KAMAD (new)

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FINAL REPORT

F.A.M.E. GRANT #10962E

KAMAD CLAIMS

Kamloops Mining Division

British Columbia

NTS: 82M/4W

Lat: 51°8'N Long: 119°49'W

Owner:

KAMAD SILVER CO. LTD.

2095 West Trans Canada Highway

Kamloops, B.C. V1S 1A7

Operator:

ESSO MINERALS CANADA

A DIVISION OF ESSO RESOURCES CANADA LIMITED

1600 - 409 Granville Street

Vancouver, B.C. V6C 1T2

October 1986.

J. M. Marr

J. L. Oliver

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It appears likely that this intensely altered quartz sericite schist has been structurally thickened through the action of highly sheared fold structures. The distribution of sulphide and barite lenses will likewise be similarly influenced by this structure. Major fault displacements do not occur across Homestake although large scale normal faults are mapped elsewhere on the property.

Strongly pyritic chert horizons within the Homestake Schist appear to be stratiform and potentially laterally equivalent to massive sulphides. The Homestake area is viewed as an impressive, highly favourable though technically difficult exploration target.

SUMMARY

A comprehensive program of evaluation for base and precious metals has been initiated by Esso Minerals Canada across the Kamad claim group. These efforts have concentrated on two principle areas, the Homestake Horizon and the Rea/Silver Zones.

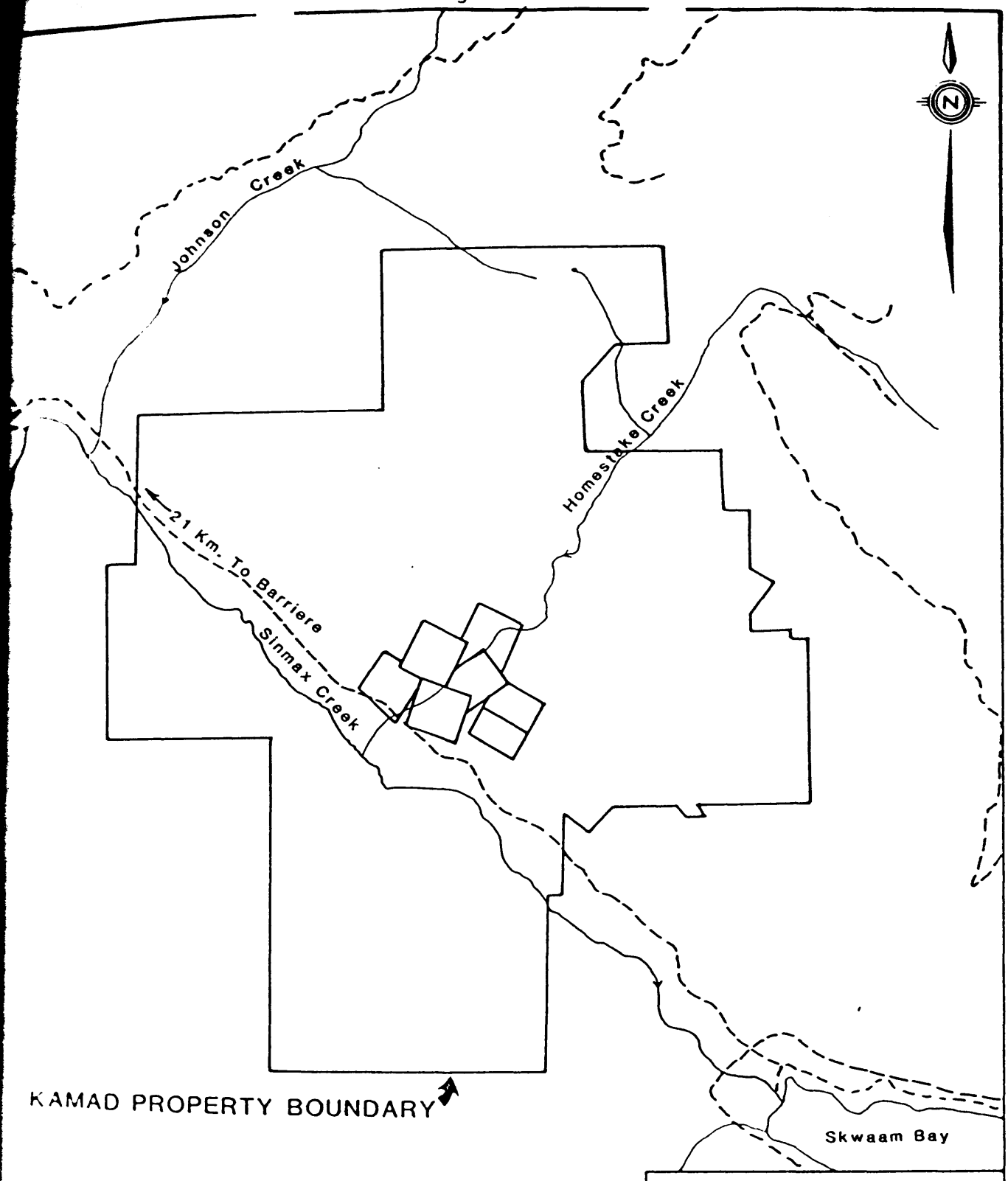
The Rea and Silver Horizons strike northwesterly across the Kamad 7 and Kamad 8 claims and dip moderately northeast. An extensive program of soil sampling has demonstrated that lead, zinc and silver in B horizon soils defines the surface trace of both the Rea and Silver horizons across the Kamad 7 claim group. The Rea Horizon exhibits a significantly weaker geochemical expression across the Kamad 8 claims.

Both the Silver and Rea zones are traceable using EM geophysically. The geophysical response of both zones is typically weak and they are generally classified as poor to moderate conductors.

Detailed geological mapping and trenching on Kamad 7 has defined the presence of both mineralized horizons and their proximity to a principle volcano-sedimentary contact. From this mapping program and from subsequent drilling both mineralized horizons are shown to be related through a major northwest trending thrust.

The Kamad 7 claim has recently been tested by 1800 meters of NQ diamond drilling in 11 holes. Although this program defined the continuity of disseminated mineralization in both the Rea and Silver zones at depth, significant massive sulphides were not intersected.

Preliminary geological mapping and sampling has been completed across the cliffs rising above the Sinmax Valley. These traverses have confirmed the presence of a large zone of strong alkali depletion, silica enrichment and sporadic elevated base metal contents.



ESSO MINERALS CANADA

KAMAD PROPERTY
LOCATION MAP

Scale 1:50000
0 1 2 3 4 Km.

Project No. MA07	Mining Div Kamloops
NTS 82M/4W	Drawn by: J.O.
Date: Oct. '86	Fig. No 1

cover of spruce and pine on the plateau to the north of Sinmax Creek was complete until the start of clear-cut logging several years ago. There is now a well-developed system of logging roads. The valleys are occupied by farms producing mainly hay and there are tourist cabins on most of the major lakes.

The climate is semi-arid, typical of the South-Central Interior, with hot summers and moderate to cold winters. Recorded precipitation, although locally variable, is in the 17.5 inch range and snowfall is correspondingly not excessive.

History

The history of the Kamad claims is essentially the history of the old Homestake Mine workings, located on the north side of Sinmax Creek about 5 km from Skwaam Bay.

The property has been worked intermittently by several owners since its discovery in 1893. High grade silver ore was mined up to 1927, 20 tons before 1895 and a reported 2770 tons in the period 1926/27. This material ran 80 oz +/Ag.

In 1935 and 1936, a 50 ton per day mill was in operation and a further 3000 tons were processed.

A significant surge took place from 1970 to 1973 when Kamad Silver and later also Canadian Reserve Oil and Gas performed 1050 m of underground drilling and 2072 m of underground development, including the lower 1750 level. There was also 2993 m of surface drilling.

The mine was re-opened for a brief period over the winter of 1983/84 and shipments of ore were made by O.K. Ore Processing Ltd.

The discovery of the Rea Gold zone to the north of Kamad 7 in 1983 provided new impetus to exploration on the plateau area above Sinmax Creek. Geophysics and drilling was carried out in 1983 on Kamad 7 and further geophysics followed in 1984. Five holes (369.7 M) were drilled in 1985 for 259146 B. C. Limited.

OBJECTIVES

The old Homestake workings and the new discoveries on the Plateau appear to share a similar mineralogy and mode of occurrence. They indicate the presence of dominantly stratiform lenticular deposits of Zn, Pb, Ag and Au, occurring at well-defined horizons in the stratigraphy. The exact relationship or location of these horizons is unknown at many points.

There are also many variations in these massive sulphides; in the degree of alteration of wallrocks, in the proportions of pyrite and arsenopyrite and in the presence or absence of barite. This mineral is particularly common in the Homestake workings. By analogy with the dominantly syngenetic, exhalative type of mineralization, it is considered to represent modified beds rather than hydrothermal veins.

The objectives of this program were to identify these horizons, both in the old workings and on the plateau, and to systematically explore them for massive sulphide deposits.

REGIONAL GEOLOGY

Generalized geology of the Adams Lake area, along with a location of the Homestake Mine, are shown on an early map by G. M. Dawson (1898 ?).

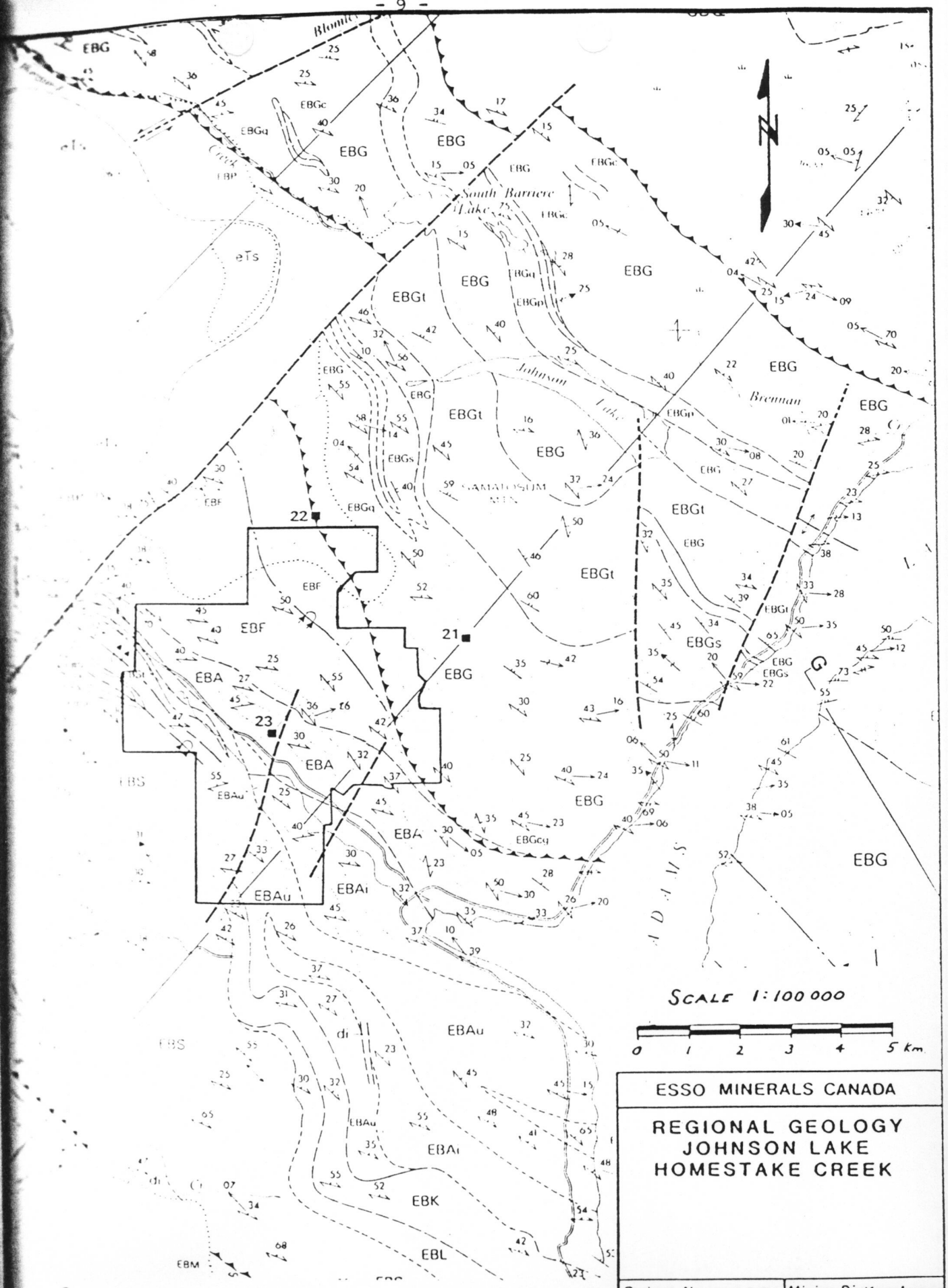
The area is included within a Preliminary Series G.S.C. map of [illegible] published by R. B. Campbell in 1963. There is some subdivision here of late Paleozoic rocks but again at a very generalized level.

A much more definitive map of the area from Clearwater to the Adams Plateau, at a 1:100,000 scale, was produced by the Provincial Ministry of Energy, Mines and Petroleum Resources in 1984 (Schiarizza and Preto, 1984). A portion of this map covers the Kamad claims and is reproduced on Figure 2 - Regional Geology, Johnson Lake, Homestake Creek. There have also been more local contributions since then, notably that by Hoy and Goutier on the Homestake-Rea area (Hoy and Goutier, 1985).

The favourable succession for this type of deposit is the Eagle Bay Formation, a Devono-Missippian sequence of sediments and volcanics which is known to outcrop from Clearwater south to Shuswap Lake. The sequence includes both mafic and felsic volcanics and a great variety of sediments, all complexly interbedded. They occur in the Lower Greenschist facies of regional metamorphism. Foliation is most pronounced and shows a very consistent northeasterly dip at moderate angles. This foliation, to which bedding is mostly parallel, appears to be axial planar to a regional series of isoclinal folds. These are poorly known. Lineations indicate sub-horizontal or gently north-west dipping fold axes.

This phase of movement appears to have related and similarly directed thrust faults. Structural complexity, superimposed on very variable stratigraphy, makes for a very difficult picture on any scale.

The main showings in the area occur south of Clearwater, in the Fork Creek area, in the Homestake belt and on the Adams Plateau. In general terms, there is some association with a belt of felsic rocks and fine grained sediments in a package below the prominent Tshwinakin limestone. There is yet no information on whether facies variations are obscuring correlation on one horizon which is structurally repeated, or whether as is more likely, a number of horizons are involved.



GEOLOGY IS TAKEN FROM B.C.M.E.M.P.R. PRELIMINARY MAP NO 56 COMPILED BY PAUL SCHIARIZZA & V.A. PRETO.

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REGIONAL GEOLOGY JOHNSON LAKE HOMESTAKE CREEK

Project No. MA07	Mining Div Kamloops
NTS. 82M/4W	Drawn by: J.O.
Date: Oct./86	Fig. No. 2

UPPER TRIASSIC AND LOWER JURASSIC NICOLA GROUP (?)

UPPER TRIASSIC OR LOWER JURASSIC

| kJv | AUGITE PORPHYRY BRECCIA

UPPER TRIASSIC

| kl | DARK GREY LIMESTONE

DEVONIAN TO PERMIAN

ALLOCHTHONOUS INTERNALLY IMBRICATED OCEANIC ASSEMBLAGE

FENNELL FORMATION

UPPER STRUCTURAL DIVISION

| ufb | GREY AND GREEN PILLOWED AND MASSIVE METABASALT, MINOR AMOUNTS OF BASALTIC BRECCIA, TUFF, DIABASE, GABBRO, AND CHERT

| ufc | GREY AND GREEN BEDDED CHERT

LOWER STRUCTURAL DIVISION

| lfc | GREY AND GREEN BEDDED CHERT, CHERTY ARGILLITE, SLATE, AND PHYLLITE

| lfb | GREY AND GREEN PILLOWED AND MASSIVE METABASALT, MINOR AMOUNTS OF BASALTIC BRECCIA AND TUFF

| lfg | GABBRO, DIORITE, DIABASE

| lfp | LIGHT TO MEDIUM GREY QUARTZ-FELDSPAR PORPHYRY RHYOLITE

| lfs | LIGHT TO DARK GREY SANDSTONE, SILTSTONE, SLATE, PHYLLITE, AND QUARTZITE, MINOR AMOUNTS OF LIMESTONE AND CHERT; IN PLACES INCLUDES GREY TO GREEN QUARTZOSE AND *FELDSPATHIC PHYLLITE (METATUFF)*

| lfcg | INTRAFORMATIONAL CONGLOMERATE, CLASTS DERIVED EXCLUSIVELY FROM FENNELL FORMATION LITHOLOGIES

| lFu | UNDIVIDED, MAINLY lFc, lFg, and lFb, BUT MAY INCLUDE ANY OR ALL OF ABOVE ROCK TYPES

DEVONO-MISSISSIPPIAN AND OLDER
PARAUTOCHTHONOUS ROCKS (EBP TO SOQ)

EAGLE BAY FORMATION (EBP TO EBG)

MISSISSIPPIAN

| EBP | DARK GREY PHYLLITE AND SLATE WITH INTERBEDDED SILTSTONE, SANDSTONE, AND GRIT, MINOR AMOUNTS OF CONGLOMERATE, LIMESTONE, AND METATUFF. EBPl–LIMESTONE, EBPv–METAVOLCANIC BRECCIA AND TUFF

DEVONIAN AND/OR MISSISSIPPIAN

| EBF | LIGHT TO MEDIUM GREY, RUSTY WEATHERING FELDSPATHIC PHYLLITE AND FRAGMENTAL PHYLLITE DERIVED FROM INTERMEDIATE TO FELSIC TUFF AND VOLCANIC BRECCIA; MINOR AMOUNTS OF DARK GREY PHYLLITE AND SILTSTONE. EBFq–*LIGHT GREY MASSIVE "CHERTY QUARTZITE" (SILICEOUS EXHALITE ?)*

DEVONIAN

| EBA | LIGHT SILVERY GREY TO MEDIUM GREENISH GREY SERICITE-QUARTZ PHYLLITE AND SERICITE-CHLORITE-QUARTZ PHYLLITE DERIVED FROM FELSIC TO INTERMEDIATE VOLCANIC AND VOLCANICLASTIC ROCKS INCLUDING PYRITIC, FELDSPATHIC, AND COARSELY FRAGMENTAL VARIETIES, LESSER AMOUNTS OF DARK GREY PHYLLITE, SILTSTONE, AND GREEN CHLORITIC PHYLLITE. INCLUDES BIOTITE-FELDSPAR-QUARTZ SCHIST AND GNEISS, BIOTITE QUARTZ HORNFELS AND AMPHIBOLITE ADJACENT TO BALDY BATHOLITH. EBAf–FELDSPAR PORPHYRY, FELDSPATHIC PHYLLITE, PYRITIC SERICITE-FELDSPAR-QUARTZ PHYLLITE, METAVOLCANIC BRECCIA. EBAs–SERICITIC QUARTZO-FELDSPATHIC SCHIST AND GNEISS DERIVED FROM FELSIC INTRUSIVE ROCKS. EBAu–UNDIVIDED EBAf and EBAs

DEVONIAN (?) AND/OR OLDER (?) (UNITS EBU TO EBG)

| EBU | LIGHT TO DARK GREEN CHLORITIC PHYLLITE, DARK GREY PHYLLITE AND SILTSTONE, LIMESTONE, QUARTZITE

| EBM | GREY AND GREEN VESICULAR AND PILLOWED METABASALT, GREENSTONE, CHLORITE SCHIST, MINOR AMOUNTS OF BEDDED CHERT, SILICEOUS PHYLLITE AND FINE-GRAINED QUARTZITE

| EBK | BANDED LIGHT GREY AND GREEN ACTINOLITE-QUARTZ SCHIST AND EPIDOTE ACTINOLITE-QUARTZ ROCK, LESSER AMOUNTS OF GARNET-EPIDOTE SKARN, CHLORITIC SCHIST, AND SERICITE-QUARTZ SCHIST

DEVONIAN (?) AND/OR OLDER (?) (UNITS EBU TO EBG) *(CONTINUED)*

| EBL | CALCAREOUS BLACK PHYLLITE, DARK GREY LIMESTONE AND ARGILLACEOUS LIMESTONE

| EBS | GREY AND GREEN PHYLLITIC SANDSTONE AND GRIT, PHYLLITE, AND QUARTZITE, LESSER AMOUNTS OF LIMESTONE, DOLOSTONE, GREEN CHLORITIC PHYLLITE, SERICITE-QUARTZ PHYLLITE, AND FELDSPATHIC SERICITE-QUARTZ PHYLLITE. EBSs *LIGHT GREY TO WHITE QUARTZITE*, EBSc–*LIMESTONE*, DOLOSTONE, MARBLE, EBSb–GREENSTONE, PILLOWED METABASALT, CHLORITIC PHYLLITE, EBScg–CONGLOMERATE, EBSp GREY PHYLLITE AND SILTSTONE, EBSi SIDERITE SERICITE-QUARTZ PHYLLITE AND FELDSPATHIC PHYLLITE (METATUFF), EBSa–PYRITIC SERICITE-QUARTZ PHYLLITE AND CHLORITOID SERICITE-QUARTZ PHYLLITE

| EBG | MEDIUM TO DARK GREEN CALCAREOUS CHLORITE SCHIST AND FRAGMENTAL SCHIST DERIVED LARGELY FROM MAFIC TO INTERMEDIATE VOLCANIC AND VOLCANICLASTIC ROCKS, LESSER AMOUNTS OF LIMESTONE AND DOLOSTONE, MINOR AMOUNTS OF QUARTZITE, GREY PHYLLITE, AND SERICITE QUARTZ PHYLLITE. EBGc–LIMESTONE, DOLOSTONE, MARBLE. EBGt–TSHINAKIN LIMESTONE MEMBER–MASSIVE, LIGHT GREY FINELY CRYSTALLINE LIMESTONE AND DOLOSTONE. EBGs–DARK TO LIGHT GREY SILICEOUS AND/OR GRAPHITIC PHYLLITE, CALCAREOUS PHYLLITE, LIMESTONE, CALC-SILICATE, CHERTY QUARTZITE, MINOR AMOUNTS OF GREEN CHLORITIC PHYLLITE AND SERICITE QUARTZ PHYLLITE. EBGq LIGHT TO MEDIUM GREY QUARTZITE. EBGp–DARK GREY PHYLLITE, CALCAREOUS PHYLLITE AND LIMESTONE, MINOR AMOUNTS OF RUSTY WEATHERING CARBONATE-SERICITE-QUARTZ PHYLLITE (METATUFF ?). EBGcg–POLYMICTIC CONGLOMERATE

SPAPILEM CREEK–DEADFALL CREEK SUCCESSION (SDO)

LOWER CAMBRIAN (?) AND/OR HADRYNIAN (?)

| SDQ | *LIGHT TO DARK GREY QUARTZITE*, MICACEOUS QUARTZITE, GRIT, AND PHYLLITE, LESSER AMOUNTS OF CALCAREOUS PHYLLITE, CARBONATE, AND GREEN CHLORITIC SCHIST. NORTHEASTERN EXPOSURES INCLUDE STAUROLITE-GARNET-MICA SCHIST, CALC-SILICATE SCHIST, AND AMPHIBOLITE

TERTIARY OR QUATERNARY

| Tb | OLIVINE BASALT

MIOCENE OR PLIOCENE

| mTb | PLATEAU LAVA, OLIVINE BASALT

EOCENE

KAMLOOPS GROUP

| eTs | SKULL HILL FORMATION AND RELATED ROCKS, ANDESITE AND BASALT, INCLUDES MINOR AMOUNTS OF MUDSTONE AND SHALE IN THE VICINITY OF ALEX AND HAGGARD CREEKS

| eTc | CHU CHUA FORMATION, SANDSTONE, SHALE, CONGLOMERATE, COAL

CRETACEOUS OR TERTIARY

| qp | QUARTZ FELDSPAR PORPHYRY

CRETACEOUS

BALDY BATHOLITH, RAFT BATHOLITH, AND RELATED ROCKS

| Kg | GRANITE AND GRANODIORITE

AGE UNKNOWN

| di | FOLIATED DIORITE, QUARTZ DIORITE, AND GABBRO

| ub | SERPENTINITE

LATE DEVONIAN

| Dgn | GRANITE AND GRANODIORITE ORTHOGNEISS, Dgnp INCLUDES SILLIMANITE BEARING PARAGNEISS

LEGEND FOR FIGURE 2

KAMAD 7

OLOGY

The Kamad 7 claim group, overlies volcano-sedimentary members of e Devonian-Mississippian Eagle Bay Formation (see "Regional Geology" - gure 1). The property geology has been established and refined by tailed, 1:2,500 scale, geological mapping, trenching and through an tensive program of diamond drilling.

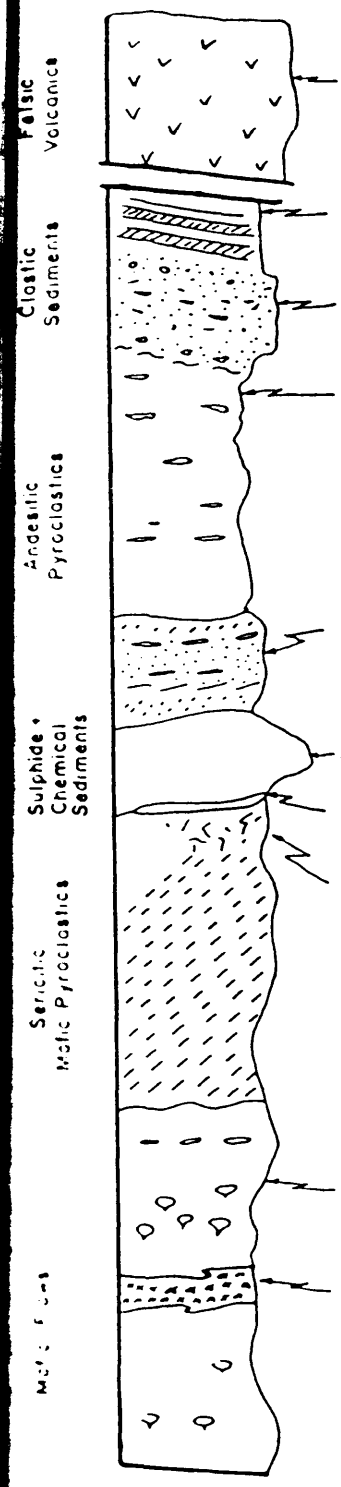
Stratigraphy

Stratigraphic relations across the subject claims are obscured by mplex structural controls, but generalized stratigraphic features do erge. A stratigraphic summary is shown on Figure 3: Stratigraphy - Kamad Property.

Pliestocene or surficial geological features, mainly two to three ter sandy to boulder sized tills, cover 90 percent of the property. lacial striae and exotic fragments suggest a northwest to southeast ansport direction.

Within supracrustal lithologies, the youngest unit comprises a hick sequence of felsic to intermediate flows and fine grained roclastics, now lying at the base of the overturned sequence. The roclastics contain both lithic and crystal fragments, are typically of low origin, and may be intercalated with fine grained black clastics. lack clastics occupy less than 10 percent of this unit which exceeds 200 etres in true thickness. Conflicting structural data may in time force a evision, to an older stratigraphic position, in the relative age relations f these felsic units.

The felsic volcanic package is overlain by a group of clastic diments which includes coarse grained polymictic conglomerates, lithic ackes, grits and minor argillites. This sedimentary unit ranges between 00 and 200 metres in true thickness.



- quartz feldspar porphyry flows and pyroclastics; contact relations indeterminate
- fine grained clastics, shales, siltstones, weakly developed turbidites
- coarse grained grits, quartz wackes, polymictic quartz pebble conglomerates
- intermediate pyroclastics and flow breccias. Monolithic lapilli sized fragmentals predominant. Interbedded penecontemporaneous argillite breccias common
- pyritic tuff, sericite and pyrite clasts, disseminated pyrite to 20%, may contain black chert
- chert and chert breccia, locally pyritic
- Pb-Zn (Au/Ag) sulphide lense - Kamad 7 lense
- locally stockwork mineralization. Chlorite ± carbonate ± pyrite alteration

Intensely sericitic ± silica mafic pyroclastics

- mafic flows and pyroclastics
- dioritic intrusions

ESSO MINERALS CANADA

GENERAL STRATIGRAPHY

REA and SILVER Horizons

To accompany a report by J. Oliver

Project No. MA07	Mining Div Kamloops
NTS 82M/4W	Drawn by: M. Reed
Date: Oct., 1986	Fig. No 3

The clastic sediments are conformably overlain by a volcanic emblage which forms the immediate stratigraphic hanging wall to the eralization horizon. This unit is composed predominantly of intermediate canic flows and fine grained pyroclastics, with minor interbedded chert black argillite. Close to this hanging wall contact pyrite content, in e uniform disseminations, increases to 25 percent rock volume. stically deformed fragments, wispy primary chlorite, and obiquitous 1.0 x mm carbonate ovoids are hallmarks of this unit. The hanging wall canic package tends to be quite thin, less than 30 metres overall, and fficult to trace laterally. This unit is identified in drill core only.

A hiatus in volcanic activity is clearly defined by the tructurally) overlying package of fine grained clastic and chemical diments. This sequence includes sericitic cherts and sericitic phyllites, gillaceous cherts, and homogeneous, massive cream to black cherts. The ll defined compositional layering within this unit is strongly tectonized d reveals well developed small amplitude isoclinal, box and conjugate fold ructures. This unit ranges in thickness from 5 to 45 metres. sseminated sulphides, predominantly pyrite, occur throughout this unit and e also present within small foliation parallel microveinlets. This rizon is the lateral equivalent, of and locally hosts, massive sulphide neralization across the Kamad 7 property.

A thick sequence of mafic pyroclastics and flows forms the ratigraphic footwall (structural hanging wall) to the mineralized zone. thin 45 to 50 metres of the mineralized horizon, mafic footwall rocks are rongly altered by silica, carbonate and sericite. Distinct compositional yering, over 2.0 to 4.0 cm widths, may be produced by the segregation of inerals within this assemblage. Within the footwall alteration zone, isseminated pyrite averages 8 to 10 percent. At deeper levels within the ootwall series the units appear as weakly carbonitized mafic pyroclastics nd flows. Mafic flows, including pillowed sequences typically occupy less han 20 percent of the column.

These footwall lithologies are cut by mafic intrusions, mainly of nblende diorite, which are present as small sills 20 to 40 metres thick, weakly discordant dykes. These units are weakly foliated, may introduce ong contact aureoles, and characteristically have highly sheared tacts. They are believed to be Cretaceous in age.

Mineralized Zones and Sulphide Development

Two mineralized horizons are encountered across the Kamad 7 ims. These horizons are identified as the "Rea" and "Silver" Zones, the lver Zone being a thrust repetition of the Rea Zone. Both zones are fined by a chert, sericitic chert and sericitic phyllite assemblage. hin these units pyrite averages 8 to 10 percent, and occurs as small liation parallel disseminations and microveinlets. Arsenopyrite is rarely ted.

Massive sulphides are developed within this horizon, in at least o lenses. These sulphides are well bedded, fine grained and to date are ss than 2.0 metres in true width. Reddish brown sphalerite typically erages 2 to 3 percent, galena 2 percent and chalcopyrite less than 1.0 rcent. Barite has not been documented. In at least one of these lenses gnificant gold-silver values (4.25 g/t Au, 47.7 g/t Ag) have been reported raser, 1985).

Structural Relations

The lithologic trend across the property is 130 to 150° with derate, 40 to 50° northeast dips. Across the subject claims, as eviously indicated, stratigraphy is typically inverted. Regional tratigraphic inversion is indicated by:

1) Graded beds within metasediments, suggest younging to the southwest
2) Cleavages are typically at a shallower angle than bedding
3) The footwall alteration zone structurally overlies massive sulphides

Lithologic trends and structural relations are illustrated by Map Geology - Kamad 7 Property (back pocket).

Rapid and repeated changes in cleavage vergence and within graded ggests frequent bedding reversals within the stratigraphic units, due to intraformational folds. The major structural plunge occurs rate to low angles, namely 10-12 degrees and is north-northwesterly d.

Major faults may be identified through surface mapping and e of them is repeatedly seen in drill core. Of these, the most icant is a major southwesterly directed thrust which produces a ural repetition of the Rea Zone, the subparallel Silver Zone. This ing took place after stratigraphic inversion and in this case younger are thrust over older ones. This thrust and other ural-stratigraphic features are shown on Map 3: Geological Cross on - Kamad 7 Property (back pocket). Several other low angle failures ncountered in drill core and may represent imbricate structures to the thrust.

Late dextral faults trending north-northeasterly have lacements of 40 to 75 metres, and shift stratigraphy along with the r low angle thurst. Dextral faults may have a rotational component, side down of indeterminate magnitude.

SINMAX CLIFF TRAVERSES

A series of fourteen geological traversals, at 500 m spacings, were ...ucted across the prominent cliffs which rise 1000 m above the Sinmax ...ley. These traverses required the use of intermediate mountaineering ...niques and were intended to:

1) Delineate at a semi-regional scale the stratigraphy and structure across the southern Kamad claims.

2) To characterize, lithogeochemically, zones within this stratigraphy most favourable to the development of massive sulphide mineralization.

Detailed mapping at a scale of 1:5000 and 1:2500 is still in ...ress across the main Homestake Horizon, or the Homestake schist. The ...companying 1:10,000 scale map, Map 25: Lithogeochemical Sample Point and ...eralized Stratigraphy Sinmax Cliffs (back pocket), serves only as a ...liminary focus for discussion.

This portion of the Kamad claims has been examined at a regional ...le by Preto (1978, 1980) and by Preto, McLaren and Schiarizza (1979). ...e immediate area surrounding the Homestake Mine has recently been mapped ...Hoy and Goutier (1985). East of the Kamad claims, the Homestake Horizon ...been sampled and mapped by Wodjak (1977).

Lithology and Lithogeochemistry

A pronounced hydrothermal alteration system has been superimposed ...r much of the stratigraphy exposed across the Sinmax Cliffs. The ...ical characteristics which characterize primary lithology, at the ...oscopic scale, are severely affected by this hydrothermal system. Even ...ighly altered rock units, alteration assemblages are assumed to reflect ...ary rock composition, and in general field classifications are supported ...lithogeochemical data.

A stratigraphic data base was established at a regional scale from series of 14 geological traverses. Traverse locations and geochemical sample points are shown on Map 25. All lithogeochemical sample locations are identified by a traverse number, elevation and sample number. One hundred and fifty three samples were analyzed using an ICP whole rock analytical package. Analytical methods and the data for these analyses are documented in Appendix VII: Lithogeochemistry Sinmax Cliff traverses.

The structurally, and potentially stratigraphically, lowest member in the map area is a weakly altered series of medium grained mafic volcanic flows locally weakly porphyritic and fine grained pyroclastic rocks. This unit carries disseminated calcium carbonate, as its principle alteration product. The best exposure of this unit is located at the base of traverse H2, where it is exposed over vertical distances in excess of 100 m. Geochemically, it is similar to rock compositions marking the transition between basalts and andesites. These units do not exhibit alkali depletion, silica addition, and carry only background Pb, Zn, Ag values, Appendix VII.

The immediate structural footwall to the principle alteration zone is formed by a quartz rich chloritic phyllite, a derivation of an intermediate volcanic. This unit is significantly more massive than the overlying schists, with well defined plates of chlorite, ankerite, sericite and manganese oxides which form the principle foliation and produce a dull brownish green weathered surface. Two to five centimeter quartz bands produce strong compositional layering and may carry up to 3 percent disseminated pyrite. The unit forms steep cliffs at the base of traverse H5 and averages 50-75 m true thickness. Lithogeochemically, strong silica addition and sodium depletion have significantly changed the bulk composition of this rock, Appendix VII.

A spectacular zone of alteration forms the quartz sericite schist unit which host the massive barite and sulphide lenses of the Homestake mine. In the historical literature this unit is identified as the Homestake schist, with a thickness varying between 200-300 m. Within it this unit contains several submembers which are mappable at a detailed, 1:2,500 scale. These include:

Sericite - Ankerite Schists (Intermediate tuffs)
Chloritic Schists (Mafic Pyroclastics)
Quartz Eye Intermediate Flows
Pyritic Quartz Sericite Schists (Pyritic Felsic Volcanics & Exhalites)
Quartz Sericite Schist (Felsic Pyroclastics)

Of these submembers, chloritic schists provide the most reliable internal marker horizon. Four narrow, less than 15 meter wide, chlorite schist units are noted within the Homestake Schist, two of these are structurally repeated and two are stratigraphic repetitions.

Geochemically these rocks are strongly depleted in Fe, Ca, Na and possibly Mg, and enriched in K and silica. Na_2O is commonly less than 0.5 percent. Significant enrichment occurs in Ba, F, with sporadic base metal enrichment. Enhanced fluorine levels may be correlated at the macroscopic scale with an increase in green-fluoromicas.

Pyrite and arsenopyrite average 4-5 percent across the schist and may exceed 15-20 percent in local small 15-30 m thick stratiform units. Pronounced yellow green oxides, scorodite, are developed in these areas and reflect a marked increase in arsenopyrite. Residual quartz eyes may occasionally be identified within the schist and support a felsic origin for the original lithology.

Bedded barite outcrops in three small lenses near the Homestake line, all of these are hosted within the quartz sericite schist and in one case underlain by a sericitic chert. These lenses are all located near the [illegible] Homestake Portal and vary in width from 1.0-12.0 m. The largest exposure, Barite Bluff, has a strike length of approximately 65 m. At this exposure coarsely crystalline bedded barite envelopes thin foliation parallel lamella of galena and sphalerite, 3-4 percent combined. Plunge directions of these lenses are indeterminant.

Baritic lenses and the Homestake Schist are directly overlain by a quartz eye porphyritic flow and fine grained felsic pyroclastic. This unit is mapped only in the eastern traverses, traverses H9-H12, where it averages 30 to 50 metres in width. Within these traverses this felsic unit may be seen to grade directly into the quartz sericite schist or may be entirely embayed within the schist as an alteration island. Well defined grey quartz eyes, to 0.75 cm, occupy 3-5 percent rock volume. The unit is characterized lithogeochemically by weak silica addition, strong Na, Ca and Mg depletion and by locally strong K addition. Base metals, barium and fluorine may be significantly increased e.g. sample H10-2400, 16495.

Brownish buff weathering ankeritic phyllites are capped by an argillite, and provide the principle transition between the highly altered Homestake Schists and overlying less altered volcanic lithologies. This phyllitic unit averages 75-150 m in thickness, has a blocky, angular weathering pattern and consist of both altered clastic and mafic volcanoclastic lithologies. A 5-15 m thick argillite bed frequently overlies ankeritic phyllites, and is the structurally lowest member of the five argillites horizons recorded on the property. Within the ankeritic phyllites alteration levels have signifcantly decreased and strong Ca addition remains as the principle chemical signature.

A thick, 150-175 m section of calcareous mafic to intermediate pyroclastics and flows overlie the ankeritic phyllite member of the Sinmax stratigraphy. These rocks are fissile, light green grey and rarely exhibit weathering, highly calcareous mafic pyroclastics. Whole rock analysis, and in particular the titanium content, suggests that an intermediate pyroclastic volcanic origin may be more appropriate.

The structurally youngest rocks in the section are a series of well defined mafic flows, pillowed sequences lightly altered mafic pyroclastics, and plagioclase porphyritic mafic flows. These units exceed 100-150 m in true thickness. Included in this series is distinctive mafic flow and argillite slump breccia. This unit is noted only on the eastern traverses H1-H3 where it appears as a highly reliable marker horizon. Displacement of this unit provides one of the principle lines of evidence for the position of a major normal fault between traverses H2 and H3. Volcanic units within this section are only weakly altered and their chemical composition suggests them to be andesitic to tholeiitic in composition.

CONCLUSIONS

From the comprehensive technical data base compiled on both the Rea Silver and Homestake horizons several conclusions may be attained. From these data it has been shown that both the Rea and Silver mineralized horizons are mappable across much of the Kamad 7 claim block. These two subparallel zones trend 135-140 degrees and dip 40-45 degrees northeast. Both zones occur near a volcanic sediment contact and are related to each other by a major northwest trending thrust.

Geochemically both the Rea and Silver zones are traceable on surface by B horizon soils. Lead, zinc and silver soil geochemistry produce moderate to strong linear anomalies across the Kamad 7 claim group. A significantly weaker and more diffuse lead zinc soil anomaly may define the surface trace of the Rea Horizon across the Kamad 8 claim group.

Both the Rea and Silver Horizons appear to be moderate to low quality conductors. These zones, and lithology contacts, are traceable using a frequency domain EM, GENIE, system. Some caution is required in the interpretation of the low quality/low priority conductors associated with the Rea-Silver Horizons. Many of the sulphides/sulphates on Kamad property are nonconductive, barite, tetrahedrite sphalerite.

Drill testing on the Kamad 7 claim group failed to intersect significant massive sulphides on either the Rea or Silver zones. Both horizons carry disseminated sulphides across their lengths and are frequently geochemically anomalous in base metals and barium. Low angle and normal faults frequently disrupt those zones, whereas stratigraphic thinning occurs less often.

Mapping and sampling across the Sinmax Cliffs has produced preliminary subdivisions in the internal stratigraphy of the Homestake Schist. Particular emphasis has been placed on stratigraphic and structural features near the Homestake Mine. It is likely that the Homestake Schist is anomalously thickened by large scale overturned fold structures. These folds are best defined through repetition in a chloritic schist marker

[illegible]. Sericitic lenses within the Homestake Schist occur with a broad zone [illegible] alkali depletion, silica and fluorine enrichment. Strongly [illegible] rocks may be mapped as stratiform units within the Homestake Schist [illegible] as primary exploration targets.