GEOLOGICAL AND GEOCHEMICAL REPORT

on the

KYDD PROPERTY

NELSON MINING DIVISION

NTS: 82 F/1E

Owner:

493744 Ontario Limited
2300 - 885 West Georgia Street
Vancouver, B.C.
V6C 3E8

January 15, 1993

Ross D. Zawada

TABLE OF CONTENTS

FIGURES

1.0 INTRODUCTION

1.1 Program Objectives and 1992 Work Performed

The Kydd Project field program was conducted between September 18th and October 4th, 1992. The program was designed to assess previous work, and ascertain the exploration potential on the property. The program was also an opportunity for Granges personnel to become more familiar with the various geological and exploration aspects of the Sullivan Camp. Work was performed by Gordon Allen and Ross Zawada. The program consisted mainly of geological mapping at 1:10,000 scale and geochemical sampling.

A total of 88 rock, 1 silt, and 28 soil samples was collected and submitted for 30-element ICP, Fire Assay Au, and flameless AA Hg Analysis. One sieved stream sediment sample was collected for heavy mineral separation. Fourteen samples were collected for whole rock analysis, and thirty-two rock samples were collected for petrographic study.

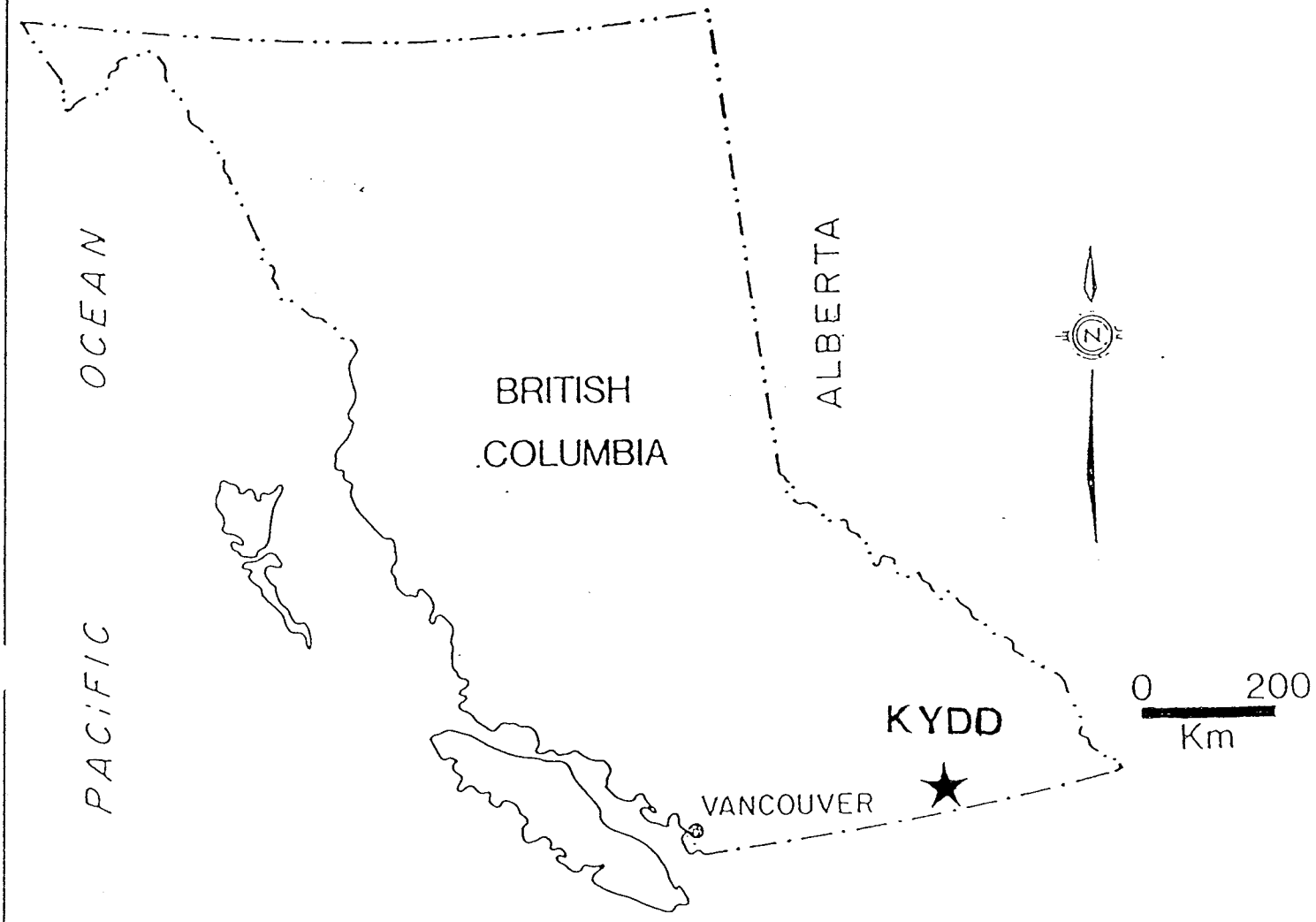
1.2 Location and Access and Physiography

The Kydd property is located in the Purcell Mountains, southeastern, B.C. (Figures 1 and 2). The property is centered at approximately latitude 49° 12'N and longitude 116° 13'W. It is located 6 km along the Kid Creek Forest Service Road which originates on B.C. Route 3, 20 km east of Creston. The Forest Service Road follows Kid Creek, transecting the property in SW/NE direction. This, along with a small number of secondary logging roads, provides limited access to the property. Approximately 15% of the property has been cleared by logging operations.

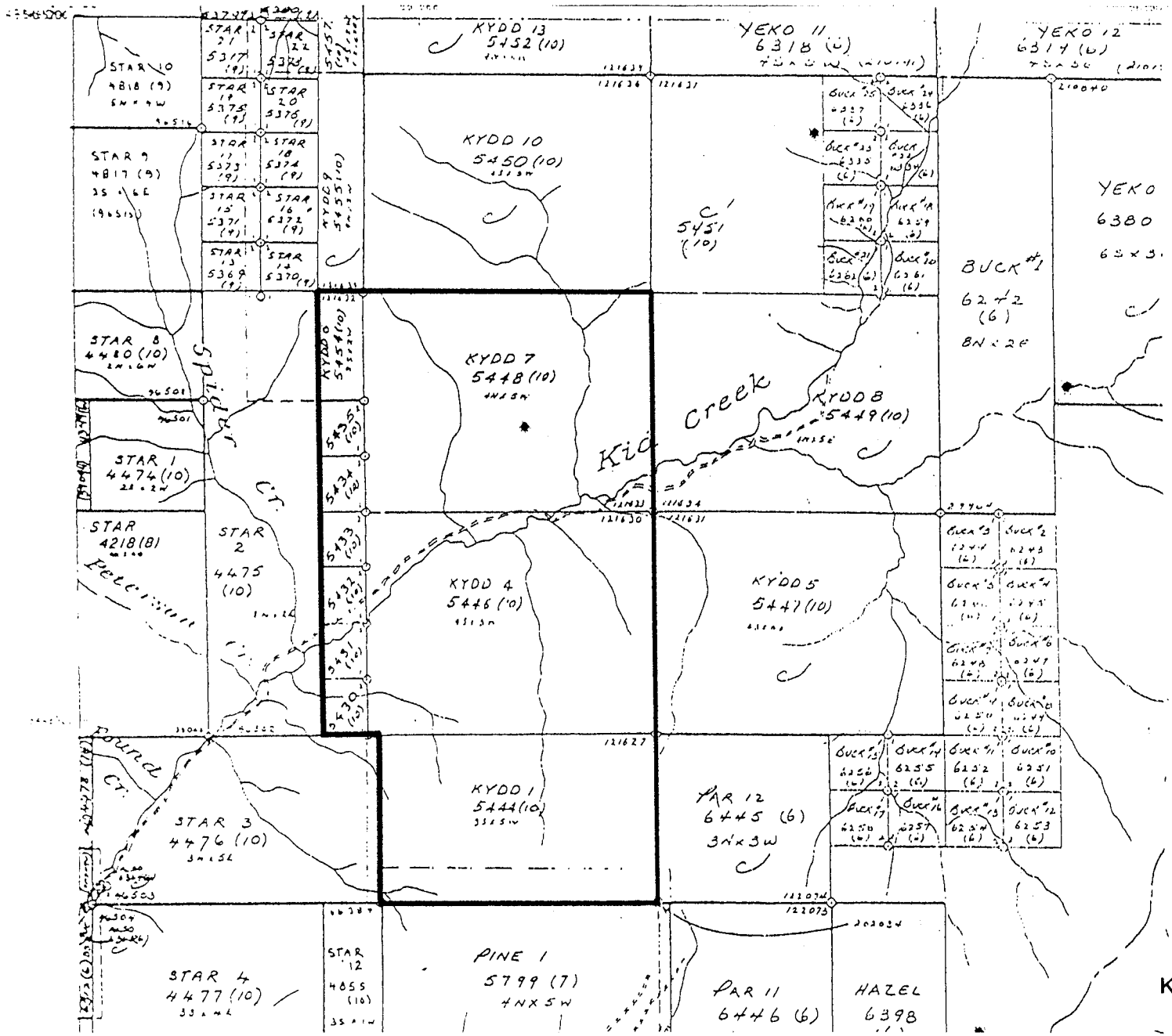
Elevations on the property range from 885m (2,900')to as much as 1,920m (6,300'); slopes are steep to moderate. Vegetation cover is moderate, being denser on north facing slopes. Fir, pine and spruce comprise the majority of the cover with a small percent of alpine meadow in the southeastern corner of the property. Good outcrop exposure is rare, not exceeding 5% of the property area.

1.3 Ownership and Claim Information

The Kydd property is owned by 493744 Ontario Limited. The claims were originally staked for Chevron Minerals Limited in October 1988. Claim information is summarized in the following table. Expiry dates are a result of assessment work covered by this report.



Kydd Property location map. fig. 1



PROVINCE OF
BRITISH COLUMBIA

MINISTRY OF
ENERGY, MINES AND
PETROLEUM RESOURCES

MINERAL TITLES REFERENCE

MAP 082F01E

U.T.M. ZONE 11

LAST MAP UPDATE: 1992 AUG

ORIGINAL PRODUCED AT 1:2 500

METRES

500 0 500 1000 1500 2000

ADMINISTRATIVE AREAS

MINING DIVISIONS: NELSON,
FORT STEELE

Kydd Property claim map. fig. 2

Tenure No.	Claim Name	Claim Units	Due Date
233974	Kydd 3	1	1993/10/21
233975	Kydd 15	1	1993/10/21
233976	Kydd 20	1	1993/10/21
233977	Kydd 21	1	1993/10/21
233978	Kydd 22	1	1993/10/21
233979	Kydd 23	1	1993/10/21
233980	Kydd 1	15	1993/10/23
233981	Kydd 4	20	1993/10/23
233987	Kydd 6	4	1993/10/23
233983	Kydd 7	20	1993/10/28
	TOTAL	65	

1.4 Previous Work

The only known work on the property previous to the 1992 program was conducted by Chevron Minerals Ltd. during the 1989 field season. The Kydd property was part of a larger claim block extending to the south and west. This program consisted of soil sampling and limited 1:5,000 geological mapping.

1.5 Logistics

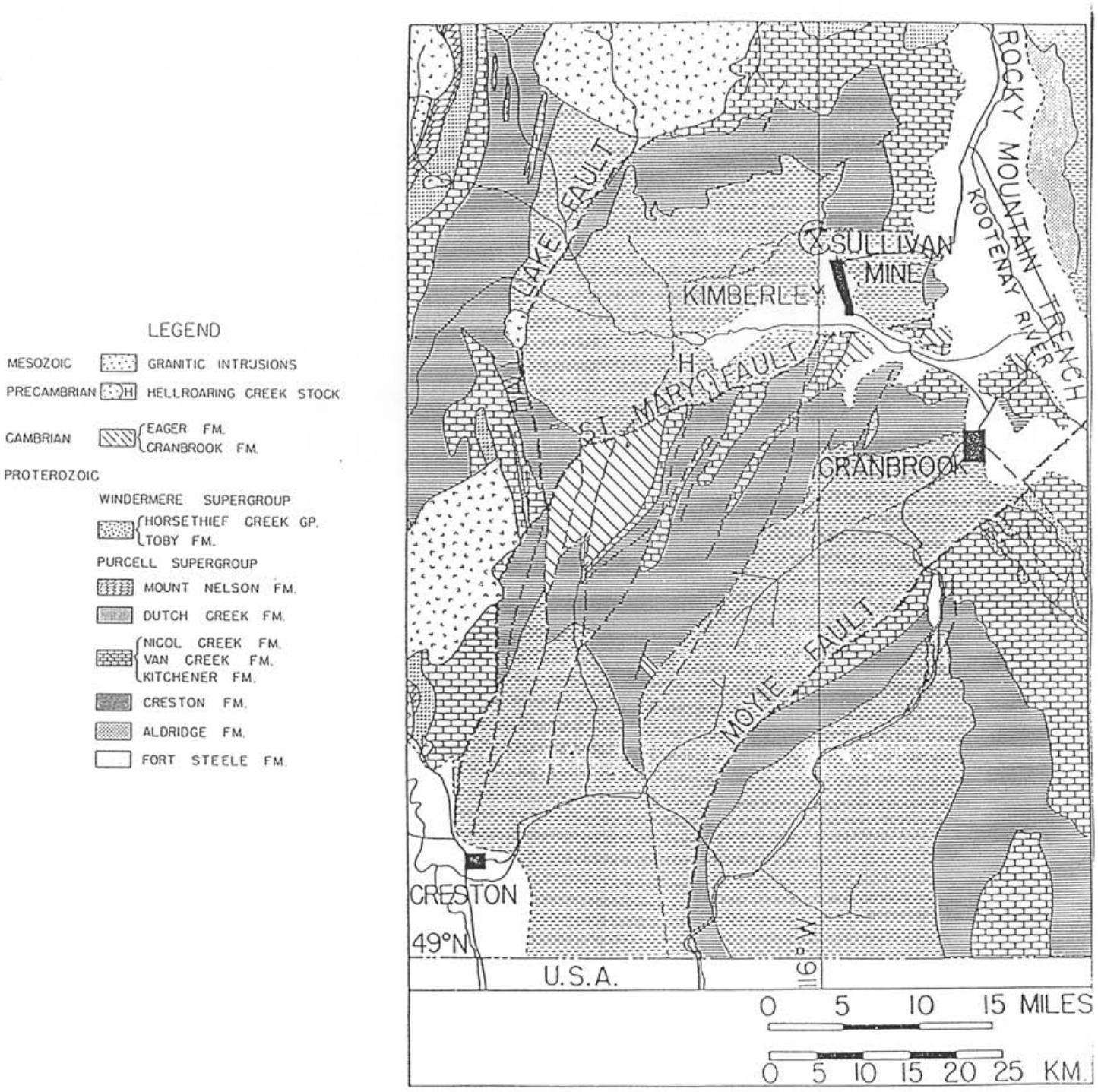
A long tradition of mining and exploration, along with a well developed infrastructure in the Creston Area resulted in few logistical obstacles. The property is easily accessible by 4WD vehicle and is approximately 25 minutes driving time from Creston. Samples were shipped to Vancouver via Greyhound Courier. Helicopter support is available out of Cranbrook, approximately 100km to the east.

2.0 GEOLOGY

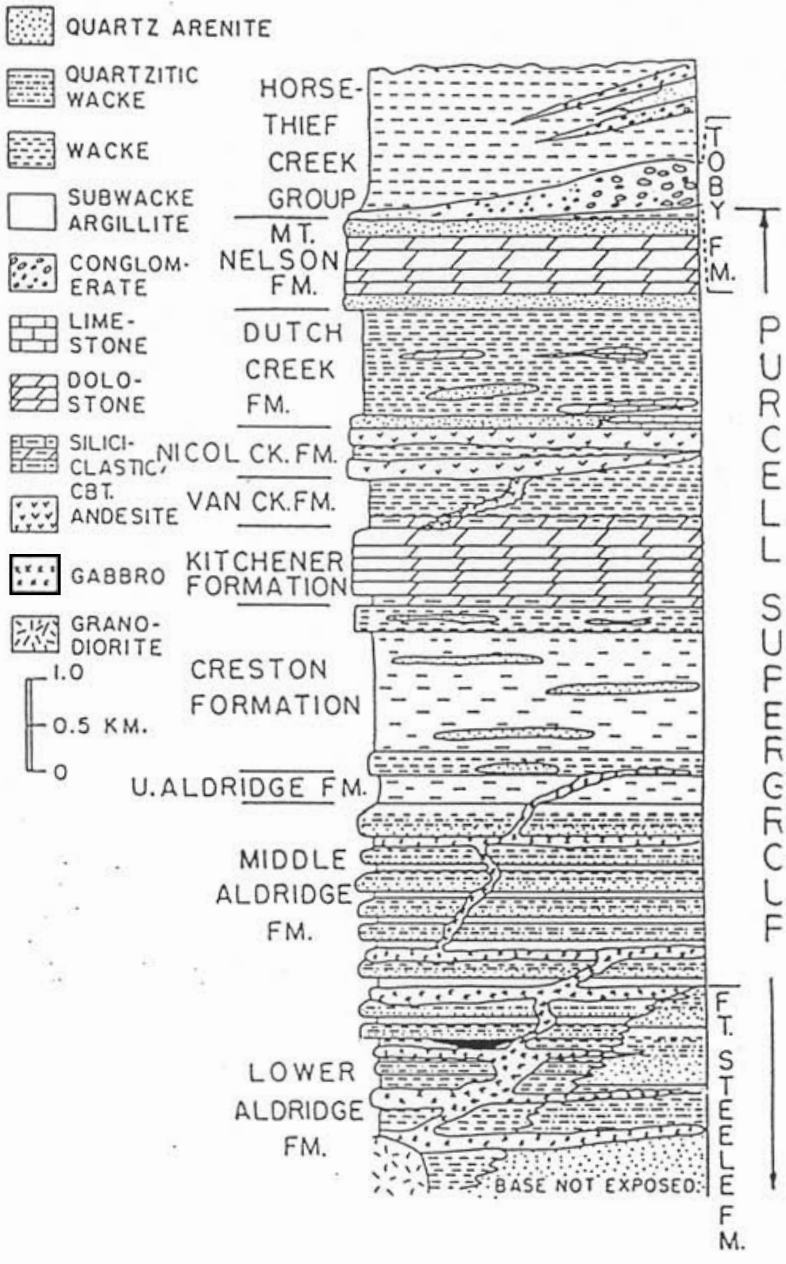
2.1 Regional Geology

The Kydd property occurs on the western flank of the Purcell anticlinorium and is entirely underlain by rocks of the Belt-Purcell Supergroup (Hitzman, 1990). The middle Proterozoic (Helikian) Purcell Supergroup rocks are a thick sequence of predominantly sedimentary rock deposited in a large intercontinental flysch basin (Figures 3 and 4). The base of the sequence is not exposed but exceeds 10,000m in thickness in southeastern B.C. (Hamilton et al., 1983).

The basin falls within the Foreland Thrust and Fold Belt and is characterized by shallow, easterly-verging thrust faults and broad open folds. The Purcell anticlinorium was deformed and metamorphosed by the Kootenay orogeny. This allochthonous



Regional geology map, Kimberly, B.C. area fig. 3



Purcell Supergroup stratigraphic column, (after Hamilton et al., 1983) fig. 4

structure is believed to have been transported eastward by generally north-trending thrusts during the Laramide Orogeny of late Mesozoic to early Tertiary time (Turner et al., 1992).

The Kydd area is predominantly underlain by the Aldridge Formation, a greater than 4,000m succession of fine-grained siliciclastic rocks probably deposited by turbidity currents (Hamilton et al., 1983). Mineralogy is chiefly very fine-grained quartz, sericite and plagioclase. Biotite, muscovite, chlorite and garnet are also common; pyrrhotite is a typical accessory. Proterozoic gabbro intrusions termed Moyie sills intrude the Aldridge at all stratigraphic levels but are more common in the Lower Aldridge (McCartney, 1992).

Units are generally well bedded on a larger scale while being quite massive internally. Although the very fine-grained nature of the rock gives it a massive appearance in hand specimen, depositional features are common in some units. These features consistently show stratigraphic tops up and to the east. Strikes are generally north-south with shallow to moderate east dips. Foliation is generally north to 010° with dips steeper than bedding. For a comprehensive review at the regional geology of the Purcell Supergroup the reader is directed to Hamilton et al., 1983.

2.2 Economic Setting

2.2.1 Sullivan Mine

The Sullivan Mine is one of the largest stratiform sediment hosted Pb-Zn-Ag sulphide deposits in the world. As of 1988 it has provided 144 million tons of ore averaging 6.5% Pb, 5.6% Zn and 2.3 Ag ounce per ton (McCartney, 1992).

A simplified geological cross-section is shown in Figure 5. This figure and the following description of the mine are taken largely from Hamilton et al., 1983.

The Sullivan orebody occurs near the top of the Lower Aldridge Formation. It has the shape of an inverted saucer approximately 2,000m along its north-south axis and 1,600m along its east-west direction. In the west it has flat to gentle easterly dips, moderate easterly to northeasterly dips in the centre and gentle east to northeasterly dips in the east. Footwall rocks are intraformational conglomerates and massive wackes overlain by wackes and pyrrhotite laminated subwackes. The upper part of the ore zone stratigraphy consists of

West

East

LEGEND

7 "Granophyre."

6 Gabbro – Moyie sills.

5 Limit of Tourmalinization.

4 Albitization.

3 Massive Sulfide.

2 Footwall Conglomerate.

1 Footwall Breccia...

Fault.

Geologic contact..

0 50 150 metres

Geological cross-section, Sullivan Mine, Kimberly, B.C. (after Hamilton et al., 1983) fig. 5

several fining-upward sequences of quartzitic wacke and silty wacke.

Beneath the eastern part of the ore body are two gabbro sills separated by about 150m of quartz-feldspar biotite rock locally called granophyre, which in places has an igneous texture while elsewhere exhibits the texture of a highly altered sedimentary rock. The upper sill, 10 to 15m thick, is located about 500m below the orebody. The lower sill is approximately 50m thick.

In the west there is an abrupt change in the attitude of the gabbro-granophyre complex as it rises steeply to contact the footwall of the orebody near its western margin. To the west of this margin the gabbro-granophyre complex plunges downward again to resume a sill-like form at approximately its original stratigraphic position. The resulting configuration is a north-northwest trending arch.

Two satellite deposits, the Stemwinder and the North Star, are located 2 km and 3.5 km respectively south of the Sullivan orebody.

2.2.2 Others Mines

Numerous other past-producing mines or advanced exploration plays are located in the Sullivan Camp. All of the following are found within the Aldridge Formation and can be divided into two categories based on styles of mineralization: stratiform or vein type deposits.

The Vulcan property and the Kootenay King Mine are examples of stratiform type Pb-Zn mineralization. While the Vulcan Property consists of low grade sub-economic Pb-Zn-Ag mineralization the Kootenay King Mine contains the only high-grade stratiform mineralization within the Aldridge Formation outside of the Sullivan area. This deposit has produced 22,000 tons of 14% combined Pb-Zn.

Other deposits in the area such as the St. Eugene Mine, the Vine Property, the Estella Mine, the Star properties and the Delaware Mine are classified as vein type deposits. The Star Property is located adjacent to the western boundary of the Kydd property. It is believed to represent a small argillite sub-basin within the lower to middle part of the middle Aldridge Formation. It consists of low-grade Pb-Zn sulphides

within a vein stockwork and possibly limited stratiform mineralization. Tourmalities are also associated with mineralization on the Star Property.

2.3 Property Geology

While the geology of the Purcell Supergroup and particularly the Aldridge Formation relatively well understood, property scale geology can be somewhat of an enigma. This is primarily attributable to the paucity of outcrop in the area.

Where recognized, and differentiated, the many marker horizons of the Aldridge Formation can allow for a high degree of stratigraphic control over distances of hundreds of kilometers. They can also prove useful in solving structural problems. Unfortunately, a good knowledge of the markers is restricted to only a few workers, and photo-libraries of the markers can be expensive. Previous work by Chevron has identified a number of surface showings of Aldridge markers. One of the locations falls within the Kydd property and was interpreted to be a Butte marker by Dr. F.R. Edmunds during the 1989 field program. Using this identification of the marker, offset on the Spider Creek Fault has been interpreted to be approximately 2,000m vertical. This would suggest that stratigraphy near that of Sullivan time is repeated on the property. Numerous other north-south trending faults disrupt stratigraphy locally with small offsets generally on a tens of metres scale.

Gabbro outcrops in numerous locations on the property, most prominently on the southeast corner at higher elevations. These gabbros, interpreted to be Moyie sills, are a fresh-looking coarse-grained, plagioclase and amphibole-rich rock. East of Spider Creek and north of the Kidd Creek Road gabbro outcrops along with subcropping granophyre.

2.3.1 Stratigraphy

All sedimentary rocks found on the Kydd property are interpreted to belong to the Aldridge Formation of the Purcell Supergroup (Figures 3 and 6). Concordant gabbro intrusions known as the Moyie sills are also present.

Exposure of strata is relatively good in the area north-northeast of the Spider Creek bridge on the Kid Creek Road where secondary logging roads and clear-cuts have removed some of the heavy cover. Exposure is also very good above 1,830m (6,000') in the southeast corner of the property where the conformable relationship of the Moyie sills to the Aldridge strata is well

exhibited. A limited amount of outcrop is exposed along the Kid Creek Forest Service Road.

Sedimentary rocks of the region have been described as siliciclastic sediments (Hamilton et al., 1982), a description very fitting for Kydd property rocks. They commonly appear quite massive and are composed predominantly of fine-grained quartz grains. Rhythmic bedding varies in thickness on a scale of 1cm to 100cm and while it is usually internally massive some areas have excellent depositional features preserved. The area above 1,830m (6,000') in the southeast corner of the property has abundant exposures of these features which include crossbedding, flame structures, flute marks, and fining-upward sequences. These depositional features are consistent with a turbidite source for the sediments indicating an upright position for stratigraphic tops. A weak to moderate phyllitic lustre is common to rocks of the property.

Two unsuccessful attempts were made to locate the Butte marker mapped by previous work in the south-central area of the claims, southeast of Kid Creek (Figure 6). The heavy cover on this steep north-facing slope makes tight geological control quite difficult. Other possible marker horizons were observed on the property, but none were positively identified to be true Aldridge marker horizons.

The best exposure of the gabbro sills occurs above 1,830m (6000') in the southeastern corner of the property. The lower contact of the sill is well exposed and locally offset by small north-south normal faults associated with a larger structures (trending north-south along Old Man creek). No granophyre has been observed in proximity to this gabbro. A spatial relationship between the two units can be demonstrated elsewhere on the property, such as in Kid Creek at approximately 960m level and also along the power line right-of-way northeast of the Spider Creek bridge, north of the Kid Creek Road (Figure 6).

2.3.2 Lithology

All sedimentary lithologies found on the Kydd property are interpreted to belong to the Aldridge Formation, a Proterozoic sequence of dominantly fine-grained rocks. Middle Aldridge Formation dominates the property and is distinguished from the Lower Aldridge Formation by its lesser relative amount of argillite units. The Lower Aldridge Formation also contains minor amounts of fine-

grained pyrrhotite giving it a characteristic rusty appearance. Field identification of constituent minerals in hand sample is often difficult due to the fine-grained nature of the rock and the dominance of quartz grains in the composition. For this reason much of the descriptive mineralogy discussed here is based on results of petrographic reports on samples submitted to Dr. Craig Leitch for examination (Appendix II).

Sedimentary rocks of the Kydd property are generally fine sand-sized or silt-sized wackes. Colour ranges from a light smoky grey to medium grey in the quartz-dominated sandstones to a dark grey to black in the subordinate argillites. Detrital quartz grains with interstitial feldspar, muscovite and biotite are the main constituent minerals. Mica content can be quite variable and significantly higher in the more argillaceous, or clay rich units. The mica gives the rocks a weak to moderate phyllitic lustre.

Alteration of the rocks ranges from nil to moderate with an albite-chlorite-epidote alteration assemblage and varying amounts of sericite quite common. Tourmaline is often present as long, slender, microscopic-sized crystals.

Conformable gabbro units found on the property are interpreted to be Moyie sills. These are typically medium-grained to coarse-grained, with roughly equal proportions of amphibole and plagioclase, and have a "fresh looking" appearance in hand specimen.

Granophyre found within the property have a distinct "salt and pepper" appearance in hand specimen with fine grains of quartz, biotite and feldspar in roughly equal proportions. Petrographic examination has confirmed the presence of quartz that is micrographically intergrown with feldspar in the classic granophyric texture.

2.3.3 Structure

The dominant structure on the property is the Spider Creek Fault which transects the southwest corner of the property in a south-southeasterly direction. Geological interpretation based largely on the displacement of the Butte marker horizon indicates a vertical displacement of 2,120m on this normal fault, with the west side down (Hitzman, 1990). This sub-vertical (?) structure has a north-northwest trend. Numerous other faults with displacement on a tens of

metres scale are present and share the same general trend as the Spider Creek Fault. The Kid Creek valley, trending east-northeast across the property does not appear to be fault related.

While local disruptions occur, foliation generally strikes north-south and is consistent with the regional tectonic fabric.

2.3.4 Mineralization

Only one mineralized outcrop has been located on the property to date. Mineralization consists primarily of iron sulphide which is most commonly pyrrhotite. Traces of chalcopyrite and galena observed in the field were not confirmed in ICP analysis. Thin section study of a sample from the mineralized outcrop did not contain base metal sulphides, but Leitch comments that "pyrrhotite is common in the Aldridge, but concentrations of this order are enough to be interesting to exploration" (Leitch, Appendix II).

3.0 ROCK GEOCHEMISTRY

A total of 88 outcrop rock samples were collected during the program. Rock sample descriptions are presented in Appendix I and locations shown in Figure 7. These samples are presently stored at the Granges warehouse, North Vancouver. Sampling consisted of collecting two samples approximately two metres apart at 40 metres intervals across stratigraphy. Argillites were sampled whenever possible, otherwise a sample of wacke or sandstone was collected. Petrographic studies conducted by Dr. C.H. Leitch were performed on 36 of the collected rock samples, the results of which are presented in Appendix II.

Fourteen of the rock samples were submitted to X-Ray Assay Laboratories, Toronto, for sample preparation, whole rock and trace element analysis, the results of which are presented in Appendix III. The whole rock package consisted of 11 major oxides with loss on ignition and Ba, Nb, Rb, Sr, Y and Zr analyzed using the standard pressed pellet and XRF method. Trace element analysis consisted of 31 elements analyzed by ICP/MS with standard nitric aqua regia preparation.

All rock samples were submitted to Acme Analytical Laboratories for sample preparation and 30-element ICP/EMS analysis as well as fire assay for gold and flameless AA for mercury. Results are presented in Appendix IV. These results were subsequently analyzed by Dr. F.R. Edmunds, the conclusions of which are presented in Appendix V.

4.0 SOIL GEOCHEMISTRY

Twenty eight "B" horizon soil samples were collected during the 1992 program. Samples were collected at or near anomalous soil sample sites that originated from during the previous exploration program in 1989. In most cases, sample density was increased to a 25 metre spacing from the previous interval of 50 metres. These samples were submitted to Acme Analytical Laboratories for sample preparation and 30-element ICP/EMS analysis as well as fire assay for gold and flameless AA for mercury. Results are presented in Appendix IV and sample locations shown in Figure 7.

One stream sediment sample (Kydd-H1) was also collected during this exploration program. This sample was submitted to Min-En Laboratories for heavy mineral sample preparation and 30-element ICP/EMS analysis as well as fire assay for gold. Results are presented in Appendix IV and sample location shown in Figure 7.

The soil and stream sediment results were subsequently analyzed by Dr. F.R. Edmunds, the conclusions of which are presented in Appendix V.

5.0 CONCLUSIONS

The Kydd Property shows a degree of geological similarity with the Sullivan area which makes it interesting from an exploration viewpoint. Regionally, the Creston area is the only known area in the Aldridge Formation that has as great a number, or density of Moyie sills as the Sullivan area. The genetic relationship between the sills and mineralization at Sullivan is not well understood but the spatial relationship they exhibit cannot be ignored. Gabbro of the Moyie sills and associated granophyre are present on the Kydd property.

Stratigraphically, the property encompasses a section from just below the Lower Aldridge Formation contact with the Middle Aldridge Formation up to a stratigraphic level near the top of the Middle Aldridge. This should allow for exploration of virtually the entire Middle Aldridge Formation.

Tourmalinites, which have a known spatial and probable genetic relationship to the Sullivan orebody, are known to occur in the vicinity of the Kydd property. The adjacent Star claims (Figure 2) and the Goat River tourmalinite approximately 10km southeast are two examples of this.

Further follow-up of the 1992 geochemical results remains to be completed. A small program of mapping and prospecting concentrated along the favourable horizon(s) would help to

better understand their relationship to one another, if one exists. Also, additional property mapping and prospecting may uncover other possible target horizons.

6.0 BIBLIOGRAPHY

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7.0 STATEMENT OF EXPENDITURES

Geological Survey	$ 6,914.05
Analyses, Petrographic Work	5,233.00
(Acme Analytical Laboratories Ltd.) (' Ray Assay Labs) (Dr. Craig Leitch) (Min-En Laboratories)	
Transportation	529.00
(Bighorn Helicopter)	
Drafting, Report Writing	2,678.00
Management Fee	1,535.41
Total	$16,889.46

STATEMENT OF QUALIFICATIONS

I, Ross D. Zawada, do hereby certify;

1) I am a graduate in geology of the University of Saskatchewan (B.Sc. 1989).

2) I have practised as a geologist in mineral exploration for four years.

3) Opinions, conclusions and recommendations contained herein are based on fieldwork and research performed by or overseen by me between September 18 and October 4, 1992.

4) I own no direct, indirect, or contingent interests in the subject property, or shares or securities of Granges Inc.

Vancouver, B.C.

December 21, 1992

ROSS D. ZAWADA

STATEMENT OF QUALIFICATIONS

I, Jenna L. Hardy, of North Vancouver, British Columbia, do hereby certify that:

1. I am employed by Granges Inc. with offices at 2300-885 West Georgia Street, Vancouver, BC, V6C 3E8.

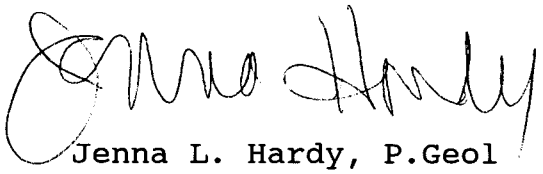
2. I am a graduate of the University of Toronto (M.Sc. Geology) and Simon Fraser University (M.B.A.)

3. I am a member in good standing of the Professional Engineers and Geoscientists of the Province of British Columbia (registration no. 19446).

4. I am a Fellow of the Geological Association of Canada.

5. I have practised as a geologist in mineral exploration for nineteen years.

Dated at Vancouver, BC, this 31st day of December, 1992



Jenna L. Hardy, P.Geol

APPENDIX I

ROCK SAMPLE DESCRIPTIONS

1 CP

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24754 24755	G.A.	KYDD 7 CLAIM, ~~WESTERN SECONDARY ROAD~~, ON POWER LINE EAST OF SPIDER CREEK.	SEPT. 19/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: PHYLLITIC SILTSTONE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Light grey weathering, light to dark grey thinly laminated phyllitic siltstone with slaty cleavage at: 002 / 40 SE.
Thought by Edmunds to be Lower Aldridge Formation.

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu	Other			
Geochemical								
Assay								

KYDD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24754	G. ALLEN	KYDD CLAIMS	Sept. 19/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [?] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: Argillaceous Quartzite.

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is a medium greenish-grey, fine grained phyllite. Bedding is readily distinguishable due to varve-like rhythmic bedding on a mm scale. Foliation is near perpendicular to bedding.

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu	Other			
Geochemical								
Assay								

Kydd PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24756	G. Allen	Kydd Claims	Sept. 19/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: (GRANOPHYRE (?)

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock has a "salt + pepper" appearance and appears to be made up of ≈20% biotite, ≈20% feldspar and ≈60% Quartz. Texture is massive, with all minerals being fine grained. Possibly some relict fragment (?)

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

W/K

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24757	G.A.	S. SIDE KID CREEK ON BANK, NEAR SPIDER CREEK	SEPT. 20

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: GABBRO

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Fine-grained equigranular amphibole gabbro. Foliation: 033/90.

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KYDD CLAIMS KYDD CREEK	DATE COLLECTED:
24758	G. ALLEN		SEPT. 20

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH ~10cm)

OCCURRENCE SIZE:

ROCK NAME: Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

A whitish to buff colored fine grained massive rock dominated by quartz grains with ~2-3% biotite & Tr muscovite. The rock has a weak "chalky" "chalky" appearance possibly from the original cement weathering to clay (?)

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kydd PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24759	G. ALLEN	Kydd Claims Kydd Creek	

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH ~10 cm)

OCCURRENCE SIZE:

ROCK NAME: Argillaceous Siltstone

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

a very fine grained quartz-biotite rich rock. The rock is dark grey in color and phyllitic. A well developed foliation cuts bedding at a moderate angle.

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

_____ PROJECT ( ) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24760	G. ALLEN	Kyoo Claims Kyoolet Creek 3090'	Sept. 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [?] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: Gabbro

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is a massive, medium grained rock. Hornblende makes up ≈60% of the rock with feldspar ≈ 35% and quartz ≈5%. The quartz is found as inclusions within the feldspars. The rock is non-magnetic.

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24761	G. ALLEN	KYDD CLAIMS KYDDIET CREEK 3100'	SEPT. 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: GRANOPHYRE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

A fine grained massive rock with a "salt + pepper" appearance. Biotite constitutes ≈ 20% of the rock, also ≈ 10% feldspar with the balance being quartz. Pyrrhotite is present in trace amounts.

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kydd PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24762	G. Allen	Kydd Claims Kyddiet Creek 3140'	Sept. 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [~] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [~] CHANNEL [ ] (SAMPLE WIDTH 10 cm)

OCCURRENCE SIZE:

ROCK NAME: Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)
A light grey to light grey-green massive, fine grained, equigranular rock. Trace amounts of biotite

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24763	G. ALLEN	KYDD CLAIMS KYDD/ET CREEK 3140'	

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH ≈10cm)

OCCURRENCE SIZE:

ROCK NAME: Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

A very fine grained, light greenish-grey rock. A weak foliation is present with thin dark layers aligned parallel to the foliation. The rock is mostly quartz with a minor argillaceous (?) component

DESCRIPTION BY: Tess Janda

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kydd PROJECT (# 140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
27764	G. Allen	Kydd Claims Kyddelet Creek 3200'	Sept. 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10 cm)

OCCURRENCE SIZE:

ROCK NAME: Argillaceous Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Medium Grey in colour, fine grained, massive. A very weak HCl Reaction probably from minor amounts of carbonate cement. Grains are predominantly quartz with minor biotite.

DESCRIPTION BY: Ross Jaeger

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KVOW PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
14765	G. ALLEN	KVOW CLAIMS KYDOIET CREEK 3200'	SEPT. 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10 cm)

OCCURRENCE SIZE:

ROCK NAME: ARGILLACEOUS QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)
A very fine grained, massive medium greenish-grey Rock

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kydd PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24766	G. Allen	Kydd Claims Kyodiet Creek 3260'	Sept 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10 cm)

OCCURRENCE SIZE:

ROCK NAME: Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is a moderate grey in color with a very weak greenish hue. Quartz grains dominate the rock with biotite also present at ≤ 1-2%. The rock has a massive texture.

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KVDD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24767	G. ALLEN	KVDD ~~CREEK~~ CLAIMS KVODJET CREEK 3260'	SEPT 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH ~10cm)

OCCURRENCE SIZE:

ROCK NAME: Argillaceous Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

A medium to dark grey rock composed of ≥ 40% fine grained, well rounded quartz and ≤ 60% very fine grained biotite

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KYDDLET CREEK, 514m UP CREEK FROM KID CR.	DATE COLLECTED:
24768	G.A.		SEPT. 20

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Fine-grained blue-grey quartzite. Bedded 173/40 NE.

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24769	G. Allen	KYDD CLAIMS KYDDIET CREEK 3310'	Sept. 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH ~10 cm)

OCCURRENCE SIZE:

ROCK NAME: Argillaceous Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

A medium to dark grey weakly bedded fine grained rock.
Dominantly quartzose with ± 2% biotite.

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24770	G. ALLEN	KYDD CLAIMS KYDDIET CREEK 3420'	SEPT. 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10cm)

OCCURRENCE SIZE:

ROCK NAME: ARGILLACEOUS QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

A MEDIUM GREY FINE GRAINED MASSIVE ROCK. RUSTY APPEARANCE ON WEATHERED SURFACE

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kydd PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24771	G. Allen	Kydd Claims Kydolet Creek 3420'	

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10 cm)

OCCURRENCE SIZE:

ROCK NAME: Argillaceous Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is dark grey, fine grained and phyllitic. Bedding is evident with a moderate foliate slightly obligue to bedding.

DESCRIPTION BY: Ross Glanda

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (# 140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KYDD CREEK KYDDIET CREEK 1026m	DATE COLLECTED:
~~ZAF~~ 24772	G. ALLEN		Sept. 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

A white to very light grey massive, fine grained rock composed ent. only of well rounded quartz grains.

DESCRIPTION BY: Rob Fedikow

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24773	G. Allen	Kydd Claims Kyddlet Creek 1026m	Sept. 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10 cm)

OCCURRENCE SIZE:

ROCK NAME: Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Light grey in color with a very faint greenish hue. Traces of biotite are present, otherwise the rock is a pure, fine grained massive quartzite.

DESCRIPTION BY: Ross Jack

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24774	G. ALLEN	KYDD CLAIMS KYDDLET CREEK 1144m	Sept. 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10 cm.)

OCCURRENCE SIZE:

ROCK NAME: Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

a light grey, fine grained, massive rock. Quartz grains are the major constituent with ~2-3% biotite

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kydd PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: Kydd Claims	DATE COLLECTED:
24775	G. Allen	1142m Kyddlet Creek	Sept. 20/92

MATERIAL SAMPLED:
ROCK - OUTCROP [~~—~~] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [~~—~~] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:
Quartzite.

ROCK NAME:

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Light grey, fine equigranular quartzite with only trace amounts of opaque grains. The rock has a weak but pervasive limonitic (?) alteration.

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu	Other			
Geochemical								
Assay								

24776 ICP, 15
24777 ICP

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KYDD 7 CLAIM, SECONDARY ROAD NORTH OF KID CREEK ROAD	DATE COLLECTED:
24776 24777	G.A.		SEPT. 22/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ] → SUBOUTCROP

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Medium to light grey poorly bedded fine-grained quartzite with 5-15% mafic grains (probably biotite), and 5% limonite in specs to 1 mm. Bedding more distinct than in other parts of the stratigraphy. Marker?

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu	Other			
Geochemical								
Assay								

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KYDD 7 CLAIM, SECONDARY ROAD NORTH OF KID CREEK ROAD	DATE COLLECTED:
24778	G.A.		SEPT. 22/92

MATERIAL SAMPLED:
ROCK - OUTCROP [ ] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [✓]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:
30 cm x 40 cm x 10 cm SUBANGULAR BOULDER

ROCK NAME: QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Rusty weathering medium to light grey fine-grained massive quartzite with 5-8% disseminated pyrrhotite. Two pieces of gossanous float close together ∴ could have local source.

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu	Other			
Geochemical								
Assay								

24780 - ICP

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24779 24780	G.A.	KYDD 7 CLAIM, SECONDARY ROAD NORTH OF KID CREEK ROAD	SEPT. 22/92

MATERIAL SAMPLED:
ROCK - OUTCROP [ ] SILT [ ] SOIL [ ] OTHER SUBOUTCROP
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Medium grey fine-grained quartzite with 5-8% mafic grains (biotite ?). Massive. Weakly limonitic.

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu		Other		
Geochemical								
Assay								

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KYDD 7 CLAIM, SECONDARY ROAD NORTH OF KID CR. RD.	DATE COLLECTED:
24781	G.A.		SEPT. 22/92

MATERIAL SAMPLED:
ROCK - OUTCROP [ ] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [✓]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:
SEVERAL PIECES OF GOSSANOUS FLOAT, PROBABLY NEAR SOURCE

ROCK NAME: QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)
Medium blue-grey fine-grained quartzite with 5-8% mafic grains (biotite?) and 5% disseminated pyrrhotite in clusters to 1 mm.

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

24783 ICP

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KYDD 7 CLAIM, SECONDARY ROAD NORTH OF KIO CREEK ROAD	DATE COLLECTED:
24782 24783	G.A.		SEPT 22/92

MATERIAL SAMPLED:
ROCK - OUTCROP [ ] SILT [ ] SOIL [ ] OTHER SUBOUTCROP
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

limonitic weathering medium blue-grey fine-grained quartzite with 5-10% biotite and 5% limonitic specs to 1mm.

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

24784 - ICP, T.S.
24785 - ICP

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KYDD 7 CLAIM, SECONDARY ROAD NORTH OF KYDD CREEK ROAD	DATE COLLECTED:
24784 24785	G.A.		SEPT. 22

MATERIAL SAMPLED:
ROCK - OUTCROP [ ] SILT [ ] SOIL [ ] OTHER SUBOUTCROP
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: 24784 - PHYLLITIC ARGILLITE OR SILTY ARGILLITE
24785 - QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

24784 - 5m WEST OF 24785. Hematitic weathering fine-grained biotite-rich phyllite with slaty cleavage

24785 - Medium grey fine-grained massive to poorly bedded quartzite with < 5% biotite.

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

24787 ICP

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24786 24787	G.A.	KYDD 7 CLAIM, SECONDARY ROAD NORTH OF KID CR. RD.	SEPT. 22/92

MATERIAL SAMPLED:
ROCK - OUTCROP [ ] SILT [ ] SOIL [ ] OTHER SUBOUTCROP
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Medium grey fine-grained quartzite. Massive. limonitic weathering. 5% limonitic specs to 1 mm. < 5% biotite.

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu	Other			
Geochemical								
Assay								

ICP, TS

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24788	G.A.	KYDD 7 CLAIM, SECONDARY ROAD NORTH OF KID CR. ROAD.	SEPT. 22/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] * SILT [ ] SOIL [ ] OTHER * SUBOUTCROP
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

~10 m EAST OF 24786, 87. limonitic weathering fine-grained quartzite with 20% fine-grained biotite and <1% fine-grained pyrite or pyrrhotite on fracture surfaces (obscure).

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

W K

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KYDD 7 CLAIM SECONDARY ROAD NORTH OF KID CR. ROAD	DATE COLLECTED:
24789	G.A.		SEPT. 22/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: GABBRO

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Fine-grained equigranular amphibole gabbro. CI ~40-50.

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

24791 - ICP

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24790 24791	G.A.	KYDD 7 CLAIM, SECONDARY ROAD NORTH OF KID CREEK ROAD	SEPT. 22

MATERIAL SAMPLED:
ROCK - OUTCROP [ ] SILT [ ] SOIL [ ] OTHER SUBOUTCROP
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Medium grey fine-grained massive quartzite with 5% biotite and 5% limonitic specs to 1 mm.

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

24793 - ICP

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KYDD 7 CLAIM, MEADOW OFF SECONDARY RD. NORTH OF KID CR. ROAD.	DATE COLLECTED:
24792 24793	G.A.		SEPT. 22

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: 24792 - ARGILLACEOUS SILTSTONE
24793 - QUARTZITE

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

24792 - Dark grey fine-grained quartz-biotite phyllite. Biotite ~ 30%. Metaargillite?

24793 - Fine-grained quartzite with 5% fine-grained biotite.

DESCRIPTION BY: G.A.

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kyoo PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: Kyoo Claims Kyoo Creek Road. ~~Star Claims~~	DATE COLLECTED:
24801	R.Z.		Sept. 21/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10 cm.)

OCCURRENCE SIZE:

ROCK NAME: Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is a pure white color on fresh surface and is made up entirely of well rounded fine quartz grains. Bedding is poor to non-existant.

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kyoo PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: Kyoo Claims Kyoo Creek Road	DATE COLLECTED:
24802	T.T.		Sept. 21/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10 cm.)

OCCURRENCE SIZE:

ROCK NAME: Arg. Meta Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is medium to dark grey in color. The rock is also moderately foliated & weakly phyllitic. Hematite (?) is present in trace amounts. Bedding is well developed with foliation slightly oblique.

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kyoo PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: Kyoo Claims Kyoo Creek Road	DATE COLLECTED:
24804	F.F.		Sept. 21/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10cm)

OCCURRENCE SIZE:

ROCK NAME: Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is predominantly fine grained quartz grains with ~1% very fine grained opaques. The color is white with a very faint greyish hue.

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kyoo PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: Kyoo Claims	DATE COLLECTED:
24805	F.T.	Kyoo Creek Road	Sept. 21/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10cm)

OCCURRENCE SIZE:

ROCK NAME: Argillaceous Quartzite.

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is a medium grey-green in colour. Grain size is consistently fine with the majority of the rock being quartz grains, the rest (≈10%) are fine grained micas.

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kydd PROJECT (# 140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: Kydd Claims Kydd Creek Road	DATE COLLECTED:
24806	F.T.		Sept. 21/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10cm)

OCCURRENCE SIZE:

ROCK NAME: Quartzite.

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is pure white in color, massive & composed entirely of fine grained quartz grains. Trace hematite (?) is found sporadically throughout the rock

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24807	F.E.	KYDD Claims KYDD CREEK Road	Sept. 21/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is pure white in color & composed entirely of fine grained quartz grains. mm scale mafic lenses are present & appear to be elongated along bedding planes. Te to 1% hematite (?)

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
14608	R. ZAGADA	Star Claims	Sept. 21/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: Quartzite Aldridge Mbr K (?)

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

A fine grained quartzite with consistent rhythmic bedding on a mm scale with black & light coloured bands or bedding (?)

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kydd PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24809	G. Allen	Star Claims	Sept. 21/92

MATERIAL SAMPLED:
ROCK – OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
– FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

Quartzite

ROCK NAME:

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Possible marker horizon from the Aldridge formation. Rhythmic "varve" like banding on a mm scale. Dominantly medium to dark grey beds up to 10 mm thick with the subordinate whitish beds not exceeding 2 mm. Rusty weathering along these lighter colored beds.

DESCRIPTION BY: Ross Jaworski

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: ~10 M N. of Kydd Creek Road @ Soil grid location M820	DATE COLLECTED:
24810	Ross Zawada		Sept. 22nd/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10cm.)

OCCURRENCE SIZE:

ROCK NAME: Argillaceous Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

Medium to dark grey fine grained rock with a moderately developed foliation. Rusty appearance on weathered surfaces.

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: Kydd Claims N. of Kid Creek Road @ soil grid location M822	DATE COLLECTED:
24811	R. ZAWADA		Sept. 22nd/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 10cm.)

OCCURRENCE SIZE:

ROCK NAME: Argillaceous Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

a medium to dark grey rock, fine grained with a moderately developed foliation. Rusty appearance on weathered surfaces.

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (# 140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24814	R. ZAWADA	KYDD Claims 6100' KYDD 1	Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 5 cm)

OCCURRENCE SIZE:

ROCK NAME: Siltstone.

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

an argillaceous siltstone, fine grained and medium gray in color. Constituent minerals are ≈ 15% fine grained feldspar, ≈ 80% fine grained quartz and 5% medium grained biotite with the balance probably fine grained biotite.

DESCRIPTION BY: Ross Jack

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KVDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KVDD 1	DATE COLLECTED:
24815	R. ZAWADA	6100'	Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 5 cm)

OCCURRENCE SIZE:

ROCK NAME: Siltstone

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

an argillaceous Siltstone, fine grained & medium grey in colour. Rock forming minerals are ≈15% feldspar, ≈60% quartz ≈5% medium grained biotite with the remainder probably being V. fine grained biotite.

DESCRIPTION BY: [signature]

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24816	R. Zawada	KYDD 1 6100'	Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 5 cm)

OCCURRENCE SIZE:

ROCK NAME: Argillaceous Quartzite.

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is dark grey in color. Fine to medium grained with 2-3% medium grained biotite. The rock has a weak phyllitic texture.

DESCRIPTION BY: R. Zawada

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
248167	R. ZAWADA	KYDD 1 6100'	Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 5 cm)

OCCURRENCE SIZE:

ROCK NAME: Argillaceous Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is fine to medium grained with 2-3% medium grained biotite flakes. The rock has a weak phyllitic texture.

DESCRIPTION BY: Tom Jones

ANALYSES:	Au	Ag	As	Cu	Other			
Geochemical								
Assay								

KYOO PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24818	R. ZAWADA	KYOO 1 6115'	Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 8 cm)

OCCURRENCE SIZE:

ROCK NAME: Quartzite.

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is biotite rich with very uniform bedding on a 1-5 mm scale. The more biotite rich beds give the rock a black and white striped appearance. Biotite is also present (1-2%) in the white units.

MM size "vugs" that are quartz(?) filled and lined by a black mineral are present along with 2-3 mm long lath-like crystals, possibly Tourmaline. These crystals are randomly oriented wrt to bedding.

The unit is ~~[illegible]~~ ~10 cm thick.

DESCRIPTION BY: Ross Zawada

ANALYSES:	Au	Ag	As	Cu	Other
Geochemical					
Assay					

Kyoo PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KYOO 2	DATE COLLECTED:
24819	R. ZAWADA	6115'	Sept 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 5 cm)

OCCURRENCE SIZE:

ROCK NAME: Quartzite.

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

The rock is fine to medium grained and dark grey in colour. The rock is strongly bedded with abundant internal structure indicative of turbidite deposition. Tops are up. The rock also contains a few "black mineral lined vugs" with the black mineral possibly tourmaline.

DESCRIPTION BY: Ross Jack

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24820	R. ZAWADA	KYDD 1 6115	Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH Whole Rock)

OCCURRENCE SIZE:

ROCK NAME: Gabbro.

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

medium to coarse grained hornblende & plagioclase feldspar.

DESCRIPTION BY: Ross Jack

ANALYSES:	Au	Ag	As	Cu	Other
Geochemical					
Assay					

KVDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KVDD 1 6020' ELEV.	DATE COLLECTED:
24821	K. ZAWADA		Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH Whole Rock)

OCCURRENCE SIZE:

ROCK NAME: Gabbro

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

medium grained hornblende + plagioclase feldspar.

DESCRIPTION BY: Ross Jack

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24622	R. ZAWADA	KYDD 1 6020'	Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE: Quartzite

ROCK NAME:

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

a medium to dark grey, fine to medium grained rock with 2-3% medium grained biotite & probably a small to moderate amount of fsp. The rock has a rusty appearance on weathered surface.

DESCRIPTION BY: Ross Jack

ANALYSES:	Au	Ag	As	Cu	Other			
Geochemical								
Assay								

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24823	R. ZAWADA	KYDD 1 6020'	Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: Quartzite

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

a medium to dark grey, fine to medium grained rock with 2-5% medium grained biotite and probably a small to moderate amount of feldspar. The rock has a rusty appearance on weathered surface.

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu	Other			
Geochemical								
Assay								

KYOO PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24824	R. Zawada	KYOO 1 5445'	Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: Quartzite. (Argillaceous)

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

a moderately foliated dark grey fine grained rock. Traces of medium grained biotite and probably a moderate % of very fine grained biotite. Probably better termed a wacke

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24825	R. Zawada	KYDD 1 5445'	Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: Wacke

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)
a moderately foliated dark grey, fine grained rock with traces of medium grained biotite and probably a moderate % of very fine-grained biotite.

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYDD PROJECT (#190) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION: KYDD Claims 5020'	DATE COLLECTED:
24826	R. Fowler		Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 5 cm.)

OCCURRENCE SIZE:

ROCK NAME: Quartzite.

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

A medium to dark grey fine grained rock, primarily quartz

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

Kydd PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24817	R. ZAWADA	Kydd Claims 5020'	Sept. 29/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [✓] CHIP [ ] CHANNEL [ ] (SAMPLE WIDTH _____)

OCCURRENCE SIZE:

ROCK NAME: Gabbro Whole Rock

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

a medium to coarse grained rock made up of roughly equal amounts of hornblende and feldspar

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

KYOD PROJECT (#140) : ROCK SAMPLE DESCRIPTION

SAMPLE NO.:	TRAVERSE NO. AND/OR COLLECTOR:	LOCATION:	DATE COLLECTED:
24828	R. Zowada	KYOD Claims Above Soil Grid location 3E 950E	Sept. 30/92

MATERIAL SAMPLED:
ROCK - OUTCROP [✓] SILT [ ] SOIL [ ] OTHER _____
- FLOAT [ ]

ROCK SAMPLE TYPE:
GRAB [ ] CHIP [✓] CHANNEL [ ] (SAMPLE WIDTH 5 cm.)

OCCURRENCE SIZE:

ROCK NAME: Argillaceous Siltstone

SAMPLE DESCRIPTION: (If Rock, Include Colour, Texture, Rock Forming Minerals, Mineralization, and Etc.)

a quartz rich very fine grained rock, medium grey in color with a phyllitic lustre. The rock is moderately foliated and has a rusty appearance on weathered surface. Abundant limonitic (?) "clots" are present on fresh surface.

DESCRIPTION BY:

ANALYSES:	Au	Ag	As	Cu			Other	
Geochemical								
Assay								

APPENDIX II

PETROGRAPHIC REPORTS

PETROGRAPHIC REPORT ON 21 THIN SECTIONS OF LOWER AND MIDDLE ALDRIDGE SEDIMENTS FROM THE KYDD PROPERTY NEAR CRESTON, B.C.

Report for: Gordon Allen
Granges Inc.
2300-885 West Georgia St.
Vancouver, B.C.
V6T 2Z4.

Oct. 12, 1992

Invoice attached

Your reference: letter dated Sept. 23, 1992 (Project 140).

Samples submitted: 24750, 52, 54, 56, 59; 24761, 63, 67; 71, 75, 76, 79; 24782, 84, 86, 88; 24790, 92; 24802, 07, 09.

SUMMARY:

Most of the rocks in this suite are either fine sand-sized or silt-sized wackes composed of detrital quartz grains with intersitial feldspar (mainly plagioclase, about ?oligoclase but ranging from ?albite to ?andesine), muscovite and biotite. They are arbitrarily divided into fine sand-sized if the quartz grains are over 0.2 mm in diameter, or silt-sized ("argillite") if 0.15 mm or less (24763, 71, 76, 88, 24802 and 09). Four of the samples have fragmental to vaguely fragmental character (24759, 79, 82 an 92). Two of the samples (24756, 61) that are composed of micrographic intergrowths of quartz and alkali feldspar (?oligoclase?) clearly represent biotite granophyres, probably indicating proximity to a Moyie gabbro sill.

Alteration ranges from nil (24752, 82, 84) to moderate, with several (24763, 75, and 24807) containing minor garnet. Several samples (24767, 76, 79, and 84) contain rounded porphyroblasts of ?K-feldspar ± chlorite, possibly after garnet, although one sample (24788) with abundant K-spar is unlikely to have formed in this way. The most altered samples are 24763, 75, 86, 90, and 24807; in these variable amounts of albite, chlorite, sericite (muscovite) and Fe-poor epidote or clinozoisite are found, plus minor sphene and/or garnet. In at least two of these, 24786 and 90 (and also possibly the others) the albite-chlorite-epidote alteration could be due to Moyie sills. In 24763, 75 and 807 alteration is stronger and more likely hydrothermal (especially where associated with sphene, as found in the albitite zone at Sullivan). Other samples with moderate to abundant muscovite may represent hydrothermally altered rocks, but this is difficult to be sure of in regional biotite-grade metamorphics; only field evidence demonstrates this at Sullivan. Two samples (24788 and 24809) appear to contain appreciable ?carbon, similar at least in 809 to marker horizons found in the Middle Aldridge.

Craig H.B. Leitch, Ph.D, P.Eng.
(604) 921-8780 or 666-4902

24750: MILDLY SERICITE-CHLORITE ALTERED, FINE SAND OR SILT SIZED WACKE

Light grey-greenish, fine-grained, even-textured siltstone or fine sandstone. The rock is not magnetic, and there is no reaction to cold dilute HCl. In thin section, the modal mineralogy is:

Quartz (detrital)	70%
Feldspar (mainly plagioclase?)	15%
Mica (muscovite and sericite)	5%
Chlorite/chloritized biotite	5%
Epidote or clinozoisite	3%
Opaque	1%
Tourmaline	tr
Zircon (?), sphene	tr

The framework of this rock consists of detrital quartz grains up to 0.5 mm diameter. The borders are somewhat irregular (sutured) and extinction is mildly undulose, indicating slight recrystallization. There is no evidence for quartz overgrowths (silicification).

Feldspar and micas are interstitial to the quartz grains. Most feldspar grains are sub- to anhedral and range up to 0.25 mm across; vague twinning and minor alteration to fine white mica (sericite) suggests most are plagioclase, although K-feldspar could be present as well. Relief less than quartz suggests albite or oligoclase, probably less than An_{20}. However, this is detrital rather than secondary (alteration) feldspar.

Muscovite forms eu- to subhedral flakes up to 0.3 mm diameter, in places replacing plagioclase. Mafic phyllosilicates are mainly a mix of brownish green chlorite and partly chloritized biotite, but ranging in places to pale green chlorite with anomalous birefringence. Epidote (or more likely Fe-poor clinozoisite) forms subhedral crystals up to 0.2 mm across. It is not clear that this is detrital; it may be a metamorphic product of some mineral that replaced feldspar.

Opaque grains are up to 0.1 mm across, aggregating to 0.3 mm. There are a few subhedral grains of sphene to 0.2 mm across, and rare euhedral prisms of brown tourmaline to 0.1 m long. Zircon (?) forms euhedral, detrital-looking crystals up to 100 μm long interstitial to the quartz grains.

This is a typical quartz wacke ("high rank greywacke" of Edmunds, 1977) with low-grade alteration characteristic of such rocks. If K-feldspar is present it would have to be confirmed by etching and staining. The amount of epidote present is not high enough and Fe content is too low (no pleochroism observed) to suspect an alteration zone. No garnet is present; rare tourmaline is normal in the Aldridge sediments.

Edmunds, F.R. (1977): The Aldridge Formation, B.C., Canada; Ph.D thesis, Pennsylvania State University, University Park, Pennsylvania, 368 p.

24752: UNALTERED FINE SAND-SIZED WACKE CONTAINING FRESH PLAGIOCLASE AND MICROCLINE

Grey-green, medium to fine-grained sandstone or wacke, characterized by 2-3 mm round rusty blotches. Non-magnetic, no reaction to cold dilute HCl. Modal mineralogy in thin section is as follows:

Quartz (detrital)		65%
Feldspar:	plagioclase, oligoclase-andesine	10%
(detrital)	K-feldspar, microcline	3%
Biotite (green)		10%
Muscovite, sericite		10%
Opaque		1%
Zircon (?)		tr
Limonite		tr
Tourmaline		tr

Quartz forms somewhat rounded, subhedral detrital grains up to 0.3 mm in diameter, set in a matrix of finer quartz, feldspar, and mica. Quartz grains are relatively unstrained, and although minor suturing of borders is seen, there does not seem to have been any significant overgrowths of secondary quartz (silicification).

Plagioclase is common as rounded subhedral grains with polysynthetic twinning (extinction angles about 5-8° on 010) and relief slightly above to the same as quartz suggesting a composition about oligoclase-andesine, An_{30}. K-feldspar forms subhedral grains up to 0.25 mm long that display some grid twinning, characteristic of microcline. Relief is much less than quartz.

Micas include biotite, which has a dark green-brown pleochroism, and muscovite plus finer sericite or white mica. Biotite flakes are subhedral and up to 0.15 mm diameter (aggregates rarely to 0.3 mm); muscovite flakes are more euhedral and up to 0.2 mm diameter.

Opaque grains are sub- to euhedral and up to 0.1 mm across; their identity is not obvious. Rare euhedral crystals of ?zircon and greeny-blue tourmaline, up to 85 and 50 μm long respectively, are scattered through the rock. Minor pleochroic haloes are present in biotite around the zircon.

This is a very fresh Aldridge sediment, again typical of Edmund's (1977) greywacke division. Feldspar, both plagioclase and K-feldspar, is untouched by alteration (fresher than 24750), and there is no chlorite, epidote, or garnet. The rusty blotches of limonite are likely caused by weathering.

24754: FINE LAMINATED SILTSTONE, POSSIBLY SERICITE-CHLORITE ALTERED, CONTAINING MINOR ?DETRITAL TOURMALINE

Finely laminated, buff-coloured, very fine-grained siltstone that does not react to cold dilute HCl. In thin section, the rock is composed of:

Quartz	40%
Sericite, muscovite	35%
Green biotite	15%
Chlorite	5%
Opaque	2%
Tourmaline	1%
Limonite	1%
Apatite	<1%

Quartz grains in this rock are sub- to anhedral, partly flattened (length to width about 2:1), and rarely over 0.1 mm long. They show signs of moderate strain (undulose extinction, sutured grain boundaries).

Micas present include unusually abundant sericite and coarser euhedral flakes of muscovite up to 80 μm long. The muscovite is generally found oriented perpendicular to the foliation, unlike the finer white mica, which is found as subhedral flakes generally less than 50 μm in diameter. Intermixed with the white mica is a green mica that could be a ferroan, H_2O-rich variety; it forms subhedral flakes also up to about 50 μm in diameter. Chlorite is not common, forming scattered blastic grains up to about 0.1 mm diameter with pale green pleochroism and vaguely anomalous birefringence suggesting a ferroan character.

There is no feldspar evident; it has presumably all been converted to white mica (sericite) although whether this is due to hydrothermal alteration is questionable. There is a pronounced foliation caused by alignment of the mica flakes and elongation of quartz grains, suggesting some flattening during metamorphism.

Generally mixed with the green biotite are minute crystals and aggregates of opaque and semi-opaque material with rod-like shape, up to a few microns in size. These may be rutile, but are difficult to separate from limonite of similar size and distribution. Larger crystals of opaque are up to 60 μm long. Tourmaline is noticeably abundant in this sample compared to most normal Aldridge sediments, forming euhedral prisms up to 100 μm long oriented both across and in the foliation like the coarser muscovite. It is dark green in colour, indicating a fairly Fe-rich composition; it is not likely to be hydrothermal.

In summary, since all the feldspars are absent, and sericite is abundant, biotite is green, and chlorite is present, this could be a mildly altered rock. Such rocks rich in sericite are present in the Sullivan-North Star corridor, presumably related to mineraized centers there. However, this is not certain in this sample unless other indications of altered rocks can be found nearby. The finely bedded (undisrupted) nature of the rock in hand sample argues against it being hydrothermally altered.

24756: BIOTITE-QUARTZ-PLAGIOCLASE "GRANOPHYRE", MILDLY ALTERED TO CHLORITE AND SERICITE

Medium-grained, black/white salt-and-pepper textured rock composed mainly of biotite and quartz/feldspar. The rock is not magnetic and does not react to cold dilute HCl. Modal mineralogy in thin section is:

Quartz (partly secondary)	35%
Biotite (partly secondary)	30%
Alkali feldspar (Plagioclase)	30%
Sericite (after feldspar)	3%
Chlorite (after biotite)	2%
Sphene (trace rutile?)	<1%
Epidote (after feldspar)	tr

Quartz forms large (up to 1 mm diameter) subhedral optically continuous crystals micrographically intergrown with feldspar in the classic "granophyre" textured defined by Gunning at Sullivan in the 1940's. The quartz is strained, showing undulose extinction and deformation lamellae in places, although the boundaries are not sutured.

Feldspar is present as mainly fine intergrowths with the quartz, mostly as sub- to anhedral crystals, but in places there are euhedral crystals up to 0.5 mm across that display compositional zoning. Relief close to that of quartz suggests this feldspar may be as calcic as oligoclase or andesine, An_{30}. Most shows mild to moderate alteration to fine flakes of sericite and rare epidote.

Biotite forms eu- to subhedral flakes up to 1 mm in diameter, aggregating in places to 2 mm. Pleochroism is pale yellow to bright red-brown, typical of fresh, presumably metamorphic, biotite in the Aldridge. In places, particularly along some fractures, there is minor alteration to interleaved chlorite and rare muscovite. Chlorite has deep anomalous blue birefringence and green pleochroism and is length-slow, indicating an Fe-rich variety.

Accessory sphene, rarely with inclusions of rutile, forms sub- to euhedral crystals up to 0.15 mm long, mainly associated with biotite.

This appears to be a typical granophyre, developed in this case after Aldridge sediment rather than gabbro, but probably not far from the contact with gabbro. There is very mild alteration of feldspar to sericite and biotite to chlorite, but not significant enough to suggest proximity to hydrothermal activity (this type of chorite-sericite may in fact prove to be post- East Kootenay metamorphism, even as young as Cretaceous during Mesozoic deformation).

24759: FRAGMENTAL QUARTZ-MUSCOVITE-GREEN BIOTITE SILTSTONE CUT BY PLAGIOCLASE AND RARE QUARTZ VEINLETS

Light brownish grey, fine-grained, vaguely fragmental and ?foliated siltstone. Fragments are strongly elongated in the plane of foliation and are up to 1.5 cm long; they appear to be more biotite-rich than the matrix. A dark fracture cuts the rock perpendicular to foliation. In thin section, the mineralogy is approximately:

Quartz (detrital, recrystallized)	30%
Muscovite, sericite	25%
Green biotite	15%
Feldspar (plagioclase and K-feldspar)	10%
Opaque	3%
Limonite	<1%

Quartz grains are an- to subhedral, with polygonal outlines suggesting metamorphic recrystallization of detrital grains. Most are less than 0.2 mm in diameter, averaging about 0.1 mm; they show mild undulose extinction.

Interstices between quartz grains are filled by micas and remnants of feldspars. Feldspars are concentrated in certain layers up to 0.2 mm thick parallel to foliation, probably original bedding. Mica is mostly muscovite (sericite) as euhedral flakes up to 0.1 mm diameter, but there is also significant green (hydrous) biotite forming subhedral books to 0.2 mm diameter. In places some layers are richer in mica, especially the green biotite. The biotite is partly interleaved by muscovite, and contains most of the small (<0.05 mm) grains of opaque in the rock.

Vaguely defined patches of the rock, elongate parallel to foliation, are also enriched in micas (muscovite or green biotite). Some of these have clearly defined boundaries that show they are fragments, mainly of more argillaceous beds which lithify earliest during diagenesis and are therefore prone to fragmentation when the sandy beds liquify. Narrow quartz veinlets cross both fragments and host but die out in the host.

The rock is cut by a narrow (0.25 mm thick) veinlet, the dark fracture seen in hand specimen, that appears to be composed entirely of feldspar, mainly limonite-stained plagioclase (identifiable only by rarely observed twinning and zoning) with relief very close to quartz indicating a composition close to An_{30-35}. (I have only one analysis from regional Aldridge rocks, which is An_{38}, although how to square this with regional greenschist grade in which plagioclase should all be homogenized to albite, below An_{7-8}, is hard to explain.) Feldspar in the matrix of the rock generally has relief a little lower than quartz (oligoclase) with some well below probably being K-feldspar.

The fragmental character of this rock is of interest to exploration (although dewatering pipes unrelated to mineralization are known, e.g. south end of Moyie Lake). Abundance of muscovite and green biotite is higher than usual, and veinlets (especially plagioclase) are also not common in Aldridge rocks.

24761: BIOTITE-QUARTZ-OLIGOCLASE GRANOPHYRE MILDLY SERICITE ALTERED; MINOR CLOTS OF PYRRHOTITE-EPIDOTE-CHLORITE-SPHENE

Dark grey, medium-grained, biotite-rich granophyre containing some dark patches with rectangular outlines that look to be after mafic minerals. The rock is magnetic, and contains significant disseminated pyrrhotite. In thin section, the modal mineralogy is:

Quartz (partly secondary)	35%
Plagioclase (oligoclase-andesine)	25%
Biotite	25%
Sericite (after plagioclase)	5%
Epidote or clinozoisite (after plagioclase)	3%
Opaque (?mainly pyrrhotite)	3%
Chlorite	1%
Sphene	1%
Apatite	<1%

This rock is much as described for 24756 in terms of mineralogy, although the texture is a little more typical of derivation from a gabbro than a sediment. Quartz forms subhedral crystals and aggregates up to almost 2 mm across, with optical continuity and enclosing ragged feldspar crystals. The intergrowth is micrographic in places. Quartz is mildly strained (undulose extinction and fractures or lamellar deformation).

Feldspar crystals are sub- to anhedral and up to 0.5 mm long, with relief close to that of quartz and polysynthetic twinning extinction angles about 6-8 ° suggesting compositions around An_{25-30} (oligoclase). Most show minor to moderate alteration to fine flakes of sericite and crystals of (clino)zoisite. No K-feldspar was observed.

Biotite crystals are subhedral and up to 0.5 mm diameter, with pleochroism as in 24756. There is no alteration to chlorite except in the cores of clusters of pyrrhotite grains (associated with clinozoisite and sphene). Chlorite has green pleochroism and anomalous blue birefringence (?Fe-rich). Rare patches of biotite have roughly rectangular outlines, possibly suggestive of replacement of former amphibole crystals. Sphene forms subhedral crystals up to 0.35 mm long, often associated in clusters with clusters of biotite and pyrrhotite, plus rare euehdral apatite crystals up to 0.15 mm long. Pyrrhotite forms sub- to anhedral crystals up to 0.4 mm across.

Biotite in this sample is presumably related to proximity to a gabbro sill. Although very weak, alteration in this specimen, especially the "clots" of pyrrhotite-epidote-chlorite-sphene, is similar in character to that observed in the Sullivan-North Star corridor (Leitch et al, 1991). However, the sericite-epidote after feldspar is weak and could be regionally distributed. No garnet was seen.

Leitch, C.H.B., Turner, T.J.W. and Höy, T. (1991): The district-scale Sullivan-North Star alteration zone, Sullivan mine area, B.C.: a preliminary petrographic study; in Current Research, Part B, G.S.C. Paper 91-1E, p. 45-57.

24763: SERICITE-CHLORITE-CLINOZOISITE-GARNET ALTERED FINE FOLIATED SILTSTONE CUT BY ALBITE AND CHLORITE FRACTURES

Light greenish grey, vaguely laminated fine siltsone crossed by fractures of dark ?biotite and more vaguely defined white ?albite. Minor limonite staining; non-magnetic. In thin section, the mineralogy is:

Quartz (detrital, partly recrystallized)	30%
Muscovite, sericite	25%
Biotite (partly chloritized)	15%
Alkali feldspar (?albite)	10%
Epidote (?clinozoisite)	10%
Chlorite	5%
Garnet	3%
Opaque, limonite	1-2%
Zircon (?), apatite	tr

The bulk of this rock consists of fine quartz with interstitial sericite and clinzoisite, the latter minerals possibly after feldspar. Certain portions of the rock are richer in clinzoisite and garnet.

Quartz forms subhedral, distinctly flattened grains up to 0.15 mm long, elongated parallel to the foliation which is crudely defined by concentrations of sericite between the quartz grains. Most of the biotite is partly chloritized, but fresh remnants are pleochroic in red-brown to pale yellow as in the granophyre. Chlorite is pleochroic in green and has weak anomalous blue interference colours, i.e. Fe-rich; some biotite is green, possibly intermediate between fresh biotite and chlorite. Epidote forms sub- to euhedral crystals up to 0.1 mm diameter with no detectable colour, indicating an Fe-poor composition (clinozoisite). Garnets are eu- to subhedral and very fine, rarely over 0.1 mm in diameter. They appear to be concentrated in certain layers and absent in others (commonly seen in Aldridge sediments), and appear to be destroyed in the white fracture-controlled "bleached" areas of the rock. These areas contain increased amounts of very fine, anhedral alkali feldspar (probably albite: although twinning cannot be seen, relief is less than quartz but not low enough for K-feldspar). The ?albite is similar to the feldspar seen throughout the rock, but ranges up to 50% of the rock in the bleached areas compared to 10-20% interstially elsewhere. Dark fractures in the rock consist mainly of green chlorite-hydrobiotite, with minor distinctly twinned crystals of plagioclase (extinction 16° indicates albite).

Apatite forms minute cloudy euhedra up to 50 μm in diameter and ?zircon crystals are euhedral, up to 70 μm long. Opaque grains up to 0.1 mm and limonite staining are common throughout the rock; they could be in part after former sulfides. This rock is certainly altered; the presence of abundant epidote and modest garnet, both indicators of hydrothermal activity at North Star, are of interest although the garnet should be checked for its Mn content. Albite and chlorite on fractures are found next to many sills in the Aldridge as well as near Sullivan.

24767: FINE QUARTZ-MUSCOVITE-GREEN BIOTITE WACKE WITH MINOR K-FELDSPAR PATCHES AND ?PSEUDOMORPHS AFTER ?GARNET

Dark grey, fine-grained, even-textured, non-magnetic wacke characterized by scattered oval light-coloured patches and minor fractures. In thin section, the modal mineralogy is:

Quartz (mainly detrital)	35%
Muscovite, sericite	30%
Biotite (green)	25%
K-feldspar (microcline)	5%
Plagioclase (?oligoclase-andesine)	3%
Opaque	1%
Limonite	<1%
Apatite, ?zircon	tr
Tourmaline (?detrital)	rare

This rock consists of a framework of detrital quartz grains in two size ranges: coarse, up to 0.3 mm, and finer interstitial, gnerally less than 0.1 mm. Most are slightly elongate or oval, with long axes subparallel to ?layering. The grains are moderately strained (undulose extinction); overgrowths are rarely seen.

The matrix between quartz grains consists largely of micas, principally muscovite or sericite, and a biotite with deep brownish green pleochroism. Both muscovite and biotite flakes are eu- to subhedral and up to 0.15 mm in diameter.

Feldpar is mainly absent in this rock, suggesting that at least part of the sericite is developed by alteration of the feldspar. In a few places relict plagioclase can be seen as ragged crystals up to 0.05 mm across with relief about the same as quartz suggesting a composition near oligoclase-andesine. The white patches seen in hand specimen, on the other hand, consist of lenses of coarser quartz and minor K-feldspar (microcline, with grid twinning, up to 0.15 mm diameter). I am not sure of the significance of K-spar in Aldridge rocks; such lenses could be incipient pegmatitc "sweats" such as seen in the higher-grade areas near St. Mary River, but these lenses are also seen near Sullivan. In one layer of the rock, there are prominent 0.5 mm subhedral porphyroblastic crystals of K-feldspar, with many inclusions of quartz and mica, that have the shape, size and distribution of garnets in other rocks I have seen; they are also located in a more sericitic, finer-grained layer, characteristic of garnets elsewhere.

Opaque crystals are generally tabular (?implying ilmenite) and are up to 0.1 mm long. Euhedral apatite and zircon (?) crystals are up to 65 μm long. Rare tourmaline, probably detrital, is present as euhedral prisms up to 75 μm long with deep brown-green colour (intermediate schorl-dravite).

It is difficult to be sure what the significance of this rock is; it could be marginally muscovite altered, and there may have been garnet present. It could be, but is not necessarily, peripheral to a more altered zone.

24771: MUSCOVITE-BIOTITE RICH, QUARTZ-POOR, FINE WACKE ("ARGILLITE") CONTAINING ?FELDSPAR AUGEN

Dark grey-brown, very fine-grained, laminated and foliated wacke, again with some small white spots. The rock is weakly magnetic; there is no reaction to cold dilute HCl. Modal mineralogy in thin section is roughly:

Sericite (muscovite)	50%
Quartz (detrital)	25%
Biotite	20%
Feldspar (?plagioclase) augens	3%
Opaque	2%
Limonite	<1%

This rock is unusually rich in mica, principally fine muscovite or sericite, and lesser biotite. Quartz is definitely subordinate, suggesting it would fall into the "Argillite" class of Edmunds (1977). Muscovite is present both as a fine-grained (about 50 μm) matrix and as rare larger (to 0.1 mm) euhedral flakes. Both are sub-parallel to and help to define the foliation in this rock. Biotite is present as coarser flakes up to 0.2 mm diameter generally parallel to foliation, with deep blackish-brown to red-brown pleochroism. Most flakes include some fine opaque grains, some of which are tabular (?rutile or ilmenite, or perhaps hematite) and up to 0.05 mm long.

Quartz grains look to have been detrital but are now strongly flattened, with length to width ratios up to 5:1, and are up to 0.1 mm long. They show signs of significant deformation and recrystallization, and are oriented parallel to foliation.

Parts of the rock are characterized by "augen" of porphyroblastic quartz and ?feldspar up to 0.5 mm across, full of inclusions of mica and minor opaques. Although none show any twinning, the relief of these crystals is slightly below that of included quartz, suggesting they may be plagioclase rather than K-feldspar. Textures suggest syn-metamorphic/deformation growth of the augen.

This rock is similar to 24767 in many respects (mineralogy, foliation, texture, feldspar "augen"). Again, the abundance of muscovite (sericite) is suggestive, but does not prove, proximity to a zone of hydrothermal alteration. The way to resolve this question is not at thin-section scale, but to see if all the beds (not just this 2 cm one) and in fact most of the outcrops in a given area are similarly enriched in muscovite. This is easy once the eye is attuned to the muscovite.

24775: ALBITE-CHLORITE-EPIDOTE-MUSCOVITE-SPHENE-GARNET-?SULFIDE ALTERED COARSE QUARTZ-RICH WACKE OR "QUARTZITE"

Light grey to white, medium-grained, apparently quartz-rich wacke or quartzite, cut by brwon limonitic fractures. The rock is not magnetic. In thin section, the modal mineralogy is approximately:

Quartz (coarse, mainly detrital)	65%
Feldspar (plagioclase, ?albitic)	15%
Biotite (partly chloritized)	5%
Chlorite	5%
Zoisite and clinozoisite	5%
Muscovite, sericite	3%
Sphene	1%
Garnet	1%
Opaque	<1%

Quartz grains are coarse and an- to subhedral, up to 0.7 mm diameter. They show mild strain effects, but have a recrystallized look (development of polygonal grains) suggesting alteration when taken in conjunction with the rest of the mineralogy of the sample.

Interstices between quartz grains are occupied mainly be feldspar and biotite, both partly to completely altered. Feldspar forms anhedral to subhedral crystals up to 0.1 mm across, or aggregates up to 0.2 mm long. The relief is mainly less than quartz, suggesting albite or albite-oligoclase; there is no twinning. Most are mildly to partly replaced by fine flakes of sericite and crystals of epidote. The rock is crossed by thin (0.1 mm) veins of feldspar which have relief distinctly lower than quartz, and are more obviously albite. In envelopes on both sides of these veins, there appears to be an increase in feldspar (i.e., albitization) and biotite is chloritized. One such veinlet contains fine flakes of chlorite.

Biotite forms subhedral flakes up to 0.15 mm diameter that have brown pleochroism but are partly interleaved by pale green chlorite. Muscovite forms similar, but rarer, euhedral books to 0.35 mm diameter, especially where associated with opaque grains.

Chlorite forms eu- to subhedral flakes up to 0.1 mm in diameter, probably after biotite. Pleochroism is light green, with weak blue anomalous birefringence and length-slow character indicating significant Fe content. Epidote-group minerals include both ?zoisite, as eu-to subhedral crystals up to 0.1 mm diameter, and clinozoisite (with higher birefringence) as finer sub- to anhedral aggregates up to 0.05 mm across. Both lack any pleochroism and are thus probably Fe-poor. In one area of the rock, a large patch (0.5 cm diameter) consists of garnet, partly altered to chlorite, in the interstices of quartz grains; surrounding areas appear to be mainly albitized. Sphene, garnet and albite appear to be closely related.

Sphene is notable for its abundance in this rock, forming subhedral to rounded crystals up to 0.1 mm, aggregating to 0.25 mm across. Opaque grains are sub- to

euhedral and up to 1 mm diameter; they appear to be sulfides, partly replaced by limonite. Sphene is notably abundant in the albitized hangingwall at Sullivan; also, the association of opaques, possibly sulfides, with coarser crystals of zoisite and chlorite is typical of altered rocks in the Sullivan-North Star trend, and suggests that this rock could have been a quartz-rich wacke or "quartzite" that has undergone mild alteration to ?albite, chlorite, epidote, and sphene. However, note that albitization is common near gabbro sills in the Aldridge (e.g. near Goat River, Arrow Creek E. road). Typically, sandy (quartz-rich, coarse) beds albitize most readily. If the garnet is Mn-rich, it could possibly indicate proximity to a hydrothermal vent, although this criteria has yet to be tested regionally in the Aldridge.

24776: MUSCOVITE- AND BIOTITE-RICH LAYERED, ?K-FELDSPAR PORPHYROBLASTIC, FINE WACKE OR "ARGILLITE"

Brown, fine-grained, typically light and dark bedded biotitic siltstone/wacke. The most biotitic layers have white (?sericitic) layers adjacent to them. The rock is not appreciably magnetic. In thin section, the mineralogy is:

Muscovite (sericite)	50%
Biotite	25%
K-feldspar (?), possibly microcline	15%
Quartz (?detrital)	10%
Opaque	3%
Limonite	<1%
Zircon	tr

This rock is rich in mica, consisting essentially of fine muscovite (sericite) defining a weak foliation and containing varying amounts of biotite and porphyroblastic ?K-feldspar. Muscovite forms sub- to euhedral matted flakes averaging about 50 μm diameter, although in biotitic layers there are also coarser, euhedral flakes to 0.1 mm across. Biotite has deep greenish-brown pleochroism, and forms subhedral flakes to 0.15 mm diameter.

As in several other specimens in this suite (24767, 24771) this rock contains abundant porphyroblastic crystals that appear to be K-feldspar. The crystals are euhedral to rounded, with the approximate shape of garnets, and a distribution (concentrated in certain layers) similar to that of garnet in rocks I have seen. Unfortunately none of the porphyroblasts contain identifiable quartz, so it is difficult to compare the refractive index to quartz. However, the interference figure indicates a biaxial mineral with large negative 2V, appropriate for orthoclase or microcline, and there is vague grid twinning and zoning present.

It is difficult to say how much quartz is present, since many clear grains are not in contact with the ?K-feldspar. However, the usual abundant detrital quartz is essentially absent, implying an unusually argillaceous protolith or intense muscovite alteration.

Opaques are also unusually common, forming sub- to euhedral crystals with cubic to rectangular outlines that suggest ?pyrite before oxidation to limonite. However, no sulfide is visible in the hand specimen. Certain layers, notably those rich in sericite, are rich in these opaques (in biotitic layers, opaques are mostly fine ?rutile-ilmenite or hematite, contained in the biotite).

This is an unusual rock, outside my experience in the Aldridge particularly if the identification of substantial K-feldspar is confirmed by subsequent stain testing (which I recommend for all the offcuts where K-spar is tentatively identified optically). It is difficult to speculate on the possible former presence of garnet in this rock, based as it is on the shapes of the ?K-feldspar porphyroblasts.

24779: FINE SAND-SIZED WACKE WITH AREAS (?BEDS OR FRAGMENTS) RICH IN MICA AND K-SPAR OR CHLORITE PSEUDOMORPHS OF ?GARNET

Grey, but rusty-weathering fine sand or silt sized wacke containing dark coloured 2-3 mm thick ?fragments elongated parallel to bedding or ?fracture envelopes. The rock is also cut by thin light-coloured fractures crossing bedding. In one of the dark areas there are 1 mm white patches with the form and distribution characteristic of garnets. Mineralogy in thin section is as follows:

Quartz (detrital)	35%
Muscovite, sericite	25%
Biotite	20%
Feldspar (mainly plagioclase?)	15%
Opaque	3%
?K-feldspar (after ?garnet)	1%
Limonite	1%
Chlorite (?)	<1%
Zircon, apatite	tr

This specimen consists of the ususal framework of detrital quartz grains, about 0.1 to 0.4 mm in diameter, and interstitial feldspar, mica and opaques. Quartz grains are rounded to anhedral, with some evidence of secondary overgrowths (?silicification) on the larger grains. They are clear and relatively unstrained. Feldspar grains are finer (0.05-0.1 mm) and anhedral, with a few twinned examples and relief lower than quartz suggesting plagioclase of about oligoclase-albite composition. Most grains are lightly flecked by clay-sericite (due to weathering) or replaced at their margins by micas (probably during metamorphism), so there is little chance that the feldspar is secondary albite. Also, it is not distributed around veins or fractures; it looks original.

Micas include euhedral to subhedral flakes rarely to 0.2 mm of muscovite and 0.05 mm of biotite, the latter with a brownish green pleochroism. Opaques, commonly subhedral and up to 0.2 mm across, are abundant in this rock. They are not obviously sulfide in hand specimen, but a few grains of limonite in the thin section have the appearance of being after sulfide (1-2 % is not unknown in the Aldridge). The usual fine (50 μm) ?zircon and apatite crystals are present.

The dark or unusual layers consist of concentrations of mica (both muscovite and/or biotite) as well as round patches up to 0.5 mm across that appear to be composed mainly of K-feldspar (large negative 2V) with minor mica. They look to be pseudomorphs after some mineral (as in 24776), such as garnet. This is purely speculation, but the speculation is reinforced by the occurrence of these pseudomorphs in the mica-rich areas (seen elsewhere) and the fact that some are replaced by ?chlorite (iron-stained).

This appears to be a typical fresh, unaltered Aldridge wacke, but contains more opaque than normal and may contain ?altered relics of garnet.

24782: FINE SAND-SIZED QUARTZ-MUSCOVITE-BIOTITE-ALBITE WACKE CONTAINING SMALL DARK COARSER SAND-SIZED ?CLASTS

Dark brown-green fine sand or silt-sized wacke containing scattered 2-3 mm rounded clasts. Very slightly magnetic in places. In thin section, the mineralogy is:

Detrital quartz	45%
Muscovite	25%
Biotite	15%
Feldspar (?mainly albitic plagioclase)	13%
Opaque	2%
Limonite	<1%
Epidote	<1%
Zircon (?)	tr

This rock consists of the typical framework of detrital quartz grains separated by interstitial micas and minor feldspar. Quartz grains are anhedral and angular, and up to 0.2 mm in diameter. Larger grains show minor overgrowth of silica; there are also some fine (10-20 μm) grains interstitially, with the micas.

Muscovite forms euhedral flakes of up to 0.5 mm diameter, although generally they are 0.1 to 0.2 mm across. Biotite has a deep greenish-brown pleochroism and forms euhedral flakes to 0.1 mm diameter.

Feldspar appears to be all plagioclase, forming sub- to anhedral grains up to 0.1 mm across except in the "clasts" where they are up to 0.2 mm. The grains are clear and fresh, some with twinning (Y^010=12 °) and relief below quartz that suggests albitic compositions around An_{10}. This does not however appear to be secondary albite; the textures are not consistent with hydrothermal alteration.

Opaques form eu- to subhedral crystals up to 0.15 mm long that may in part be ilmenite (tabular shape). There are traces of limonite, although none look to be derived from oxidation of sulphides. Rare patches of fine-grained ?epidote crystals up to 50 μm long are seen, as are rare euhedral zircon (?) crystals to 90 μm long.

The rounded "clasts" are composed mainly of coarse quartz averaging about 0.2 mm, with minor biotite, muscovite and plagioclase plus rare opaques, all to 0.2 mm diameter. These may represent fragments of a coarser sandstone.

This specimen does not appear to show any effects of hydrothermal alteration.

24784: FINE SAND-SIZED WACKE OF QUARTZ, MUSCOVITE, AND BIOTITE, WITH ?LAYERS CONTAINING K-SPAR AFTER ?GARNET

Dark grey-brown fine sand-sized wacke containing a 1-2 mm ?layer or fracture envelope of browner material containing small grains of an orange-brown mineral. There is no reaction to cold dilute HCl, however, and the rock is not appreciably magnetic. Mineralogy in thin section is:

Detrital quartz	35%
Muscovite	35%
Biotite	25%
K-feldspar (?)	3%
Plagioclase (?albitic)	2%
Opaque, limonite	<1%

Quartz in this sample is of two distinct size ranges; mainly less than 0.1 mm, and up to 0.3 mm. The coarser grains show some secondary overgrowths. Interstices between quartz grains are filled by muscovite and biotite flakes, of up to 0.2 and 0.1 mm respectively, although like quartz the muscovite shows two size ranges. Biotite has very deep blackish-brown pleochroism. Rarely, minor grains of plagioclase are seen which look fresh, so although their composition appears to be albitic (extinction angles up to 15 ° and relief mainly below quartz) it is unlikely to be secondary albite. In fact, there appears to be unusually little feldspar in this specimen compared to normal Aldridge sediments, although this could be merely because it is mainly untwinned. Opaque grains are concentrated in certain layers, suggesting they are of sedimentary origin; they are mainly limonite but may include some rutile, and are mainly found in the biotite.

The most unusual feature of this specimen is the presence of what appear to be rounded crystals or aggregates of ?K-feldspar, similar to those seen in 24776 and 779. These are ovoid and up to 0.4 mm in diameter; they show no twinning but some have what looks like perthitic texture, and relief is less than the minute grains of quartz they poikilitically include. They have the appearance of being after porphyroblastic garnets, and occur in mica (muscovite and/or biotite) rich areas. There are also clots of biotite up to 0.5 mm across and opaques (mainly limonite ?pseudomorphs after former mafic minerals or ?sulfides, up to 0.5 mm long) in these layers.

I see little in this rock to suggest proximity to hydrothermal alteration; the presence of altered porphyroblastic K-spar that could possibly be after garnet is interesting.

24786: QUARTZ-FELDSPAR (?ALBITE-OLIGOCLASE) RICH SAND-SIZED WACKE, ALTERED TO CHLORITE AND MINOR CLINOZOISITE

Light brownish-grey to whitish, altered medium to fine sand sized wacke. The light purplish-brown areas are unaltered (biotitic) while the lighter colour is due to bleaching (typically muscovite-chlorite alteration, commonly quite late; it is not certain that it is related to Proterozoic hydrothermal activity). Such alteration is widespread in the Aldridge. Mineralogy in thin section is:

Quartz (detrital)	50%
Feldspar (?detrital, albite-oligoclase)	15%
Biotite (partly chloritized)	10%
Chlorite	10%
Muscovite	10%
Epidote/clinozoisite	3%
Opaque (some hematite)	1%
Limonite	<1%
Tourmaline (schorl)	<1%
Zircon	tr

This is a quartz-rich sediment, tending towards an impure quartzite. Quartz grains are rounded to anhedral and up to 0.5 mm in diameter, with overgrowths suggesting mobilization of silica. Smaller grains about 0.1 mm diameter are mixed with sub- to anhedral grains of detrital plagioclase of similar size. Twinning is rare in these, but relief near that of quartz (slightly below to slightly above) suggests compositions around albite-oligoclase. Most feldspar grains show incipient alteration to clay and limonite, making it easy to estimate their abundance. Although the rock in hand specimen looks like it could be albitized, the textures in thin section are not convincing as such; the feldspar looks detrital rather than secondary, except along the fractures.

Micas are less abundant than normal, and comprise fine biotite as sub- to euhedral flakes to 0.2 mm diameter that are partly chloritized, especially along fractures that coalesce to form irregular bleached areas where chlorite is common, forming sprays of subhedral flakes up to 0.2 mm in diameter. Epidote, or more likely Fe-poor clinozoisite, is also common as patches up to 0.15 mm across.

Scattered opaque grains are up to 0.1 mm diameter; some are revealed to be hematite where exposed as thin flakes. There are the usual rare crystals of ?detrital coarse dark green schorlitic tourmaline, up to 0.1 mm long, scattered in the rock, and also rare ?zircon crystals to 50 μm long. Minor limonite is found in intergranular sites due to weathering.

It is not clear whether this rock is hydrothermally altered or is merely distal to a Moyie sill, causing weak "bleaching" (chlorite-epidote-albite alteration). Certainly the rock is not fresh and unaltered.

24788: K-FELDSPAR AND CARBON (?) RICH, FINE SAND-SIZED WACKE

Very dark grey to blackish, fine-grained rock with irregular blotchy dark mottling. It is not magnetic. In thin section, the mineralogy is:

K-feldspar (?)	35%
Quartz (?detrital)	25%
Muscovite	20%
Biotite	15%
Chlorite	2%
Opaque (?mainly carbon)	1%
Epidote (clinozoisite)	1%
Sphene, ?allanite, ?rutile	1%
Apatite	<1%

This is an unsual rock, which appears to be composed mainly of feldspar rather than quartz. I have not seen any like it, or read of them in Edmunds (1977) descriptions. The feldspar is like that tentatively identified in 24767, 76, 79, and 84, apparently a K-feldspar as rounded to anhedral crystals up to 0.25 mm across. Most show no twinning, but have a fuzzy extinction not characteristic of quartz; a few have traces of "grid" twinning characteristic of microcline. All appears to have relief substantially less than quartz; however, I would feel more confident of the identification if it were confirmed by staining. Most grains are full of inclusions of mica and quartz, suggesting growth or recrystallization during metamorphism.

Quartz grains are generally finer than the feldspar, averaging about 0.1 mm or less; there appear to be layers richer in quartz alternating with layers richer in feldspar. Muscovite is abundant, forming euhedral flakes of 0.05-0.1 mm diameter, in places mixed with biotite which is coarser (up to 0.2 mm diameter). In some places the biotite is partly altered to chlorite, or interleaved by muscovite.

Alteration minerals include minor epidote (Fe-poor, probably clinzoisite) as patches of fine-grained anhedral crystals similar to those seen in 24786.

The dark patches are caused by aggregates of very fine (micron-sized) opaque, possibly organic carbon. In places there are also grains of sphene up to 0.1 mm long which fall along trails and include semi-opaque minerals, probably allanite (rare-earth-bearing epidote) and possibly rutile or ilmenite. This suite (?carbon, sphene, epidote, allanite) is found concentrated in the dark bands of marker horizons. There are also a few grains of apatite and ?zircon to 50 μm long.

I am not sure of the significance of the feldspar in this rock - whether or not it is due to alteration is not clear. Certainly it makes one wonder whether the K-spar ascribed to being after ?garnet in other samples really is pseudomorphing that mineral. Apart from this feature, the other unusual minerals are, as mentioned, more typical of the marker horizons than altered rocks.

24790: QUARTZ-RICH BIOTITE-MUSCOVITE FINE SAND-SIZED WACKE CUT BY MINOR BLEACHED (CHLORITE-MUSCOVITE) FRACTURES

Similar to 24788, a light purplish brown (biotitic) medium to fine sand-sized wacke cut by irregular fracture-controlled bleaching. In thin section, the mineralogy is:

Quartz (detrital)	55%
Muscovite	20%
Biotite	15%
Feldspar (?secondary, albite and K-spar?)	5%
Chlorite	2%
Hydrobiotite	1%
Opaque (including some ?carbon)	1%
Tourmaline (schorl)	<1%
?Zircon	tr

This sample, in direct contrast to 24788, appears to be very poor in feldspar. Quartz grains have thin fuzzy margins where they touch (and in the usual sites for feldspar), but none can be positively identified; their sites may be occupied by muscovite and ?secondary silica. Quartz grains are mainly anhedral and interlocking, up to 0.3 mm diameter; there is some evidence for silica overgrowth. Along thin veinlets or fractures, which appear to be mainly composed of secondary quartz, there are some grains with relief less than quartz (possibly albite, although there is no good twinning evident to confirm this) and some with very low relief that may be K-feldspar. Both appear to be secondary. Some feldspar may be replaced by muscovite (sericite).

Muscovite flakes are mainly euhedral and up to 0.3 mm diameter, while biotite (deep brown pleochroism) are rarely over 0.1 mm. In places, particularly where there are "clots" of hydrobiotite and limonite (?after sulfide), the biotite is altered to a iron chlorite (anomlaous blue interference colours, green pleochroism). The hydrobiotite has characteristics intermediate between those of chlorite and biotite; it forms fine matted aggregates of 20 μm flakes. Although they are minor in this rock, "clots" (mostly with sulfide) are characteristic of fringe altered rocks around either hydrothermal systems or Moyie sills.

There are the usual scattered traces of tourmaline as euhedral brown-green schorlitic crystals to 75 μm long, and possible zircon crystals to 50 μm. Rare patches of fine opaque material may be carbon similar to that seen in 24788.

The "bleached" fracture envelopes, readily observed in hand specimen, are difficult to distinguish in thin section. However, they appear to be loci of minor feldspar (?mainly albitic), chlorite after biotite, and sericite after feldspar. As in other samples, this alteration could indicate hydrothermal alteration or alteration related a gabbro sill. In either case, it is certainly not intense.

24792: MUSCOVITE-BIOTITE RICH FINE SAND SIZED WACKE CONTAINING SERCITIZED PATCHES OR ?CLASTS; NO FELDSPAR

Grey-brown biotitic fine sand or silt-sized wacke cut by numerous thin discontinuous paler-coloured fractures. The rock is not magnetic; there is no obvious sulfide, but there are a few clots of limonite that could be after sulfide. In thin section, the modal mineralogy is:

Detrital quartz	35%
Muscovite, sericite	35%
Biotite	25%
Opaque (limonite, unidentified and ?carbon)	2%
?K-feldspar	1%
Tourmaline (schorl)	<1%
Apatite	tr
Allanite (?)	tr

This rock consists of a framework of fairly coarse quartz grains (anhedral, up to 0.3 mm diameter) separated by abundant micas, especially muscovite (and finer sericite). There is evidence for minor overgrowth of secondary silica, but the main ?alteration feature appears to be the lack of feldspar, possibly due to sericitization. Muscovite is present in two forms: coarse euhedral very thin flakes up to 0.3 mm diameter (?possibly detrital) and fine mats of 20-50 μm flakes between the quartz grains. This form of alteration, as opposed to the fracture-controlled "bleaching" seen in 24788 and 24790, is more characteristic of hydrothermal alteration associated with the Sullivan-North Star trend. Rare rounded grains to 0.2 mm with low relief, characteristically spotted by ?carbon, may be K-feldspar.

Biotite forms euhedral to subhedral flakes up to 0.15 mm diameter with red-brown to greeny blackish brown pleochroism. In places, biotite is almost lacking, although these areas appear to be as much elongate ?clasts to 1 cm long as to be fracture envelopes. These areas reinforce the suggestion that hydrothermal muscovite may be present in this rock.

Rare euhedral ?detrital tourmaline crystals are up to 0.15 mm long; their deep greenish brown pleochroism suggests Fe-rich compositions such as schorl. Apatite crystals are euhedral and up to 35 μm long. Minor allanite shows up as minute (5-15 μm) crystals surrounded by radiation-damage pleochroic haloes in biotite. Opaques include limonite in certain larger grains that could be after sulfides as well as euhedral grains to 0.15 mm across that could be ilmenite or other Fe-Ti oxides.

24802: MUSCOVITE-GREEN BIOTITE-MINOR CHLORITE ?ALTERED FINE SILT-SIZED WACKE; MINOR METAMORPHIC QUARTZ, AND LIMONITE

Dark greenish grey, fine sand or silt-sized wacke with a phyllitic sheen and minor limonite on foliation surfaces. There are rare rusty clots to 1 mm diameter and minor thin white veinlets. Mineralogy in thin section is:

Muscovite (sericite)	35%
Quartz (detrital)	30%
(metamorphic sweats)	5%
Biotite (green)	25%
Chlorite (after biotite)	2%
Opaque	2%
Limonite	1%
Apatite	tr

Most of this rock consists of very fine sand-sized (25-50 μm) quartz grains and mica flakes. Alternating layers are enriched in quartz and mica. In places, between the layers, there are discontinuous lenses of coarser (up to 0.2 mm) quartz, mica and limonite. The latter quartz is moderately strained (undulose extinction, sutured grain boundaries) and also forms "augen" strung out along the layering/foliation. There is no feldspar evident in this specimen, possibly due to its complete replacement by fine muscovite (sericite).

Biotite forms subhedral books up to 0.1 mm in diameter that are oriented both perpendicular and parallel to the foliation, implying metamorphic growthsyn- and post-deformation. The colour ranges from brown to green, apparently due to incipient chloritization around the margins. In some layers it is entirely green, and in others it has been completely replaced by an Fe chlorite with anomalous blue interference colours.

Opaques are common, forming sub- to euhedral crystals up to 0.1 mm across with a tabular form that suggests ilmenite. Other very fine (micron-sizd) grains may be carbon. Much of the limonite in this sample is present along foliation planes and may be transported, but in the metamorphic sweats some larger grains up to 0.15 mm across may be in situ and possibly after former sulfides. Rare euhedral crystals of apatite are up to 35 μm long.

In summary, this appears to be what I would class as a "muscovite-chlorite altered" sediment in the Sullivan area. However, away from this area it is not possible to be certain that the muscovite is due to hydrothermal alteration.

24807: QUARTZ-RICH FINE SAND-SIZED WACKE, CONTAINING MINOR GARNET, ALTERED TO ALBITE-CHLORITE-SERICITE-EPIDOTE-SPHENE

White to pale greenish, bleached and altered medium to fine sand-sized wacke characterized by pale rusty "clots" and some greenish alteration envelopes on fractures. In thin section, the mineralogy is:

Quartz (detrital and secondary)	60%
Relict feldspar (?albitic, sericitized)	10%
Muscovite, sericite	10%
Epidote (clinozoisite)	10%
Chlorite (after biotite)	5%
Relict biotite	3%
Garnet	1%
?K-feldspar or albite (veinlets)	<1%
Sphene	<1%
Tourmaline (schorl)	<1%

This is a quartz-rich, but also distinctly altered rock that consists of quartz (partly secondary) with interstitial feldspar (partly altered, partly secondary) and secondary muscovite, epidote, chlorite and sphene. The rock is crossed by thin (<0.1 mm) veinlets of feldspar with broad (up to 1 mm) envelopes of variable alteration.

Quartz forms mainly anhedral detrital grains to 0.25 mm diameter that appear to be somewhat recrystallized to and overgrown by secondary silica. In the interstitial feldspar sites, feldspar ranges from fresh and with low relief in the veinlets and adjacent material (probably all albite, although the veinlets could be K-feldspar) to strongly replaced by epidote, sericite and sphene farther away. Most feldspar crystals are anhedral and less than 0.1 mm across; there is no twinning, but low relief suggests it is albitic.

Muscovite forms subhedral flakes up to 0.05 mm diameter (possibly detrital) as well as fine ragged sericite to 25 μm after feldspar and biotite. Epidote, which is probably mostly Fe-poor clinozoisite (no pleochroism), forms ragged secondary masses up to 0.1 mm across composed of fine anhedral crystals of up to 25 μm. Ragged bleached remnants of pale brown biotite are up to 0.1 mm diameter; most are pseudomorphed by pale green chlorite with anomalous blue interfernece colours indicating moderate Fe content. Minor sphene, as subhedral crystals to 50 μm long, appear to be part of the alteration assemblage (as observed in the albitite zone at Sullivan).

There are scattered, extremely sieve-like garnets up to 2 mm across that include much quartz, and are partly altered by chlorite, epidote and muscovite. They are cut by the feldspar veinlets. These garnets are not visible in the hand sample, even knowing they are present. Rare tourmaline crystals are the usual ?detrital deep green schorl to 25 μm.

This is a well altered rock containing garnet and sphene as well as albite, chlorite epidote and sericite, but the timing of the feldspathic alteration apparently post-dating the garnet is puzzling (note however that at North Star, it also puzzling that tourmaline replaces biotite).

24809: PARTLY CHLORITIZED SILT-SIZED WACKE WITH ABUNDANT DARK LAMINAE RICH IN ?CARBON AND LIMONITE; MINOR TOURMALINE

Very fine-grained, finely laminated sediment with alternating dark and light layers very much like a marker horizon; there are small white clots in most layers. Limonite is common along some layers, apparently spreading out from bed-parallel fractures. The rock is not magnetic; mineralogy in thin section is:

Quartz (mainly detrital)	35%
Muscovite, sericite	30%
Biotite	25%
Chlorite	5%
Opaque (?carbon)	2%
Limonite	2%
Tourmaline (schorl-dravite)	1%

The detrital framework is made up of fine (generally less than 50 μm) quartz as rounded to subangular anhedral grains. Interstices are filled with micas as subhedral flakes averaging about 50-75 μm for biotite and 25 μm for muscovite (sericite). There does not appear to be any feldspar; possibly it has been sericitized. Light coloured layers are rich in sericite, although they contain biotite as well.

The darker layers are composed of the same minerals as the light layers plus wispy concentrations of very fine opaque grains (?micron-sized carbon particles) oriented sub-parallel to the foliation. The concentrations of sphene, epidote and allanite common in these layers in specimens of the marker horizons appear to be lacking in this sample.

Biotite has dirty green pleochroism and appears to be partly chloritized, especially near "clots". The "clots" consist of coarse chlorite (length-slow, anomalous interference colours, moderately Fe-rich) as sub- to euhedral crystals up to 0.2 mm long, plus abundant limonite and some opaque. Some of the opaque (and limonite) may indicate the presence of minor sulfides. Some clots are composed mainly of metamorphic sweats of quartz.

Tourmaline is found as ?detrital euhedral pale green crystals up to 100 μm long, probably of intermediate dravite-schorl composition.

This rock is distinct from the others in this suite for its finely laminations, and abundance of dark layers rich in ?carbon and limonite. There may have been significant sulfide (now oxidized to limonite) in the clots with chlorite, and the abundant sericite plus lack of feldspar suggests possible proximity to hydrothermal alteration. In spite of the lack of sphene, epidote and allanite, this sample could represent a marker horizon (the amount of tourmaline is higher than most Aldridge sediments, but similar to the content in one marker horizon I have examined petrographically). The colour of the tourmaline is lighter, suggesting more Mg-rich composition (usually a vector toward hydrothermal vents).

PETROGRAPHIC REPORT ON 15 THIN SECTIONS FROM THE KYDD PROPERTY, B.C. (PROJECT NO. 140)

Report for: Gordon Allen
Granges Inc.
2300-885 West Georgia St.
Vancouver, B.C.
V6T 2Z4.

Nov. 28, 1992

Invoice attached

Samples submitted: 24662, 65, 67, 69; 24673, 78; 24680, 85; 24814, 16, 18, 22, 24, 28, 31.

SUMMARY:

The rocks in this suite are all Aldridge sediments that are generally mica (muscovite and/or biotite) -rich compared to many Aldridge specimens I have examined. In most cases this is probably due to an argillaceous, or clay-rich, original compostion. They may be divided into:

Fragmentals (24667) composed of variably biotite, muscovite or quartz rich clasts to 2 cm diameter; this sample could be important in exploration in defining a zone of weakness or upflow zone.

Fine to medium sand-sized wackes (24678, 80, 85) composed of detrital quartz to 0.5 mm, with significant plagioclase that appears to vary from albite to ?andesine in composition, and could be either primary or secondary, plus abundant sericite and minor to significant sulfides

Fine sand-sized to silt-sized wackes (24662, 65, 69, 73; 24818, 22, 24) composed of detrital quartz of 25 μm to 0.1 mm diameter, biotite and muscovite. Some are layered or laminated (24665, 73; 24814) with alternating quartz-biotite or muscovite-rich layers; others contain significant ?carbonaceous matter, causing light and dark laminations (24665, 24824) and 24665 contains significant carbonate. Several specimens contain enigmatic ?relict amphibole phenocrysts or clasts with rectangular, euhedral-looking outlines to several millimeters long (24662, 67, 78) while others contain chlorite porphyroblasts that could pseudomorph some earlier mafic crystal or have grown during metamorphism (24667, 73, 24814, 16).

Fine sand to silt-sized meta-argillites (24814, 16, 28, 31) composed of scattered biotite, chlorite, quartz or in places K-feldspar metacrysts in a matrix consisting almost entirely of fine muscovite.

Alteration (to apparently hydrothermal muscovite) is strongest in samples 24678, 80, and 85. In other samples, the abundant muscovite may not be hydrothermal but due to original clay-rich compositions. Apparent albitization in

24669 seems in thin section to be an unusual epidote-sphene-calcic plagioclase (andsesine) alteration. K-feldspar is seen in traces in a number of the samples of this suite (24662; 24816) and is more abundant in 24678 and 24831, although what its significance is, is not clear. Most tourmaline seen is the ubiquituous ?detrital variety, with relatively Fe-rich composition inferred from its greenish colour; however, in 24678, it is not only more abundant but its light colour suggests more dravitic (Mg-rich) composition, both signs of possible hydrothermal tourmaline. Hydrobiotite-chlorite alteration along fractures in 24824 and 28 is likely late, possibly even post-metamorphic.

Sulfide mineralization is restricted to 24680 (traces of pyrite and galena) and 85 (abundant pyrrhotite). The origin of these sulfides is not clear, but could be stratabound especially for the pyrrhotite; the pyrite and galena are strongly interstitial to quartz grains and more reminiscent of sandstone-type Pb deposits than Sullivan-type. Abundant limonite in some samples (24824, 28) does not appear to be after sulfides, but is rather transported, from weathering of Fe-bearing phases.

Craig H.B. Leitch, Ph.D., P.Eng.

(604) 921-8780 or 666-4902

24662: BIOTITE PORPHYROBLASTIC, FINE SAND-SIZED WACKE WITH ?AMPHIBOLE RELICTS REPLACED BY BIOTITE-QUARTZ

Dark grey, fine-grained, even-textured sediment marked by fine dark specks of ?biotite. Occasional 1-2 mm long dark ?clasts are present. The rock is not magnetic and does not react to cold dilute HCl. In thin section, the modal mineralogy is:

Biotite	35%
Muscovite	35%
Quartz (detrital)	25%
Feldspar (?K-feldspar)	2%
Opaque	2%
Sphene	1%

This rock consists of abundant biotite books and scattered coarse quartz grains in a fine matrix of muscovite and quartz. The rare ?clasts actually appear to be relicts, perhaps of some mafic mineral, that have been replaced by biotite and minor quartz, or quartz with minor biotite; the latter are slender needles up to 3.5 mm long. I have seen these in a few other places in the Aldridge; their origin is enigmatic, but detrital amphibole is a possibility.

Biotite forms subhedral flakes and books up to 0.15 mm diameter with deep brown pleochroism. Poikilitic inclusions of quartz indicate that the biotite is blastic, i.e. grew during (middle greenschist) metamorphism at around 400°C.

Detrital quartz grains are up to 0.2 mm diameter, although most are less than 25 μm in the matrix of the rock. The larger quartz grains are angular to subangular and show slight overgrowths of secondary silica.

Muscovite forms rare euhedral flakes up to 0.15 mm diameter as well as the matrix of fine subhedral flakes averaging about 30-40 μm in diameter. The latter is intimately mixed with fine quartz.

In some layers up to 0.2 mm thick, there are minor quantities of fine subhedral 25 μm grains that have lower relief than the quartz; cloudiness and vague ?twinning suggest they may be K-feldspar. Again, the origin of K-feldspar in the Aldridge is problematic since as detritus it should not have survived burial; perhaps it is metamorphic.

There are minor amounts of euhedral opaques (Fe-Ti oxides such as ilmenite and hematite) and subhedral sphene, both up to 0.1 mm across.

This is a typical biotite-facies metamorphosed Aldridge fine sand- to silt-sized wacke. Muscovite is more abundant than normal and plagioclase feldspar appears to be absent, but I do not have the sense that this is a significantly altered rock (the biotite is too fresh and there is no sulfide present).

24665:FINELY LAMINATED QUARTZ-BIOTITE-CARBONATE-CARBONACEOUS MATTER-SPHENE FINE SAND-SIZED WACKE

Dark grey-brown, finely laminated sediment that reacts strongly to cold dilute HCl but is not magnetic. Brown laminae appear to be mainly carbonate, although the framework of the rock is still mainly siliceous (cannot scratch with steel). In thin section, modal mineralogy is:

Quartz (?detrital)	35%
Biotite	35%
Carbonate (?mainly calcite)	15%
Muscovite	10%
Opaque (Fe-Ti oxides, limonite)	3%
(carbonaceous matter)	1%
Sphene	<1%
Tourmaline	<1%
Zircon	tr

This is an unsual sediment, consisting of scattered opaque grains, euhedral muscovite books, and biotite/opaque "clots" to 0.5 mm across in a matrix of quartz, biotite, carbonate. Vaguely defined thin laminae to 0.5 mm thick are relatively enriched in carbonate and biotite/quartz, respectively; they are separated by wispy partings richer in carbonaceous matter and sphene. Quartz forms the matrix of the rock, as subrounded sub- to anhedral ?detrital grains averaging about 0.1 mm but in places reaching 0.2 mm diameter. Poorly developed triple junctions between grains indicate a metamorphic overprint on their shape.

Biotite flakes are subhedral and also average about 0.1 mm diameter; they are pleochroic in light to medium brown. In the "clots", larger more euhedral flakes, in places interleaved by muscovite, reach 0.35 mm diameter.

Carbonate forms anhedral grains up to 0.1 mm diameter loosley concentrated in certain layers. Muscovite is present as unusual, euhedral coarse crystals up to 0.25 mm diameter. They are poikilitic, with abundant quartz inclusions indicating growth during metamorphism.

Opaques are eu- to subhedral and up to 0.3 mm across; they may be Fe-Ti oxides. Very fine (1-5 μm diameter) grains of carbonaceous matter are commonly found with concentrations of sphene. This is typical of the dark laminae in marker horizons in the Aldridge.

Rare ?detrital tourmaline forms euhedral prisms up to 100 μm long with light green-brown pleochroism indicating intermediate schorl-dravite compositions. Rare euhedral crystals of ?zircon to 65 μm long are found.

This is also an unusual sediment for the Aldridge, with abundant carbonate and muscovite confined to euhedral blastic crystals. I have seen a few similar rocks in the Middle Aldridge; it is somewhat like a marker horizon, but allanite is notably absent from the carbonaceous matter-sphene laminations. It does not appear to be hydrothermally altered, but could represent ?exhalitive activity (the significance of carbonate horizons is not yet understood, but keep this sample in mind).

24667: ?FRAGMENTAL CONTAINING VARIABLY BIOTITE, MUSCOVITE, OR QUARTZ-RICH CLASTS, CUT BY A SERICITIC ?FRACTURE ZONE

Fine dark brown to grey sediment with vague ?fragmental textures, cut by ?veins of lighter-coloured material and limonitic fractures. The rock scratches easily, but shows no reaction to cold dilute HCl; it is slightly magnetic. In thin section, modal mineralogy is:

Muscovite	40%
Biotite	30%
Quartz (?detrital)	20%
Chlorite (porphyroblasts)	5%
Opaques	2%
Limonite	2%
?Sphene	<1%
?Allanite	<1%

There are three major domains in the section: a large, lighter colour ?clast of 1-2 cm diameter, richer in quartz than the darker brown host which is richer in micas (biotite and muscovite), and a ?vein/fracture zone (or flattened or elongated clast) even more enriched in sericite (muscovite). Relict crystals up to 0.5 mm long are common in this rock, replaced by either chlorite or fine quartz-biotite as in 62.

The quartz-rich clast consists of rare angular 0.2 mm detrital quartz grains, blastic chlorite to 0.3 mm and finer biotite to 0.17 mm, plus rare muscovite flakds to 0.3 mm in a matrix of 25-50 μm quartz and sericite (?muscovite). Opaques are euhedral ?ilmenite or other Fe-Ti oxides up to 0.1 mm long, and there are rare subhedral crystals of ?allanite (or other radiactive mineral such as monazite) as 10-15 μm crystals surrounded by pleochroic haloes in biotite. At the margin of the ?clast, two ?relict mafic crystals up to 1 mm diameter are heavily replaced by biotite ?chlorite and opaque oxides.

The host brownish rock is richer in blastic biotite and fine sericite in the matrix, with less detrital quartz. Chlorite porphyroblasts are also more common, to 0.4 mm long; the chlorite is Fe-rich (length-slow, with blue anomalous birefringence and strong green pleochroism). The significance of these chlorite crystals in the Aldridge, which may be up to 3 mm long, has yet to be established.

The rest of the rock consists of a much finer-grained matrix of mainly sericite with little quartz, containing blastic chlorite to 0.5 mm long and lesser biotite but abundant fine (10-25 μm) opaques. The ?fracture zone is about 2 mm thick, and consists of a vuggy central zone of coarse chlorite, biotite and quartz plus limonite, with an ?envelope enriched in fine sericite.

Fragmentals are always considered important in Aldridge exploration; although it is not obvious that this rock is hydrothermally altered, many fragmentals at Sullivan contain a similar mineralogy.

24669: QUARTZ-BIOTITE FINE SAND OR SILT-SIZED WACKE CUT BY FRACTURES AND ZONES OF ?ANDESINE-EPIDOTE-SPHENE BLEACHING

Dark grey-brown fine-grained sediment cut and altered by whitish areas that are harder than steel, as well as by limonitic fractures. The darker areas are weakly magnetic, indicating that the minor sulfides are pyrrhotite; there is no reaction to cold dilute HCl. Thin section mineralogy is:

Quartz (mainly detrital?)	40%
Plagioclase feldspar (?andesine)	20%
Biotite	20%
Opaques (?mainly limonite)	10%
Epidote (?clinozoisite)	5%
Chlorite	2%
Sphene	2%
?Garnet	<1%
Tourmaline (schorl)	<1%

The framework of this rock in both brown and white areas appears to consist of quartz and relatively abundant ?feldspar grains, both an- to subhedral and up to 0.1 mm in diameter. The quartz is clear and relatively unstrained, with some triple junctions developed between grains. Interstitial grains that are cloudy appear to have relief higher than the quartz, suggesting a plagioclase feldspar of fairly calcic composition, perhaps andesine over An_{35}. This identification is tentative however and needs confirmation by X-ray diffraction or SEM studies, especially since the ?feldspar appears to be more abundant in the bleached areas, suggesting it may be unusually calcic compared to albite normally found near Moyie sills and hydrothermal systems.

Biotite forms subhedral deep brown flakes up to 0.1 mm diameter that are more abundant in the brown portions of the rock. In bleached areas they appear to be replaced by minor chlorite and also be epidote. Chlorite is moderately Fe-rich, with green pleochroism, birefringence, and length-slow character; it forms ragged flakes to 50 μm diameter, concentrated in "clots" with epidote and opaques. The epidote forms subhedral crystals up to 0.1 mm across lacking pleochroism (likely Fe-poor, clinozoisite) that suggest a distal position from hydrothermal activity; Fe increases in epidotes towards the North Star-Sullivan system. An- to subhedral sphene crystals up to 50 μm across are also found associated with the epidote, suggesting they are secondary; such concentrations of sphene are seen with albite and other alteration facies at Sullivan. Opaques are likely pyrrhotite, as anhedral crystals up to 0.2 mm across. One or two isotropic 0.2 mm crystals associated with epidote may be garnets. Tourmaline forms stubby euhedral ?detrital prisms up to 50 μm long with green colour indicating Fe-rich composition.

This is a well-altered rock similar in macroscopic appearance to albitized specimens near Moyie sills, but the feldspar appears to be unusually calcic. The epidote-sphene-chlorite-pyrrhotite-?garnet alteration is similar to that found distally in the North Star corridor.

24673: LAYERED QUARTZ-BIOTITE AND MUSCOVITE-RICH FINE SAND-SIZED WACKE WITH COARSE BLASTIC CHLORITE

Laminated dark grey to light grey fine-grained sediment with substantial limonite due to oxidation along fractures and the outside of the rock. Rock is somewhat similar in appearance to 24669, but is softer than steel, indicating sericite (muscovite) is abundant rather than feldspar. Non-magnetic, no reaction to cold dilute HCl. Mineralogy in thin section is:

Sericite (muscovite)	45%
Biotite	30%
Quartz (detrital)	20%
Chlorite (porphyroblastic)	3%
Opaque, limonite	2%
Allanite	tr
Tourmaline	tr

Alternating layers in this rock consist of 7 mm quartz-rich layers and interbedded biotite-quartz rich and muscovite-rich laminae. The quartz-rich layers are made of tightly packed subhedral to anhedral 50-70 μm detrital quartz with interstitial, lesser biotite of similar size and minor sericite to 35 μm diameter. Biotite has medium brown pleochroism, and often contains minute (5-15 μm) grains of a radioactive mineral, probably allanite. Opaques are tabular ?ilmenite or Fe-Ti oxide crystals up to 0.1 mm long, and thera are rare green euhedral schorlitic crystals of tourmaline to 50 μm long.

Micaceous layers range from almost entirely muscovite with minor biotite to more quartz-biotite rich and similar to that described above. The muscovite-rich layers are lighter in hand specimen, and contain common chlorite porphyroblasts up to 0.75 mm long, as well as rectangular patches of chlorite, biotite and lesser quartz up to 1.8 mm long. Chlorite is length-slow, with green pleochroism and blue anomalous birefringence indicating an Fe-rich composition. Muscovite of the matrix is about 25-35 μm in diameter, and is mixed with a little quartz. Opaques are similar to those described above, and are concentrated in the biotitic layers.

It is difficult to class this rock as muscovite altered even though feldspar is absent, since the texture does not appear affected and sulfides are apparently absent. However, it may be perpipheral to more altered rocks. The significance of the chlorite porphyroblasts is not clear.

24678: INTENSELY MUSCOVITE ALTERED FINE SAND-SIZED WACKE WITH K-FELDSPAR CRYSTALS AND TOURMALINE, CUT BY QUARTZ VEINS

Light grey-green altered sediment characterized by abundant disseminated fine white ?feldspar crystals, and cut by quartz-limonite veins to 2 mm thick. The rock is not appreciably magnetic; mineralogy in thin section is:

Sericite (muscovite)	65%
K-feldspar (porphyroblasts)	10%
Biotite	10%
Quartz (minor detrital; largely vein)	10%
Opaque (mainly limonite)	3%
Hydrobiotite	1%
Tourmaline	1%
Sphene, rutile	<1%

This rock consists of small (generally less than 0.5 mm) aggregates of feldspar, quartz and biotite/opaques in varying proportions set in a fine matrix of sericite crossed by limonitic fractures.

The aggregates are mainly composed of ?K-feldspar (relief lower than quartz) as subhedral crystals up to 0.25 mm diameter. In places there are minor amounts of other minerals admixed: quartz, biotite, muscovite, tourmaline, hydrobiotite and opaques. Biotite forms subhedral ragged flakes up to 0.1 mm with deep brown pleochroism, in general mostly partly altered to a yellow-greenish mineral like chlorite but still with significant birefringence, probably hydrobiotite. Other alteration products include traces of sphene and rutile as minute crystals up to 15 μm in size. Muscovite flakes are euhedral and up to 0.1 mm in diameter; tourmaline forms slender euhedral needles to 0.1 mm long with pale yellow-brown colour indicating significant Mg content (intermediate dravite-schorl). Opaques are subhedral to anhedral and probably mostly Fe-Ti oxides, although some could be sulfides oxidized to limonite.

The matrix is mainly sericite (fine-grained muscovite) as subhedral matted flakes about 25-50 μm in diameter. There are minor amounts of admixed quartz as subhedral to anhedral ?detrital grains up to 0.1 mm in diameter, clusters of minute sphene/rutile to 50 μm across, and unusually common prismatic tourmaline similar to that in the feldspar aggregates, to 0.1 mm long. Veins consist of coarse strained anhedral quartz up to 0.5 mm diameter and lesser anhedral K-feldspar of similar size, implying the K-spar in the wallrock could also be due to hydrothermal alteration. There are minor amounts of fine muscovite, as in the wall rocks, and limonite that looks to be *in situ*, i.e. after sulfides. Transported limonite spreads out into wallrock.

This is a strongly altered rock; original feldspar has been completely altered to very abundant sericite, biotite is partly altered to hydrobiotite, and the amount and composition of tourmaline are suggestive of its being hydrothermal rather than detrital. Significant quartz veining and limonite after ?sulfide are associated with this sericitic-tourmaline alteration.

24680: QUARTZ-?OLIGOCLASE-MUSCOVITE SAND-SIZED WACKE WITH SIGNIFICANT, PARTLY OXIDIZED PYRITE AND GALENA

White, strongly bleached sand-sized wacke characterized by fine specks of ?partly oxidized sulfide and minor limonite stains on fractures. The rock is not magnetic; mineralogy in polished thin section is approximately:

Quartz (detrital?)	55%
Plagioclase (?oligoclase)	25%
Muscovite, sericite	15%
Voids (?after sulfide/limonite)	2%
Pyrite, galena	1%
Ilmenite, rutile	1%
Limonite	1%
Tourmaline	tr
Zircon (?)	tr

The framework of the rock consists of detrital quartz grains up to 0.5 mm diameter. The grains are mostly anhedral and angular to subangular, with slight strain shown by undulose extinction. It is difficult to estimate the quartz abundance due to presence of abundant feldspar.

This rock contains significant amounts of feldspar, mostly plagioclase with an apparently unusually calcic composition. Most grains are less than 0.3 mm diameter and subhedral; extinction angles Y^010 range up to 13-15°, and relief is about the same as or slightly below quartz, suggesting oligoclase, An_{25-30}. Some grains are fresh, but many shlow slight to moderate flecking by fine muscovite (sericite). It is difficult to know if this is secondary or detrital feldspar: if secondary, why is it not albitic and id detrital, why is not more altered by sericite, in a rock that is indicated to be relatively altered by the bleached character and sulfide content.

Opaques include fine subhedral crystals of pyrite to 0.1 mm across, aggregates of galena to 0.5 mm, and fine (20 μm) intergrowths of ilmenite and rutile, plus common limonite. Most sulfides and limonite are associated with voids where other sulfides or limonite may have been plucked out during section preparation. Zircon (?) crystals are euhedral and up to 100 μm long; rare tourmaline crystals are similar in size and euhedral character, with light brown colour indicating intermediate schorl-dravite composition. They look detrital, but it is not possible to be sure.

The origins of sulfides in this sample are enigmatic. It is not common for the sulfides in the Aldridge to be pyrite rather than pyrrhotite, and galena is only known from mineralized areas; this suggests that the sulfides are associated with a hydrothermal system. However, it is not clear that the rock is hydrothermally altered because of the abundance of plagioclase which is not sericitized and not albitic. The position of the sulfides, in interstices between detrital quartz grains, is permissive of a sandstone hosted type Pb mineralization rather than a Sulivan type (note that ilmenite is common in such deposits, but in this sample it may be merely a normal component of the Aldridge).

24685: MEDIUM SAND-SIZED QUARTZ-?ALBITE-MUSCOVITE-BIOTITE WACKE CONTAINING SIGNIFICANT INTERGRANULAR PYRRHOTITE

Fine-grained, dark grey, altered sediment with abundant non-magnetic sulfide, possibly pyritic. Amount of sulfide is overestimated by the eye due to its very fine character and "plating" around silicate grains. Modal mineralogy in polished thin section is as follows:

Quartz (detrital)	50%
Sericite (muscovite)	20%
Biotite	10%
Plagioclase (?albitic)	10%
Pyrrhotite (oxidized to pyrite/marcasite)	10%
Tourmaline, zircon	<1%

This rock is similar to 24680 in its framework of detrital quartz with interstitial plagioclase and muscovite, but contains in addition significant intergranular sulfide and some biotite. Quartz forms angular to subangular corroded-looking detrital grains up to 0.5 mm across that are set in a "hash" of finer quartz, plagioclase, sericite, and biotite. Plagioclase abunance is difficult to estimate due to the similarity of its refractive index to quartz, but it appears to have somewhat negative relief. Extinction angles range up to Y^010=14° and Z^001=12°, suggesting An_5. Grains that are identifiable (twinned) are clear and unaltered, supporting the albite identification, although there could have been more fine interstitial feldspar that has been altered to sericite.

Muscovite forms fine subhedral flakes up to 0.1 mm in diameter, probably of both detrital and metamorphic origin, as well as fine ragged flakes that may be due to alteration. Biotite flakes are generally subhedral and less than 75 μm in diameter, with a pale brown colour suggesting partial bleaching (alteration to muscovite).

Opaques are found as intergranular films between quartz grains, concentrated in clots, and as lesser coarse crystals. Opaques are mainly subhedral grains of pyrrhotite to 0.5 mm across that are partly oxidized to lamellar aggregates of secondary pyrite and marcasite. The lamellar character probably indicates alteration rather than monoclinic pyrrhotite; the lack of magnetism suggests that most grains have lost their magnetism (more likely) or were hexagonal pyrrhotite (less lkely since hexagonal pyrrhotite is the high-temperature form). No base-metal sulfides were seen.

Both the greater abundance of sulfide and the texture and composition of feldspar in this rock suggest it is a strongly ?albite-muscovite altered wacke. Pyrrhotite is common in the Aldridge, but concentrations of this order are enough to be interesting to exploration. Genesis of sulfides is again enigmatic, since the textures are suggestive of sulfidization of the rock rather than bedded sulfides, but hydrothermal and/or metamorphic recrystallization could have altered the textures.

24814: FINE MUSCOVITE-RICH SEDIMENT WITH BIOTITIC LAMINAE AND RELICT ?CRYSTALS REPLACED BY BIOTITE-QUARTZ AND CHLORITE

Fine-grained, well bedded sediment with light grey muscovite-rich layers alternating with wispy brown biotitic laminae. Not appreciably magnetic. Modal mineralogy in thin section is:

Sericite (muscovite)	65%
Biotite	15%
Quartz (detrital and secondary)	15%
Chlorite	3%
Opaque	2%
Sphene, rutile	<1%
?K-feldspar	<1%
Tourmaline	tr
Allanite (?)	tr

This rock is similar to 24667 and 73, composed almost entirely of fine sericite that hosts blastic crystals or aggregates of biotite, chlorite and quartz-biotite; brown layers contain more biotite and some quartz.

Sericite in the matrix of the rock forms fine matted sub- to euhedral flakes about 20-30 μm in diameter, with minor quantities of similar sized subhedral quartz intermixed. Rare euhedral flakes of muscovite to 0.3 mm diameter are also found, commonly at the edges of biotitic layers. Fine aggregates of sphene and rutile nark the sites of former Fe-Ti oxides ?destroyed by sericitic alteration.

Biotite forms euhedral blastic crystals to 0.2 mm diameter with variable brown to brownish green colour and distinct zoning from core to rim. Inclusions of quartz and sericite are common. Cores are generally greenish, with deep brown rims, suggesting a zonation from Fe-rich cores to Mg-rich rims; in some crystals the cores consist of a euehdral crystal of ?limonite with pale reddish brown colour. There are pleochroic haloes around minute crystals up to 35 μm long of radioactive minerals such as ?allanite.

Lath-like to rectangular areas replaced by quartz and biotite with minor subhedral ?K-feldspar to 0.05 mm and traces of sericite and opaques, look like relict crystals of ?amphibole up to 1.5 mm long (also seen in 24662 and 78). A similar mineralogy is seen in the dark layers, which are composed of ?detrital quartz to 0.35 mm diameter, biotite as described above, fine sericite, and rare ?K-feldspar and chlorite grains.

Poikiloblastic chlorite crystals up to 0.4 mm diameter are found scattered throughout the rock, with random orientations; blue anomalous birefringence, length-slow character and distinct green pleochroism indicate an Fe-rich variety with Fe:Fe+Mg of 0.55-0.6. The usual rare euhedral crystals of tourmaline are found, up to 70 μm long. Opaques are mainly ?Fe-Ti oxides as sub- to euhedral crystals less than 0.1 mm diameter.

As for 24667 and 73, the sericitic nature of this rock and lack of feldspar suggest alteration, but could be the product of metamorphism of a rock of unusual composition.

24816: FINE, MUSCOVITE-RICH SEDIMENT WITH BLASTIC BIOTITE AND CHLORITE, RARE QUARTZ-CARBON RICH LAYERS

Dark, very fine-grained, biotitic sediment with fine dark specks of biotite; not appreciably magnetic. Cut by very thin, white fractures but otherwise relatively homogeneous in texture. Mineralogy in thin section is:

Sericite (muscovite)	55%
Biotite	25%
Quartz (partly secondary)	15%
Chlorite	3%
Opaque (Fe-Ti oxides, carbonaceous matter)	2%
Feldspar (?K-feldspar)	<1%

This rock is similar to the muscovite-rich portions of 24814: porphyroblastic crystals of biotite and rare chlorite plus rectangular patches of quartz set in a fine matrix of sericite.

The matrix consists mainly of fine matted subhedral flakes of sericite or fine muscovite about 50 μm in diameter, with rare large euhedral flakes to 0.1 mm across. There are minor amounts of subhedral 30 μm quartz mixed with the sericite.

Biotite forms subhedral porphyroblastic books up to 0.15 mm diameter that poikilitically enclose fine quartz and sericite. Colour is an even deep brown, with no zoning like that seen in 24814. Where in contact with chlorite, there is little suggestion of the chlorite being secondary.

Chlorite forms similar subhedral porphyroblasts up to 0.25 mm diameter, with distinct green pleochroism, length-slow and anomalous blue character indicating an Fe-rich variety.

Rectangular patches of fine-grained quartz, with lesser biotite, muscovite, and feldspar, apear to be relics of some former crystal. Their elongate shapes to 0.8 mm long suggest a ?mafic mineral as precursor. Quartz in the patches forms fine an- to subhedral grains up to 50 μm in diameter, in places mixed with minor low-relief ?K-feldspar of similar or finer size.

Opaques scattered throughout the rock are mostly tabular euhedral crystals up to 0.1 mm long that could be ilmenite or other Fe-Ti oxides. One layer in the rock consists of abundant biotite, quartz and very fine (micron-sized) opaques that are probably carbonaceous matter.

It is not clear whether this represents a hydrothermally altered rock or not; as in the preceeding specimen, it could represent metamorphism of an unusual original composition (quartz-poor, with more abundant argillic, or clay, fraction). The lack of sulfide or altered texture suggests hydrothermal alteration is unlikely.

24818: LAMINATED QUARTZ-RICH AND MUSCOVITE-BIOTITE RICH LAYERS IN A SILT TO FINE SAND-SIZED WACKE

Layered to laminated white to dark grey fine-grained sediment; dark layers are very slightly magnetic and look to be somewhat cross-bedded. In thin section, the mineralogy is approximately as follows:

Light-coloured		Dark-coloured	
Quartz (detrital)	45%	Muscovite	45%
Muscovite	35%	Biotite	35%
Biotite	15%	Quartz	15%
Opaque	5%	Sphene, rutile	3%
		Opaque	2%

The light-coloured layers consist of fine, subhedral sub-angular quartz grains averaging about 20-25 μm in diameter, intermixed with euhedral flakes of muscovite up to 50 μm across. Small crystals of poikiloblastic biotite to 0.1 mm diameter are sprinkled throughout, and there are scattered tabular crystals of opaque to 75 μm long, possibly ilmenite.

Dark-coloured layers consist of similar minerals but in different proportions: quartz is subordinate to the fine muscovite, but of similar size as in the light-coloured layers, and biotite crystals are more abundant. Sphene is also notably abundant in the dark layers, forming small sub- to euhedral crystals up to 50 μm across, while opaques are less common than in the light-colourd layers, and generally more anhedral; they may be magnetite. Thin individual laminae of biotitic rock to as little as 0.1 mm thick are found in the lighter-coloured rock, forming ?cross-beds.

Chlorite is absent from this rock, in contrast to the two preceeding specimens, but it does also contain the rectangular patches of quartz-biotite or biotite±quartz, up to 2 mm long, that characterize those specimens. The biotite-rich ones in particular look very much like relicts after some mafic mineral such as amphibole. Both varieties are found parallel to and perpendicular to layering.

It is even more apparent in this specimen that there is probably a strong control on mineralogy by original composition, with more clay-rich sedimentary laminae forming biotite-muscovite rich layers in an otherwise more quartz-rich, normal Aldridge sediment. Hydrothermal alteration is not strongly suggested by this specimen.

24822: MUSCOVITE-BIOTITE RICH SILT OR FINE SAND-SIZED WACKE CUT BY COMMON LIMONITIC FRACTURES

Dark brown to black, fine-grained, even-textured sediment with suggestion of fine dark biotite. Not magnetic; cut by thin limonitic fractures. Modal mineralogy in thin section is approximately:

Sericite (muscovite)	40%
Biotite	30%
Quartz (detrital)	25%
Opaques (mainly limonite)	2%
Feldspar (?K-feldspar)	2%
Sphene, rutile	<1%
Zircon (?)	tr

Layering is not apparent in this specimen; instead, it is composed of a uniform mix of fine sericite and quartz, as a matrix hosting abundant porphyroblastic biotite and rare ?K-feldspar crystals.

The matrix consists of wispy foliations of subhedral sericite (fine muscovite) of about 25 μm diameter wrapping around detrital quartz grains of about 10-30 μm diameter. Biotite crystals within this matrix have pale yellow to deep brown or blackish pleochroism, are sub- to euhedral, and up to 0.1 mm in diameter. Some contain minor plates of reddish hematite and semi-opaque ?rutile as well as opaque ?ilmenite. They show little preferred orientation, and commonly contain many inclusions of quartz and sericite.

Rare crystals of ?K-feldspar are also up to 0.1 mm in diameter, and poikilitically enclose fine quartz and micas, implying metamorphic growth. Chlorite is absent from this rock. Rare bundles of minute (5-15 μm) semi-opaque crystals are possibly mixtures of sphene and rutile.

Opaques are not common in this rock except for transported limonite that is found along fractures and staining foliation surfaces throughout. Bright red amorphous limonite is found in the fractures along with a few crystals of greenish-brown "hydrobiotite" (probe analyses of similar material show a very Fe-rich phase intermediate between chlorite and biotite, something like a chamosite).

Although this rock contains abundant muscovite and plagioclase feldspar appears to be absent, it does not impress me as a particularly altered specimen; the freshness of the biotite is against it being strongly altered. It might be distally peripheral to a hydrothermal system, but compared to rocks like 24678 it is weak.

24824: FINE SAND-SIZED QUARTZ-MUSCOVITE-BIOTITE-CARBONACEOUS MATTER WACKE, ALTERED TO CHLORITE-HYDROBIOTITE

Dark grey to black fine-grained sediment characterized by fine white specks along ?bedding planes or foliation. The rock is not magnetic; modal mineralogy in thin section is approximately:

Quartz (mainly detrital)	40%
Sericite (muscovite)	35%
Biotite	15%
Chlorite, hydrobiotite	3%
Opaque (?carbonaceous matter)	3%
Opaque (?Fe-Ti oxides, limonite)	2%
Epidote (?clinozoisite)	1%
Sphene	1%
Tourmaline	<1%

Subhedral books of biotite up to 0.15 mm diameter are sprinkled through a matrix of fine detrital quartz and sericite. There are some irregular lensoid concentrations of quartz, and a wispy foliation is defined by 0.1 mm thick layers rich in fine dark ?carbonaceous matter. The rock is crenulated in places and is cut by thin veinlets of chlorite or hydrobiotite.

Quartz forms detrital grains locally up to 0.1 mm diameter but generally less than 50 μm. Proportions of quartz to sericite (fine muscovite) vary from place to place, but sericite is fairly fine (20-30 μm) and interstitial to the quartz. No feldspar is apparent, suggesting it has been replaced by sericite.

Biotite is in generally ragged, ratty crystals with brown to greenish pleochroism due to partial alteration to chlorite and/or hydrobiotite. Many are also heavily stained by limonite along cleavages from oxidation. Most opaques are also limonite, as ragged anhedra up to 0.1 mm long. Chlorite is generally length-slow, with weak blue anomalous birefringence indicating moderately high Fe content; hydrobiotite has character between biotite and chlorite. It is found both replacing biotite and in veins up to 0.15 mm thick. Hydrobiotite at Sullivan is very iron-rich (F/M over 0.7), commonly associated with limonite as in this sample, and appears to be a very late (?even post-metamorphic) event.

Laminae rich in ?carbonaceous matter contain abundant dusty fine specks of up to a few microns in diameter, and also commonly are enriched in fine sub- to anhedral crystals of a pale, Fe-poor epidote (?clinozoisite) upto 0.05 mm across. Subhedral to anhedral clusters of fine sphene grains of similar size are also associated with these layers. Rare euhedral prisms of tourmaline are up to 0.1 mm long and have pale colour of intermediate schorl-dravite.

It is not clear whether a portion of the muscovite in this specimen is due to hydrothermal alteration; I would give it lower priority since biotite is not replaced by muscovite, but instead by hydrobiotite which is possibly not a Proterozoic alteration.

24828: FINE SAND-SIZED MUSCOVITE-QUARTZ-BIOTITE META-ARGILLITE, ALTERED TO HYDROBIOTITE/CHLORITE AND LIMONITE

Dark grey, fine-grained, even-textured sediment cut by abundant limonitic fractures, similar to 24824 in appearance but possibly less carbonaceous and without the fine white specks of ?sphene and epidote. Not magnetic; mineralogy in thin section is approximately:

Muscovite	40%
Quartz (detrital)	35%
Biotite	15%
Opaque (Fe-Ti oxides, limonite)	5%
Hydrobiotite, chlorite	3%
Sphene, epidote (?)	1%
Rutile	1%

Quartz forms highly angular to subangular detrital grains up to 0.15 mm long with some overgrowths of secondary silica. Most grains average around 50 μm and are mixed with or contain abundant sericite as fine flakes about 50 μm in diameter. Some small knots of coarser quartz are up to 0.3 mm across, and may be metamorphic "sweats".

Biotite forms subhedral flakes rarely over 0.1 mm diameter. They are bright brown in colour and range from fresh to completely replaced by greenish chlorite or hydrobiotite, although alteration is in general weaker than in 24824. Chlorite is length-slow and Fe-rich as in 24824. Limonite accompanies this alteration of the biotite.

Although similar to 24824, this rock is even richer in sericite (fine muscovite) and in biotite, with less quartz. Instead of fine ?carbonaceous matter, its dark colour comes from abundant fine tabular Fe-Ti oxides such as ?ilmenite up to 0.05 mm long scattered throughout the rock. Limonite is abundant, as in 24824, both replacing biotite or associated with chlorite/hydrobiotite and along fractures and foliations.

Sphene and or epidote may be present, as aggregates up to 0.1 mm long of fine subhedral grains to 20 μm diameter that are stained yellow by ?oxidation and difficult to identify with certainty. There are also fine concentrations of minute (5-15 μm) crystals of ?rutile.

The same comments as for 24824 would also apply to this sample: it is not clear that the muscovite alteration is hydrothermal. Even although there does not appear to be any feldspar, biotite is principally altered to chlorite and hydrobiotite rather than muscovite.

24831: FINE SAND-SIZED MUSCOVITE-BIOTITE META-ARGILLITE WITH FINE QUARTZ AND K-FELDSPAR AUGEN

Dark grey to black, fine-grained sediment characterized by fine specks of white mineral and black biotite. Limonite along foliations and fractures is weaker than in 24824/28. The rock is not magnetic; modal mineralogy in thin section is roughly as follows:

Muscovite	60%
Biotite	20%
Quartz	10%
K-feldspar (?orthoclase)	5%
Sphene, rutile	2%
Opaque (Fe-Ti oxides)	1%

This specimen consists of sub- to euhedral crystals of biotite, quartz and feldspar set in a fine matrix of 20-100 μm muscovite. The quartz is unusual for Aldridge sediments, in that it does not look detrital (not angular, but more subhedral in character). Also the feldspar is too euhedral; both look to be the products of metamorphism, with foliation in the host micas wrapping around them as if they were microscopic augen.

Feldspar forms subhedral crystals up to 0.1 mm diameter with traces of twinning and a small negative 2V of about ?40° suggesting virtually pure orthoclase. Since the feldspar does not occur with quartz, it is almost impossible to distinguish it from quartz; abundances given above are crude estimates only.

Biotite is fresh, subhedral to flattened in the plane of foliation (implying dynamic metamorphism at this location after the static burial metamorphism of the Proterozoic). The crystals are up to 0.2 mm in diameter, with very deep greenish-brown to almost black pleochroism. Rare euhedral crystals of muscovite to similar size are also found.

The rock is rich in small aggregates up to 0.2 mm long of minute crystals (5-20 μm) of rutile and ?sphene. There are also small (to 50 μm) tabular laths of opaque, possibly ilmenite. Minor bright red limonite is found along some foliation planes.

This is a very muscovite-rich rock, but once again the presence of very fresh biotite and feldspar (admittedly K-feldspar rather than plagioclase, which is generally more susceptible to alteration) argues against this being strongly hydrothermally altered.

APPENDIX III

WHOLE ROCK DATA

SAMPLE	NA2O % WR	MGO % WR	AL2O3 % WR	SIO2 % WR	P2O5 % WR	K2O % WR	CAO % WR	TIO2 % WR	CR2O3 % WR	MNO % WR	FE2O3 % WR
24661	2.63	5.19	14.2	51.4	.11	.54	9.34	1.18	<.01	.20	13.0
24674	1.89	5.33	13.5	49.3	.12	.30	10.5	1.38	<.01	.21	14.7
24676	2.44	4.95	12.4	49.7	.15	.40	8.59	1.76	<.01	.24	16.9
24677	1.35	7.70	13.0	50.2	.08	.60	11.5	.846	.04	.19	11.3
24820	2.44	2.68	11.0	52.2	.25	.82	6.86	2.36	.01	.28	19.3
24821	2.47	6.45	13.5	52.0	.11	.62	9.24	1.13	<.01	.21	13.2
24827	1.40	7.10	13.7	52.1	.11	.55	4.09	1.27	.04	.23	15.2
24686	1.44	7.98	13.6	51.5	.08	.43	11.0	.833	.04	.19	11.2
24712	1.37	5.98	13.2	51.3	.11	.41	8.96	1.25	.01	.28	13.9

SAMPLE	LOI % WR	SUM % WR
24661	1.25	99.0
24674	1.30	98.5
24676	1.50	99.0
24677	1.85	98.7
24820	.50	98.7
24821	1.60	100.5
24827	3.65	99.4
24686	1.40	99.7
24712	2.55	99.3

SAMPLE	RB PPM XRF	SR PPM XRF	Y PPM XRF	ZR PPM XRF	NB PPM XRF
24661	23	171	10	110	10
24674	9	159	7	91	8
24676	19	189	17	112	8
24677	25	118	<2	72	8
24820	34	96	40	177	14
24821	30	190	4	88	10
24827	30	74	<2	71	8
24686	17	125	3	72	8
24712	20	174	14	93	9

SAMPLE	AU PPB NA	HA PPM NA	CA % NA	SC PPM NA	CR PPM NA	FE % NA	CO PPM NA	NI PPM NA	ZN PPM NA	AS PPM NA	SE PPM NA
24756	<2	19000	1.7	21.3	200.	4.18	13.0	<50	100	1	<1
24757	<2	10000	7.0	39.5	520.	7.28	36.0	90	170	3	<1
24760	<2	13000	5.5	30.5	150.	7.21	32.0	80	160	2	<1
24761	<2	19000	2.8	22.0	230.	5.05	22.0	<50	120	1	<1
24789	<2	10000	6.6	41.4	190.	7.40	44.0	80	180	5	<1

SAMPLE	BR PPM NA	RB PPM NA	SR PPM NA	MO PPM NA	AG PPM NA	SB PPM NA	CS PPM NA	BA PPM NA	LA PPM NA	CE PPM NA	ND PPM NA
24756	4.3	80	<100	6	<2	.8	3.5	550	14.0	29	14
24757	4.1	30	<100	5	<2	1.9	1.5	100	6.9	15	7
24760	5.4	60	<100	6	<2	.9	2.0	410	22.4	45	20
24761	4.0	150	<100	10	<2	.5	7.0	630	34.6	69	30
24789	2.2	50	<100	3	<2	1.5	2.6	140	8.6	19	10

SAMPLE	SM PPM NA	EU PPM NA	TB PPM NA	YB PPM NA	LU PPM NA	HF PPM NA	TA PPM NA	W PPM NA	IR PPB NA	TH PPM NA	U PPM NA
24756	2.92	.61	.5	2.78	.45	6.2	.9	2	<5	9.8	2.7
24757	1.64	.70	.2	1.32	.23	1.6	<.5	5	<5	1.6	.4
24760	4.03	.97	.5	2.83	.45	4.4	.6	4	<5	7.9	2.1
24761	6.20	1.22	.8	3.44	.54	6.0	1.3	<1	<5	10.0	2.7
24789	2.11	.65	.3	1.75	.28	2.2	.6	<1	<5	2.2	.7

SAMPLE	RB PPM XRF	SR PPM XRF	Y PPM XRF	ZR PPM XRF	NB PPM XRF
24756	65	205	9	219	14
24757	28	129	<2	55	5
24760	49	145	10	136	9
24761	117	169	25	201	11
24789	40	196	3	74	7

SAMPLE	NA2O % WR	MGO % WR	AL2O3 % WR	SIO2 % WR	P2O5 % WR	K2O % WR	CAO % WR	TIO2 % WR	CR2O3 % WR	MNO % WR	FE2O3 % WR
24756	2.78	2.18	13.5	66.0	.10	2.38	2.84	.837	.02	.10	6.34
24757	1.31	8.17	13.6	50.5	.06	.49	11.2	.602	.07	.20	10.9
24760	1.72	4.68	14.3	55.6	.07	1.29	8.29	.676	.02	.22	10.6
24761	2.70	2.10	13.4	65.0	.09	2.52	3.22	.798	.03	.11	7.67
24789	1.39	6.86	14.0	52.7	.07	.77	10.9	.759	.02	.19	11.6

SAMPLE	LOI % WR	SUM % WR
24756	1.35	98.4
24757	2.20	99.3
24760	1.60	99.1
24761	1.10	98.7
24789	1.40	100.6

X-RAY ASSAY LABORATORIES 04-NOV-92 REPORT ----- REF. 13605 PAGE 1

SAMPLE	NA2O % WR	MGO % WR	AL2O3 % WR	SIO2 % WR	P2O5 % WR	K2O % WR	CAO % WR	TIO2 % WR	CR2O3 % WR	MNO % WR	FE2O3 % WR
24690	4.28	5.90	12.7	49.4	.24	.23	6.07	2.52	<.01	.22	14.5
24843	1.85	5.16	12.0	48.5	.28	1.52	6.94	2.87	<.01	.24	16.4

SAMPLE	LOI % WR	SUM % WR
24690	2.30	98.4
24843	2.75	98.5

APPENDIX IV

CERTIFICATES OF ANALYSIS

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER B.C. V6A 1R6 PHONE(604)253-3158 FAX(604)253-1716

GEOCHEMICAL ANALYSIS CERTIFICATE

Granges Inc. PROJECT KYDD 92-1 File # 92-3371 Page 1

2300 - 885 W. Georgia St., Vancouver BC V6C 3E8 Submitted by: GORDON ALLEN

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Au* ppb	Hg ppb
24750-X	3	16	33	151	.1	10	2	220	.81	4	5	ND	9	13	.5	2	2	7	.17	.008	17	42	.07	38	.05	3	.51	.06	.08	1	3	30
24751-X	2	9	18	47	.1	11	2	234	.98	3	5	ND	11	16	.2	2	2	9	.14	.008	13	20	.07	47	.06	2	.60	.06	.12	2	1	5
24752-X	1	15	10	42	.1	9	4	151	1.27	3	5	ND	8	6	.2	2	2	7	.09	.015	8	9	.12	63	.09	2	.71	.04	.41	1	1	5
24753-X	3	13	16	41	.1	14	6	306	1.48	3	5	ND	11	7	.2	2	2	12	.05	.007	20	41	.14	57	.10	2	1.02	.04	.39	1	1	10
24754-X	3	3	2	28	.1	24	8	248	3.09	6	5	ND	12	8	.2	2	2	12	.15	.043	34	20	2.30	48	.01	2	2.33	.01	.19	1	1	10
24755-X	1	3	2	24	.1	22	5	152	2.26	3	5	ND	19	9	.2	2	2	8	.11	.025	23	15	1.90	40	.01	2	1.80	.01	.17	1	1	10
24756-X	2	11	14	112	.1	8	10	672	4.24	6	5	ND	10	13	.2	2	2	105	.27	.030	5	42	1.28	256	.27	2	2.33	.06	1.44	1	1	15
24758-X	1	32	5	52	.1	14	7	305	2.81	2	5	ND	17	4	.2	2	2	15	.07	.017	25	19	.47	175	.10	2	1.42	.03	.75	1	1	15
24759-X	1	21	12	67	.1	22	10	518	3.45	3	5	ND	20	7	.3	2	2	17	.15	.031	28	19	.60	155	.12	2	1.65	.02	.83	1	1	5
24761-X	2	30	7	95	.1	14	17	669	4.88	5	5	ND	5	11	.2	2	2	104	.27	.025	6	41	1.26	292	.28	2	2.34	.06	1.50	1	1	10
24762-X	1	10	9	36	.1	14	5	347	1.85	2	5	ND	11	7	.2	2	2	12	.14	.017	12	18	.43	37	.06	2	.94	.05	.17	1	1	10
24763-X	66	27	101	63	.1	8	3	565	3.16	6	5	ND	13	23	.4	2	2	23	.30	.046	24	31	1.02	75	.08	2	1.69	.05	.35	1	1	10
RE 24768-X	2	20	13	29	.1	11	3	246	1.78	5	5	ND	11	9	.2	2	2	13	.15	.014	14	20	.34	47	.08	2	.83	.07	.19	1	1	10
24764-X	3	19	14	56	.1	11	5	385	2.53	2	5	ND	10	10	.2	2	2	22	.08	.011	20	47	.53	79	.13	2	1.28	.05	.61	1	1	10
24765-X	2	7	5	69	.1	22	8	417	2.65	2	5	ND	17	5	.2	2	2	11	.18	.021	31	17	.50	71	.10	2	1.25	.03	.36	1	1	10
24766-X	1	20	18	52	.1	7	5	307	1.48	4	5	ND	10	7	.2	2	2	11	.16	.009	14	18	.17	38	.08	2	.66	.04	.11	1	1	10
24767-X	1	8	5	66	.1	21	7	393	2.93	2	5	ND	23	9	.2	2	2	14	.25	.018	30	25	.52	108	.20	2	1.48	.03	.78	1	1	5
24768-X	2	18	13	28	.1	11	3	249	1.75	4	5	ND	11	9	.2	2	2	13	.15	.013	14	20	.34	46	.08	2	.81	.06	.19	1	1	5
24769-X	1	35	6	37	.1	10	7	297	2.76	3	5	ND	22	7	.3	2	2	12	.11	.022	20	14	.45	88	.12	2	1.29	.02	.54	1	1	5
24770-X	2	21	16	40	.1	10	6	335	2.87	3	5	ND	16	13	.2	2	2	17	.07	.017	16	32	.50	115	.15	2	1.39	.03	.86	1	1	5
24771-X	1	8	7	68	.1	12	10	390	3.12	2	5	ND	25	6	.3	2	2	15	.11	.023	58	16	.54	119	.20	2	1.56	.01	1.10	1	1	5
24772-X	1	37	15	38	.1	9	4	208	2.14	2	5	ND	11	8	.2	2	2	11	.10	.025	17	14	.24	55	.08	2	.90	.03	.28	1	1	5
24773-X	2	9	17	46	.1	16	5	354	2.02	3	5	ND	12	8	.2	2	2	11	.17	.014	14	37	.33	61	.11	2	.96	.03	.28	1	1	5
24774-X	2	6	16	52	.1	14	5	309	1.89	2	5	ND	12	8	.2	2	2	11	.11	.012	11	18	.28	57	.12	2	.89	.05	.42	1	1	5
24775-X	1	110	120	172	.1	8	15	1172	2.48	37	5	ND	11	8	.2	2	2	14	.20	.017	13	16	.14	34	.07	2	.72	.04	.09	1	3	5
24776-X	1	18	7	52	.1	21	8	274	3.15	5	5	ND	26	7	.2	2	2	19	.10	.024	30	25	.54	125	.17	2	1.63	.02	1.13	1	2	5
24777-X	1	13	13	41	.1	12	5	195	1.87	2	5	ND	15	5	.2	2	2	11	.08	.015	42	16	.29	72	.11	2	.92	.04	.55	1	1	5
24778-X	1	91	12	62	.1	20	24	364	5.12	6	5	ND	10	13	.3	2	2	22	.18	.012	23	25	.36	52	.12	2	.97	.09	.50	1	1	5
24779-X	2	17	9	33	.1	12	4	115	1.60	2	5	ND	12	8	.2	2	2	9	.03	.010	29	36	.14	82	.08	2	.78	.04	.39	1	1	5
24780-X	1	12	10	40	.1	14	5	48	1.59	2	5	ND	12	8	.3	2	2	7	.05	.013	37	12	.12	63	.05	2	.72	.04	.27	1	3	15
24781-X	1	47	9	37	.1	11	8	286	2.48	3	5	ND	17	5	.3	2	2	16	.09	.021	11	20	.41	121	.15	2	1.21	.04	.73	1	3	5
24782-X	2	8	2	42	.1	14	5	276	2.16	2	5	ND	16	6	.2	2	2	12	.14	.027	14	29	.35	126	.14	2	1.16	.04	.74	1	2	5
24783-X	2	11	7	18	.1	9	1	113	1.12	2	5	ND	10	9	.2	2	2	11	.07	.009	13	22	.08	42	.05	2	.45	.06	.11	1	2	5
24784-X	1	19	25	172	.1	22	8	358	3.08	9	5	ND	23	6	.2	2	2	15	.11	.021	23	16	.38	115	.17	2	1.52	.01	1.06	1	2	5
24785-X	2	11	70	184	.1	13	4	211	1.26	2	5	ND	9	7	.2	2	2	12	.11	.008	23	39	.12	51	.08	2	.84	.05	.18	1	1	5
24786-X	1	16	11	32	.1	12	3	195	1.51	2	5	ND	12	6	.2	2	2	9	.09	.020	25	15	.17	82	.08	2	.88	.04	.34	1	1	5
24787-X	1	10	8	33	.1	8	4	211	1.62	2	5	ND	12	6	.2	2	2	7	.08	.014	23	9	.27	56	.10	3	.83	.04	.36	1	1	5
STANDARD C\AU-R	19	61	38	130	7.2	72	31	1068	3.96	42	21	7	41	53	17.0	14	19	58	.49	.086	40	60	.95	184	.08	34	1.88	.06	.14	10	480	1600

ICP - .500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN FE SR CA P LA CR MG BA TI B W AND LIMITED FOR NA K AND AL. AU DETECTION LIMIT BY ICP IS 3 PPM.
ASSAY RECOMMENDED FOR ROCK AND CORE SAMPLES IF CU PB ZN AS > 1%, AG > 30 PPM & AU > 1000 PPB
- SAMPLE TYPE: P1 TO P2 ROCK P3 SOIL P4 SILT AU* ANALYSIS BY ACID LEACH/AA FROM 10 GM SAMPLE.
HG ANALYSIS BY FLAMELESS AA. Samples beginning 'RE' are duplicate samples.

DATE RECEIVED: SEP 28 1992 DATE REPORT MAILED: Oct 1/92 SIGNED BY ..... D.TOYE, C.LEONG, J.WANG; CERTIFIED B.C. ASSAYERS

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Au* ppb	Hg ppb
24788-X	4	52	58	76	.2	18	9	456	3.80	2	5	ND	10	11	.3	2	2	22	.20	.033	16	25	.96	70	.16	2	1.66	.03	.54	1	1	20
24790-X	1	15	14	58	.1	13	7	361	2.87	2	5	ND	13	7	.2	2	2	16	.09	.017	19	19	.55	96	.16	3	1.34	.03	.65	1	1	10
24791-X	1	16	6	38	.1	7	4	258	1.85	2	5	ND	11	7	.2	2	2	11	.10	.012	21	15	.32	29	.09	2	.80	.03	.09	1	1	10
24792-X	1	17	9	44	.1	10	5	285	3.14	2	5	ND	16	10	.2	2	2	14	.04	.017	20	15	.51	145	.17	3	1.39	.02	1.01	1	1	10
24793-X	1	17	16	38	.1	9	4	256	2.42	2	5	ND	10	9	.2	2	2	11	.10	.035	28	13	.38	102	.14	3	1.19	.02	.71	1	1	10
24801-X	1	16	7	65	.1	23	7	463	3.22	6	5	ND	17	5	.2	2	2	14	.14	.036	40	22	.79	41	.04	3	1.48	.02	.21	1	1	5
24802-X	1	49	8	63	.1	18	10	543	4.32	14	5	ND	18	6	.2	2	2	14	.24	.071	44	18	.91	56	.06	2	1.86	.01	.30	1	1	10
RE 24806-X	1	34	19	53	.1	14	7	299	2.51	3	5	ND	12	6	.2	2	2	7	.08	.020	40	13	.19	38	.05	2	.85	.02	.22	1	1	5
24803-X	3	6	4	7	.1	12	4	159	.42	2	5	ND	1	2	.2	2	2	1	.01	.003	2	11	.01	3	.01	4	.05	.01	.01	1	1	10
24804-X	1	28	33	37	.1	10	12	244	1.32	3	5	ND	11	6	.2	2	2	9	.07	.011	30	17	.12	22	.04	2	.58	.03	.07	1	1	5
24805-X	1	22	8	64	.1	15	7	382	3.23	4	5	ND	16	4	.2	2	2	10	.12	.027	48	16	.63	48	.09	3	1.41	.02	.32	1	1	5
24806-X	1	34	21	53	.1	14	7	299	2.51	2	5	ND	12	6	.2	2	2	7	.08	.019	39	13	.19	38	.05	2	.84	.02	.22	1	1	10
24807-X	1	16	139	37	.1	9	5	318	1.92	2	5	ND	10	4	.2	2	2	11	.04	.017	56	17	.32	28	.05	2	.82	.03	.13	1	1	5
24808-X	2	32	20	48	.1	4	2	209	2.39	13	5	ND	14	11	.2	2	2	8	.03	.040	30	14	.35	57	.01	3	.93	.02	.19	1	1	5
24809-X	1	26	12	49	.1	7	3	202	2.30	12	5	ND	13	9	.2	2	2	8	.03	.045	30	14	.37	54	.01	3	.97	.01	.19	1	1	5
24810-X	1	19	22	42	.1	11	6	310	2.32	2	5	ND	16	11	.2	2	2	16	.12	.023	40	19	.41	71	.10	2	1.08	.03	.41	1	1	5
24811-X	1	16	13	30	.1	7	2	270	2.05	2	5	ND	11	10	.2	2	2	13	.09	.020	22	18	.37	54	.10	2	.87	.03	.18	1	3	20
STANDARD C\AU-R	18	58	39	129	7.1	71	32	1118	3.96	41	23	7	40	52	17.1	15	19	56	.49	.084	38	60	.94	183	.08	34	1.88	.06	.14	11	480	1500

Sample type: ROCK. Samples beginning 'RE' are duplicate samples.

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Au* ppb	Hg ppb
92M-800E	1	18	23	203	.2	25	12	661	2.30	4	5	ND	7	33	.2	2	2	24	.28	.313	13	20	.28	270	.15	2	3.52	.02	.12	1	2	50
92M-850E	1	23	31	172	.2	28	10	367	2.43	2	5	ND	8	20	.2	2	2	28	.15	.041	21	22	.39	261	.14	2	2.59	.01	.20	1	1	30
92M-900E	1	27	29	166	.1	32	16	371	2.60	7	5	ND	11	23	.2	2	2	28	.18	.126	37	24	.40	290	.12	2	3.11	.01	.24	1	1	15
92S-325E	1	26	18	238	.4	52	16	436	2.50	3	5	ND	7	19	.3	2	2	30	.16	.050	25	27	.38	333	.15	2	3.20	.02	.23	1	2	35
92S-350E	1	28	15	120	.3	27	12	249	2.28	2	5	ND	8	19	.2	2	2	28	.16	.089	32	16	.34	221	.15	2	3.27	.02	.20	1	2	30
92S-375E	1	35	21	283	.4	63	16	535	3.00	2	5	ND	9	30	.2	2	2	31	.22	.098	47	28	.45	324	.16	2	3.81	.02	.29	1	1	25
RE 92T-550E	1	22	14	72	.2	15	9	356	1.78	2	5	ND	4	13	.2	2	2	23	.16	.017	32	16	.38	85	.11	2	1.50	.01	.24	1	1	5
92S-400E	1	23	17	262	.3	52	16	516	2.63	2	5	ND	8	27	.2	2	2	29	.25	.047	23	26	.42	305	.15	2	3.15	.02	.28	1	1	25
92S-425E	1	21	13	107	.1	23	9	197	1.88	2	5	ND	6	10	.2	2	2	24	.09	.013	19	15	.34	133	.11	2	1.87	.01	.19	1	3	5
92S-450E	1	35	15	114	.3	26	12	352	2.47	2	5	ND	7	22	.2	2	2	30	.21	.049	33	25	.40	270	.14	2	2.87	.02	.27	1	3	15
92T-550E	1	20	12	69	.2	14	8	324	1.70	2	5	ND	4	12	.2	2	2	22	.15	.016	30	15	.37	81	.11	2	1.44	.01	.23	1	2	5
92T-575E	1	15	9	73	.1	13	8	360	1.57	2	5	ND	5	22	.2	2	2	21	.24	.023	16	14	.32	151	.09	2	1.28	.01	.18	1	2	5
92T-600E	1	47	25	181	.4	33	18	639	2.97	2	5	ND	8	22	.2	2	2	37	.22	.064	31	29	.41	290	.18	2	4.13	.02	.30	1	1	35
92T-625E	1	8	9	49	.1	10	4	126	1.07	2	5	ND	2	10	.2	2	2	13	.14	.011	11	12	.28	71	.09	2	1.11	.01	.17	1	1	15
92T-650E	1	39	21	244	.4	35	19	941	3.18	2	5	ND	8	20	.2	3	2	34	.18	.088	36	33	.42	348	.18	2	4.51	.02	.32	1	1	35
92T-675E	1	19	15	76	.2	17	9	398	1.88	2	5	ND	4	17	.2	2	2	24	.20	.019	18	20	.38	89	.10	2	1.68	.01	.24	1	2	20
STANDARD C\AU-S	17	62	39	130	7.5	72	31	1059	3.96	43	18	7	39	53	18.8	15	19	59	.49	.086	40	61	.93	184	.09	34	1.88	.07	.14	11	52	1500

Sample type: SOIL. Samples beginning 'RE' are duplicate samples.

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Au* ppb	Hg ppb
KYDD SILT 1	1	31	25	70	.2	20	11	617	2.22	3	5	ND	4	58	.2	2	2	19	.64	.039	92	16	.43	104	.07	2	1.61	.01	.26	1	1	75
RE KYDD SILT 1	1	30	26	66	.3	20	11	584	2.13	2	7	ND	4	56	.2	2	2	18	.62	.037	89	15	.41	100	.07	2	1.54	.01	.25	1	1	90

Sample type: SILT. Samples beginning 'RE' are duplicate samples.

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER B.C. V6A 1R6 PHONE(604)253-3158 FAX(604)253-1716

GEOCHEMICAL ANALYSIS CERTIFICATE

Granges Inc. PROJECT KYDD 92-5 File # 92-3481 Page 1

2300 - 885 W. Georgia St., Vancouver BC V6C 3E8 Submitted by: GORDON ALLEN

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Au* ppb	Hg ppb
24662-X	1	8	16	73	.2	14	6	426	2.60	6	5	ND	37	5	.2	4	2	16	.16	.022	12	14	.43	131	.23	5	1.57	.04	1.30	1	3	25
24663-X	1	13	15	61	.1	16	6	398	2.61	8	5	ND	20	6	.2	2	2	13	.07	.016	13	18	.50	125	.16	3	1.52	.06	1.34	1	2	10
24664-X	1	24	24	51	.1	9	4	367	3.39	2	5	ND	23	9	.2	2	2	18	.04	.025	30	17	.61	112	.22	2	1.71	.04	1.40	1	2	10
24665-X	6	20	30	70	.1	13	4	397	2.60	2	5	ND	13	39	.3	2	2	31	.81	.065	29	32	1.58	96	.20	2	2.34	.23	1.78	1	1	10
24666-X	1	13	44	88	.1	14	4	483	3.09	2	5	ND	18	69	.2	2	3	69	.71	.039	41	71	2.34	118	.29	2	3.67	.40	2.79	1	1	10
24667-X	1	27	15	59	.1	11	4	312	3.67	3	5	ND	25	7	.2	2	2	20	.04	.030	28	19	.72	140	.18	2	1.92	.02	1.56	1	2	10
24668-X	1	25	27	83	.2	20	11	395	4.10	5	5	ND	29	5	.2	4	2	23	.06	.028	29	22	.90	130	.21	2	2.36	.02	1.90	1	3	5
24669-X	1	33	43	71	.1	20	5	275	2.82	2	5	ND	16	24	.2	2	3	30	.18	.024	28	35	.80	114	.18	2	1.77	.11	1.22	1	1	5
24670-X	1	13	14	55	.1	9	4	289	2.87	2	5	ND	15	8	.2	2	2	18	.04	.023	17	17	.72	118	.17	2	1.72	.02	1.45	1	2	10
24671-X	1	33	23	73	.1	12	6	392	4.19	2	5	ND	26	17	.2	2	2	25	.04	.030	23	23	1.00	160	.23	2	2.40	.02	2.06	1	4	10
24672-X	1	36	16	76	.1	20	9	379	3.82	2	6	ND	28	8	.2	2	3	23	.09	.030	58	21	.63	138	.21	2	2.15	.03	1.57	1	3	15
24673-X	1	16	15	77	.1	20	7	369	4.05	2	5	ND	27	7	.2	2	3	24	.12	.023	26	21	.68	141	.22	2	2.21	.04	1.17	1	3	10
24675-X	1	24	11	68	.2	17	9	265	2.49	2	5	ND	21	8	.3	2	2	14	.05	.018	26	14	.71	85	.14	2	1.47	.04	1.07	1	2	5
24678-X	2	32	10	15	.1	2	1	101	2.01	2	5	ND	24	15	.2	2	2	8	.07	.032	41	9	.16	100	.15	3	.81	.03	.70	1	4	5
24679-X	1	25	17	45	.2	7	4	303	2.32	2	5	ND	15	18	.2	2	2	13	.21	.039	28	14	.54	117	.17	2	1.24	.05	.82	1	1	5
24680-X	1	20	23	35	.1	7	5	307	1.40	2	5	ND	13	6	.2	2	2	9	.17	.015	22	10	.25	38	.09	2	.50	.06	.23	1	12	5
24681-X	1	19	8	17	.1	7	5	174	1.46	2	5	ND	17	4	.2	2	2	6	.10	.018	27	15	.25	57	.08	3	.65	.04	.38	1	1	5
24682-X	1	27	12	54	.2	25	11	286	2.11	2	5	ND	16	7	.2	2	2	11	.15	.032	17	12	.44	74	.12	3	.98	.04	.76	1	2	5
24683-X	1	26	17	52	.2	17	8	308	2.46	2	5	ND	19	11	.2	2	2	13	.13	.033	34	13	.49	98	.16	3	1.15	.04	.94	1	2	5
24684-X	2	27	7	16	.1	27	10	145	1.39	2	5	ND	14	4	.2	2	2	6	.09	.022	12	22	.20	77	.08	3	.70	.03	.58	1	3	5
24685-X	1	39	14	15	.1	22	13	143	1.74	6	5	ND	19	7	.2	2	2	7	.09	.031	44	10	.18	82	.11	3	.64	.05	.54	1	10	5
24814-X	1	72	33	88	.1	14	5	302	3.28	2	5	ND	26	4	.3	3	2	19	.07	.031	28	17	.67	118	.16	2	1.91	.02	1.11	1	1	5
24815-X	1	25	33	109	.1	13	5	403	4.13	2	5	ND	31	17	.2	2	2	22	.04	.030	49	22	.91	129	.23	2	2.31	.02	1.46	1	2	5
24816-X	1	24	22	58	.1	12	5	362	3.62	3	5	ND	25	8	.2	2	4	21	.08	.027	31	20	.77	132	.21	2	2.03	.03	1.51	1	2	5
24817-X	1	30	15	55	.1	11	4	310	4.03	2	5	ND	30	8	.2	2	2	22	.06	.032	49	19	.74	135	.21	2	2.05	.02	1.34	1	2	5
24818-X	1	6	10	57	.1	21	8	367	3.41	4	5	ND	23	5	.2	2	2	21	.14	.025	26	23	.73	161	.26	2	1.83	.04	1.62	1	4	5
24819-X	1	6	11	50	.1	24	10	265	3.54	6	5	ND	26	5	.2	2	2	26	.10	.028	21	25	.79	162	.19	2	1.97	.05	1.63	1	3	5
RE 24816-X	1	22	19	58	.2	12	5	357	3.59	2	5	ND	25	7	.2	2	2	21	.08	.027	30	20	.78	130	.21	2	2.01	.03	1.46	1	2	5
24822-X	1	19	17	45	.1	7	3	380	3.60	2	6	ND	25	15	.2	2	3	19	.04	.026	72	16	.56	150	.24	3	1.80	.03	1.38	1	2	5
24823-X	1	23	28	91	.1	22	8	655	4.44	2	5	ND	17	9	.2	2	2	31	.14	.043	24	32	1.79	158	.31	2	2.85	.04	2.53	1	3	5
24824-X	1	23	16	32	.4	2	1	192	2.15	2	7	ND	21	21	.2	2	2	11	.04	.020	29	10	.39	117	.16	3	1.18	.02	.74	1	2	5
24825-X	2	28	25	49	.1	4	2	257	2.77	2	5	ND	18	21	.3	2	2	13	.07	.035	32	12	.61	107	.18	3	1.31	.02	.70	1	3	5
24826-X	1	5	6	24	.1	14	6	205	1.86	2	5	ND	21	3	.2	2	2	15	.20	.027	23	20	.48	90	.16	4	1.11	.03	.48	1	2	5
24828-X	1	34	15	37	.1	4	2	248	4.02	2	5	ND	23	28	.2	2	3	13	.05	.033	43	13	.45	118	.17	2	1.21	.05	1.05	1	1	5
24829-X	1	18	17	36	.1	3	1	265	3.35	2	5	ND	21	26	.2	2	2	13	.23	.087	50	13	.50	92	.14	3	1.26	.03	.90	1	2	5
24830-X	5	5	3	8	.1	10	1	40	.28	2	5	ND	1	1	.2	2	2	1	.01	.002	4	50	.01	11	.01	3	.06	.01	.02	1	3	5
24831-X	1	13	14	47	.1	11	6	351	2.96	2	5	ND	32	6	.2	2	2	15	.15	.028	20	14	.49	149	.20	4	1.57	.01	1.25	1	2	5
STANDARD C/AU-R	21	61	41	135	7.3	79	32	1099	3.96	42	17	7	39	53	19.2	15	21	61	.50	.088	39	62	.91	185	.09	35	1.88	.08	.17	10	480	1500

ICP - .500 GRAM SAMPLE IS DIGESTED WITH 3ML 3-1-2 HCL-HNO3-H2O AT 95 DEG. C FOR ONE HOUR AND IS DILUTED TO 10 ML WITH WATER.
THIS LEACH IS PARTIAL FOR MN FE SR CA P LA CR MG BA TI B W AND LIMITED FOR NA K AND AL. AU DETECTION LIMIT BY ICP IS 3 PPM.
ASSAY RECOMMENDED FOR ROCK AND CORE SAMPLES IF CU PB ZN AS > 1%, AG > 30 PPM & AU > 1000 PPB
- SAMPLE TYPE: P1 ROCK P2 SOIL AU* ANALYSIS BY ACID LEACH/AA FROM 10 GM SAMPLE. HG ANALYSIS BY FLAMELESS AA.
Samples beginning 'RE' are duplicate samples.

DATE RECEIVED: OCT 2 1992 DATE REPORT MAILED: Oct 8/92 SIGNED BY ..... D.TOYE, C.LEONG, J.WANG; CERTIFIED B.C. ASSAYERS

SAMPLE#	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ni ppm	Co ppm	Mn ppm	Fe %	As ppm	U ppm	Au ppm	Th ppm	Sr ppm	Cd ppm	Sb ppm	Bi ppm	V ppm	Ca %	P %	La ppm	Cr ppm	Mg %	Ba ppm	Ti %	B ppm	Al %	Na %	K %	W ppm	Au* ppb	Hg ppb
3D 1000E	1	11	27	145	.1	19	9	327	2.25	2	5	ND	7	86	.2	2	2	21	.47	.356	9	8	.15	218	.18	5	3.12	.05	.10	1	2	35
3D 1050E	1	19	23	101	.1	27	13	214	3.04	2	5	ND	9	32	.2	2	2	26	.22	.053	17	13	.28	115	.14	3	2.79	.03	.18	1	1	15
3D 1150E	1	27	45	106	.4	38	24	564	2.58	2	5	ND	4	61	.2	2	2	19	.51	.026	67	16	.40	113	.07	3	2.18	.03	.24	1	2	30
92E 300E	1	18	29	125	.1	25	13	375	2.06	2	5	ND	7	23	.2	2	2	18	.16	.068	22	12	.25	156	.09	3	2.05	.02	.22	1	1	20
92E 325E	1	17	39	105	.1	18	11	259	2.45	2	5	ND	5	22	.2	2	2	21	.17	.067	21	13	.26	119	.09	3	2.11	.01	.20	1	2	20
92E 350E	1	18	28	80	.1	15	6	442	1.96	2	5	ND	4	24	.2	2	2	16	.15	.037	21	11	.30	96	.08	2	1.29	.02	.30	1	4	5
92E 375E	1	7	22	106	.3	15	7	501	1.58	2	5	ND	5	23	.2	2	2	19	.14	.060	11	8	.14	172	.12	3	1.86	.03	.11	1	1	20
92E 400E	1	31	100	221	.6	30	17	1562	2.77	2	5	ND	6	50	.4	2	2	23	.30	.060	69	17	.34	231	.11	3	2.84	.04	.31	1	1	35
RE 92E 300E	1	16	30	124	.3	24	13	387	2.02	2	5	ND	8	22	.2	2	2	19	.15	.066	21	12	.24	155	.09	2	2.01	.02	.24	1	1	20
92E 425E	1	14	32	95	.1	16	12	338	1.70	2	5	ND	5	22	.2	2	2	17	.18	.039	18	12	.27	127	.07	2	1.41	.02	.23	1	1	10
92E 450E	1	13	49	150	.1	18	10	444	2.10	2	5	ND	4	19	.2	2	2	22	.14	.114	16	11	.23	193	.13	3	2.66	.03	.15	1	1	30
92E 475E	1	34	80	193	.3	36	28	727	3.25	5	5	ND	13	36	.2	2	2	29	.27	.082	45	19	.39	177	.12	4	2.87	.03	.35	1	2	25
92E 500E	1	27	55	173	.2	35	15	271	3.12	3	5	ND	11	29	.2	2	2	28	.22	.051	35	16	.35	144	.12	3	2.95	.02	.28	1	3	20
92E 950E	1	46	57	203	.8	49	36	707	3.88	3	5	ND	16	60	.3	2	2	24	.39	.078	104	22	.48	151	.11	4	2.55	.02	.44	1	1	20
STANDARD C/AU-S	19	60	37	134	7.3	75	31	1069	3.96	43	21	7	40	53	18.9	14	20	59	.49	.086	41	60	.93	185	.09	34	1.88	.08	.15	10	54	1600

Sample type: SOIL. Samples beginning 'RE' are duplicate samples.

COMP: GRANGES INC.
PROJ: KYDD (140)
ATTN: BRUCE DOWNING

MIN-EN LABS — ICP REPORT

705 WEST 15TH ST., NORTH VANCOUVER, B.C. V7M 1T2
(604)980-5814 OR (604)988-4524

FILE NO: 2V-1128-RJ
DATE: 92/10/0
* HEAVY MINERAL SEPAR * (ACT:F31

SAMPLE NUMBER	AG PPM	AL %	AS PPM	B PPM	BA PPM	BE PPM	BI PPM	CA %	CD PPM	CO PPM	CU PPM	FE %	K %	LI PPM	MG %	MN PPM	MO PPM	NA %	NI PPM	P PPM	PB PPM	SB PPM	SR PPM	TH PPM	TI PPM	V PPM	ZN PPM	GA PPM	SN PPM	W PPM	CR PPM	AU-FIRE PPB
KYDD-M1	.1	1.70	1	7	68	.1	24	1.15	.1	27	60	5.93	.09	10	.82	560	1	.09	53	260	16	1	18	1	4069	141.8	69	1	4	4	18	5

APPENDIX V

FACTOR ANALYSIS

EXPLANATION of the ACCOMPANYING TABLES

Summary: the Factor Score Estimate classifies samples in terms of the Sullivan trace element halo. Those marked with an asterisk are possible members of a Sillivan-type halo.

Previous work on SEDEX deposits shows them to be surrounded by a trace element halo extending radially several kilometres in the plane of the bedding. The elements comprising the halo, and their respective weightings have been sought by subjecting large sets of rock samples from the vicinity of SEDEX deposits to the statistical technique known as Factor Analysis in R-Mode.

R-Mode Factor Analysis is described by J.C. Davies ('Statistics and Data Analysis in Geology', 2nd. ed., John Wiley & Sons, Inc., New York, NY, 1986, 646p.). Given, say, 20 or 30 variables, R-Mode identifies groups that vary together throughout the samples. It is often justifiable to interpret such blocks of common variation as independent responses to different geologic processes.

Each group of variables is a FACTOR, and it consists of a set of coefficients recording the strength of the relationship between each variable and the conceptual geologic process. One attempts to interpret the Factor by considering the variables of which it consists.

One may score each sample in terms of any desired Factor to yield a Factor Score. As a further application, one may derive a Score for ANY sample, such as an exploration sample, and judge the extent to which it displays the effects of the interpreted geologic process. This requires, however, that the sample to be tested be analysed for all the oxides and trace elements employed in the original research - at a significant cost. One can produce a Factor Score Estimate that correlates very strongly with the full Factor Score much more cheaply from just those variables with significant weightings in the relevant Factor.

For SEDEX deposits, the identification of the process responsible for mineralization is fairly easy: it consists of those elements that are also concentrated in the ore deposit, and the highest Scores cluster around the deposit in the form of a halo. In the Aldridge and Prichard Formations, host to the Sullivan deposit, previous work has shown that Pb, Zn and Hg alone yield a sufficient Factor Score Estimate of the process interpreted as responsible for mineralization.

Factor Score Estimates are standardized to a mean of zero and a standard deviation of 1, and they have an approximately normal distribution in most cases: so most lie between plus and minus 3. The Sullivan-Aldridge test-bed study led to the conclusion that Factor Score Estimates above zero in exploration sampling can be considered as POSSIBLE members of a Sullivan-sized halo, while values above +0.5 indicate PROBABLE membership.

The Factor Score Estimate used here provides a valid rating to the extent that the tested samples are similar and are treated in a similar manner to those upon which the original Factor Analysis was performed. Principally, they should be shales of the Aldridge or Prichard Formations. A comparison of summary statistics with those from some previous regional surveys shows the type of variation encountered from place to place. Anomalous responses have been removed - so "background" values are being compared.

	Mean			Standard Deviation			
	Pb ppm	Zn ppm	Hg ppb	Pb ppm	Zn ppm	Hg ppb	N
Survey A	10.66	55.86	5.74	20.46	27.25	4.12	1785
Survey B	11.42	67.22	5.06	31.61	26.66	0.92	1796
Survey C	16.83	48.92	43.32	20.65	40.72	16.62	1826
Row 92	70.00	54.58	9.19	127.70	28.53	4.85	31
Kydd 92	18.10	53.26	7.01	19.36	28.85	3.53	83
Row+Kydd	32.21	53.62	7.60	71.69	28.64	4.03	114

The Hg difference in Survey C is a difference in laboratories. The small sample size in the Kydd and Row data may partly explain differences from the previous, larger surveys. Nevertheless, the Row Pb appears unusually high.

In the accompanying tables, the Factor Score Estimates are listed after the sample ID. Those above 0.0 are marked by a single asterisk; those above +0.5 are indicated with a double asterisk. The Pb, Zn and Hg values come next, and then the transformed values employed in the scoring. The raw data are transformed in an attempt to satisfy some of the assumptions of the statistical procedure. For Pb and Hg, the transform is log10, for Zn it is log100.

Spurious positive responses are produced in most surveys. In attempting to distinguish between a spurious response and a member of a genuine halo the following principles are helpful:-

1. It is generally impossible to reproduce a spurious response by check sampling within a metre or two of the original.

2. In the field, genuine responses cluster along a horizon in the form of a bedded geologic feature. This tendency may be more significant in identifying a response than the mere strength of the values.

3. The most satisfactory lithochemical response is one that coincides with one obtained by some other means - such as geophysics, or a good geologic model.

In the accompanying tables, most of the responses come from what appear (from the Sample ID) to be soil or silt samples - for which I have no absolute rating criterion. If they are rock samples, both Kydd and Row grids contain moderate, yet significant lithochemical anomalies in terms of the Sullivan halo.

If these samples are excepted, Kydd 92-1 contains 3 possible target samples and Row 92-1 contains 4. In the Row file, dependence on high Pb values in Samples 24796-X, 24798-X and 24842-X may cause one to suspect minor vein mineralization of the Delaware type. Otherwise, all 7 responses are of the tenor one might expect within the Sullivan halo 5km or more from the deposit. In a smaller deposit, of course, they would be closer to the source of mineralization.

In spite of this somewhat disheartening assessment, I think the Kydd results are worth following up if they come from east of the Spyder Fault - and especially if 2 or more represent the same stratigraphic package. They could be the first clue to mineralization in that region. I would recommend a small program of close-spaced sampling to try to establish an anomalous horizon.

FRE
09.11.92

PROJECT KYDD 92-1: File 92-3371

	Sample ID	Factor Score Estimate	Pb ppm	Zn ppm	Hg ppb	Transformed Pb	Zn	Hg
1	24750-X	0.265*	33	151	30	1.5185	0.3383	1.4771
2	24751-X	-0.781	18	47	5	1.2553	0.2233	0.6990
3	24752-X	-0.953	10	42	5	1.0000	0.2104	0.6990
4	24753-X	-0.648	16	41	10	1.2041	0.2076	1.0000
5	24755-X	-1.327	2	24	10	0.3010	0.1399	1.0000
6	24756-X	-0.220	14	112	15	1.1461	0.3116	1.1761
7	24758-X	-0.697	5	52	15	0.6990	0.2345	1.1761
8	24759-X	-0.747	12	67	5	1.0792	0.2615	0.6990
9	24761-X	-0.546	7	95	10	0.8451	0.2962	1.0000
10	24762-X	-0.826	9	36	10	0.9542	0.1921	1.0000
11	24763-X	-0.087	101	63	10	2.0043	0.2551	1.0000
12	24764-X	-0.565	14	56	10	1.1461	0.2426	1.0000
13	24766-X	-0.535	18	52	10	1.2553	0.2345	1.0000
14	24767-X	-0.946	5	66	5	0.6990	0.2600	0.6990
15	24768-X	-1.055	13	28	5	1.1139	0.1605	0.6990
16	RE 24768-X	-0.831	13	29	10	1.1139	0.1651	1.0000
17	24769-X	-1.114	6	37	5	0.7782	0.1954	0.6990
18	24770-X	-0.867	16	40	5	1.2041	0.2047	0.6990
19	24771-X	-0.862	7	68	5	0.8451	0.2630	0.6990
20	24772-X	-0.901	15	38	5	1.1761	0.1986	0.6990
21	24773-X	-0.801	17	46	5	1.2304	0.2208	0.6990
22	24774-X	-0.771	16	52	5	1.2041	0.2345	0.6990
23	24775-X	0.046*	120	172	5	2.0792	0.3494	0.6990
24	24776-X	-0.954	7	52	5	0.8451	0.2345	0.6990
25	24777-X	-0.904	13	41	5	1.1139	0.2076	0.6990
26	24778-X	-0.774	12	62	5	1.0792	0.2534	0.6990
27	24779-X	-1.069	9	33	5	0.9542	0.1814	0.6990
28	24780-X	-0.639	10	40	15	1.0000	0.2047	1.1761
29	24781-X	-1.024	9	37	5	0.9542	0.1954	0.6990
30	24782-X	-1.309	2	42	5	0.3010	0.2104	0.6990
31	24783-X	-1.391	7	18	5	0.8451	0.0987	0.6990
32	24784-X	-0.302	25	172	5	1.3979	0.3494	0.6990
33	24785-X	-0.056	70	184	5	1.8451	0.3550	0.6990
34	24786-X	-1.037	11	32	5	1.0414	0.1776	0.6990
35	24787-X	-1.095	8	33	5	0.9031	0.1814	0.6990
36	24788-X	0.061*	58	76	20	1.7634	0.2743	1.3010
37	24790-X	-0.553	14	58	10	1.1461	0.2464	1.0000
38	24791-X	-0.894	6	38	10	0.7782	0.1986	1.0000
39	24792-X	-0.749	9	44	10	0.9542	0.2158	1.0000
40	24793-X	-0.677	16	38	10	1.2041	0.1986	1.0000
41	24801-X	-0.877	7	65	5	0.8451	0.2584	0.6990
42	24802-X	-0.649	8	63	10	0.9031	0.2551	1.0000
43	24803-X	-1.860	4	7	10	0.6021	-0.0731	1.0000
44	24804-X	-0.737	33	37	5	1.5185	0.1954	0.6990
45	24805-X	-0.853	8	64	5	0.9031	0.2568	0.6990
46	24806-X	-0.495	21	53	10	1.3222	0.2366	1.0000
47	RE 24806-X	-0.726	19	53	5	1.2788	0.2366	0.6990
48	24807-X	-0.418	139	37	5	2.1430	0.1954	0.6990
49	24808-X	-0.750	20	48	5	1.3010	0.2256	0.6990
50	24809-X	-0.856	12	49	5	1.0792	0.2279	0.6990
51	24810-X	-0.778	22	42	5	1.3424	0.2104	0.6990
52	24811-X	-1.303	13	30	2	1.1139	0.1694	0.3010

PROJECT KYDD 92-1: File 92-3371 continued

	Sample ID	Factor Score Estimate	Pb ppm	Zn ppm	Hg ppb	Transformed Pb	Zn	Hg
53	92M-800E	0.419*	23	203	50	1.3617	0.3631	1.6990
54	92M-850E	0.287*	31	172	30	1.4914	0.3494	1.4771
55	92M-900E	0.053*	29	166	15	1.4624	0.3464	1.1761
56	92S-325E	0.299*	18	238	35	1.2553	0.3760	1.5441
57	92S-350E	0.025*	15	120	30	1.1761	0.3179	1.4771
58	92S-375E	0.275*	21	283	25	1.3222	0.3895	1.3979
59	92S-400E	0.209*	17	262	25	1.2304	0.3835	1.3979
60	92S-425E	-0.582	13	107	5	1.1139	0.3074	0.6990
61	92S-450E	-0.200	15	114	15	1.1761	0.3132	1.1761
62	92T-550E	-0.738	12	69	5	1.0792	0.2645	0.6990
63	RE 92T-550E	-0.690	14	72	5	1.1461	0.2689	0.6990
64	92T-575E	-0.783	9	73	5	0.9542	0.2703	0.6990
65	92T-600E	0.300*	25	181	35	1.3979	0.3537	1.5441
66	92T-625E	-0.588	9	49	15	0.9542	0.2279	1.1761
67	92T-650E	0.339*	21	244	35	1.3222	0.3779	1.5441
68	92T-675E	-0.238	15	76	20	1.1761	0.2743	1.3010
69	KYDD SILT 1	0.247*	25	70	75	1.3979	0.2660	1.8751
70	RE KYDD SILT 1	0.291*	26	66	90	1.4150	0.2600	1.9542

PROJECT KYDD 92-5: File 92-3481

	Sample ID	Factor Score Estimate	Pb ppm	Zn ppm	Hg ppb	Transformed Pb	Zn	Hg
71	24662-X	-0.170	16	73	25	1.2041	0.2703	1.3979
72	24663-X	-0.520	15	61	10	1.1761	0.2517	1.0000
73	24664-X	-0.479	24	51	10	1.3802	0.2324	1.0000
74	24665-X	-0.321	30	70	10	1.4771	0.2660	1.0000
75	24666-X	-0.163	44	88	10	1.6435	0.2888	1.0000
76	24667-X	-0.532	15	59	10	1.1761	0.2482	1.0000
77	24668-X	-0.498	27	83	5	1.4314	0.2831	0.6990
78	24669-X	-0.446	43	71	5	1.6335	0.2675	0.6990
79	24670-X	-0.571	14	55	10	1.1461	0.2406	1.0000
80	24671-X	-0.366	23	73	10	1.3617	0.2703	1.0000
81	24672-X	-0.311	16	76	15	1.2041	0.2743	1.1761
82	24673-X	-0.443	15	77	10	1.1761	0.2757	1.0000
83	24675-X	-0.762	11	68	5	1.0414	0.2630	0.6990
84	24678-X	-1.404	10	15	5	1.0000	0.0704	0.6990
85	24679-X	-0.810	17	45	5	1.2304	0.2183	0.6990
86	24680-X	-0.838	23	35	5	1.3617	0.1887	0.6990
87	24681-X	-1.390	8	17	5	0.9031	0.0901	0.6990
88	24682-X	-0.821	12	54	5	1.0792	0.2386	0.6990
89	24683-X	-0.757	17	52	5	1.2304	0.2345	0.6990
90	24684-X	-1.450	7	16	5	0.8451	0.0807	0.6990
91	24685-X	-1.329	14	15	5	1.1461	0.0704	0.6990
92	24814-X	-0.436	33	88	5	1.5185	0.2888	0.6990
93	24815-X	-0.370	33	109	5	1.5185	0.3091	0.6990
94	24816-X	-0.662	22	58	5	1.3424	0.2464	0.6990
95	RE 24816-X	-0.695	19	58	5	1.2788	0.2464	0.6990
96	24817-X	-0.765	15	55	5	1.1761	0.2406	0.6990
97	24818-X	-0.843	10	57	5	1.0000	0.2445	0.6990
98	24819-X	-0.868	11	50	5	1.0414	0.2302	0.6990
99	24822-X	-0.810	17	45	5	1.2304	0.2183	0.6990
100	24823-X	-0.461	28	91	5	1.4472	0.2920	0.6990
101	24824-X	-0.954	16	32	5	1.2041	0.1776	0.6990
102	24825-X	-0.693	25	49	5	1.3979	0.2279	0.6990
103	24826-X	-1.293	6	24	5	0.7782	0.1399	0.6990
104	24828-X	-0.911	15	37	5	1.1761	0.1954	0.6990
105	24829-X	-0.894	17	36	5	1.2304	0.1921	0.6990
106	24830-X	-2.040	3	8	5	0.4771	-0.0443	0.6990
107	24831-X	-0.837	14	47	5	1.1461	0.2233	0.6990
108	3D 1000E	0.256*	27	145	35	1.4314	0.3347	1.5441
109	3D 1050E	-0.141	23	101	15	1.3617	0.3020	1.1761
110	3D 1150E	0.231*	45	106	30	1.6532	0.3065	1.4771
111	92E 300E	0.060*	29	125	20	1.4624	0.3216	1.3010
112	RE 92E 300E	0.065*	30	124	20	1.4771	0.3209	1.3010
113	92E 325E	0.074*	39	105	20	1.5911	0.3056	1.3010
114	92E 350E	-0.502	28	80	5	1.4472	0.2795	0.6990
115	92E 375E	-0.050	22	106	20	1.3424	0.3065	1.3010
116	92E 400E	0.659**	100	221	35	2.0000	0.3700	1.5441
117	92E 425E	-0.209	32	95	10	1.5051	0.2962	1.0000
118	92E 450E	0.351*	49	150	30	1.6902	0.3377	1.4771
119	92E 475E	0.473*	80	193	25	1.9031	0.3590	1.3979
120	92E 500E	0.293*	55	173	20	1.7404	0.3499	1.3010
121	92E 950E	0.344*	57	203	20	1.7559	0.3631	1.3010

KYDD 6
KYDD 23
KYDD 7
KYDD 22
KYDD 21
KYDD 20
KYDD 15
KYDD 3
KYDD 4
KYDD 1
KID CREEK ROAD
SPIDER CREEK FAULT
Spider Creek
Kid Creek
6500
6000
5000
4500
3200
55
54
53
52
51
48
0 500 1000m

LEGEND

LITHOLOGY LEGEND

1 MAFIC VOLCANIC
2 INTERMEDIATE VOLCANIC
3 UNDIFFERENTIATED FELSIC VOLCANIC
4 DACITE
5 RHYOLITE
6 LIMESTONE
7 CLASTIC SEDIMENT
8 MAFIC INTRUSION
9 INTERMEDIATE INTRUSION
10 FELSIC INTRUSION

ROCK UNIT LETTER QUALIFIERS

The first letter indicates the type of rock; if omitted a dash should be inserted before additional letters are used.

A FINE-GRAINED TUFF (<0.5mm)
B MEDIUM-GRAINED TUFF (0.5mm-2mm)
C COARSE-GRAINED TUFF (>2-4mm)
D LAPILLI TUFF (>4-64mm fr. 4cm)
E TUFF BRECCIA (>4-4 cm, matrix supported)
F VOLCANIC BRECCIA (>4-6 cm, clast supported)
G FLOW
H FLOW BRECCIA
I ARGILLITE
K SILTSTONE
L SANDSTONE / WACKE
M CONGLOMERATE
N CHERT (CHERTY)
O DEBRIS FLOW
R DOLOMITIC (ANKERITIC) CARB.
T TUFFACEOUS SED.
W APHANITIC
X FINE-GRAINED
Y MEDIUM-GRAINED
Z COARSE-GRAINED

The second and third letters are optional and further define the rock

a stng/calcitel
b bedded
c calcareous
d dolomitic
e fine banded
g graphitic
h hematic
i hornfels
k siliceous
l limonitic
m magnetic-bearing (magnetic on pyrrhotite)
n massive
o welded tuff
p pillowed
q quartz
r sheared
s siliceous/cherty
t phyllitic
u fragmental
v quartz phyric
w feldspar phyric
x quartz-feldspar phyric
y mafic phyric
z mafic feldspar phyric

Additional Qualifiers:

/ - As a prefix to the basic rock type indicates rubble or abundant float giving an indication of underlying geology.
( ) - A letter in parentheses indicates that this particular characteristic is poorly defined, vague, or a minor constituent.
. - A period within the code separates the basic lithology from additional information such as fragment type, mineralization, or alteration.
bx - Breccia. Separated from the main rock description by a period.
cr - Crossbed foliation or bedding.
/ - A slash within the code between two rock types indicates uncertainty.
- - A comma within the code between two rock types indicates that both are present.
- - A dash within the code between two lithologies indicates a rock type gradational or intermediate between the two.

MINERALS

Au NATIVE GOLD
Ag NATIVE SILVER
Az AZURITE
bn BORNITE
cc CHALCOCITE
el ELECTRUM
cp CHALCOPYRITE
ga GALENA
gn GOLDTITE
cy CINNABAR
hm HEMATITE
li LIMONITE
mg MAGNETITE
mc MALACHITE
mn MANGANESE STAIN
mo MOLYBDENITE
py PYRITE
po PYRRHOTITE
qz QUARTZ
sb STIBNITE
sl SPHALERITE
te TETRAHEDRITE

ALTERATION

Cl CHLORITE
Cb CARBONATE (ANKERITE)
Se SERICITE
Si SILICA
Ka KAOLINITE
Kf K-FELDSPAR

Alteration Intensity:
0-Trace
1-Weak
2-Moderate
3-Strong

SYMBOLS

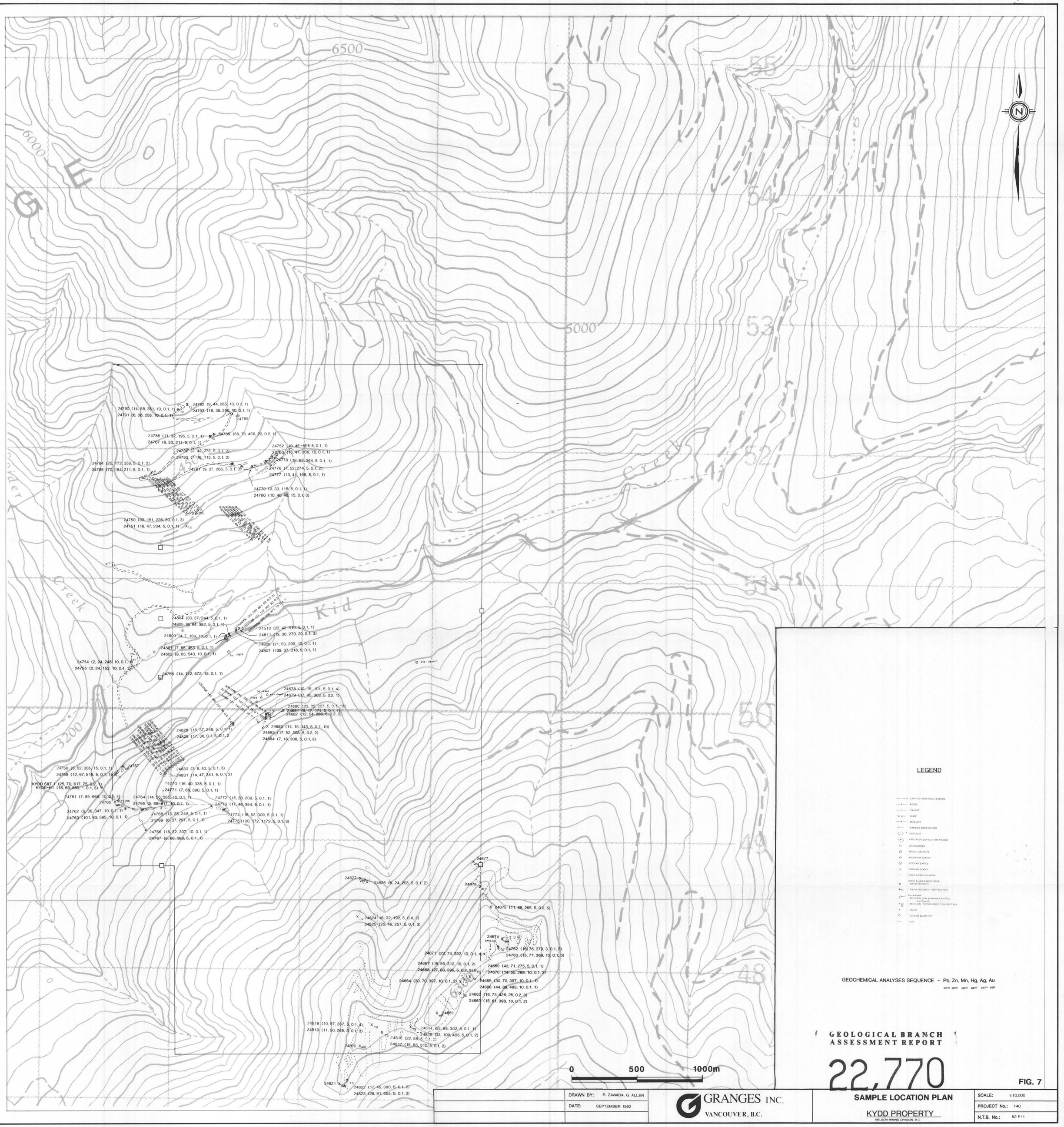
BEDDING:
- TOPS UNKNOWN
- TOPS UP
- OVERTURNED
- HORIZONTAL
- FLOW BANDING, OR PLANE OF FLATTENING
- FOLIATION, CLEAVAGE
- FOLIATION PARALLEL TO BEDDING
- LINEATION (PLUNGE, TREND): F - fold axis; F - parallel lineation; M - mineral lineation; S - slickensides
- JOINT
- FAULT, SHEAR
- THRUST FAULT
- VEIN: Qv QUARTZ VEIN; Cv CARBONATE VEIN; QCv QUARTZ-CARBONATE VEIN; Ch CHLORITE VEIN; Py PYRITE VEIN
- GEOLOGICAL CONTACT, DEFINED, INTERFECTED
- UNCONFORMABLE CONTACT ('U's on upper unit)
- FOLD AXES: ANTIFORM (WITH PLUNGE DIRECTION); SYNFORM (WITH PLUNGE DIRECTION)
- ZONE OF TIGHT FOLDING (WITH PLUNGE)
- GLACIAL STRIATION
- LINEAR TOPOGRAPHIC FEATURE
- LIMIT OF SURFICIAL FEATURE
- RIDGE
- VALLEY
- CLIFF
- MORAINE
- NARROW DYKE OR BED
- OUTCROP
- OUTCROP SEEN BUT NOT VISITED
- OVERBURDEN
- FOSSIL LOCALITY
- AIRPHOTO TARGET
- HELIPAD (GOOD)
- HELIPAD (POOR)
- FIELD NOTE LOCATION
- ROCK SAMPLE LOCATIONS: HAND SPECIMEN; HAND SPECIMEN - THIN SECTION
- For Analysis: BEDROCK (Grab unless noted, C=Chip, H=Channel); BEDROCK - WHOLE ROCK, THIN SECTION
- FLOAT
- STREAM SEDIMENT
- SOIL

GEOLOGICAL BRANCH
ASSESSMENT REPORT

22,770

FIG. 6

	DRAWN BY: R. ZAWADA, G. ALLEN	GRANGES INC. VANCOUVER, B.C.	GEOLOGY KYDD PROPERTY NELSON MINING DIVISION, B.C.	SCALE: 1:10,000
	DATE: SEPTEMBER 1992			PROJECT No.: 140
				N.T.S. No.: 82 F/1



GEOCHEMICAL ANALYSES SEQUENCE – Pb, Zn, Mn, Hg, Ag, Au
ppm ppm ppm ppm ppm ppb

GEOLOGICAL BRANCH
ASSESSMENT REPORT

22,770

FIG. 7

	DRAWN BY: R. ZAWADA, G. ALLEN	GRANGES INC. VANCOUVER, B.C.	SAMPLE LOCATION PLAN KYDD PROPERTY NELSON MINING DIVISION, B.C.
	DATE: SEPTEMBER 1992		SCALE: 1:10,000 PROJECT No.: 140 N.T.S. No.: 82 F/1