607 Northtown Office Building, Spokane, Washington 99207 • Bus. 509-HU 9-1485 • Res. 509-FA 8-9401

NEIL CAMPBELL
GEOLOGIST • PROFESSIONAL ENGINEER

013097

Mr. Leo D. Kirwan
Minerals Section
Imperial Oil Limited
500 - 6th Avenue S.W.
Calgary, Alberta
Canada

April 3,. 1972

Dear Leo:

In response to your letter of March 28, I enclose the report on the Max Group together with the petrographic description made from the thin sections you had sent.

To review briefly the features we discussed in conversation, the prospect was evidently a valid porphyry copper-moly target and the work by Trigg-Woollett and Associates was well done. I believe most geologists feel that petrographic work is most useful in determining specific minerals or rocks. If one were to draw a collective conclusion from the thin sections, however, I think he would find that the rocks are generally more acidic than is common in porphyry copper intrusives. There is a significant amount of potash enrichment in the form of K-feldspar and mica but in no specimen does there appear to be evidence of potash "flooding".

Other silicates such as epidote and the pyroxenes are present but not in great amounts nor do they suggest the temperature levels one expects to see in the vicinity of an ore body. Kaolinization appears nominal although identification under the microscope is difficult. One should be hesitant about making sweeping generalization based on microscope work but it would appear in brief that hydrothermal activity, while undoubtedly present, did not reach high levels of intensity where the specimens were collected.

The field observations point to the same conclusions. Hydrothermal activity of the type associated both with ore and peripheral alteration simply does not seem to have been very intense. One might expect to find other such zones (and presumably they were looked for) but one could hardly expect that they would be much different.

It was this line of reasoning that led to the opinion that the Max property has been adequately tested and that further work is not warranted. Again, making such a judgement without seeing the field evidence is risky but this is the best judgement I can offer.

This material should, of course, been returned to you long ago and I regret the delay. I shall be interested in learning how your 1972 program eventually shaped up.

Kindest regards.

Sincerely,

N Campbell

Neil Campbell

NC:pn

Enclosure

Specimen 1476

Epidote	40%
Quartz	35%
Sericite	10%
Augite	10%
Opaques (magnetite-pyrite)	5%

A fine-grained, foliated (gneissic) metamorphic rock, possibly derived from a lime-rich volcanic extrusive or pyroclastic. The strong foliation and strained quartz extinction suggests shearing although there is scarcely enough mica to produce schist. Feldspar appears to be absent altogether.

Specimen 1477

Quartz	30%
Sericite-calcite	25%
Microcline fs.	10%
Opaques	5%

A medium grained quartz monzonite in which the original plagioclase crystals are totally altered to fine-textured mixtures of sericite and carbonate. A few grains of fresh, probably secondary potash feldspar are observed.

Specimen 1478

Microcline	20%
Quartz	20%
Plagioclase	40%
Biotite	7%
Sericite	10%
Opaques	3%

A medium-grained quartz-monz onite or granite twinning of microcline is blurred; flash figures are biaxial positive near optic normal. The plagioclase occurs in well-developed, zoned, subhedral crystals. Uniform texture. Except for the limited development of sericite, the rock is comparatively fresh. The potash feldspar is probably primary although a few small grains replaced larger crystals of plagioclase.

Specimen 1480

Sericite-carbonate	45%
Quartz	30%
Muscovite	10%
Microcline	10%
Opaques	5%

Medium-grained granodiorite in which the plagioclase has been completely altered to very fine-textured mixtures of sericite and carbonate. Quartz is present as large grains which may incorrectly appear to be phenocrysts. One larger quartz veinlet. Numerous minute veinlets of quartz-carbonate. The microcline may be secondary. The opaque minerals (sulphides?) appear to develop along former cleavage planes. A highly altered rock.

Specimen 1481

Plagioclase	45%
Quartz	30%
Biotite	10%
Muscovite	5%
Epidote	5%
Chlorite	2%
Opaques	3%

Medium-grained granodiorite. A comparatively fresh example of rock from which Specimen 1480 may have been derived. The epidote and chlorite are indicative of low-grade metamorphism. There is some evidence of shattering although fracturing has not been accompanied by veining. A fresh rock.

Specimen 1482

Plagioclase (fresh)	30%
Chlorite	25%
Sericite-carbonate	35%
Opaques	10%

A fine-textured brownish rock showing a distinctly clastic texture. Angular fragments described as being composed of sericite-carbonate may actually be kaolinized plagioclase fragments. Other feldspars are

quite fresh, commonly euhedral and zoned. The opague minerals which may include magnetite are particularly abundant. The general appearance suggests a tuffaceous rock of intermediate to basic composition although this would be subject to confirmation by megascopic primary structures.

Specimen 1483

Perthite	40%
Plagioclase	20%
Quartz	20%
Biotite (altered)	10%
Microcline	5%
Opaques	5%

A medium-grained quartz monzonite, equi-granular and relatively fresh. The biotite shows indications of conversion to chlorite, but little other evidence of alteration is observed.

Specimen 1484

Quartz) Plagioclase)	70%
Biotite	7%
Microcline	20%
Opaques	3%

Probably a feldspär porphyry. The matrix consists of an extreme fine mixture of equi-granular quartz and feldspar of uncertain proportions together with minor biotite which appears to be partially chloritized. The large, commonly euhedral phenocrysts are microcline with some crystals showing good cross-hatched twinning. The phenocrysts show slight indications of sericitization. Clastic textures which might suggest a sedimentary rather than igneous origin were not observed. Some smears of iron oxide are seen suggesting oxidation of sulphides.

Specimen 1485

Quartz)	50%
Plagioclase)	
Unidentified	30%
Quartz	15%
Tourmaline	4%
Opaques	1%

A very fine matrix as in 1484 but also containing 1.0MM rosettes of an unidentified mineral having low refraction and birefringence, feathery extinction, possibly partially altered pyroxene phenocrysts. Rounded quartz grains cuts across other grains. Probably volcanic porphyry of intermediate composition

Specimen 1486

Quartz-sericite	80%
Chlorite	5%
Quartz	10%
Hematite	5%

Sub-rounded, equigranular fine grained of highly altered feldspar probably consisting of quartz and sericite are set in a matrix of extremely fine material of apparently the same composition. These are cut by rounded quartz grains up to 1.0 MM across. Minor biotite partially chloritized is observed together with streaks of hematite. The essentially rounded form of the altered grains suggest a sedimentary origin although alteration is too severe to permit positive identification.

Specimen 1487

Plagioclase	50%
Hornblende	45%
Opaques	5%

Medium to fine grained, dark green, porphyritic. Euhedral feldspar lathes are set in matrix of hornblende with abundant large crystals and crystal clusters of plagioclase. Ophitic texture. Probably hypabyssal, possibly fine grained diorite dyke.

Specimen 1488

Plagioclase	50%
Augite	30%
Biotite	8%
Orthoclase	10%
Opaques	2%

Sub-hedral, lathe-shaped fresh feldspars set in a matrix of pyroxene and large biotite crystals. Probably some chloritization of the pyroxene but rock is generally quite fresh with little evidence of hydrothermal alteration. Igneous rock, diorite or volcanic (flow) equivalent.

Specimen 1489

Plagioclase	60%
Orthoclase	20%
Biotite	5%
Quartz	10%
Apatite	1%
Opaques	4%

Medium-grained granite. All minerals are relatively fresh although some breakdown of biotite to chlorite and iron oxides. Some indication of fracturing (cataclastic structures) but no veining. No evidence of hydrothermal alteration.

Specimen 1490

Quartz	70%
Quartz-sericite	20%
Opaques	10%

A fine-textured foliated rock composed mainly of quartz grains many with sutured margins. Interstial material between quartz grains is extremely fine and not positively identified but is believed to consist of alteration products secondary after feldspar. May contain sphene up to 5% together with minor apatite. Quartz vein.

MAX GROUP THIN SECTIONS

SLIDE #	ROCK #	HAND SPECIMEN NAME
Cores		
N1476	71M-1 51 Feet	Schistose Micaceous Quartzite
N1477	71M-2 299 Feet	Greenish Altered Quartz-Monzonite
N1478	71M-2 420 Feet	Hornblende-Biotite Quartz-Monzonite
N1479	71M-4 157 Feet	Orangy Altered Quartz-Monzonite
N1480	71M-4 239 Feet	Greenish Altered Quartz-Monzonite
N1481	71M-4 351 Feet	Hornblende-Biotite Quartz-Monzonite
Grabs		
N1482	1M-1	Porphyritic Andesite
N1483	1M-3	Alaskite
N1484	1M-4	Quartz-K-Feldspar Porphyry
N1485	1M-6	Pink Poprhyritic Felsite
N1486	1M-7	Grey Porphyritic Felsite
N1487	1M-11	Diorite Porphyry
N1488	1M-14	Biotite Diorite
N1489	HI-3	Hornblende-Biotite Quartz-Monzonite MoS_2
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