W	NAD27	451596	7493927	1283	122-20SW					
06BT255	7/11/2006	06W	NAD27	451804	7493992	1240	136-08SW					
06BT256	7/11/2006	06W	NAD27	451878	7494034	1220	Horizontal					
06BT257	7/11/2006	06W	NAD27	452609	7493905	1151	Horizontal	147-16NE				
06BT258	7/11/2006	06W	NAD27	452799	7494010	1157	070-08SE					
06BT259	7/11/2006	06W	NAD27	452935	7494051	1149	090-08S					
06BT260	7/11/2006	06W	NAD27	452810	7493673	1094	030-18SE					
06BT261	7/11/2006	06W	NAD27	452828	7493613	1086	022-18SE					
06BT262	7/11/2006	06W	NAD27	452862	7493480	1059						
06BT263	7/11/2006	06W	NAD27	452873	7493325	1017	118-16NE					
06BT264	7/11/2006	06W	NAD27	453130	7493124	960						
06BT265	7/11/2006	06W	NAD27	453200	7492906							
06BT266	7/12/2006	06W	NAD27	453630	7492447	841						
06BT267	7/12/2006	06W	NAD27	453846	7492073	869						
06BT268	7/12/2006	06W	NAD27	453891	7491977	921						
06BT269	7/12/2006	06W	NAD27	453953	7491785	989	085-45SE					
06BT270	7/12/2006	06W	NAD27	454212	7491733	1084	080-55SE					
06BT271	7/12/2006	06W	NAD27	454920	7493750	823						
06BT272	7/12/2006	06W	NAD27	454272	7491697	1101						
06BT273	7/12/2006	06W	NAD27	454313	7491553	1114	98-10NE					
06BT274	7/12/2006	06W	NAD27	454410	7491472	1140	110-22NE					
06BT275	7/12/2006	06W	NAD27	454282	7491115	1240	140-15NE					
06BT276	7/12/2006	06W	NAD27	454268	7490977	1244	138-27NE				020-10NE	
06BT277	7/12/2006	06W	NAD27	455970	7490855	792						
06BT278	7/12/2006	06W	NAD27	453984	7490912	1250	080-11NW					

Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
06BT279	7/12/2006	06W	NAD27	453635	7490904	1157	105-08NE					
06BT280	7/12/2006	06W	NAD27	453172	7490804	1221	100-55NE					
06BT281	7/12/2006	06W	NAD27	452953	7490769	1271	120-12NE					
06BT282	7/12/2006	06W	NAD27	452810	7490669	1341	108-41NE					
06BT283	7/12/2006	06W	NAD27	452760	7490880	1236	044-61SE					
06BT284	7/12/2006	06W	NAD27	452661	7491068	1235	105-30NE					72-15NE
06BT285	7/12/2006	06W	NAD27	452634	7491234	1239	077-42NW					
06BT286	7/12/2006	06W	NAD27	452636	7491447	1241	065-75NW				080-55NE	
06BT287	7/12/2006	06W	NAD27	452663	7491611	1241					085-16NE	
06BT288	7/12/2006	06W	NAD27	452501	7491303	1360	075-65NW				082-46NE	
06BT289	7/12/2006	06W	NAD27	452984	7491843	1088	070-30NW					
06BT290	7/12/2006	06W	NAD27	453230	7491973	1008	062-55SE					
06BT291	7/12/2006	06W	NAD27	453537	7492288	867						
06BT292	7/12/2006	06W	NAD27	453603	7492599	834						
06BT293	7/13/2006	06W	NAD27	453711	7492810	881						
06BT294	7/13/2006	06W	NAD27	453771	7493048	922						
06BT295	7/13/2006	06W	NAD27	453782	7493162	975	Horizontal					
06BT296	7/13/2006	06W	NAD27	453797	7493288	997						
06BT297	7/13/2006	06W	NAD27	453817	7493322	1032						
06BT298	7/13/2006	06W	NAD27	453837	7493412	1057						
06BT299	7/13/2006	06W	NAD27	453944	7493525	1080	165-35NE					
06BT300	7/13/2006	06W	NAD27	454169	7493618	1101	062-35SE					
06BT301	7/13/2006	06W	NAD27	454758	7493771	1103	105-21NE				060-12NE	
06BT302	7/13/2006	06W	NAD27	454961	7493862	1081	125-16SW				060-09SW	70-05E
06BT303	7/13/2006	06W	NAD27	455310	7493820	1051	Horizontal					
06BT304	7/13/2006	06W	NAD27	455385	7494395	899			080-Vertical	165-85SW		
06BT305	7/13/2006	06W	NAD27	454447	7493750	1097	055-27NW				032-16NE	
06BT306	7/13/2006	06W	NAD27	453963	7493703	1115	120-22NE					
06BT307	7/13/2006	06W	NAD27	453866	7493879	1140	065-18NW					
06BT308	7/13/2006	06W	NAD27	453697	7493944	1162			016-Vertical	105-vertical		
06BT309	7/13/2006	06W	NAD27	453639	7494018	1179	116-35NW					
06BT310	7/13/2006	06W	NAD27	453326	7494055	1152	040-15SE					
06BT311	7/13/2006	06W	NAD27	453378	7494161	1140	Horizontal				025-14NE	
06BT312	7/13/2006	06W	NAD27	452545	7493902	1133						
06BT313	7/13/2006	06W	NAD27	451858	7490207	1131	Horizontal					
06BT314	7/13/2006	06W	NAD27	451552	7494306	1083	Horizontal					

Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
06BT315	7/14/2006	06W	NAD27	449037	7495625	765						
06BT316	7/14/2006	06W	NAD27	448734	7495412	786						
06BT317	7/14/2006	06W	NAD27	448638	7495091	826						
06BT318	7/14/2006	06W	NAD27	448348	7494977	882	106-16NE					
06BT319	7/14/2006	06W	NAD27	448242	7494983	939	120-22NE					
06BT320	7/14/2006	06W	NAD27	447870	7495399	913						
06BT321	7/14/2006	06W	NAD27	447669	7494908	1038	108-33NE					
06BT322	7/14/2006	06W	NAD27	447375	7494616	1290	092-21NE					
06BT323	7/14/2006	06W	NAD27	447690	7494700	1240					080-16NE	
06BT324	7/14/2006	06W	NAD27	447189	7494408	1337	104-30NE				077-20NE	
06BT325	7/14/2006	06W	NAD27	448458	7494009	875						
06BT326	7/14/2006	06W	NAD27	448870	7494263	954	082-27NW					
06BT327	7/14/2006	06W	NAD27	448503	7494471	847						
06BT328	7/14/2006	06W	NAD27	448580	7494528	845	163-48SW				016-10NE	
06BT329	7/15/2006	06W	NAD27	449262	7491439	1401	095-08NE					
06BT330	7/15/2006	06W	NAD27	448436	7491293	1475	120-16NE	022-27SE				
06BT331	7/15/2006	06W	NAD27	446727	7491207	1313	120-10NE					
06BT332	7/15/2006	06W	NAD27	445171	7491595	1018	105-22NE					
06BT333	7/15/2006	06W	NAD27	445034	7491559	1048	120-24NE	033-34SE				
06BT334	7/15/2006	06W	NAD27	444538	7492254	NA	105-20NE					
06BT335	7/15/2006	06W	NAD27	444428	7492487	1145						
06BT336	7/15/2006	06W	NAD27	444413	7492566	1184	128-22NE					
06BT337	7/15/2006	06W	NAD27	444257	7492835	1321	117-05NE					
06BT338	7/15/2006	06W	NAD27	444024	7492853	1354	163-08SW					
06BT339	7/15/2006	06W	NAD27	443812	7493149	1352	080-31NW					
06BT340	7/15/2006	06W	NAD27	443664	7493314	1248	102-26NE					
06BT341	7/15/2006	06W	NAD27	443492	7493054	1181	095-34NE					
06BT342	15-Jul	06W	NAD27	443166	7493345	1052						
06BT343	7/15/2006	06W	NAD27	442847	7493377	1022	110-25NE					
06BT344	7/15/2006	06W	NAD27	442488	7493496	978	168-35NE					
06BT345	7/15/2006	06W	NAD27	442374	7493772	898	100-22NE					
06BT346	7/15/2006	06W	NAD27	442022	7493815	862	145-29NE					
06BT347	7/16/2006	06W	NAD27	442015	7494135	836						
06BT348	7/16/2006	06W	NAD27	442030	7494016	822	170-37NE	105-24NE			070-25NE	
06BT349	7/16/2006	06W	NAD27	441856	7493973	878	155-34NE	122-20NE			070-15NE	
06BT350	7/16/2006	06W	NAD27	441486	7493791	920						

Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
06BT351	7/16/2006	06W	NAD27	441368	7493757	928	170-34NE					
06BT352	7/16/2006	06W	NAD27	441488	7493686	920			035-72SE	140-68SW		
06BT353	7/16/2006	06W	NAD27	441801	7493472	978						
06BT354	7/16/2006	06W	NAD27	441306	7493181	1013	174-30NE					
06BT355a	7/16/2006	06W	NAD27	442131	7493230	1002	166-32NE					
06BT355b	7/16/2006	06W	NAD27	442285	7492870	1041						
06BT355c	7/16/2006	06W	NAD27	442379	7492470	1096	165-09NE					
06BT356	7/16/2006	06W	NAD27	442450	7492200	1170	164-21NE					
06BT357	7/16/2006	06W	NAD27	442430	7492585	1114	164-19NE				060-09NE	
06BT358	7/16/2006	06W	NAD27	442364	7492830	1039			045-Vertical	145-70SW		
06BT359	7/16/2006	06W	NAD27	442236	7493148	985	162-34NE					
06BT360	7/16/2006	06W	NAD27	442201	7493430	939	154-30NE					
06BT361	7/17/2006	06W	NAD27	442203	7493994	870	140-25NE					
06BT362	7/17/2006	06W	NAD27	442322	7494065	884	140-35NE					
06BT363	7/17/2006	06W	NAD27	442544	7494154	905	138-33NE		115-80SW			
06BT364	7/17/2006	06W	NAD27	442815	7494022	980	160-24NE					
06BT365	7/17/2006	06W	NAD27	443695	7494269	1087						
06BT366	7/17/2006	06W	NAD27	444310	7494260	1108	129-31NE					
06BT367	7/17/2006	06W	NAD27	443870	7494552	1210	155-27NE				084-16NE	
06BT368	7/17/2006	06W	NAD27	443982	7494654	1260	158-36NE					
06BT369	7/17/2006	06W	NAD27	444024	7494717	1292	130-20NE					
06BT370	7/17/2006	06W	NAD27	444209	7494782	1297	118-38NE					
06BT371	7/17/2006	06W	NAD27	444299	7494775	1411	155-41NE	103-22NE			084-20NE	
06BT372	7/17/2006	06W	NAD27	444563	7494918	1469	119-20NE					
06BT373	7/17/2006	06W	NAD27	444763	7494845	1567	142-30NE				075-20NE	
06BT374	7/17/2006	06W	NAD27	444650	7495295	1606	140-33NE					
06BT375	7/17/2006	06W	NAD27	444992	7494732	1571	155-30NE					
06BT376	7/17/2006	06W	NAD27	445168	7494559	1605	135-32NE				077-25NE	
06BT377	7/17/2006	06W	NAD27	445192	7494437	1610	128-35NE					
06BT378	7/17/2006	06W	NAD27	445176	7494161	1509	145-20NE					
06BT379	7/17/2006	06W	NAD27	445197	7493792	1613	110-24NE				080-10NE	
06BT380	7/17/2006	06W	NAD27	444955	7493719	1570	110-40NE					
06BT381	7/17/2006	06W	NAD27	444730	7493566	1571	125-35NE					
06BT382	7/17/2006	06W	NAD27	444625	7493428	1550						
06BT425	9/3/2006	06W	NAD27	440421	7496627	1213	155-37NE				118-21NW	
06BT426	9/3/2006	06W	NAD27	440421	7496698	1218	135-33NE				116-20NW	

Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
06BT427	9/3/2006	06W	NAD27	440604	7496804	1243	128-29NE				108-16NW	
06BT428	9/3/2006	06W	NAD27	440670	7496991	1257	122-35NE					
06BT429	9/3/2006	06W	NAD27	440846	7496927	1247						
06BT430	9/3/2006	06W	NAD27	440912	7496991	1248	148-32NE					
06BT431	9/3/2006	06W	NAD27	440152	7492704	1076			146-65NW	025-Vertical		
06BT432	9/3/2006	06W	NAD27	440445	7492546	1102	128-42NE				071-27NE	
06BT433	9/3/2006	06W	NAD27	441980	7490711	1374	136-35NE					
06BT434	9/3/2006	06W	NAD27	442032	7490992	1359	127-36NE					
06BT435	9/3/2006	06W	NAD27	442257	7491427	1420	112-29NE					
06BT436	9/3/2006	06W	NAD27	442269	7491589	1439	127-40NE					
06BT437	9/4/2006	06W	NAD27	446283	7497304	1191	024-19NW	065-06NW			070-16NE	
06BT438	9/4/2006	06W	NAD27	446140	7497448	1183	Horizontal	060-16NW				
06BT439	9/4/2006	06W	NAD27	446272	7497143	1229	025-09SE					
06BT440	9/4/2006	06W	NAD27	444208	7496759	1599	155-22NE	035-16NW			071-10NE	
06BT441	9/4/2006	06W	NAD27	444036	7496840	1598	132-14NE				065-08NE	
06BT442	9/4/2006	06W	NAD27	441675	7497687	1671	135-25NE					
06BT443	9/4/2006	06W	NAD27	441451	7498142	1521	138-35NE	071-25NW				
06BT444	9/4/2006	06W	NAD27	440646	7498969	1463	142-17NE	172-30NE				
06BT445	9/4/2006	06W	NAD27	439362	7499506	1102	115-11NE					
06BT446	9/4/2006	06W	NAD27	440674	7500389	1094	Horizontal				012-04SW	
06BT447	9/4/2006	06W	NAD27	441278	7501260	888	147-16SW					
06BT448	9/4/2006	06W	NAD27	442685	7500419	893	175-25NE					
06BT449	9/4/2006	06W	NAD27	442878	7500532	896			050-Vertical	118-75SW		
06BT450	9/4/2006	06W	NAD27	442743	7500784	820	085-65NW					
06BT451	9/4/2006	06W	NAD27	444103	7500749	805		08070SE				
06BT452	9/4/2006	06W	NAD27	443612	7498387	1438	118-17NE				014-07NE	
06BT453	9/4/2006	06W	NAD27	443613	7498686	1411	Horizontal				020-01NE	
06BT454	9/4/2006	06W	NAD27	443596	7498752	1408						
06BT455	9/4/2006	06W	NAD27	454453	7494684	843	170-55SW					
06BT456	9/4/2006	06W	NAD27	457639	7481395	678	025-13SE					
06BT457	9/5/2006	06W	NAD27	451041	7488771	1491	115-08NE					
06BT458	9/5/2006	06W	NAD27	451133	7489057	1539	098-09NE	073-16NW			062-10NE	
06BT459	9/5/2006	06W	NAD27	450965	7489311	1507	099-17NE					
06BT460	9/5/2006	06W	NAD27	451322	7489168	1503	112-22NE					
06BT461	9/5/2006	06W	NAD27	451585	7488983	1495	108-25NE	074-25NW				
06BT462	9/5/2006	06W	NAD27	451918	7489008	1439	155-27NE				105-20NW	

Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
06BT463	9/5/2006	06W	NAD27	452106	7489056	1427	Horizontal					
06BT464	9/5/2006	06W	NAD27	452425	7488958	1363	163-27NE				105-10NW	
06BT465	9/5/2006	06W	NAD27	452935	7488621	1210	092-24NE					
06BT466	9/5/2006	06W	NAD27	451127	7490103	1562	095-42NE				070-35NE	
06BT467	9/5/2006	06W	NAD27	452019	7490619	1464	074-54NW					
06BT468	9/5/2006	06W	NAD27	451512	7490895	1438	095-72SW				072-16NE	
06BT469	9/5/2006	06W	NAD27	451987	7492069	954			052-Vertical	140-Vertical		
06BT470	9/5/2006	06W	NAD27	451864	7491958	975	155-52NE					
06BT471	9/5/2006	06W	NAD27	452065	7492168	953	074-25SE					
06BT472	9/5/2006	06W	NAD27	451921	7491792	1026	108-15NE					
06BT473	9/5/2006	06W	NAD27	450922	7491502	1105	153-35NE					
06BT474	9/5/2006	06W	NAD27	456136	7488138	1225	170-18NE					035-08NE
06BT475	9/5/2006	06W	NAD27	455780	7486552	1077	155-35NE		120-80SW		025-20NE	
06BT476	9/5/2006	06W	NAD27	454112	7489430	1019						
06BT477	9/6/2006	06W	NAD27	449828	7491876	1352						
06BT478	9/6/2006	06W	NAD27	450982	7492818	1335	118-13NE					
06BT479	9/6/2006	06W	NAD27	450835	7492921	1401			035-Vertical	118-75SW		
06GL016	7/1/2006	06W	NAD27	447632	7496571	1118	110-11NE					
06GL017	7/1/2006	06W	NAD27	448361	7496227	970						
06GL018	7/1/2006	06W	NAD27	448014	7490189	942						
06GL019	7/1/2006	06W	NAD27	447905	7489509	1150						
06GL020	7/1/2006	06W	NAD27	447952	7489374	1080						
06GL021	7/1/2006	06W	NAD27	450100	793978	919						
06GL023	7/2/2006	06W	NAD27	449497	7493370	1142						
06GL024	7/3/2006	06W	NAD27	451786	7494816	924						
06GL025	7/3/2006	06W	NAD27	452063	749401	1036						
06GL026	7/6/2006	06W	NAD27	446648	7492323	1550						
06GL027	7/6/2006	06W	NAD27	446100	7493071	1637	130-32NE					
06GL028	7/7/2006	06W	NAD27	448600	7492752	1371	078-30NW					
06GL029	7/7/2006	06W	NAD27	453316	7491080	1214						
06GL199	7/8/2006	06W	NAD27	448520	7492675	1315	90-40N					
06GL200	7/8/2006	06W	NAD27	448281	7402917	1219	148-45NE					
06GL201	7/8/2006	06W	NAD27	448228	7492936	1114	135-29NE					
06GL202	7/8/2006	06W	NAD27	448033	7493650	925	85-20NW					
06GL203	7/8/2006	06W	NAD27	447917	7493510	NA						

Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
06GL204	7/8/2006	06W	NAD27	457858	7493312	980	120-23NE	80-25NW			10-20NE	
06GL205	7/8/2006	06W	NAD27	447653	7492832	1010	110-33NE					
06GL206	7/8/2006	06W	NAD27	447503	7492548	1039	90-32N					
06GL207	7/8/2006	06W	NAD27	447705	7492332	1089	93-18NE				160-18NW	
06GL209	7/9/2006	06W	NAD27	447010	7490898	1551	115-12NE					
06GL210	7/9/2006	06W	NAD27	446714	7490634	1560	170-24NE					
06GL211	7/9/2006	06W	NAD27	446687	7490608	1561	155-25NE					
06GL212	7/9/2006	06W	NAD27	446389	7490580	1573	72-17NW					
06GL213	7/9/2006	06W	NAD27	446255	7490632	1553	118-30NW					
06GL214	7/9/2006	06W	NAD27	446239	7490677	1548	63-19NW					
06GL215	7/9/2006	06W	NAD27	446114	7490768	NA						
06GL217	7/9/2006	06W	NAD27	446041	7490714	1476	135-35NE					
06GL218	7/9/2006	06W	NAD27	445981	7490702	1469	88-12NW					
06GL224	7/9/2006	06W	NAD27	444544	7491717	1078	150-23NE					
06GL225	7/9/2006	06W	NAD27	444808	7491650	1118	105-18NE					
06GL229	7/9/2006	06W	NAD27	446126	7492085	1243	169-24NE					
06GL230	7/10/2006	06W	NAD27	446920	7491381	1425	90-16N					
06GL231	7/10/2006	06W	NAD27	446858	7491287	1355	140-58NE					
06GL232	7/10/2006	06W	NAD27	447061	7491399	1456	61-13NW					
06GL233	7/10/2006	06W	NAD27	449437	7493582	1169						
06GL234	7/10/2006	06W	NAD27	449557	7493793	1160	Horizontal		110-vertical	30-vertical		
06GL239	7/11/2006	06W	NAD27	450450	7492225	1425	155-32NE					
06GL241	7/11/2006	06W	NAD27	450652	7492591	1426	75-29NW					
06GL243	7/11/2006	06W	NAD27	450798	7493022	1413	132-26NE					
06GL244	7/11/2006	06W	NAD27	450851	7493035	1409	97-12NE					
06GL248	7/11/2006	06W	NAD27	451744	7494006	NA	116-13SW					
06GL249	7/11/2006	06W	NAD27	452568	7493739	1125	172-34NE					
06GL258	7/11/2006	06W	NAD27	454225	7490975	1246	115-30NE					
06GL266	7/13/2006	06W	NAD27	454253	7493737	1100	160-32NE	52-20NW			30-15NE	
06GL267	7/13/2006	06W	NAD27	454198	7493759	1001					020-15NE	
06GL268	7/13/2006	06W	NAD27	454140	7493752	1103	23-45NW					
06GL269	7/13/2006	06W	NAD27	454023	7493681	NA	36-29NW					
06GL270	7/13/2006	06W	NAD27	453980	7493774	1119	28-09NE					
06GL271	7/13/2006	06W	NAD27	453729	7493906	1163	125-65NW		110-80NE			
06GL272	7/13/2006	06W	NAD27	453469	7494048	1140						
06GL273	7/13/2006	06W	NAD27	453223	7494109	1153	136-24NE					

Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
06GL274	7/13/2006	06W	NAD27	452753	7494010	1151						
06GL275	7/14/2006	06W	NAD27	449514	7493812	1174	30-30NW	050-22NE				
06GL276	7/14/2006	06W	NAD27	449507	7493864	1202	28-03NE					
06GL277	7/14/2006	06W	NAD27	449574	7493983	1185	80-24NW					
06GL278	7/14/2006	06W	NAD27	449584	744013	1182						
06GL279	7/14/2006	06W	NAD27	449556	7494063	1190	112-20NE				025-13NE	
06GL280	7/14/2006	06W	NAD27	449701	7494439	1107	124-12NE					
06GL281	7/14/2006	06W	NAD27	449644	7494622	1090	90-32N	116-80SW				
06GL283	7/14/2006	06W	NAD27	450107	7494957	953	116-14NE					
06GL284	7/14/2006	06W	NAD27	450193	7495121	889						
06GL285	7/14/2006	06W	NAD27	450341	7495047	880						
06GL298	7/17/2006	06W	NAD27	442495	7494140	913	170-38NE					
06GL300	7/17/2006	06W	NAD27	444035	7494733	1314	130-20NE					
06GL301	7/17/2006	06W	NAD27	444193	7494770	1325	118-38NE					
06GL303	7/17/2006	06W	NAD27	444773	7494844	1562	140-30NE				075-20NE	
06GL313	9/3/2006	06W	NAD27	440343	7496431	1203	172-33NE					
06GL314	9/3/2006	06W	NAD27	440138	7496422	NA	170-28NE					
06GL315	9/3/2006	06W	NAD27	440035	7496436	1236	180-22E					
06GL316	9/3/2006	06W	NAD27	440958	7496984	NA						
06GL317	9/3/2006	06W	NAD27	440274	7492585	1079	135-24NE					
06GL318	9/3/2006	06W	NAD27	440344	7492569	1093	139-31NE					
06GL319	9/4/2006	06W	NAD27	442062	7490984	1314	143-35NE					035-22NE
06GL320	9/4/2006	06W	NAD27	442278	7491482	1408						
06GL321	9/4/2006	06W	NAD27	442320	7491550	1469	105-24NE				037-10NE	
06GL322	9/4/2006	06W	NAD27	446236	7497235	1205						
06GL323	9/4/2006	06W	NAD27	444107	7496802	1601	150-36NE				005-21NE	
06GL324	9/4/2006	06W	NAD27	442996	7496310	1616						
06GL325	9/4/2006	06W	NAD27	442946	7497360	1632	143-31NE					
06GL326	9/4/2006	06W	NAD27	440131	7499009	1392	151-26NE				095-13NW	
06GL327	9/4/2006	06W	NAD27	440046	7499008	1401	170-22NE				135-03NW	
06GL328	9/4/2006	06W	NAD27	440672	7500382	1080					170-Horizontal	
06GL329	9/4/2006	06W	NAD27	441276	7501258	889	155-16SW					
06GL330	9/4/2006	06W	NAD27	442666	7500396	887	165-05NE					
06GL331	9/4/2006	06W	NAD27	442739	7500788	818						
06GL333	9/4/2006	06W	NAD27	443608	7498388	1437	120-15NE				015-06NE	
06GL334	9/4/2006	06W	NAD27	443616	7498688	1421	Horizontal				020-Horizontal	

Station	Date	UTM Zone	Datum	Easting	Northing	Elevation (M)	Foliation (S1)	Cleavege (S2)	Joint 1	Joint 2	Isoclinal Fold (F1)	Mineral L
06GL335	9/4/2006	06W	NAD27	454454	7494686	853	180-55W					
06GL336	9/4/2006	06W	NAD27	457634	7481420	719	025-13SE					
06GL337	9/5/2006	06W	NAD27	450966	7488586	1491	175-12NE					
06GL338	9/5/2006	06W	NAD27	450971	7488112	1574	100-23NE		010-Vertical		070-39NE	
06GL339	9/5/2006	06W	NAD27	450801	7488120	1608						
06GL340	9/5/2006	06W	NAD27	450763	7488101	1604	124-32NE					110-03NW
06GL341	9/5/2006	06W	NAD27	450531	7487891	1571	110-24NE					
06GL342	9/5/2006	06W	NAD27	450495	7487868	1543	126-32NE					
06GL343	9/5/2006	06W	NAD27	450406	7487789	1567	116-44NE				060-45NE	
06GL344	9/5/2006	06W	NAD27	450354	7487731	1569	136-39NE		035-Vertical			
06GL345	9/5/2006	06W	NAD27	450296	7487704	1566						
06GL346	9/5/2006	06W	NAD27	450968	7489312	1507	102-42NE					
06GL347	9/5/2006	06W	NAD27	451027	7489855	1614	091-07NE				050-18NE	
06GL348	9/5/2006	06W	NAD27	452908	7490259	1285	095-24NE				030-06NE	
06GL349	9/5/2006	06W	NAD27	452825	7490356	1298	Horizontal		150-70NE			
06GL350	9/5/2006	06W	NAD27	453218	7490216	1322	095-24NE				030-06NE	
06GL351	9/5/2006	06W	NAD27	456123	7488136	1241	170-18NE					
06GL352	9/6/2006	06W	NAD27	450988	7492838	1330						
06GL353	9/6/2006	06W	NAD27	450856	7492950	1288	137-25NE					
06GL354	9/6/2006	06W	NAD27	452558	7494372	1053						

Station	Mica C	Pencil	Mineral Fault	Station Description
06BT065				Examination of Mello Bench northwest of camp; look at two shafts; onlyminimal gravel found at shafts (2)
06BT066			087-75SE	Examination of 200 foot level, Little Squaw vein-fault system with Barker; N87W strike of vein; both NE and SW dips
06BT067			114-82NE	Examination of 100 foot level, Summit vein fault system; N64W strike; dominantly steep NE dip
06BT068				Examination of Eneveloe-Chandalar vein-fault system; complicated strike here
06BT069			116-77SE	Examination of Mikado Mine Site; examination of open pit and trenches above mine workings
06BT070				Vegetated glacial till in Big Squaw Creek valley
06BT071				Circular morainal feature here-probably not a pingo as depicted on topographic map
06BT072				Medium gray to black, porhyroblastic (chlorite) schist
06BT073				Medium to dark gray, non-porphryoblastic, chlorite schist
06BT074				Dark greenish gray, porphyroblastic, chlorite schist with abundant bull quartz
06BT075				Light gray, quartz-rich, muscovite schist with quartz veinlets parallel to schistocity
06BT076				Medium grained, medium gray, tannish, quartz muscovite-chlorite schist
06BT077				Dark gray, pyrite-rich, porphyroblastic (chlorite) calcareous schist
06BT078			125-85NE	Light gray, siliceous, quartzose schist with calcareous layers, NW-striking, high angle quartz sulfide veins
06BT079				Dark gray to black, 'black schist' with locally abundant disseminated pyrite
06BT080				Dark gray, pyrite-rich, chlorite rich 'black schist'
06BT081				Dark gray, pyrite-bearing 'black schist' with lighter gray siliceous layers in some outcrops
06BT082				Porphyroblastic black schist with locally abundant pyrite
06BT083				Medimum gray, chloritic, porphyroblastic black schist of lower plate
06BT084				Light green-gray, quartzose mica schist of upper plate?
06BT085				Reddish oxide coating on light gray quartz muscovite schist
06BT086				Tannish weathered, muscovite-rich schist near Mikado vein-fault; discontinuous quartz veins in crush zones
06BT087			123-80NE	Medium gray, quartz-rich schist of upper plate; quartz-ferricrete breccia in Mikado structure indicates movement
06BT088				Tan weathered, quartz-rich upper plate schist with abundant quartz boudins (35-50%); calc-schist rubble nearby
06BT089				Light gray, siliceous quartz muscovite schist with abundant quartz vein float nearby (but not in place)
06BT090				Medium gray, porphyroblastic, quartz-rich, chlorite schist resistant knobs up to 2 cm are metaconglomerate (?)
06BT091				Light gray, quartz-rich chlorite schist
06BT092				Brownish tan weathered, quartzose muscovite schist with local felspar porphyroblasts in layers
06BT093				Medium gray, quartz-chlorite muscovite schist with local albitic feldspar porphyroblasts in 2 cm layers.
06BT094				Medium gray, feldspathic quartzose muscovite schist
06BT095				Dark gray, iron-stained, pyritic, phyllite schist thought to be lower plate
06BT096				Variagated, light gray quartz-rich, pyrite-rich schist of lower plate
06BT097				Light gray, 'sugary', chlorite schist; sugary layers may be meta-sandstone
06BT098				Rubble of blocky, medium gray, lumpy with quartz, chlorite muscovite schist; interpreted to be meta-turbidites
06BT099	016-16NE		117-75NE	Grubstake East prospect area; portal in medium gray, muscovite schist with strong mica crenulation
06BT100				Talus fans below Little Squaw adits form valley profile; up valley is active rock glacier and cirque; landslide block
06BT101				Light gray, crenulated, quartz mica schist in darker layers resembles meta-turbidites of Nome area
06BT102				In angular rubble is distinctive, greenish epidote? bearing, calc-schist; overlain by light gray meta-quartzite?
06BT103				Medium gray, quartz chlorite schist in place but much around here is not in place (slump blocks)
06BT104	016-25NE			Dark gray, carbonaceous schist with abundant quartz lamina, locally strongly crenulated.
06BT105				Classic', quartzose mica schist with quartz lamina and metaturbide layers
06BT106				Tan weathered (FeOx), laminated quartzite with < 5% mica minerals; probably a small unit layer in mica schist
06BT107				Light gray, quartzose, mica schist; high quartz content; conspicuous isoclinal folds and secondary foliation
06BT108			110-72NE	200 foot level, Little Squaw mine; medium gray quartzose mica schist on both walls of vein-fault; isoclinal folds
06BT109				Light gray, quartz mica schist strongly deformed with local isoclinal folds, secondary schistosity
06BT110				Outcrop of light gray, quartz-rich chlorite schist dominated by plunging isoclinal folds
06BT111				Steeply dipping schistosity (unusual); quartz boudins locally abundant
06BT112				Mica-rich quartzose schist with abundant quartz lamina and boudins (meta-turbidites)
06BT113				Extremely fissle, dark gray phyllitic schist; characterized by massive slump blocks
06BT114				Glacial till covers eastward trending ice marginal meltwater channel cut into sidehill notch; three granitic erratics
06BT115				Massive, dark green, non-foliated, meta-gabbro or meta-diorite; some carbonate alteration; mica schist nearby
06BT116	080-16NE			Dark gray, carbonaceous, quartz-poor, chlorite mica schist of lower plate
06BT117				Rubble only of light gray to pinkish, feldspar rich, amphibole-bearing meta-igneous schist (meta-tuff?)
06BT118				Variable colored, light to dark green, amphibole-rich (and pyroxene?), meta-igneous greenstone
06BT119				Massive, dark green, non-foliated, meta-gabbro or meta-diorite; largely unaltered
06BT120				Medium to darke gray, quartz poor chlorite mica schist of lower plate sequence
06BT121				Rubble crop only of felspathic rich amphibole bearing meta-igneous rock (meta-diorite?)
06BT122				Medium gray, hard, quartz-rich schist with quartz vein float
06BT123				Hanging wall of Palisgren Au-As-Sb prospect; mainly Dark gray quartz poor mica schist of lower plate
06BT124			120-Vertical	Palisgren Au-As-Sb Prospect; 2 meter wide vertically dipping quartz vein; 1-2 percent arsenopyrite plus stibnite
06BT125				Quartz-rich muscovite schist with 3 meter wide zone of feldspathic schist
06BT126				Large block on gentle slope of massive, subfoliated, altered greenstone in 'lowere plate of Chipp (1970)
06BT127				Cliff wall of 1) gray, quartz-rich, muscovite chlorite schist; 2) massive, subfoliated, chlorite-amphibole greenstone
06BT128				Classic, carbonaceous, chloritic, quartz-poor, black schist of lower plate
06BT129				Massive, sub-foliated, amphibole-bearing altered greenstone
06BT130				Classic, carbonaceous, chloritic black schist of lower plate; some quartz boudins here
06BT131				Massive sub-foliated, medium green greenstone layer about 5 meters thick in cliff face of black schist
06BT132				Massive, blocky, knob of sub-foliated, meta-gabbro of meta-diorite
06BT133			075-40SE	Dark gray, fissle, 'greasy', sheared carbonaceous schist; incompetent and slumps down hill slopes
06BT134				Light to medium gray, quartz rich (in 1 cm boudins), laminated chlorite mica schist typical of upper plate
06BT135				Light to medium gray, quartz rich (in 1 cm boudins), laminated chlorite mica schist typical of upper plate
06BT136				Light gray, quartzose mica schist dips to the SW with strong mica mineral lineation; double-folded outcrop

Station	Mica C	Pencil	Mineral Fault	Station Description
06BT137				Rubble of quartzose mica schist of upper plate
06BT138			120-30SW	Possible SE extension of Summit vein-fault system; some galena and arsenopyrite grains noted in hanging wall
06BT139				Medium gray, crenulated, chlorite-rich quartzose schist of upper plate
06BT140				Excellent exposure of light gray, granular, poorly foliated, quartz-bering meta-graywacke (meta-turbidite) schist
06BT141				Green-gray, chlorite muscovite schist of upper plate
06BT142				Typical light to medium gray, quartz-rich porphyroblastic schist of upper plate sequence
06BT143				Typical light to medium gray, quartz-rich porphyroblastic calc-schist of upper plate sequence
06BT144				Mixture of medium green chloritic schist, black schist, and quartzose schist at lower/upper plate contact
06BT145				Mixture of 1) sub-foliated, calcareous, porphyroblastic green schist; 2) black schist both in lower plate
06BT146				Medium gray quartzose mica schist--could be either lower or upper plate unit
06BT147				Dark gray, quartz-poor, chlorite black schist of lower plate
06BT148			115-75NE	Probable extension of Mikado vein-fault SE of Big Creek; wall rock is black schist; pyrite in 2 m wide quartz vein
06BT149				Medium green, sub-foliated, amphibole-epidote meta-igneous greenstone; 2-3 % sulfide in fractures
06BT150				Medium green, sub-foliated, amphibole-epidote meta-igneous greenstone
06BT151				Medium gray, coarse-grained, crenulated quartzose mica schist adjacent to Star Au-quartz lode
06BT152				Medium gray, coarse-grained, crenulated quartzose mica schist on peneplain north of Star lode
06BT153				Large, clean outcrop of medium-coarse-grained, quartz-rich, mica, metaturbidite schist; relict graded bedding
06BT154				Coarse grained, quartzose, meta-turbidite schist
06BT155	090-10W			Medium-coarse-grained, quartz-rich, mica, metaturbidite schist; relict graded bedding; strong crenulation in OC
06BT156				Medium gray, quartz-poor, mica schist, discordant foliation from previous stations
06BT157				Medium gray, quarttz-poor, mica schist with strong mineral lineation (mica)
06BT158				At 100 foot portal level of Summit Gold mine; tan weathered, hydrothermally altered, phyllite; quartz breccia
06BT159				Took samples of carbonaceous drift from 140 cm in depth cut in cirque at headwall of Little Squaw Creek basin
06BT160				Variable, tan-weathered quartzose mica schist with distinctive feldspathic layers north of fissle schist unit
06BT161				Light gray, tan weathered, quartzose mica schist with strong mica crenulation
06BT162				Fissle schist section; (phyllite unit of Chipp (1970); mica rich with frequent slumps along hill slopes
06BT163				Fissle schist unit (phyllite unit of Chipp (1970)
06BT164				Light gray, coarse grained, quartz-rich, meta-turbidite schist unit with relict graded bedding
06BT165				Black, fissle, chloritic schist layer 5 meters thick in coarse grained meta-turbidite schsit (meta-mudstone?)
06BT166			120-85NE	Walked across prominant, NW vein-fault with quartz; both hanging and fott walls very micaceous and fissle
06BT167				Light gray, coarse-grained, mica schist north of fissle unit; interlayered coarse and fine grained zones are seds
06BT168				Light gray, with abundant quartz boudins, quartzose mica schist; upper plate
06BT169				Light gray, quartz -rich, coarse-grained, mica schist; maybe 50% quartz; upper plate
06BT170				Medium gray, very quartz-rich mica schist with some layeres being impure quartzite of upper plate.
06BT171				Medium gray, quartz-rich, coarse grained, mica schist of upper plate
06BT172				Light gray, quartz-rich, mica schist; locally laminated as in a quartzite; in snow storm

Station	Mica C	Pencil	Mineral Fault	Station Description
06BT173				Light gray, quartz-rich, chlorite mica schist.
06BT174				Gray, laminated, quartzose mica schist and impure quartzite.
06BT175				Light gray-tan, fine to medium grained, mica-rich calcareous schist; >40% CaCO3
06BT176				Continue mappable unit of calcareous schist from 06BT175; associated with distinctly green, chlorite schist
06BT177				Continuation of coarse-grained, calcareous schist unit from 06BT175-176; in upper plate
06BT178				Medium gray, coarsely crenulated, quartzose mica schist of upper plate.
06BT179				Medium gray, very coarse grained, quartz-boudin mica schist of upper plate.
06BT180				Medium grained, medium gray-tan, quartz muscovite-chlorite schist with albite grains and calcareous zones
06BT181				Medium gray, medium grained, muscovite-chlorite schist with feldspar-rich zones.
06BT182				Top of Tobin-North Fork; coarse-grained, quartzose schist of upper plate.
06BT183				Light to medium gray, medium grained, calcarous schist unit mapped earlier at 06BT175-177 in upper plate.
06BT184				Below Mikado Fault zone; mixture of calcaroeous schist section and black, incompetant, fissle schist
06BT185				Medium grained, quartzose meta-turbidite schist above fissle unit but below calcareous unit.
06BT186				Same unit as 06BT185 but ere there are thin (3-8 cm) calcaroeus schist horizons.
06BT187				Light gray, massive outcrop but schistose, strongly calcareous schist with 25% CaCO3 (field estimate)
06BT188				Light gray, strongly crenulated, quartz boudin-rich, muscovite chlorite schist of upper plate.
06BT189				Top of Little Squaw Peak; isoclinally folded calcareous schist section snakes down both sides of peak.
06BT190				Dark gray, fissle mica schist below folded calc-schist section; possibly phyllite unit of Chip (1970)
06BT191				Dark gray carbonaceous schist layers interlayered with lighter gray quartzo-feldspathic schist; metaturbidite
06BT192				Classic metaturbidite schist section above fissle schist unit but below folded, calc-schist horizon
06BT193				Classic metaturbidite schist section as at 06BT191 and 06BT192
06BT194				Medium gray, quartzose, mica 'classic' meta-turbidite schist with rhythmic dark gary chorite schist layers.
06BT195				Black schist/medium gray meta-turbidite schist on north hanging wall of Eneveloe Au-quartz vein-fault deposit
06BT196				Light gray, quartzose mica schist.
06BT197A				Tan alterd, fine grained, weakly calcareous, micaceous schist
06BT197B				Dark gray, chlorite-rich black schist in rubble; not in place
06BT198				Dark gray, Fe-stained, unusually brecciated, black phyllite; brecciation zones are parallel to compositional beds
06BT199				Medium gray, quartz-rich, medium grained, chlorite mica schist; also brecciated as at 06BT198
06BT200			112-80SW	Quartz vein-fault with disseminated arsenopyrite (1%), 0.8-to-1.0 m wide, wall rock is meta-turbidite schist
06BT201				Black, chlorite-rich phyllite; strongly crenulated and incompetant unit
06BT202				1) typical quartz-rich, coarse grained, mica schsit as is just below Little Squaw Peak; 2) tan calcareous schist
06BT203				Light gray, tan weathered, moderately calcareous meta-sandstone schist about 15 meters thick; 15% CaCO3
06BT204				Black quartzose schist; unclear whether lower or upper plate
06BT205				Classic, upper plate, coarse grained, quartzose, meta-turbidite schist in creek cut.
06BT206				Non-calcareous, subfoliated, gray meta-sandstone; black, chlorite rich schist bands like wall rock, Eneveloe Mine
06BT207				Similar to rock types @ 06BT206; but chlorite rich layers have disseminated pyrite pseudomorphs.

Station	Mica C	Pencil	Mineral Fault	Station Description
06BT208				Medium gray, quartzose, medium grained mica schist of upper plate.
06BT209				Tan weathered, quartz-rich upper plate schist with abundant quartz boudins (35-50%); with meta-sandstone
06BT210				Tan weathered, fine grained, quiartzose mica schist @ Big Squaw Creek 'kill zone' area; like kill zone, Kantishna
06BT211				Typical medium gray, quartz-rich, chlorite micas schist of upper plate; some FeOx in groundmass
06BT212				Same unit as at 06BT211; also thin (3-5 cm) bands of tan weathered, moderately calcareous schist
06BT213				Contact between 1) 15 m thick strongly calcareous schist (like Little Squaw Peak zone); and 2) quartz-rich schist
06BT214				Massive, dark gray, quartz-rich, muscovite chlorite schist and tan weathered, medium grained, calcareous schist
06BT215				1) fissle graphitic schist (phyllite unit of Chipp (1970); and 2) tan weathered, strongly calcareous schist
06BT216		012-12NE		Strongly penciled, muscovite chlorite schist; near contact of upper and lower plate.
06BT217		015-06NE	055-Vertical	1) Highly siliceous, coarse-grained mica schist and 2) Greenish chlorite schist; NE-trending quartz veins in saddle.
06BT218			120-Vertical	Conspicuous NW-trending quartz vein rubble in saddle; can be traced for 250 meters in 25 meter-wide zone.
06BT219				Dark gray, fine grained quartz-poor 'black schist' of lower plate.
06BT220				Dark gray, fine grained quartz-poor 'black schist' of lower plate; a few layers of quartz-rich mica schist.
06BT221				Dark gray, quartz poor, fissle, chorite schist; lower plate?
06BT222				Dark gray, quartz poor, fissle, chorite schist; lower plate?
06BT223				Medium gray, quartz-rich, muscovite-chlorite schist about 100 m from wrecked C119 aircraft; upper or lower plate
06BT224				Medium gray, quartz-poor, fissle, graphitic schist at Tobin Creek mill road cut; greenstone found 150 m south
06BT225				Light gray, quartz-rich, coarse grained, meta-turbidite schist of upper plate
06BT226				Nearly black, quartz-poor, graphitic, incompetant, fissle schist.
06BT227				Light gray, medium grained major strongly calcareous schist section here; definitely mappable unit.
06BT228				Medium gray, variable textured, fine to coarse grained quartzose meta-turbidite schist of upper plate
06BT229				Structurally deformed, fissle, graphitic schist 50-75 meters north of Mikado fault zone
06BT230				On 200 foot level of Mikado Mine; hanging wall is dark gray, quartz-poor, fissle schist
06BT231A			048-70SE	In trenches, upper Mikado mine area near road summit; conjugate NE/NW high angle vein-faults in upper plate
06BT231B				Medium gray, quartz-rich, muscovite chlorite schist of upper plate but without NE/NW high angle vein-faults.
06BT232			062-74NW	At Mikado open pit mine workings; Hanging wall is fissle schist unit; variable shallow/steep foliations in schist
06BT233				Massive, unfoliated, blocky, fine to medium grained, medium green porphyroblastic greenstone--meta-diorite?
06BT234				On north side (footwall) of Little Squaw vein-fault; medium gray, quart-rich, laminated muscovite chlorite schist
06BT235				Light gray, very quartz-rich (nearly a quartzite; about 80% quartz), mica quartzose schist.
06BT236				1) Medium gray, quartz-rich, meta-turbidite schist and 2) light gray, coarse grained modeately calcareous schist
06BT237				Abundant rubble-crop of light gray, medium to coarse grained, strongly calcareous schist near Little Squaw fault
06BT238				Thick section 35-40 meters) of light gray medium to coarse grained, strongly calcareous (40% CaCO3) schist
06BT239		170-25SE		Medium gray, quartz-rich, meta-turbidite mica schist of upper plate
06BT240				Transitional zone between dark gray fissle schist and medium gray, medium garined, quartz-rich meta-turbidite.
06BT241				Same as 06BT240; transitional zone between fissle schist and meta-turbidite schist
06BT242				Medium gray, 'lumpy', coarse-grained, quartzose mica schist--possibly a metamorphosed conglomerate

Station	Mica C	Pencil	Mineral Fault	Station Description
06BT243				Medium gray, coarse grained, quartz-rich muscovite chlorite schist (upper plate)
06BT244		10-16NE		Deformed (with pencil development) and strongly sheared, greenish gray, chlorite schist
06BT245			115-Vertical	In footwall (south side) of Uranus project, light gray, coarse grained, quartz-rich, meta-turbidite schist
06BT246				Distinctly greenish gray, moderately to strongly calcareous, feldspathic tuffaceous? schist
06BT247				Thick band continues of greenish gray, moderately calcareous, feldspathic schist; also gray meta-sandstone?
06BT248				Gray, fissle, quartz-poor, muscovite-chlorite schist with some calcareous components; perhaps lower plate
06BT249	80-20NE		120-83SW	Highly crenulated, mica-dominated, schist at Crystal Vein-Fault
06BT250				Gray, distinctly 'lumpy', muscovite-chlorite schist of unknown provenance; either lower or upper plate.
06BT251				Greenish, chlorite-rich, strongly calcareous feldpathic schist (resembles greenstone; probably lower plate.
06BT252			120-80SW	Pioneer Vein-Fault appears to form contact between greensish calcareous schist and gray quartzose meta-turbidite
06BT253				Coarse-grained, greenish gray, porphyroblastic (albite grains), calcareous tuffaceous schist (lower plate?)
06BT254				Same unit as 06BT254; greenish albitic calcareous albitic schist dipping to the south
06BT255				Dark gray, pelitic, muscovite schist of lower plate
06BT256				Greenish gray, calcareous schist of lower plate; about 150 m northwest of Drumlummon Prospect
06BT257				Tan weathered, gray, muscovite-rich, with 30-40% quartz content--thought to be upper plate; lower plate nearby
06BT258				Sub-foliated, greenish gray, medium grained, greenschist-greenstone of lower plate
06BT259				Quartz-poor, 'black' schist and green, subfoliated, meta-diorite of lower plate; lost Timex Expedition watch
06BT260				Gray, pelitic, quartzose schist
06BT261			110-Vertical	Quartz-rich vein-fault here; black schist and sub-foliated, greenstone; variation--meta-gabbro of lower plate
06BT262				Massive, blocky, medium green, amphibole/pyroxene rich, sulfide bearing, meta-gabbro.
06BT263				Gray, quartz-rich, mica-chlorite schist
06BT264				Rubble only of medium green, coarse-grained, greenstone, variation of meta-gabbro in lower plate
06BT265				Boulders of massive foliated, locally quartz-rich, pyrrhotite-rich, black schist of lower plate
06BT266				Glacial cirque (Wisconsin) perched above valley floor to the south; standing on alluvial fan complex here.
06BT267				Light to medium gray, quartz-rich, mica-chlorte schist; probably meta-turbidite schist but blocky (higher rank?)
06BT268				Light gray, laminated qurtzose meta-turbidite schist but blocky; maybe higher metamorphic rank
06BT269				Light gray, blocky, quartz-rich muscovite schist; locally quartzite schist
06BT270	90-30E			Medium to dark gray, blocky, quartz-poor, sulfide bearing lower plate?
06BT271				Terminal moriane with classic hummucky topography in McClellan Creek below; placer mine tailngs below
06BT272			118-80SE	Probable extension of Pioneer Vein-Fault; good FeOx fault breccia; horst of black schist in meta-turbidite schist
06BT273				Dark gray, graphitic, mica quartz schist (lower plate?)
06BT274				Judged to be light gray, quartzose mica chlorite schist but higher metamorphic rank (upper greenschist facies?)
06BT275			070-Vertical	NE-trending vein fault traced across edge of slope; some slickensides observed but all in meta-turbidite schist
06BT276				Light gray, siliceous, muscovite quartzose schist; abundant quartz boudins
06BT277				Glacial moraine in McLelland Creek valley to the east.
06BT278			072-Vertical	Light gray, quartz-rich, feldspathic, quartzose schist--like Wickersham Grit near Fairbanks; strong N72E linear

Station	Mica C	Pencil	Mineral Fault	Station Description
06BT279	015-05NE			Blocky, hard, light gray, muscovite quartzose schist
06BT280				Blocky, hard, light gray, tan weathered, muscovite quartzose schist--no calcareous schist to this point
06BT281				Light gray, blocky, hard, coarse-grained, 'classic' meta-turbidite schist
06BT282				Quartz-rich, muscovite, chlorite schist exposed along steep hill slopes.
06BT283				Continuous rubble/outcrop control of light gray, siliceous, non-calcareous schist--higher metamorphic rank
06BT284				Gray siliceous mica schist with FeOx weathering
06BT285				Blocky, resistent, 'psuedo-calcareous', light gray, mica schist--high metamorphic rank meta-turbidite
06BT286				Blocky, light gray, micaceous, chlorite, meta-turbidite schist with thin layers 10-20 cm thick of calcareous schist
06BT287				Isoclinally folded, meta-turbidite schist with black fine grained mudstone and light gray, meta-sandstone schist
06BT288				Isoclinally folded, meta-turbidite schist as at 06BT287
06BT289				Coarse-grained, quartz-albite schist and meta-turbidite schist as at 06BT287-288
06BT290				Hard, black schist of lower plate possibly extended form horst mapped east of station @ 06BT270-272
06BT291				Rubble of bedrock-derived schist of unknown origin near moraine contact in Little McLelland Creek
06BT292				Camp at Little McLelland Creek; bench level; old caved cabin
06BT293				Rubble of light tan weathered, mica schist upper or lower? Plate
06BT294				Dark gray, quartz-poor, black schist of lower plate and quartzo-feldspathic schist; distinctive H2O spring here
06BT295				Tan weathered, dark gray, sulfide-bearing, 'black schist' of lower plate
06BT296	015-20NE			Gray, laminated, black schist and thin zones of calcareous schist probably of lower plate
06BT297				Rubble of greenish-gray, moderately to strongly calcareous, feldspathic tuffaceous? schist of lower plate
06BT298				Very distinctly tan, K-spar rich, quartzose schist thought to be felsic meta-tuff of lower plate
06BT299				Gray, quartzose, fine grained shcist (lower plate?)
06BT300	027-10NE			Distinctly greensih, coarse grained, quratz-chlorite albite schist of lower plate
06BT301				Medium gray, blocky, quartzose mica meta-turbidite schist of upper plate across NE fault from 06BT300
06BT302				Medium gray, blocky, quartzose mica meta-turbidite schist of upper plate like at 06BT301
06BT303				Gray, crenulated, coarse-grained, quartz muscovite schist.
06BT304				Green, sub-foliated, non-altered, hornblende meta-gabbro or meta-diorite.
06BT305				Greenish gray, medium grained, feldspar-rich, meta-tuff and gray, calcareous schist
06BT306				Light gray, coarse-grained, strongly calcareous schist--essentially a clastic meta-limestone
06BT307				Dark gray, sulfide-bearing, black schist interlayered with clastic meta-limstone as at 06BT306
06BT308				Green, nearly non-foliated, coarse amphiboile, meta-diorite or meta-gabbro
06BT309				Gray, coarse-grained, strongly calcareous, chlorite tuffaceous? meta-sandstone
06BT310				Obviously folded, light gray to tan, pinkish K-spar-bearing, felsic meta-tuff as at 06BT298--probably same unit
06BT311				Complicated structure; black schist here, but infolded with quartzose schist and K-spar meta-tuff
06BT312				Dark gray, mylonitic?, quartz-poor, black schist; found lost watch at 06BT259
06BT313				Light gray, coarse-grained with unusual rounded albite grains, strongly calcareous chlorite schist
06BT314				Quartz-rich, mica schist on south side of Pioneer Vein-Fault heading back to camp.

Station	Mica C	Pencil	Mineral Fault	Station Description
06BT315				Prominant glacial end moraine about 12 meters high, with steep (>30°) till-front); Late Wisconsin?
06BT316				Prominant glacial end moraine just above junction of two tributaries of Big Squaw Creek; angular granitic erratics
06BT317				Still in prominent moraine; here about 30 meters thick; both tributaires of Big Squaw Creek contained ice
06BT318				Dark gray, quartz-poor, chlorite 'black schist' on northside of Pioneer Fault trace
06BT319				Dark gray, laminted, pyrite-bearing chlorite 'black schist' of lower plate.
06BT320				Rubble only of dark gray, laminated, chlorite 'black schist' of lower plate.
06BT321				Medium gray, medium to coarse grained, quartz-rich muscovite schist of upper plate, south side of Pioneer Fault
06BT322				Classic, medium gray quartz-rich, variably grain size meta-turbidite schist; relict graded bedding indicated
06BT323				Complexly folded outcrop of meta-turbidite schist as at 06BT322
06BT324				Overturned isoclinal fold in outcrop; classic meta-turbidite schist with relict graded bedding; calc-schist on slope
06BT325				In rock talus: 1) 95% meta-turbidite schist; 2) 5% light gray, strongly calcareous mica schist.
06BT326				Tan-weathered, meta-turbidite schist with 20 cm layers composed of highly siliceous schist.
06BT327				Cribbed placer prospect shaft on left limit bench; penetrates glacio-fluvial deposits; cribbing old and rotted
06BT328				Classic light gray, variably grained quartzose meta-turbisite schist with relict graded bedding; below morainal front
06BT329				Medium gray, variably colored, fine to coarse grained, meta-turbidite schist with relict graded bedding
06BT330				Dark gray, soft, fissle schist with slumps in outcrops.
06BT331				Hanging wall of 200 foot level of Mikado vein-fault; fissle schist section here
06BT332				In Del Ackel's placer cut on east fork, Tobin Creek below glacial terminus; dark gray black schist and greenstone
06BT333				Mid portion of Ackel's placer cut; dark gray, black schist with disseminated pyrite.
06BT334				Dam site on north fork, Tobin Creek; medium gray, medium to coarse grained, mica-chlorite meta-turbidte schist
06BT335				South side, Mikado fault zone; medium gray, variable textured meta-turbidite schist with relict graded bedding
06BT336				South side, Mikado fault zone; medium gray, variable textured meta-turbidite schist with relict graded bedding
06BT337				Dark gray, fissle schist on north side of Mikado fault zone; abundant quartz vein float in talus
06BT338				Dark gray, fissle schist on south side of Mikado fault zone; in saddle area on topographic map
06BT339				Dark gray, fissle schist
06BT340				Excellent exposure of light gray, granular, poorly foliated, quartz-bering meta-graywacke (meta-turbidite) schist
06BT341				Medium gray, variably textured meta-turbidite schist; see geochemical sample #3226
06BT342				Unusual spring at head of lower cirque, Boulder Creek basin; anomalous green moss with dark FeOx stains
06BT343				Dark gray, chlorite-rich 'black schist' presumably of lower plate; prominent glacial moraine in foreground
06BT344				Flaggy weathered, almost black in color, chlorite 'black schist' of lower plate.
06BT345				Medium gray, quartz-rich (quartz boudins), micaceous meta-turbidite schist?
06BT346				Strongly isoclinally folded, meta-turbidite schist?
06BT347				Boulder Creek camp site; erratic boulders (2m) of granodiorite and granite from main trunk of Chandalar River
06BT348				Light gray, meta-turbidite schist
06BT349				Folded and sheared outcrop of dark gray chlorite-muscovite schist
06BT350				Rubble crop of: 1) medium green, non-foliated, meta-gabbro; 2) dark gray, chlorite black schist MO of greenstone

Station	Mica C	Pencil	Mineral Fault	Station Description
06BT351	041-25NE			Classic, dark gray to almost black, chlorite schist of lower plate.
06BT352				Massive, blocky essentially unfoliated, meta-igneous greenstone--probably metagabbro
06BT353				Rubble crop of: 1) coarse-grained quartz-boudin-rich micaeous schist; 2) dark gray, chlorite black schist
06BT354				Sketched in lateral moraines of Chandalar Valley from here; black schist with NE-trending quartz veins
06BT355a				All dark gray to black chlorite schist
06BT355b			070-Vertical	Black schist and greenstone rubble with large NE-trending quartz veins as at 06BT354
06BT355c				Looks like transition between chlorite-rich black schist and variably textured meta-turbidite schist
06BT356				All dark gray, chlorite black schist
06BT357				Looks like transition between chlorite-rich black schist and variably textured meta-turbidite schist as at 06BT355c
06BT358				Large greenstone body in rubble crop; metagabbro at least 200 meters in length
06BT359				All dark gray, chlorite black schist; excellent creek exposures
06BT360	03-20NE			Excellent exposures of nearly black chlorite schist; almost no quartz--like Big Hurrah Slate (Seward Peninsula)
06BT361				Probably dark gray, black schist of lower plate
06BT362				Light to dark gray, fine grained chlorite schist with abundant quartz float; shearing evident (Mikado Fault?)
06BT363				Light to dark gray, fine grained chlorite schist; probably lower plate but unsure
06BT364				Last rock exposure in Boulder Creek valley before glacial cover; dark gray chlorite 'black schist'
06BT365				In cirque headwall, eastern limit of Boulder Creek; fresh faces suggests Wisconsin age
06BT366				Light gray, coarse grained quartz-rich, meta-turbidite schist
06BT367				Variable gray colored, quartz-rich mica chlorite schist likely of upper plate
06BT368				Variable gray colored, fine to coarse grained, quartz-chloritic meta-turbidite schist of upper plate
06BT369				Variable gray colored, quartz-rich mica chlorite schist likely of upper plate; NW-trending quartz vein boulder train
06BT370				Classic, coarse grained, quartz-chlorite muscovite meta-turbidite schist, relict graded bedding; and calc schist
06BT371				1) coarse-grained gray, quartz-chlorite muscovite meta-turbidite and 2) gray, strongly calcareous schist
06BT372				Variably colored, medium to coarse grained, mica-chlorite meta-turbidite schist.
06BT373				Light gray, medium grained quartz-chlorite muscovite schist (meta-sandstone) of upper plate
06BT374				Light gray, medium grained, quartz-chlorite meta-turbidite schist
06BT375				Very light gray, massive, micaceous quartz-rich meta-sandstone like on Big Squaw Creek and in NW corner map
06BT376				West fork of McNett Creek is cirque-valley glacier system 1.2 km in length; calcareous schist on ridge top here
06BT377			115-65SW	Tan, pyrite-rich, quartz-altered schist zone 60 cm wide in NW high angle structure; some structural discordance
06BT378			100-70SW	NW-trending high angle fault zone contains mineralized quartz and gray sulfides; should be followed up
06BT379				Gray meta-turbidite schist exposure; relict graded bedding; in a hurry here
06BT380				Medium gray, medium to coarse grained, quartzose meta-turbidite schist; it's getting late
06BT381				Fine grained, quartzose phyllitic schist and coarse meta-turbidite schist
06BT382			122-Vertical	Abundant quartz float in saddle area implies fault zone; sampled
06BT425				Gray, laminated, quartz-muscovite schist with quartz boudins, unsure of upper versus lower plate
06BT426				Light gray, laminated, quartzose muscovite schist of upper plate; tan, quartz-rich unit in bluff to NW (mappable)

Station	Mica C	Pencil	Mineral Fault	Station Description
06BT427			118-Vertical	Gray quartz-rich schist intruded by NW-striking, steeply dipping thin quartz veins in a swarm 2 meters wide
06BT428				Light gray, laminate micaceous quartzite (field term) assocated with tan unit as at 06BT426
06BT429			133-Vertical	Strong NW-striking, steeply dipping quartz vein system in fault zone; could possbly be Mikado Fault
06BT430				Dark gray, chloritic 'black schist' like unit here; interpreted to be lower plate
06BT431				Massive, blocky, light greenish gray, sub-foliated, pyroxene-rich, metagabbro body; Mo taken here
06BT432			085-65NW	Dark gray, highly deformed, chlorite black schist with quartz-albite vein with gossan; like in Cape Nome district
06BT433				Dark gray, graphitic?, black schist of lower plate; near thrust fault
06BT434	077-20NE			Fine grained, light gray, quartzose phyllitic schist and coarse meta-turbidite schist at base of upper plate
06BT435				1) Light to dark gray, feldspathic, quartzose meta-turbidite schst; 2) light greenish gray, porphyroblastic schist
06BT436				Probably upper plate, feldspathic, quartzose meta-turbidite schist with thin calcareous schist horizons
06BT437				Light to dark gray, bleached, fine grained, chlorite rich, black schist with minor quartz content (<10%)
06BT438				Dark gray, chlorite-rich, black schist of lower plate; glaciated valley to south.
06BT439				Mostly fine grained, quartz-poor, black schist but some of this has quartz-rich zones; maybe horst-like fault block
06BT440				Blocky, coarse-grained, quartzose mica-chlorite meta-turbidite schist
06BT441				Classic, coarse-grained, blocky, feldspathic quartz muscovite phyllitic-schist--probably meta-turbidite schist
06BT442				Coarse-grained, feldspathic meta-turbidite schist
06BT443				1) Coarse-grained, meta-turbidite schist and 2) tan, quartzite schist
06BT444				1) Light gray, quartzo-feldspathic (almost gneissic) meta-turbidite schist and 2) dark gray, coarse grained schist
06BT445				Tannish, fine grained, quartzo-feldspathic unit; unit can be mapped although unsure of upper versus lower type
06BT446				Siliceous schist, banded, crenulated, and resembling silicceous schist of June 28th; abundant glacial erratics
06BT447				Medium green, actinolite-feldspar meta-clastic tuff? MO needed here
06BT448				Albite porphyroblasts in green schist as at 06BT447; tuffaceous parentage; probably lower plate
06BT449				Medium green, sub-foliated, actinolite-rich,meta-gabbro; furthest known NW exposure of greenstone in map area
06BT450				Mixed sub-foliated, metagabbro and fine grained, chlorite black schist; but quartz-bearing rocks also here
06BT451				Medium to dark green, practically unmetamorphosed, mafic volcanic agglomerate; like in Angayuchum Mountains
06BT452				Light gray, blocky, hard, coarse-grained, quartzose schist to quartzite (unusual rock type)
06BT453				Gray, fine grained, quartzose phyllitic schist; not a quartzite but not a meta-turbidite either; with Fe gossan blebs
06BT454			135-Vertical	NW-striking, high angle quartz vein one meter thick; host rock resembles higher rank rocks of McLelland Creek
06BT455				Greenish gray, albite, quartzose, phyllitic, tuffaceous? schist of lower plate
06BT456				Interlayered greenish gray, calcareous schist and coarse grained, feldspathic quartz mica schist (meta-turbidite)
06BT457				In saddle area, greenish-gray, chlorite-rich schist and micaceous quartzite (very siliceous)
06BT458			155-75SW	Mixed bedrock types: 1) gray micaceous quartzite; 2) gray calcareous schist; 3) small greenstone lense.
06BT459				Light to medium gray, fine grained, quartz-rich schist, blocky; maybe upgraded meta-turbidite schist or quartzite
06BT460				Same unit as at 06BT459; this be the upper-most part of the lower plate (Dlq unit).
06BT461				Medium gray, coarse-grained, feldspathic, quartzose, chlorite meta-turbisidite schist; upgraded upper plate.
06BT462				Medium gray, medium grained, muscovite-chlorite meta-turbidite schist; a part of the upgraded unit; NE fault.

Station	Mica C	Pencil	Mineral Fault	Station Description
06BT463				Same as 06BT462; upgraded meta-turbidite schist, which is in sharp contact with lower plate along NE fault.
06BT464				Light gray, blocky, medium to coarse grained, feldspathic meta-turbidite schist, a part of the upgraded unit.
06BT465				Tannish gray, blocky medium to coarse grained, feldspathic meta-turbidite schist; a part of the upgraded unit.
06BT466				Tannish gray, blocky medium to coarse grained, feldspathic meta-turbidite schist; a part of the upgraded unit.
06BT467				Classic, coarse grained, crenulated, quartz-rich chlorite (actinolite) upgraded, meta-turbidite schist.
06BT468				Isoclinally deformed, crenulated, actinolite-bearing, quartz-rich upgraded metaturbdite schist.
06BT469				Near head of Little McLelland Creek basin; rubble crop of fresh, subfoliated, metagabbro; collected for U/Pb age
06BT470	075-40NE			Micaceous quartzite of upper-most part of lower plate or part of upgraded unit?
06BT471	065-10NE			Medium gray, medium to coarse grained, chlorite meta-turbidite schist; an outcrop of exposure NW of NE fault
06BT472				Light gray, coarse grained, actinolite-bearing, upgraded,meta-turbidite schist on SE side of NE striking fault.
06BT473				Gray, micaceous, crenulated medium grained, quartzose mica schist; basal oart of upper plate NW of NE fault.
06BT474				Single station east, McClelland Creek; gray, medium to coarse grained, quartz-rich, chlorite, meta-turbidite schist
06BT475			055-Vertical	Examine NE-striking fault zone east of Rock Creek; Gray meta-turbidite schist on both walls of fault zone
06BT476			055-Vertical	Examine NE-striking fault zone west of McLelland Creek; large quartz boulders, 1% pyrite; should be prospected
06BT477			120-Vertical	At Listwanite prospect (Ratchet Ridge Prospect); pyrrhotite bearing greenstone in RC chips; identify alteration
06BT478				Fresh, medium green, medium to coarse-grained, hornblende meta-dirorite or metagabbro in horst of lower plate
06BT479				Fresh, medium green, coarse-grained, hornblende metagabbro in horst of lower plate; below ridge crest at Crystal
06GL016				Silvery gray, upper plate schist
06GL017				Black schist of lower plate
06GL018				Black schist south of Mikado Fault
06GL019				Greenstone with black, quartz-rich schist; various non-and calc-bearing schist; a horst of lower plate?
06GL020				Iron rich quartz poor schist of lower plate
06GL021				Blocky, impure quartzite with sheeted quartz veins in outcrop.
06GL023				Calc-Schist above 200 foot level, Little Squaw Gold Mine
06GL024				Altered Fe-altered granular greenstone from lower plate
06GL025				Greenstone meta-gabbro with possible skarn zone; slope before Nugget Creek
06GL026				Crenulated schist of upper plate; strong secondary cleavege oblique to S1 surface
06GL027				Black, fine grained, quartz-rich schist near 06BT179
06GL028				Fissle schist unit of upper plate; silvery gray, dominated by micas plus graphite.
06GL029				Higher rank upper plate schists (incipent garnets?), Little McLelland Creek basin, south slope of valley
06GL199				Dark gray, fine grained 'black schist' with fine grained meta-turbidite?
06GL200				Gray, fine grained phyllitic schist with low quartz content; present in thin 1 cm layers.
06GL201				Gray, calc-schist in rubble; otherwise fine grained, crenulated, shiny, meta-turbidite phyllite.
06GL202				Black, shiny, crenulated quartz mica schist with brown (Fe) alteration plus siderite?
06GL203				Up Little Squaw Creek near confluence with Reindeer Gulch; deformed, gray, chlorite schist

Station	Mica C	Pencil	Mineral Fault	Station Description
06GL204				Gray, fine grained, micaceous, calcareous schist with pyrite disseminations
06GL205				Fine grained, black and white, quartz mica schist
06GL206				Gray, coarse-grained, mica quartz schist; classic 'upper plate'
06GL207				Classic gray, mica quartz schist of upper plate; interlayered meta-mudstone and meta-sandstone
06GL209	180-72E			Doubly folded, gray, fine to coarse grained, mica quartz schist; probably meta-turbidite schist
06GL210				Greenish gray, crenulated, mica chlorite schist.
06GL211				Greenish gray, coarse grained, quartz mica schist
06GL212				Greenish gray, coarse grained, quartz mica schist above calcareous schist unit.
06GL213				Gray, fine grained, calcareous schist (marker unit?)
06GL214				Non-calcareous black schist; immediately overlying calcareous schist unit
06GL215				Non-calcaeous quartz mica schist; immediately below calcareous schist unit
06GL217				Bottom of 2nd calcareous schist unit; actually same calc-schist unit isoclinally folded.
06GL218				Gray, mica quartz schist with distinctive quartz rods
06GL224				On Tobin Road; black, fine to caorse grained, quartz mica schist
06GL225				Dark gray, finely laminated, quartz schist with Fe fractures
06GL229				Black, quartz poor, with fine striping, kinky, crenulated schist
06GL230				At Mikado Fault with Layne Griffin; dark gray (nearly black), fissle schist unit, north side of Mikado shear
06GL231				Phyllitic schist in contact with Mikado shear; limit of open pit mining; coarser grained schist to the north
06GL232				Fine grained, phyllitic black schist
06GL233				Actinolite-bearing, calcareous schist in rubble crop, north of 100 foot level, Little Squaw quartz-gold vein-fault
06GL234				Gray, blocky, quartz-rich schist
06GL239				Greenish gray, quartz chlorite muscovite schist
06GL241				Silver to greenish gray, chlorite muscovite schist with Fe nuclei; calc schist to north is chlorite rich @ 06BT246
06GL243			119-64SW	Black, fine grained, carbonaceous schist equivalent to phyllitc unit on north side of Little Squaw vein-fault
06GL244				Albite-rich cream colored, porphyroblastic calc-schist
06GL248				Calcareous schist with individual quartz rods 2 cm in diameter and 10 cm long
06GL249				At Palisgren Propspect; unit contacts strike north and dip east and inludes greenstone bodies to the north
06GL258				Quartz-rich, laminated, black schist
06GL266				1) Dark gray, albite quartz chlorite muscovite schist; 2) light gray, creamy, strongly calcareous schist
06GL267				Gray, non-calcareous muscovite quartz schist
06GL268				Undulating layers of calcareous and non-calcareous schist repeated by isoclinal folding
06GL269				Base of 20 meter thick, gray calcareous schist package; non-calc-schist with abundant chlorite below
06GL270				Dark gray, porphyroblastic, quartz-poor, black schist
06GL271	70-30NE			Light green, porphyroblastic albite Fe garnet? schist overlying blocky greenstone.
06GL272	.			
06GL273	38-03NE			Dark gray, quartz-chlorite non-calcareous black schist.

Station	Mica C	Pencil	Mineral Fault	Station Description
06GL274				Coarse-grained, meta-turbidite schst in central core near hill 5440, head of Tobin Creek
06GL275				Black schist (of lower plate) with variable quartz content and Fe blebs (pyrite)
06GL276				Fine grained, ribbon textured, quartz-bearing black schist near contact with coarse grained meta-turbidite schist
06GL277				Banded black schist
06GL278				Light gray quartzite of lower plate
06GL279				Isoclinally folded, black and white quartzose mica schist with Fe alteration (pyrite?)
06GL280			120-Vertical	Iron-rich, platey black schist with sericite-muscovite zones.
06GL281	28-33NE			Believe fault in saddle to the south; banded black schist
06GL283				Greenish, albite, actinolite, chlorite, strongly calcareous schist, which overlies black schist to the east.
06GL284				Greenstone sill and quartz-rich muscovite chlorte schist above quartzite
06GL285				Greenstone rubble in moss
06GL298				Black schist of lower plate south? of Mikado Fault
06GL300				Upper plate meta-turbidite schist
06GL301				Coarse grained, meta-turbidite schist of upper plate
06GL303				Classic, upper plate, muscovite quartz schist with quartz layers or boudins
06GL313				Muscovite chlorite 'black schist' of probable lower plate; in projected saddle south of Mikado Fault
06GL314				Light brownish gray-greenish gray, quartzite schist with abundant pyrite in lamina (lower plate?)
06GL315				Same unit description as at 06GL314
06GL316				Crenulated black schist with shearing and crenulation surfaces
06GL317				Iron rich black schist and green actinolite calcareous schist layers up-section
06GL318				Iron rich black schist above green actinolite calcareous schist
06GL319				White, broken, quartz in 1-2 mm discontinuous layers in black schist; either lower or upper plate (unsure)
06GL320				Feldspathic, actinolite-rich calcareous schist interbedded with mica quartz-rich schist
06GL321				Meta-turbidite schist of upper plate with abundant quartz layers 2-3 cm thick
06GL322				Contact with black schist of lower plate at break in slope
06GL323				Crenulated muscovite quartz-rich schist; probably meta-turbidites of upper plate
06GL324			115-Vertical	Linear trend of faulting as seen from the air.
06GL325				Greenish gray, quartz chlorite meta-turbidites; linear zone not struturally importat
06GL326				Dark gray, laminated, iron rich, uncrenulated quartzose chlorite schist; could be lower plate
06GL327				White to greenish orange, quartz-rich schist large quartz boulders to 1 meter probably of metamorphic origin
06GL328				Quartz chlorite muscovite schist, locally 'felsic'; overlies black schist; like west of Big Squaw Creek valley
06GL329				Actinolite/tremolite albite chlorite calcareous schist, with rounded albite porphyroblasts.
06GL330				Green to cream, actinolite chlorite muscovite calc-schist; locally felsic schist layers
06GL331				Blocky to rounded, greenstone bouders in-cased in iron rich black schist
06GL333				Isoclinally deformed, gray quartz-rich schist to quartzite
06GL334				Micaceous quartzose schist with abndant iron nodules.

Station	Mica C	Pencil	Mineral Fault	Station Description
06GL335				Greenish gray, micaceous quartzose schist
06GL336				Greenish gray, quartzose schist.east or Rock Creek--way out of map area; calc schist and meta-turbidite schist
06GL337				At head of Pedro Gulch, medium to dark gray quartzite locally iron rich (nodules); in lower plate?
06GL338				Dark gray, mica chlorite schist with abundant pyrite; probably lower plate.
06GL339				Thin layers of calc-schist in coarse grained quartzose schist; upper plate?
06GL340				Coarse-grained, crenulated mica chlorite meta-turbidie schist; convinced this is a klippen of upper plate here
06GL341				Dark gray, quartz-poor, black schist of lower plate
06GL342				About 15 meters of calcareous, felsic schist; same as 'marker' calc-schist unit south of Mikado on Tobin Road
06GL343				Gray to white quartzite/quartzose schist; continue down section
06GL344				Coarse, crenulated, gray mica schist.
06GL345				Abundant 2 meter bull quartz boudins in green massive greenstone/metagabbro body.
06GL346				Blocky cliff outcrop of coarse-grained meta-turbidite schist.
06GL347				Highly folded (isoclinal), meta-turbidite schist of upper plate.
06GL348				Calcareous and felsic quartzose schist with epidote?
06GL349	010-10NE			Fine grained mica schist with distinctive quartz rods 1 cm in diameter and 8 cm long; upper plate?
06GL350				Folded, light gray, chlorite quartzose schist.
06GL351	030-08NE			Grayish green, quartzose (boudins) lumpy schist end day at fault trending NE
06GL352				Massive, blocky, meta-igneous greenstone body off flank of ridge; some flow banding?
06GL353				Greenstone with black, quartz-rich schist; various non-and calc-bearing schist; a horst of lower plate?
06GL354				At 'Palisgren' calc-schist; stockwork vein system north of Palisgren intersects calc-schist.

Station	Petrographic Remarks; Thin Section Mineralogical Examination with PRGCI Nikon™ Labophot-Pol Model #104 Microscope; Trasmitted Light
06BT065	
06BT066	
06BT067	
06BT068	
06BT069	
06BT070	
06BT071	
06BT072	
06BT073	Quartz-chlorite-schist with 15% graphite, 5% albite porphyroblasts and 2% phengite (white mica); 3% sulfide (pyrite); crenulated
06BT074	
06BT075	
06BT076	
06BT077	Quartz-dominant (60%), chlorite (15%) Fe-white mica (10%), carbonate bearing (13%) schist; 2% opaques (pyrite); micas define foliation
06BT078	
06BT079	
06BT080	
06BT081	
06BT082	
06BT083	
06BT084	Quartz-rich (50%), chlorite dominant (35%) Fe-white mica (15%) schist; rounded magnetite with pennine chlorite; stilpnomelane grains (<1%)
06BT085	
06BT086	
06BT087	
06BT088	
06BT089	
06BT090	Coarse-textured chlorite and quartz dominant schist; pennine (40%), quartz anhedra in layers (45%); rounded BBs of magnetite (8%); phengite white mica (5%)
06BT091	
06BT092	Granular quartz anhedra (60%) and subhedral albite (5%) may be relict sedimentary grains; muscovite (8%), pennine chlorite (20%); magnetite (4%), pyrite (3%)
06BT093	
06BT094	
06BT095	
06BT096	
06BT097	Granular quartz anhedra (75%) may be relict sedimentary clasts; pennine chlorite (12%) and Fe white mica (8%) define foliation; twinned albite (3%) sulfides (2%)
06BT098	
06BT099	
06BT100	

Station	Petrographic Remarks; Thin Section Mineralogical Examination with PRGCI Nikon™ Labophot-Pol Model #104 Microscope; Trasmitted Light
06BT101	Layers of crenulated pennine (40%) and quartz anhedra (37%); white mica (8%), albite grains (7%); epidote grains (5%); opaques mainly magnetite (6%)
06BT102	Sub-foliated, ankerite (20%), chlorite (55%), graphite (10%), small, inclusion charged epidote (8%) phyllite; also Fe-white mica (5%), and FeOx (8%) grains, "skarny"
06BT103	
06BT104	Distinctly coarse grained, pennine chlorite (55%), quartz anhedra (20%), feldspar anhedra (5%), schist; with 10% magnetite, and 8% white mica (true muscovite?)
06BT105	
06BT106	
06BT107	
06BT108	
06BT109	
06BT110	
06BT111	
06BT112	
06BT113	
06BT114	
06BT115	Non-foliated groundmass; hyperstene (45%) altered to pennine-magnetite (25%);epidote inclusions in groundmass (15%); twinned albite (10%); sphene (2%)
06BT116	
06BT117	
06BT118	Sub-schistose felsic tuff with relict plagioclase (35%) and quartz (20%) phenocrysts with resorbtion texture; groundmass is pennine (25%); carbonate (15%);
06BT119	
06BT120	
06BT121	
06BT122	
06BT123	
06BT124	Hyperstene-bearing intermediate tuff; hyperstene xtals (15%), yellow chlorite (20%), quartz anhedra in groundmass (20%), plagioclase (5%), phengite (5%)
06BT125	
06BT126	
06BT127	
06BT128	
06BT129	
06BT130	
06BT131	
06BT132	
06BT133	
06BT134	
06BT135	
06BT136	

Station	Petrographic Remarks; Thin Section Mineralogical Examination with PRGCI Nikon™ Labophot-Pol Model #104 Microscope; Trasmitted Light
06BT137	
06BT138	
06BT139	Coarse-grained meta-turbidite; greenish-yellow chlorite (15%), quartz and feldspar anhedra (70%), phengite (8%), rounded FeOx and magnetite (7%)
06BT140	
06BT141	
06BT142	
06BT143	Calcareous phyllitic-schist; rounded/subrounded calcite grains and cement (35%) between rounded/subrounded quartz/feldspar grains (55%), phengite (8%)
06BT144	
06BT145	
06BT146	
06BT147	
06BT148	
06BT149	'Massive greenstone'; chlorite (45%) in groundmass of quartz and feldsar anhedra (35%), epidote (8%), sphene (4%), pyroxene altered to chlorite; inclusions
06BT150	
06BT151	
06BT152	
06BT153	Pennine chlorite defines schistocity (45%), interlocking quartz and twinned albite graines (40%), phengite (9%), pyrite (3%), 2 small garnets (<1%), crenulations
06BT154	Coarse-grained meta-turbidite schist; muscovite (25%); chlorite (15%), graphite (15%), quartz grains in large aggregates (30%), clinozoisite (6%), rounded FeOx
06BT155	
06BT156	
06BT157	
06BT158	
06BT159	
06BT160	
06BT161	
06BT162	
06BT163	
06BT164	
06BT165	
06BT166	
06BT167	
06BT168	
06BT169	
06BT170	
06BT171	
06BT172	

Station	Petrographic Remarks; Thin Section Mineralogical Examination with PRGCI Nikon™ Labophot-Pol Model #104 Microscope; Trasmitted Light
06BT173	
06BT174	
06BT175	
06BT176	Calc-schist; equant calcite grains/cement (30%), chlorite (23%), actinolite (12%) inclusion-rich quartz and albite (20%), clinozoisite (4%), opaques (8%)
06BT177	
06BT178	
06BT179	Coarse-grained schist; quartz anhedra (40%), albite (5%), yellow chlorite (25%), muscovite (15%), rounded FeOX grains (10%), clinozoisite (5%).
06BT180	
06BT181	
06BT182	
06BT183	
06BT184	
06BT185	
06BT186	
06BT187	
06BT188	
06BT189	
06BT190	
06BT191	
06BT192	
06BT193	
06BT194	
06BT195	
06BT196	
06BT197A	
06BT197B	
06BT198	
06BT199	
06BT200	
06BT201	
06BT202	
06BT203	Tan calc-shist; iron carbonate grains (25%), quartz-feldspar anhedra and grains (50%), chlorite (10%), muscovite (8%), epidote (5%), sphene (2%) ankerite
06BT204	
06BT205	
06BT206	
06BT207	

Station	Petrographic Remarks; Thin Section Mineralogical Examination with PRGCI Nikon™ Labophot-Pol Model #104 Microscope; Trasmitted Light
06BT208	
06BT209	
06BT210	
06BT211	
06BT212	
06BT213	Calc-schist: calcite grains (20%), inclusion-rich quartz-feldspar grains (25%), brownish chlorite (30%), actinolite (10%) clinozoisite (8%), opaques (7%),
06BT214	
06BT215	
06BT216	
06BT217	Coarse-grained meta-turbidite schist: large clots, pennine (10%), muscovite layers (20%), quartz-feldspar anhedra (40%), graphite (10%), clinozoisite (4%)
06BT218	
06BT219	
06BT220	
06BT221	
06BT222	
06BT223	
06BT224	
06BT225	
06BT226	
06BT227	
06BT228	
06BT229	
06BT230	
06BT231A	
06BT231B	
06BT232	
06BT233	
06BT234	
06BT235	
06BT236	
06BT237	
06BT238	
06BT239	
06BT240	
06BT241	
06BT242	

Station	Petrographic Remarks; Thin Section Mineralogical Examination with PRGCI Nikon™ Labophot-Pol Model #104 Microscope; Trasmitted Light
06BT243	
06BT244	
06BT245	
06BT246	
06BT247	
06BT248	
06BT249	
06BT250	
06BT251	
06BT252	
06BT253	
06BT254	
06BT255	
06BT256	
06BT257	
06BT258	
06BT259	
06BT260	
06BT261	
06BT262	
06BT263	
06BT264	
06BT265	
06BT266	
06BT267	
06BT268	
06BT269	
06BT270	
06BT271	
06BT272	
06BT273	
06BT274	Quartz anhedra (40%); oligoclase-andesine (15%), muscovite (15%); chlorite (10%); actinolite (8%); opaques (6%); small incpient garnets (6%); some sphene?
06BT275	
06BT276	
06BT277	
06BT278	

Station	Petrographic Remarks; Thin Section Mineralogical Examination with PRGCI Nikon™ Labophot-Pol Model #104 Microscope; Trasmitted Light
06BT279	
06BT280	
06BT281	
06BT282	
06BT283	
06BT284	
06BT285	
06BT286	
06BT287	
06BT288	
06BT289	
06BT290	
06BT291	
06BT292	
06BT293	
06BT294	
06BT295	
06BT296	
06BT297	
06BT298	Meta-Tuff: large feldspar grains with some resorption features (25%), muscovite (15%), smaller sized quartz grains (30%), FeOx (15%), epidote inclusions (15%).
06BT299	
06BT300	
06BT301	
06BT302	
06BT303	
06BT304	
06BT305	
06BT306	
06BT307	
06BT308	
06BT309	
06BT310	
06BT311	
06BT312	
06BT313	
06BT314	

Station	Petrographic Remarks; Thin Section Mineralogical Examination with PRGCI Nikon™ Labophot-Pol Model #104 Microscope; Trasmitted Light
06BT315	
06BT316	
06BT317	
06BT318	Black schist: chlorite (15%), graphite (20%), phengite (25%), quartz anhedra (25%), twinned albite (10%), magnetite (3%), always with chlorite, clinozoisite (2%)
06BT319	
06BT320	
06BT321	
06BT322	Medium grained schist, upper plate: crenulated groundmass, chlorite (30%), phengite (30%), quartz and feldsapr anhedra (30%), magnetite (3%), layering
06BT323	
06BT324	
06BT325	
06BT326	
06BT327	
06BT328	
06BT329	
06BT330	
06BT331	
06BT332	
06BT333	
06BT334	
06BT335	
06BT336	
06BT337	
06BT338	
06BT339	
06BT340	
06BT341	
06BT342	
06BT343	
06BT344	
06BT345	
06BT346	
06BT347	
06BT348	
06BT349	
06BT350	

Station	Petrographic Remarks; Thin Section Mineralogical Examination with PRGCI Nikon™ Labophot-Pol Model #104 Microscope; Trasmitted Light
06BT351	
06BT352	
06BT353	
06BT354	
06BT355a	
06BT355b	
06BT355c	
06BT356	
06BT357	
06BT358	
06BT359	
06BT360	
06BT361	
06BT362	
06BT363	
06BT364	
06BT365	
06BT366	
06BT367	
06BT368	
06BT369	
06BT370	Calc-Schist: calcite grains/cement (25%), chlorite (15%), actinolite (10%) muscovite (20%), quartz (15%), grapite (8%), magnetite (4%); like 06BT213, 176, 143
06BT371	
06BT372	
06BT373	
06BT374	
06BT375	
06BT376	
06BT377	
06BT378	
06BT379	
06BT380	
06BT381	
06BT382	
06BT425	
06BT426	

Station	Petrographic Remarks; Thin Section Mineralogical Examination with PRGCI Nikon™ Labophot-Pol Model #104 Microscope; Trasmitted Light
06BT427	
06BT428	
06BT429	
06BT430	
06BT431	
06BT432	
06BT433	
06BT434	
06BT435	
06BT436	
06BT437	
06BT438	
06BT439	
06BT440	
06BT441	
06BT442	
06BT443	
06BT444	
06BT445	
06BT446	
06BT447	
06BT448	
06BT449	
06BT450	
06BT451	
06BT452	
06BT453	
06BT454	
06BT455	
06BT456	
06BT457	
06BT458	
06BT459	
06BT460	
06BT461	
06BT462	

Station	Petrographic Remarks; Thin Section Mineralogical Examination with PRGCI Nikon™ Labophot-Pol Model #104 Microscope; Trasmitted Light
06BT463	
06BT464	
06BT465	
06BT466	
06BT467	
06BT468	
06BT469	
06BT470	
06BT471	
06BT472	
06BT473	
06BT474	
06BT475	
06BT476	
06BT477	
06BT478	
06BT479	
06GL016	Pennine (15%), quartz anhedra (65%), twinned feldspar (10%), magnetite (4%), always with pennine, epidote (2%); FeOx station # 06GL118
06GL017	Black schist: laminated graphite (35%), chorite blocks (20%), muscovite (15%), quartz-feldspar (20%), isolated carbonate grains (4%); station #06GL125
06GL018	Gray quartzite: quartz anhedra in layers (70%), chorite (10%), muscovite (10%), opaques (8%), epidote (2%); station #06GL131
06GL019	Non-foliated: Hornblende grains and phenocrysts (30%), albitized plagioclase (15%), brown chlorite (25%), clinozoisite (25%), station #06GL133
06GL020	Interlayerd quartz anhedra (40%), and chlorite (25%) muscovite (15%) and graphite (15%) layers; unidentified isotrophic grains (<1%) station #06GL134
06GL021	Impure quartzite: quartz anhedra (75%), green chlorite (8%), muscovite (8%), carbonate (2%), opaques (2%); station #06GL138
06GL023	Calc-schist: Equant calcite (20%), quartz-feldspar anhedra (30%), chlorite (15%), yellow actinolite (15%), phengite (5%), FeOx; station #06GL144
06GL024	Subfoliated grainy texture: actinolite (15%), chlorite after mafic mineral (15%), cloudy plagioclase feldspar (30%), siderite-carbonate; station #06GL150
06GL025	Two thin sections of metagabbro: blue-purple pleocroism of amphibole--maybe glaucophane (35%), epidote (25%), feldspar (20%) station #06GL152
06GL026	Mica-dominated schist: clhorite (35%), muscovite (30%), feldspar (5%) graphite (5%), quartz anhedra (15%) opaques (5%), station #06GL188
06GL027	Impure quartzite: quartz anhedra (70%), green chlorite (10%), phengite white mica (15%), carbonate (2%), opaques (3%); station #06GL192
06GL028	Fissle schist: phengitic white mica (30%), chlorite (25%), graphite (8%), quartz anhedra layers (25%), feldspar (7%), opaques (4%); station # 06GL197
06GL029	
06GL199	
06GL200	
06GL201	
06GL202	
06GL203	

Appendix II Certified Analytical Results (Certificates #FA06111943 and #FA06085963) from ALS Chemex for Major Oxide and Trace Element Analyses for Meta-Igneous and Meta-Sedimentary rocks, Chandalar Mining District, Alaska

ALS Chemex
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ALS USA Inc.
994 Glendale Avenue, Unit 3
Sparks NV 89431-5730
Phone: 775 356 5395 Fax: 775 355 0179 www.alschemex.com

To: **PACIFIC RIM GEOLOGICAL CONSULTING**
PO BOX 81906
FAIRBANKS AK 99708-1906

Page: 1
Finalized Date: 30-SEP-2006
Account: QOK

CERTIFICATE FA06085963

Project:
P.O. No.:
This report is for 10 Rock samples submitted to our lab in Fairbanks, AK, USA on 11-SEP-2006.
The following have access to data associated with this certificate:
TOM BUNDTZEN

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
CRU-QC	Crushing QC Test
PUL-QC	Pulverizing QC Test
LOG-22	Sample login - Rcd w/o BarCode
CRU-31	Fine crushing - 70% <2mm
SPL-21	Split sample - riffle splitter
PUL-31	Pulverize split to 85% <75 um

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
OA-GRA06	LOI for ME-XRF06	WST-SIM
ME-MS81	38 element fusion ICP-MS	ICP-MS
ME-XRF06	Whole Rock Package - XRF	XRF

To: **PACIFIC RIM GEOLOGICAL CONSULTING**
ATTN: TOM BUNDTZEN
PO BOX 81906
FAIRBANKS AK 99708-1906

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature:
Keith Rogers, Executive Manager Vancouver Laboratory

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To: **PACIFIC RIM GEOLOGICAL CONSULTING**
PO BOX 81906
FAIRBANKS AK 99708-1906

Page: 2 - A
Total # Pages: 2 (A - D)
Finalized Date: 30-SEP-2006
Account: QOK

CERTIFICATE OF ANALYSIS FA06085963

Sample Description	Method / Analyte / Units / LOR	WEI-21 Recvd Wt. kg 0.02	ME-MS81 Ag ppm 1	ME-MS81 Ba ppm 0.5	ME-MS81 Ce ppm 0.5	ME-MS81 Co ppm 0.5	ME-MS81 Cr ppm 10	ME-MS81 Cs ppm 0.01	ME-MS81 Cu ppm 5	ME-MS81 Dy ppm 0.05	ME-MS81 Er ppm 0.03	ME-MS81 Eu ppm 0.03	ME-MS81 Ga ppm 0.1	ME-MS81 Gd ppm 0.05	ME-MS81 Hf ppm 0.2	ME-MS81 Ho ppm 0.01
06BT350		0.80	<1	14.7	15.8	43.8	230	0.09	76	6.13	3.73	1.61	20.0	5.49	3.5	1.36
06BT358		0.52	3	7.9	14.1	43.5	210	0.07	54	5.60	3.37	1.42	18.5	5.07	2.8	1.22
06BT431		1.14	<1	27.1	9.7	49.8	290	0.07	35	4.45	2.78	1.12	15.9	3.63	2.5	1.00
06BT441		0.78	<1	789	72.3	8.6	110	13.85	21	3.92	2.46	1.14	23.9	5.16	5.7	0.83
06BT448		0.73	1	179.0	30.2	1.6	10	0.51	5	5.60	4.09	0.77	12.3	4.67	10.4	1.31
06BT449		0.67	<1	22.9	10.8	38.7	250	0.08	14	4.45	2.66	1.32	18.8	3.90	2.1	0.97
06BT451		0.66	<1	412	15.1	42.4	330	0.34	15	4.94	3.10	1.03	15.5	4.36	2.8	1.11
06BT478		0.88	<1	75.1	24.2	47.1	210	0.06	83	5.67	3.38	1.73	21.2	5.27	3.9	1.23
06GL314		0.85	<1	222	71.5	14.8	70	3.31	16	3.58	2.15	1.00	10.1	4.17	5.2	0.75
06GL316		0.23	<1	661	68.9	19.1	110	13.75	41	4.57	2.97	0.98	21.8	4.76	7.0	0.98

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PO BOX 81906
FAIRBANKS AK 99708-1906

Finalized Date: 30-SEP-2006
Account: QOK

CERTIFICATE OF ANALYSIS FA06085963

Sample Description	Method	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81
	Analyte	La	Lu	Mo	Nb	Nd	Ni	Pb	Pr	Rb	Sm	Sn	Sr	Ta	Tb	Th
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
	LOR	0.5	0.01	2	0.2	0.1	5	5	0.03	0.2	0.03	1	0.1	0.1	0.01	0.05
06BT350		6.0	0.52	<2	3.0	13.0	123	8	2.64	0.4	4.20	1	226	0.3	0.97	0.69
06BT358		8.0	0.46	<2	2.5	12.7	138	63	2.66	0.2	3.88	2	288	0.2	0.89	0.41
06BT431		3.3	0.38	<2	1.9	8.7	250	7	1.66	0.2	2.88	1	232	0.2	0.69	0.34
06BT441		36.4	0.39	<2	16.6	30.1	42	17	8.54	173.5	5.53	3	102.0	1.3	0.72	15.60
06BT448		25.9	0.68	<2	23.1	18.7	8	28	5.36	8.0	3.66	1	84.9	1.8	0.82	16.20
06BT449		4.2	0.35	<2	3.1	8.8	123	5	1.76	0.9	2.89	1	222	0.2	0.71	0.64
06BT451		5.6	0.42	<2	2.9	11.3	122	9	2.38	2.6	3.49	1	258	0.2	0.83	0.78
06BT478		10.2	0.44	<2	10.2	16.1	121	5	3.53	0.3	4.48	2	394	0.8	0.90	1.40
06GL314		33.5	0.27	<2	9.0	21.3	42	16	6.60	40.6	3.83	1	39.1	0.8	0.62	8.15
06GL316		27.6	0.43	<2	18.0	23.3	54	24	6.57	142.5	4.79	3	80.5	1.5	0.74	14.65

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FAIRBANKS AK 99708-1906

Finalized Date: 30-SEP-2006
Account: QOK

CERTIFICATE OF ANALYSIS FA06085963

Sample Description	Method	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-MS81	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06
	Analyte	Tl	Tm	U	V	W	Y	Yb	Zn	Zr	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	Na_2O
	Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	%	%	%	%
	LOR	0.5	0.01	0.05	5	1	0.5	0.03	5	2	0.01	0.01	0.01	0.01	0.01	0.01
06BT350		<0.5	0.55	0.26	298	2	37.7	3.38	108	132	46.51	15.62	12.04	7.36	7.55	3.26
06BT358		<0.5	0.49	0.17	234	5	33.9	3.02	99	106	43.84	15.92	10.83	9.64	7.30	3.32
06BT431		<0.5	0.40	0.12	227	4	26.7	2.58	88	91	44.63	16.56	10.62	9.46	9.91	2.48
06BT441		0.5	0.37	3.23	176	7	24.5	2.61	114	202	64.90	17.18	5.54	0.04	1.58	0.80
06BT448		<0.5	0.67	4.49	5	2	38.5	4.48	65	406	74.18	12.46	3.36	0.14	0.72	6.14
06BT449		<0.5	0.37	0.19	246	3	26.3	2.32	90	79	46.59	16.99	10.86	8.41	8.11	3.24
06BT451		<0.5	0.44	0.26	258	<1	29.9	2.87	80	106	47.32	15.71	9.20	12.09	6.71	2.54
06BT478		<0.5	0.48	0.47	283	7	32.7	2.97	97	147	45.49	15.83	11.76	9.33	7.33	3.23
06GL314		<0.5	0.30	2.02	81	5	22.2	1.81	79	208	79.15	7.62	4.69	0.30	1.20	0.88
06GL316		0.5	0.43	3.30	171	13	28.3	2.86	148	263	66.15	15.11	6.75	0.33	1.72	0.64

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To: **PACIFIC RIM GEOLOGICAL CONSULTING**
PO BOX 81906
FAIRBANKS AK 99708-1906

Finalized Date: 30-SEP-2006
Account: QOK

CERTIFICATE OF ANALYSIS FA06085963

Sample Description	Method	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06
	Analyte	K_2O	Cr_2O_3	TiO_2	MnO	P_2O_5	SrO	BaO	LOI	Total
	Units	%	%	%	%	%	%	%	%	%
	LOR	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
06BT350		0.07	0.03	1.82	0.18	0.16	0.03	0.01	4.35	98.99
06BT358		0.05	0.04	1.58	0.18	0.14	0.03	0.02	6.46	99.35
06BT431		0.04	0.04	1.39	0.16	0.13	0.03	<0.01	4.26	99.70
06BT441		3.36	0.02	1.02	0.03	0.07	0.02	0.08	4.27	98.89
06BT448		0.23	0.02	0.23	0.02	0.02	0.02	0.02	1.44	99.00
06BT449		0.07	0.04	1.36	0.16	0.15	0.02	0.01	3.94	99.95
06BT451		0.18	0.04	1.47	0.16	0.14	0.03	0.04	2.76	98.39
06BT478		0.04	0.02	2.15	0.19	0.24	0.04	0.02	4.22	99.87
06GL314		0.84	0.01	0.70	0.05	0.13	0.02	0.03	2.59	98.20
06GL316		2.75	0.01	1.00	0.05	0.17	0.02	0.08	3.95	98.72

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To: **LITTLE SQUAW GOLD**
3412 S. LINCOLN
SPOKANE WA 99203

INVOICE NUMBER 1467575

BILLING INFORMATION

Certificate:	**FA06111943**
Sample Type:	**Rock**
Account:	**LITSQU**
Date:	**9-NOV-2006**
Project:	Chandalar
P.O. No.:	
Quote:	ALSC-US06-008-KNU
Terms:	**Due on Receipt** C1
Comments:	

QUANTITY	ANALYSED FOR CODE -	DESCRIPTION	UNIT PRICE	TOTAL
1	BAT-01	Administration Fee	20.00	20.00
27	LOG-22	Sample login - Rcd w/o BarCode	0.41	11.07
27	PUL-31	Pulverize split to 85% <75 um	2.05	55.35
27	ME-XRF06	Whole Rock Package - XRF	25.00	675.00
27	ME-MS81	38 element fusion ICP-MS	22.00	594.00
17.90	CRU-31	Weight Charge (kg) - Fine crushing - 70% <2mm	0.17	3.04
27	CRU-31	Fine crushing - 70% <2mm	1.23	33.21
17.90	SPL-21	Weight Charge (kg) - Split sample - riffle splitter	0.08	1.43
27	SPL-21	Split sample - riffle splitter	0.81	21.87

SUBTOTAL (USD) $ 1,414.97

TOTAL PAYABLE (USD) $ 1,414.97

To: **LITTLE SQUAW GOLD**
ATTN: RICHARD WALTERS
3412 S. LINCOLN
SPOKANE WA 99203

OK to PAY
R.R.W.
12/11/06

Payment may be made by: Check or Bank Transfer

Beneficiary Name: ALS USA Ltd.
Bank: Royal Bank of Canada
SWIFT: ROYCCAT2
Address: Vancouver BC CAN
Account: 003-00010-4001384
For transfers from USA banks use Intermediate Bank
Intermediary Bank: JP Morgan Chase Bank
Intermediary Address: New York, NY, USA
Intermediary Routing: ABA: 021000021

Please Remit Payments To :
ALS Chemex
994 Glendale Avenue, Unit 3
Sparks NV 89431-5730

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To: **LITTLE SQUAW GOLD**
3412 S. LINCOLN
SPOKANE WA 99203

Finalized Date: 9-NOV-2006
Account: LITSQU

Project: Chandalar

CERTIFICATE OF ANALYSIS FA06111943

Sample Description	Method	WEI-21	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06
	Analyte	Recvd Wt.	SiO2	Al2O3	Fe2O3	CaO	MgO	Na2O	K2O	Cr2O3	TiO2	MnO	P2O5	SrO	BaO	LOI
	Units	kg	%	%	%	%	%	%	%	%	%	%	%	%	%	%
	LOR	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
06GL28a		0.42	58.50	19.64	7.73	0.24	2.46	1.08	3.25	0.01	1.25	0.06	0.15	0.01	0.08	3.98
06GL16		0.50	75.83	11.31	4.05	0.20	1.36	1.01	1.85	0.01	0.85	0.03	0.13	<0.01	0.12	2.27
06GL21		0.59	85.46	5.03	3.92	0.59	1.00	0.45	0.24	<0.01	0.45	0.05	0.10	0.01	<0.01	1.75
06GL23a		0.36	40.71	14.74	10.32	11.32	5.21	2.17	0.03	0.03	1.20	0.15	0.06	0.03	0.01	12.60
06GL29		0.48	73.10	11.55	5.26	0.53	1.63	0.61	1.95	0.01	0.91	0.06	0.20	0.01	0.06	3.01
06GL33a		0.36	83.56	6.51	3.38	0.26	0.82	0.76	0.78	<0.01	0.52	0.03	0.11	<0.01	0.04	1.69
06GL34		0.50	59.61	19.05	8.26	0.20	2.17	1.02	3.03	0.02	1.25	0.06	0.14	0.01	0.09	3.88
06GL35		0.73	93.25	1.71	2.32	0.23	0.33	0.15	0.02	<0.01	0.14	0.03	0.06	<0.01	<0.01	0.74
06GL36a		0.39	44.64	15.67	11.44	9.77	7.58	2.55	0.02	0.05	1.23	0.17	0.12	0.03	0.01	4.99
06GL37c		0.39	74.44	9.73	6.88	0.12	1.78	1.24	0.97	0.01	0.68	0.04	0.13	<0.01	0.04	2.60
06BT115a		0.51	47.42	15.72	13.18	7.77	5.40	3.89	0.03	0.01	1.89	0.16	0.15	0.02	0.01	2.65
06BT82		0.66	65.76	16.41	4.41	0.18	1.84	0.77	2.68	0.01	0.84	0.06	0.17	0.01	0.40	4.92
06BT94		0.48	75.58	10.28	5.21	0.52	1.39	0.83	1.39	0.01	0.83	0.06	0.16	<0.01	0.05	2.54
06BT98		0.96	64.56	16.82	7.07	0.18	1.79	0.89	2.87	0.01	1.00	0.03	0.14	0.01	0.10	3.54
06BT150		0.38	43.58	12.81	13.05	8.64	12.36	1.40	0.03	0.05	1.87	0.17	0.26	0.01	0.01	4.49
06BT238		0.51	42.30	15.32	9.78	9.01	7.12	2.14	0.15	0.05	1.08	0.15	0.11	0.03	<0.01	11.40
06BT233		1.38	45.21	16.86	10.27	10.35	7.71	2.59	0.03	0.04	1.61	0.16	0.15	0.03	0.01	3.14
06BT129		0.37	44.63	16.91	11.65	6.85	7.18	2.76	0.01	0.02	1.53	0.17	0.12	0.02	0.01	6.47
06BT176a		0.33	42.87	15.14	9.90	9.80	5.45	2.52	0.08	0.03	1.60	0.14	0.16	0.05	0.02	11.05
06BT127		0.64	42.04	17.53	12.13	9.70	8.56	1.64	0.01	0.04	1.56	0.19	0.10	0.02	<0.01	5.39
06BT383a		3.55	45.19	14.30	12.56	12.01	8.03	2.11	0.02	0.07	1.74	0.22	0.10	0.02	0.01	1.79
06BT175		0.44	53.81	4.73	3.40	18.60	0.61	0.47	0.02	<0.01	0.50	0.55	0.12	0.07	<0.01	16.05
06BT187		0.48	42.65	15.34	9.61	8.91	5.94	3.01	0.05	0.03	1.40	0.16	0.14	0.04	0.01	10.95
06BT165		0.67	62.36	17.58	7.30	0.19	2.14	0.86	2.67	0.02	1.02	0.04	0.12	0.01	0.12	4.27
06BT119		0.38	46.79	16.11	10.40	11.15	7.88	2.38	0.03	0.09	1.13	0.18	0.10	0.03	0.01	2.63
06BT153a		1.07	62.63	18.16	7.06	0.30	2.27	0.81	2.93	0.02	1.03	0.06	0.15	0.01	0.10	3.93
06BT213a		0.37	41.02	14.56	10.74	9.86	6.23	1.80	0.07	0.04	1.80	0.20	0.16	0.02	0.01	11.75

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To: LITTLE SQUAW GOLD
3412 S. LINCOLN
SPOKANE WA 99203

Finalized Date: 9-NOV-2006
Account: LITSQU

Project: Chandalar

CERTIFICATE OF ANALYSIS FA06111943

Sample Description	Method / Analyte / Units / LOR	ME-XRF06 Total % 0.01	ME-MS81 Ag ppm 1	ME-MS81 Ba ppm 0.5	ME-MS81 Ce ppm 0.5	ME-MS81 Co ppm 0.5	ME-MS81 Cr ppm 10	ME-MS81 Cs ppm 0.01	ME-MS81 Cu ppm 5	ME-MS81 Dy ppm 0.05	ME-MS81 Er ppm 0.03	ME-MS81 Eu ppm 0.03	ME-MS81 Ga ppm 0.1	ME-MS81 Gd ppm 0.05	ME-MS81 Hf ppm 0.2	ME-MS81 Ho ppm 0.01
06GL28a		98.44	<1	698	76.9	21.4	110	11.45	30	5.01	3.14	1.36	26.1	5.54	5.8	1.03
06GL16		99.02	<1	959	67.0	20.0	110	5.21	26	2.42	1.67	0.67	15.4	2.84	5.7	0.50
06GL21		99.05	<1	69.2	36.1	9.5	60	0.80	7	2.70	1.55	0.69	7.8	3.13	4.2	0.50
06GL23a		98.58	<1	19.2	14.4	30.4	240	0.14	69	4.10	2.42	1.24	18.4	3.34	2.3	0.83
06GL29		98.88	<1	521	55.4	14.2	100	6.17	19	6.07	3.45	1.88	17.3	7.96	4.7	1.16
06GL33a		98.46	<1	290	46.5	6.7	50	4.29	<5	2.60	1.56	0.76	9.3	3.56	4.5	0.49
06GL34		98.78	<1	702	37.7	17.2	120	10.40	29	2.16	1.68	0.56	24.8	2.15	6.0	0.47
06GL35		98.98	<1	5.9	25.4	10.6	50	0.05	12	1.72	0.98	0.50	4.6	2.30	2.5	0.33
06GL36a		98.26	<1	42.2	12.0	38.7	320	0.05	69	4.16	2.58	1.01	18.5	3.29	2.1	0.86
06GL37c		98.66	<1	299	19.2	7.9	90	3.07	11	2.33	1.48	0.72	14.7	2.15	4.7	0.48
06BT115a		98.31	<1	118.5	20.2	42.1	60	0.56	44	6.79	4.28	1.56	21.7	5.35	4.1	1.45
06BT82		98.46	<1	3270	64.8	21.4	120	9.65	29	3.12	2.00	0.77	22.0	3.23	4.8	0.61
06BT94		98.85	<1	443	66.8	17.2	90	4.48	12	5.35	3.12	1.40	14.2	5.64	6.8	0.98
06BT98		99.02	<1	805	14.7	7.6	110	11.55	17	1.54	1.28	0.28	21.9	1.28	6.5	0.36
06BT150		98.73	<1	32.3	27.2	42.2	320	0.11	76	6.68	4.15	1.63	16.4	5.71	5.4	1.39
06BT238		98.65	<1	30.1	13.3	39.3	250	0.49	73	3.78	2.24	0.98	16.6	3.16	2.1	0.73
06BT233		98.16	<1	85.7	15.4	42.3	300	0.06	46	4.26	2.57	1.22	18.8	3.79	2.9	0.86
06BT129		98.32	<1	37.4	10.2	45.7	80	0.05	135	4.97	2.91	1.24	17.9	3.73	2.9	1.02
06BT176a		98.81	<1	148.5	15.8	34.3	210	0.42	65	4.22	2.56	1.11	17.6	3.52	2.9	0.84
06BT127		98.91	<1	4.7	9.2	44.3	290	0.01	120	5.18	3.38	1.38	22.0	3.82	2.9	1.10
06BT383a		98.17	<1	5.6	14.7	50.0	440	0.04	31	4.80	2.79	1.22	19.7	3.71	2.9	0.92
06BT175		98.93	<1	1.7	38.5	7.8	50	<0.01	18	3.52	2.03	1.20	6.8	3.72	4.5	0.68
06BT187		98.23	<1	27.2	22.4	33.2	210	0.22	63	5.18	3.21	1.51	17.8	4.61	2.8	1.06
06BT165		98.70	<1	951	33.2	7.6	100	11.75	27	3.78	2.43	0.91	22.8	3.55	5.0	0.74
06BT119		98.90	<1	52.9	10.4	46.8	520	0.07	114	3.81	2.37	0.97	17.6	2.81	1.8	0.79
06BT153a		99.46	<1	802	76.5	29.1	110	10.15	20	5.95	3.39	1.53	22.2	6.61	4.6	1.10
06BT213a		98.26	<1	21.5	11.4	31.4	200	0.24	38	5.71	3.48	1.48	18.6	4.24	3.5	1.19

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Finalized Date: 9-NOV-2006
Account: LITSQU

Project: Chandalar

CERTIFICATE OF ANALYSIS FA06111943

Sample Description	Method / Analyte / Units / LOR	ME-MS81 La ppm 0.5	ME-MS81 Lu ppm 0.01	ME-MS81 Mo ppm 2	ME-MS81 Nb ppm 0.2	ME-MS81 Nd ppm 0.1	ME-MS81 Ni ppm 5	ME-MS81 Pb ppm 5	ME-MS81 Pr ppm 0.03	ME-MS81 Rb ppm 0.2	ME-MS81 Sm ppm 0.03	ME-MS81 Sn ppm 1	ME-MS81 Sr ppm 0.1	ME-MS81 Ta ppm 0.1	ME-MS81 Tb ppm 0.01	ME-MS81 Th ppm 0.05
06GL28a		30.2	0.46	<2	21.0	28.0	54	7	7.52	154.5	5.49	3	90.0	1.4	0.82	15.95
06GL16		12.7	0.30	<2	12.5	14.0	50	7	3.74	77.2	2.88	1	43.1	0.8	0.43	9.34
06GL21		18.4	0.19	<2	6.2	16.1	37	5	4.23	10.8	2.88	1	54.2	0.4	0.49	4.59
06GL23a		6.0	0.31	<2	5.9	9.9	73	6	2.17	1.1	2.90	1	269	0.3	0.60	0.86
06GL29		48.4	0.37	<2	13.6	41.5	53	24	10.70	93.5	7.84	2	56.6	0.8	1.10	9.04
06GL33a		22.5	0.19	<2	6.8	19.1	19	<5	5.22	34.3	3.71	1	27.5	0.4	0.46	6.42
06GL34		11.9	0.29	2	18.8	10.7	61	10	2.93	138.0	2.31	2	93.1	1.2	0.36	13.35
06GL35		13.6	0.11	<2	2.6	11.6	21	<5	3.21	0.8	2.20	<1	16.5	0.2	0.33	2.39
06GL36a		4.8	0.31	<2	3.0	8.6	102	<5	1.84	0.6	2.63	1	255	0.2	0.62	0.80
06GL37c		9.0	0.23	<2	10.9	9.0	23	<5	2.36	44.4	2.00	5	25.0	0.7	0.38	8.88
06BT115a		7.8	0.56	<2	4.3	15.0	35	<5	3.08	2.8	4.13	1	218	0.3	0.98	1.46
06BT82		10.3	0.29	4	15.2	15.1	69	13	3.88	132.0	3.33	2	111.0	1.0	0.50	12.10
06BT94		22.3	0.37	<2	12.6	24.1	49	14	6.22	64.7	5.42	2	51.0	0.8	0.88	8.72
06BT98		8.8	0.27	<2	17.4	6.6	27	10	1.84	139.5	1.30	3	83.5	1.1	0.22	13.40
06BT150		10.7	0.50	<2	11.0	18.6	138	6	3.97	1.0	5.24	1	98.4	0.6	1.00	1.58
06BT238		6.8	0.28	<2	5.0	9.3	124	7	2.07	7.9	2.65	1	300	0.3	0.56	0.71
06BT233		6.1	0.31	<2	6.7	11.2	122	<5	2.35	0.6	3.11	1	280	0.5	0.68	0.76
06BT129		3.4	0.37	<2	1.6	9.4	122	<5	1.76	0.4	3.23	1	167.5	0.1	0.70	0.42
06BT176a		6.2	0.33	<2	7.4	11.0	110	<5	2.30	2.6	3.11	1	498	0.5	0.66	0.87
06BT127		3.7	0.41	<2	1.7	8.9	166	5	1.73	<0.2	3.24	1	209	0.1	0.76	0.36
06BT383a		5.4	0.33	<2	5.7	10.8	116	<5	2.21	0.3	3.32	1	176.0	0.3	0.74	0.60
06BT175		17.8	0.25	<2	6.7	16.9	23	18	4.27	0.3	3.55	1	581	0.4	0.57	5.24
06BT187		9.7	0.38	<2	4.7	15.2	89	8	3.23	1.9	3.94	1	321	0.3	0.80	1.20
06BT165		20.0	0.34	<2	17.0	17.3	26	15	4.59	135.5	3.73	3	96.2	1.1	0.59	12.75
06BT119		4.3	0.29	<2	2.3	8.2	152	<5	1.62	0.7	2.34	1	253	0.1	0.56	0.73
06BT153a		42.9	0.41	<2	16.9	35.7	72	12	9.71	134.5	6.62	2	81.3	1.1	1.00	12.60
06BT213a		3.7	0.45	<2	2.9	10.6	87	7	1.94	2.9	3.79	1	197.5	0.2	0.84	0.51

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SPOKANE WA 99203

Finalized Date: 9-NOV-2006
Account: LITSQU

Project: Chandalar

CERTIFICATE OF ANALYSIS FA06111943

Sample Description	Method / Analyte / Units / LOR	ME-MS81 Tl ppm 0.5	ME-MS81 Tm ppm 0.01	ME-MS81 U ppm 0.05	ME-MS81 V ppm 5	ME-MS81 W ppm 1	ME-MS81 Y ppm 0.5	ME-MS81 Yb ppm 0.03	ME-MS81 Zn ppm 5	ME-MS81 Zr ppm 2
06GL28a		0.6	0.48	3.71	176	4	24.7	3.14	154	197
06GL16		<0.5	0.27	1.63	98	3	11.8	2.02	46	193
06GL21		<0.5	0.21	0.95	54	4	15.0	1.38	79	146
06GL23a		<0.5	0.33	0.19	252	2	20.0	2.29	92	86
06GL29		<0.5	0.44	2.10	116	2	33.3	2.85	85	164
06GL33a		<0.5	0.20	1.02	64	2	12.6	1.38	64	169
06GL34		0.5	0.28	3.04	186	4	11.5	2.07	156	215
06GL35		<0.5	0.13	0.58	20	3	10.1	0.80	45	94
06GL36a		<0.5	0.36	0.20	270	2	21.7	2.35	82	69
06GL37c		<0.5	0.23	2.94	85	2	11.0	1.82	58	171
06BT115a		<0.5	0.59	0.41	403	2	35.6	4.06	104	150
06BT82		0.9	0.30	2.69	217	4	16.6	2.02	165	159
06BT94		<0.5	0.42	1.81	87	3	25.3	2.77	94	244
06BT98		0.5	0.24	3.20	168	3	9.2	1.74	134	231
06BT150		<0.5	0.58	0.43	237	1	34.1	3.73	89	206
06BT238		<0.5	0.29	0.18	219	1	19.6	2.05	73	76
06BT233		<0.5	0.38	0.21	233	1	22.4	2.46	84	105
06BT129		<0.5	0.43	0.12	256	2	25.1	2.76	89	106
06BT176a		<0.5	0.35	0.30	224	2	21.6	2.29	80	104
06BT127		<0.5	0.46	0.13	297	1	27.8	2.93	94	98
06BT383a		<0.5	0.38	0.23	324	1	23.2	2.44	107	101
06BT175		<0.5	0.29	1.26	59	1	20.5	1.86	54	160
06BT187		<0.5	0.39	0.36	224	2	27.0	2.71	92	98
06BT165		0.5	0.36	2.92	168	3	20.6	2.44	134	170
06BT119		<0.5	0.34	0.18	271	1	20.6	2.35	86	61
06BT153a		<0.5	0.44	2.45	150	3	31.3	2.98	128	156
06BT213a		<0.5	0.51	0.15	254	2	30.6	3.20	106	118

Appendix III Laboratory data and Interpretation Document for Radio-Carbon Age Dates

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.9:lab. mult=1)

Laboratory number: **Beta-221255**

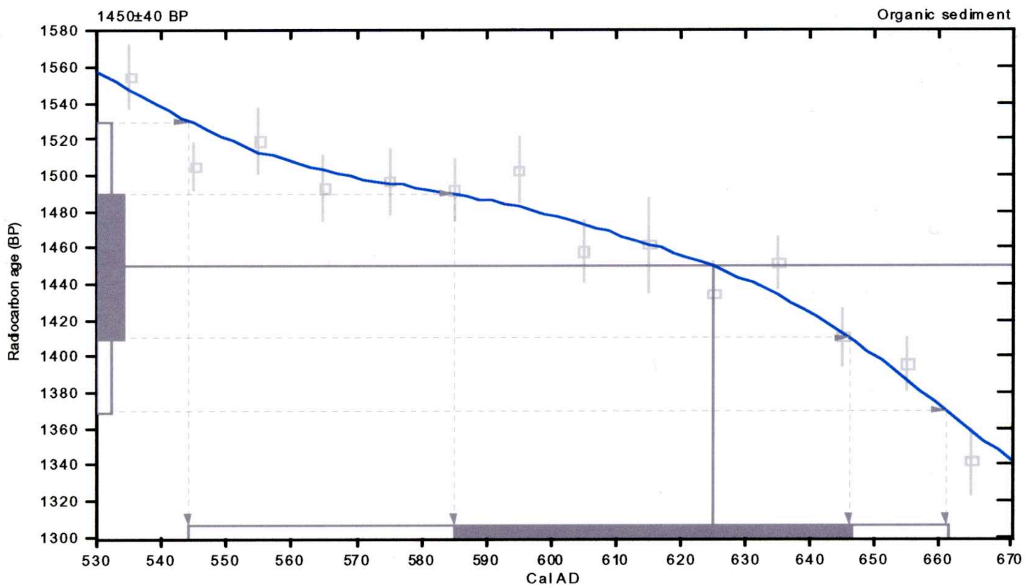
Conventional radiocarbon age: **1450±40 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 540 to 660 (Cal BP 1410 to 1290)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 620 (Cal BP 1320)

1 Sigma calibrated result: (68% probability) Cal AD 580 to 650 (Cal BP 1360 to 1300)



References:

Database used
INTCAL 98
Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
Mathematics
A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.2:lab. mult=1)

Laboratory number: **Beta-221256**

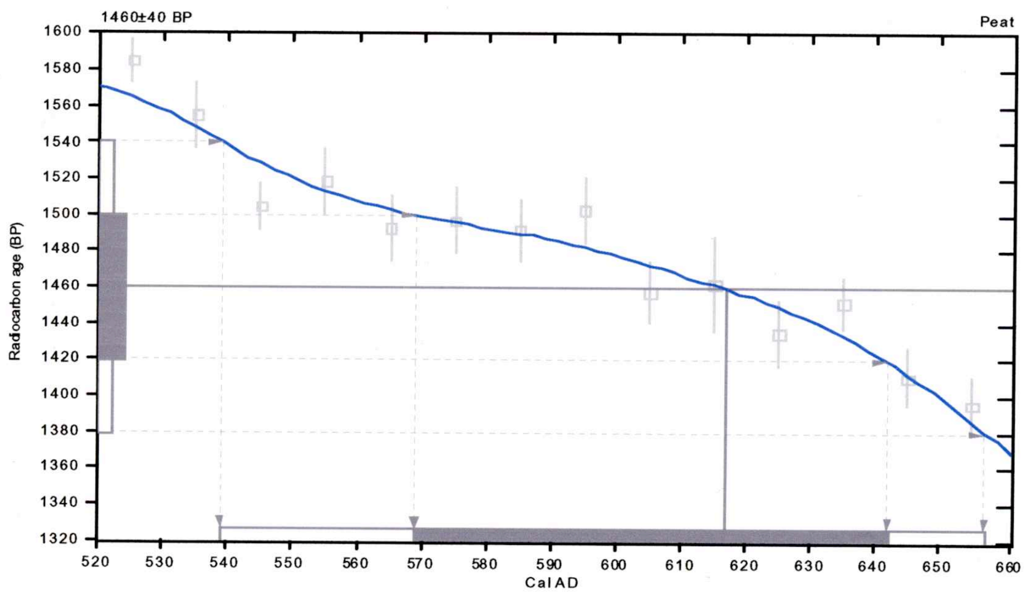
Conventional radiocarbon age: **1460±40 BP**

2 Sigma calibrated result: **Cal AD 540 to 660 (Cal BP 1410 to 1290)**
(95% probability)

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 620 (Cal BP 1330)

1 Sigma calibrated result: Cal AD 570 to 640 (Cal BP 1380 to 1310)
(68% probability)



References:

Database used
INTCAL98

Calibration Database

Editorial Comment
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INTCAL98 Radiocarbon Age Calibration
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Mathematics

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COMMENT: We recommend sending the samples which best address your research question, regardless of size. We will contact you during the analysis if issues of size arise. The amounts quoted below are conservative. Smaller sample sizes than those listed are routinely analyzed. However, it is always best to send as much as possible.

	AMS (dry weight)	RADIOMETRIC (dry weight)
Charcoal	50 mg	20 grams
Wood	50 mg	50 grams
Dung	50 mg	20 grams (with limited pretreatments)

Typically dung cannot be pretreated with alkali for the removal of secondary humic acids without reducing the size of the sample to AMS category. If your sample is from a desert environment, this should be fine. If it is from a context of complex soil development, AMS with full pretreatments is the better option.

Plant material/seeds	20 mg	20 grams
Hair	10 mg	10 grams
Insects (chitin)	20 mg	20 grams
Shell	50 mg	50 grams

We typically etch off the outer 1/2 of the shell to eliminate any potential secondary carbonate. Please consider this in selecting your samples. Generally, the-more-the-better. If you suspect all the shells from a context are the same age, there's no problem with combining multiple species as one sample.

Peat/Gyttja	1-2 grams	100 grams

Generally, more than 50 grams of dry sedge peat are suitable for standard radiometric analysis. In any case, AMS will provide the lowest sigma. Also, as the state of humification or sediment content increases, the available carbon content decreases and it becomes more difficult to estimate the amount needed. Mucky peats are limited to acid-wash pretreatments to ensure the absence of carbonate. Alkali pretreatment to ensure the absence of humic acids generally requires vegetable matter to be present. When mucky peat is contaminated with humic acids and alkali pretreatment is required, it is possible to apply alkali but only with subsequent analysis by AMS. Quite often a peat will have a mucky, sediment, and fibrous fraction. These are generally separated during pretreatments, often with the fibrous fraction receiving alkali pretreatment and the sediment fraction not receiving alkali pretreatment. If you have an idea which fraction may be better for dating, or the combination of the two being the best choice, please indicate this when you send the sample.

Pollen (extracted)	20 mg	-
Forams	20 mg	-
DIC (submitted as $SrCO_3$)	50-100 mg	30 grams (slurry is OK)
Water (for DIC extraction)	1 liter	-
Bone/Antler	1-10 grams	-
Teeth	single tooth	-
Ivory	1-10 grams	-

For bones, teeth, and ivory, preservation and quality of the preserved collagen is very important. We measure this during our pretreatments. We first demineralize the sample in dilute/cold acid, eliminating all apatite and carbonate. During this process we get a good visual observation of the quality of the collagen. If it looks poor from the start, we'll contact you. We follow the acid with sodium hydroxide to eliminate humics and exogenous organics (just like we do with charcoal). This step is usually highly destructive to the collagen, but provides a clean sample for the analysis. After a final acid wash, we dry the collagen and do the 13C/12C ratio analysis. If the result is reasonable, we continue. If it is not, we contact you. If the bone is not suitable for dating, you will be able to cancel the analysis with only partial charges depending on the stage at which the cancellation determination is made.

Cremated bone	4 grams	-

Charred or cremated bones do present some special considerations. Whether or not a charred bone will yield a radiocarbon date depends upon the degree of charring. If the bone was very well charred initially...so as to "char" the protein, then it can be a very good sample. In that case, the carbon is resilient to decay and can be fully pretreated in the laboratory. If the protein was partially charred, it will have been damaged, be highly susceptible to decay, and usually cannot be fully pretreated (or identified as protein) in the laboratory. Usually the position in the flame determines which one of the above applies. One end of a bone could be useless, and the other very good. Generally, if the bone is bleached white throughout, it's no good. If it's black or blue, there is some chance it can be dated. The only way to know is to do some pretreatments.

In the absence of any charred collagen, a method is available for dating the carbonate fraction in cremated bones (which were subjected to very high temperatures). Publication and acceptance of this method was made in 2000 at the 17th International Radiocarbon conference. Studies indicate good agreement between bone carbonate in highly heated bones with associated charcoal. This method is only available via AMS analysis and should be attempted only after attempting to retrieve charred collagen. Two portions of bone are needed for this type of analysis. 2+ grams for attempted charred-collagen retrieval and 2+ grams for bone-carbonate retrieval. Bone-carbonate dating is a special request so be sure to specifically request "bone-carbonate dating" when sending samples for such an attempt.

Organic Sediment	5 grams	< 1000 grams

Samples of organic sediment, soil, and peat with gross weights of more than 200 grams (e.g. low carbon) will incur a Bulk Low Carbon Fee and will be analyzed internally either radiometrically or by AMS. The utilized methodology will be stated in the final report. Most often researchers dating sediment horizons will opt for AMS dates on macro-fossils or on a thin, high-resolution section of the profile rather than the gross average obtained from a large mass. Sometimes a large volume of sediment is useful for extraction of soot, macrofossils, a particular size fraction, or when an alkali soluble or non-soluble fraction is dated. We are set up to do these types of extractions (usually resulting in AMS analysis) but do not do identifications on the extracts.

Phytoliths (extracted)	300 mg	-

Our methodology for dating phytoliths can be found in "2003 Piperno, Dolores R. and Karen E. Stothert; Phytolith Evidence for Early Holocene Cucurbita Domestication in Southwest Ecuador. Science 299:1054-1057." Phytoliths submitted in pre-extracted, isolated, and clean form can be routinely dated using 200-400 milligrams. On occasion the Micro-Sample AMS service is required.