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Geological Report On The Mo-Au Mineralization in The Moly May Intrusion, northwestern B.C.

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GEOLOGICAL REPORT ON
THE MOLY MAY INTRUSION

INTRODUCTION

The Moly May intrusion is located at 55o 21' N (latitude) and 129o 48' W (longitude) in northwestern British Columbia (Fig. 1). The magnetic declination in this region is 26o east. The Moly May is one of several molybdenite-bearing monzonitic-granitic stocks, referred to as the Alice Arm intrusions. These are mainly small stocks that were forcefully intruded into the eastern margin of the Coast Plutonic Complex, and the assemblage siltstone, greywacke, shale and conglomerate of Hazelton formation of late Jurassic age. The Alice Arm intrusions include the Moly May stock, Tidewater, Bell Molybdenum, Lime Creek and Roundy Creek (Kitsalt) and Ajax (Fig. 2). The age of intrusion and mineralization of these igneous bodies are nearly synchronous at about 53 Ma (e.g., Woodcock and Carter, 1976).

In the Moly May stock, molybdenite mineralization was first discovered by propector D. Javorsky and associates, over fifty five years ago. In 1965, N. Carter examined the few high-grade showings discovered at times, and worte a short description (Carter, 1965). His chip-samples found to contain 12.7% Mo. In 1981, C. Graf conducted a limited mineral exploration program for Enfield Resources Inc. on the northern part of the stock; he discovered the west zone. In

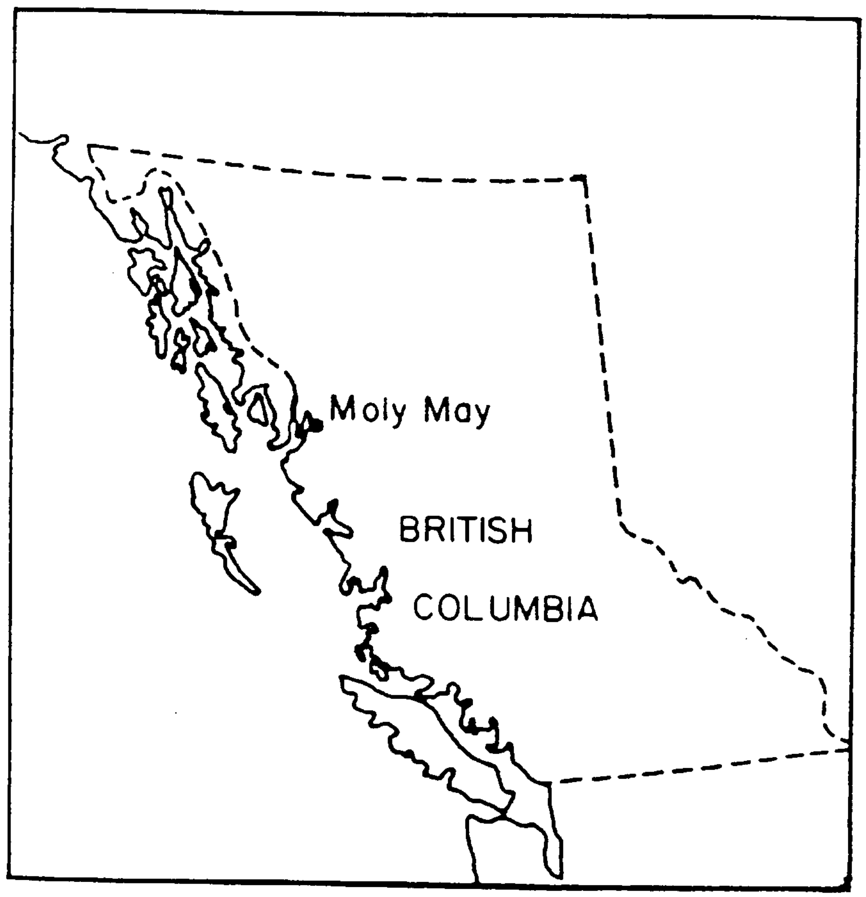


Figure 1. Location map of the Moly May intrusion

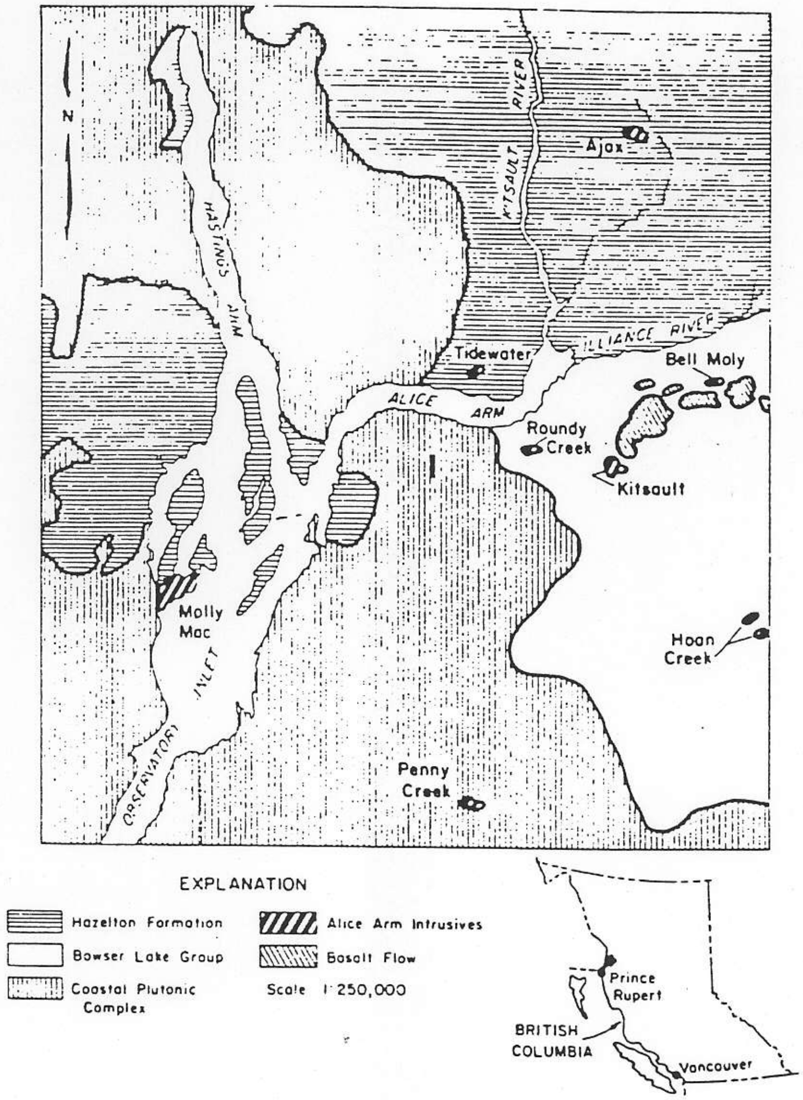


Figure 2. The Alice Arm intrusions

1982, P. Peto conducted a similar exploration and sampling program, and on the basis of a limited geochemical data, he recommended diamond drilling in the east zone; Three diamond drill holes were completed by August 1982 in the east zone (DDH 82-1 to 3).

General Geology

The Moly May intrusion (48 Ma, K-Ar age), occurs in the form of elongated body (approximately 1.2 X 2.8 km), trending NE-SW. It exhibits sharp intrusive contact with the sedimentary host rocks at the northern boundary of the stock, and faulted contact with the Coast Plutonic Complex at the southern part of the stock (Fig. 3). The sedimentary host rocks are thermally metamorphosed, and cut by several granitic dykes and quartz veins near the contact with the Moly May stock; folding, Ptygmatic folds are obverved.

In general, the stock appears to be compositionally distinct from the Coast Plutonic Complex. The Moly May stock composed mainly of muscovite-(biotite) leucogranitic rocks, and contains small igneous bodies (patches or inclusions?) of coarse-grained biotite-rich monzonitic rocks, and few metasedimentary xenoliths (hornfelsic argellite of the Hazelton formation). The leucogranitic rocks grades locally into fine-grained aplitic varieties and occasionally into coarse and very coarse varieties. Pegmatitic pods of various sizes are not uncommon within the intrusion. Light to intensive stockwork development occur mainly along the western, northwestern and central parts of the stock (Fig. 3). However, along the eastern to southeastern margin of this intrusion, the rocks are relatively fresh and only rarely spotted with Fe-Mo stain, but generally devoid intensive stockwork. These stained spots typically range from 2 to 5 cm across. The muscovite-biotite leucogranite rock is the essential rock variety of the stock; it is composed mainly of quartz, feldspars, muscovite, biotite and garnet. Miarolitic cavities and vugs are abundant in this rock. This, beside the presence of of pegmatitic pods, are taken to represent local water saturation within the exposed (roof) of the stock.

In general, the Moly May stock contains numerous gossans, and is locally highly stained by Fe and Mo oxides (limonite, ferrimolybdenite and powellite?). The gossans range in size from 0.5 m, to several meters across and are occasionally rimmed by thin layer of greisen (sericite-muscovite). Hydrothermal or deuterric alteration is pervasive at gossans and highly stained rocks. Surface weathering is intense only within 0.5 to 1.5 cm. deep within rocks exposed at the surface. At areas devoid of gossans, surface weathering does not seem to have any significant leaching effect on molybdenite mineralization.

Staining of host rocks seems to have been formed by those two processes; i) alteration via oxidation of pyrite and/or molybdenite to give limonitic, ferrimolybdenitic and powellitic alteration products of brown , reddish-brown and bright yellowish-green colors, and ii) breakdown of mafic minerals (mainly biotite) due to high oxidation where ferrous iron of biotite is oxidized to ferric iron leading to breakdown of biotite to give muscovite, the released iron oxides caused staining.

Several mafic to intermediate dykes (striking mainly NE-SW) intersect all rock varieties in the region. Late stage quartz veins (0.1 to 2 meter thick) found to contain appreciable amounts of pyrite and could represent an interesting target for gold mineralization. The stockwork type quartz veinlets exhibit a prefered NW-SE trend, with strike ranging from 320o to 350o. These stockwork-type veinlets are, unfortunately, unmineralized.

The Moly May intrusion is generally highly fractured with two general trends; 320o to 350o (parallel to stockwork veinlets), and 70o to 90o approximately. Several fault systems cross cut the Moly May intrusion, with four major trends observed: NE-SW, N-S, NW-SE, and NNE-SSW. Gossans are occasionally located at the footwall of some of these faults.

At the northern contact of the Moly May intrusion with the metasediments (hornfelsic argellite, quartzite and sandstone of the Hazelton formation), folding and ptygmatic veins within metasediments as well as granitic dykes and quartz veins ranging in thickness from 5 to 50 cm, are abundant. Hydrothermal solutions that may have trickled (perculated) through sandstone layers were stopped by the impermeable hornfelsic argellite of the Hazelton formation, where it deposited molybdenite and pyrite in a thin (2 to 4 cm thick) layer at the interface. the presence of such thin mineralized layers reflects the activity of such (orthomagmatic) hydrotharmal solutions related to the emplacement and crystallization of the Moly May stock (see below. Visible molybdenite and pyrite grains in those layers range from 1 to 5 mm across.

Summary of field work completed

A mineral exploration program consisting of prospecting reconnaissance and detailed chip rock geochemical sampling along geochemical grids with 50 meters grid intervals and 25 meters sample intervals covering all (east, west and south) mineralized zones. Rock (grap) sampling along geochemical grids with roughly 100 meters grid and sample intervals were designed to cover the whole intrusion. Chip sampling of high grade mineralized showings has also been completed. Detailed geological mapping of the mineralized zones, and semi-detailed mapping of the whole intrusion has been completed in the period between June 22 to July 22, 1988. This is summarized in the following:

1) Five rock geochemical grids, each is approximately 1,400 meter long with line spacings of 50 m., cover both the east and west zones (see figure 4).

2) Three rock geochemical grids, each 300 m long with line spacings of 50 m, and sample intervals of 25 m cover the south zone

3) Approximately 12 rock geochemical grids, with grid-, and sample intervals of roughly 100 m, cover the whole

intrusion

4) A total of 472 samples has been collected and analysed for Mo, Au, and many other elements. Field description of all 472 samples are given in table 4.

5) A detailed geological map of the Moly May intrusion, including the southern part (that were not mapped by previous investigators) has been done.

6) A location map for all geochemical samples collected is given in figure 4.

7) 16 new, small, high-grade molybdenite showings have been discovered, chip sampled and analysed for Mo, Au and other elements

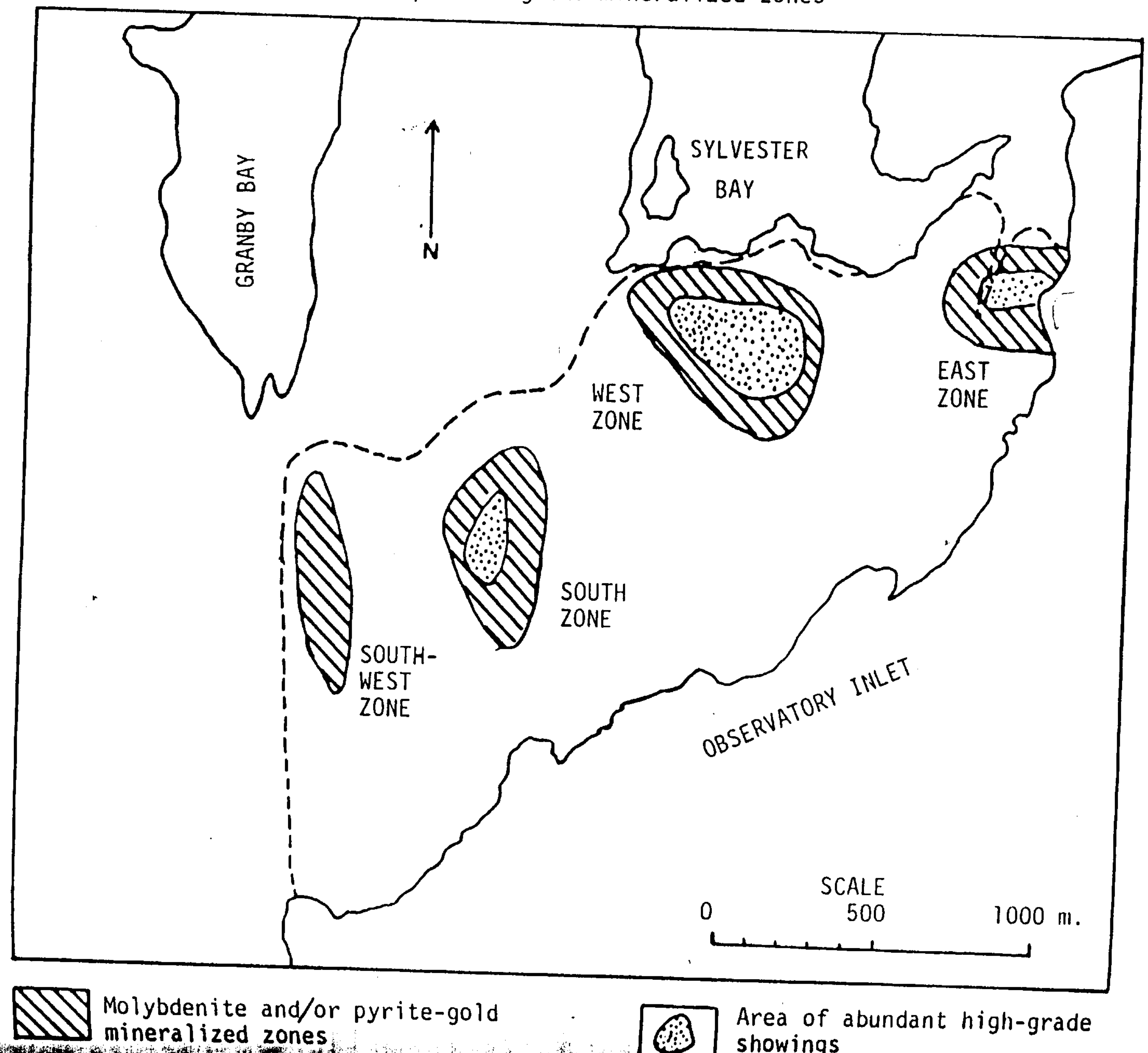
8) Five new pyrite-gold showings occur in gossans, host rocks and quartz veins have been discovered and assayed particularly for gold

9) Core loging of the 3 diamond drill holes in the east zone (DDH- 82-1 to 3) has been done.

Mineralized zones and high-grade showings

The intrusion include three mineralized zones (mineralization include molybdenite with or without pyrite-gold), and a newly discovered zone (southwest zone) with abundant pyrite mineralization. These mineralized zones are shown in Figure (5). Each zone contains a number of small high grade showings. The east zone contains 4 showings, 11 showings occur in the west zone, and 4 showings occur in the the south zone.

Figure 5. Map showing the mineralized zones



Our mineral exploration, sampling, mapping program (carried out between June 22, to July 22, 1988), resulted in the discovery of 16 new, small, high grade molybdenite or molybdenite-pyrite-gold showings; the majority of which cluster in the west zone. Seven new pyrite-rich showings occur in gossans, host rocks or quartz veins are discovered, and have been analysed for gold, molybdenum and other element. Some of these occur in the newly discovered southwest zone that contain large gossans, reaching over 10 meters across. The high-grade showings are shown in the geological map (Figure 3).

In general, the mineralized areas appear to be confined to the peripheral part of the intrusion; the central portion of which does not exhibit extensive mineralization. Molybdenite-pyrite-gold showings occur within weakly stained muscovite leucogranitic-rocks, and rarely within pegmatitic pods and biotite-rich monzonitic rocks as that of the Moly Mack showing of the east zone at the shore of the Observatory Inlet (Fig. 3). Molybdenite and pyrite-gold showings found also within gossans, and highly stained rocks, but never within stockwork quartz veinlets. The latter may have either pre-dated or post-dated mineralization.

Mineralized high-grade showings are in general localized small, and range typically from 0.3 to 1.2 meter across and rarely reach about 2.5 meters acress (e.g., sample #R12 discovered in the south Zone). The showings contain high concentrations of molybdenite (average 0.1 to 6% MoS2 in most showings), gold and bismuth (occasionally reaching over 10,000 ppb Au or Bi). Quartz veinlets and stockwork zones, as mentioned earlier, are devoid of any mineralization. Only some late stage quartz veins (mostly those greater than 10 cm in thickness) contain pyrite-gold minerals; analysed samples from these veins show high gold concentrations (see Geochemistry section).

Porphyry molybdenite is dissiminated in host rocks, and found also at the contact with the metasediments, mainly at the contact between sandstone or quartzite and hornfelsic argellite of the Hazelton formation (e.g., sample #AR1). Molybdenite occurs mainly as flackes and rosetts that range from 1 to 7 mm across. It is occasionally intergrown with muscovite (in both leucogranitic and pegmatitic varieties). Molybdenite also occurs linning miarolitic cavities and vugs. Secondary muscovite is seen intergrown with molybdenite. High grade showings found to contain higher contents of muscovite and garnet. Both muscovite and garnet show evidence to indicate a hydrothermal origin Muscovite occurs along fractures and microfractures and lining miarolitic cavities. Garnet is a ubiquitous mineral that occur in high proportions at mineralized zones. This reflects clearly that mineralization caused by deuterric or hydrothermal fluids (possibly related to late stage fractionation of the Moly May intrusion) was associated with potassic alteration. Hydrothermal fluids of magmatic heritage may have dissolved feldspars and deposited molybdenite-pyrite-gold, muscovite, garnet and possibly sericite and kaolinite. This may have been developed during multiple hydrothermal events. Further research is required to document the source and nature of the mineralizing fluids.

The style of mineralization of the Moly May stock appears to be somewhat different from that at Kitsalt. Mineralization at Kitsalt occurs within vertical to steeply dipping quartz veinlets (0.5 to 1 cm thick), and also dissiminated in highly hydrothermally altered host rocks. Dissiminated molybdenite occur in association with pyrite and/or chalcopyrite and at the contact of quartz veinlets and highly altered host-rocks, in the form of molybdenite and pyrite thin veinlets along contacts, micro-fractures or filling vugs. A generation of (2 cm and thicker) veins of quartz as well as carbonate veins, containing pyrite, pyrrhotite, galena and spbalerite also characterize the Kitsalt deposite. Most of these features do not characterize mineralization, or host-rock alteration at the Moly May. Host rocks at the Moly May are fresh to weakly altered muscovite, garnet leucogranite with minor biotite-rich monzonite and pegmatitic pods. Moderately to highly altered biotite-chlorite quartz-monzonite porphyry is the abundant host rock at Kitsalt where altered rocks give buff, pale-pinkish to greenish-yellow alteration products, possibly due to oxidation of molybdenite, chalcopyrite and pyrite, and sericite-carbonate alteration of plagioclase.

Pyrite-gold mineralizatin in the Moly May, occur either in the form of dissiminated grains in host leucogranitic, pegmatitic, and monzonitic rocks, with large gossans reaching 10 meter across (e.g., sample # R20), or in quartz veins (with thickness > 10 cm), and pegmatitic pods, occasionally filling vugs and as pyrite veinlets. A number of chip samples across these zones are collected and assayed for Au, Bi, and other elements. These could represent a prime target for gold mienralization.

Geochemistry

Twenty four trace elements including Ag, As, Ba, Be, Bi, Cd, Co, Cr, Cu, Ga, Hg, La, Mo, Ni, P, Pb, Sb, Sc, Sr, Tl, U, V, W, and Zn have been analysed for numerous (472) samples from the Moly May intrusion (Table 6). Analyses for Au, Sn, F, and Rb were done for only 261 samples, the results are given in Table (7). Major element composition of the analysed samples are given in Table (5). All analytical work has been carried out at the Chemex Labs Ltd. of north vancouver, British Columbia. Soil sampling was carried out by Consultant Geologist J. H. Hajek and associates, between June 15 to June 28, 1988; location maps for these samples were not made available by J. Hajek.

Very high to extreme concentrations of Mo, Bi, and Au are reported for many samples from the Moly May stock; the concentrations of these metals are of economic value. The concentrations of the majority of the other trace elements however, are low, and rarely exceed their background values in granitic rocks. The average trace-element compositions in most samples of the Moly May property are given in turn; the composition of Ag in most samples is about 0.2 ppm, As content is about 5 ppm and only rarely reach high values (up to about 150 ppm), Ba content is about 10 ppm and rarely reach high values up to 730 ppm, Be content is about 0.5 ppm, Cd content is also about 0.5 ppm, Co content is about 1 ppm, Cr content is variable mainly between 20 to 160 ppm, Cu content varies between 1 and 15 ppm, F content is highly variable from 40 to 1,550 ppm, average Ga content in most samples is about 10 ppm, Hg content is about 1 ppm, La content is about 10 ppm, Ni content is about 2 ppm, P content is highly variable and range mainly from 10 to 1,150 ppm, Pb content varies from 2 to 220 ppm, Rb content varies from 30 to 230 ppm, Sb content is about 5 ppm. Most samples contain similar, but very low contents of Sc, Sn and Sr (the concentration of each is about 1 ppm in most samples analysed, Tl conteot is about 10 ppm, U content is also about 10 ppm, V content is about 1 ppm, W content is about 5 ppm, and Zn content varies from 2 to 100 ppm.

Extreme molybdenum concentrations are reported for numerous samples, particularly from the newly discovered molybdenite high-grade showings (see geochemical anomalies section). It is unusual that most elements that are known to occur in higher concentrations in molybdenum rich granitic systems such as F, W, and Sn (the so-called granitophile elements, that are normally considered as pathfinders for Mo) do not show any systematic variation with Mo in the Moly May. In fact, the abundance of these elements is very low and hardly reach concentrations higher than their background values in granitic rocks; no significant anomalous W, Sn or F values are reported in the Moly May.

Anomalous gold concentrations (occasionally higher than 10,000 ppb) are reported for many samples from the Moly May stock. Some of the anomalous gold values are associated with anomalous Mo values mainly from molybdenite-pyrite high-grade showings. This association of molybdenite-gold mineralization is somewhat unusual and definitely deserve a thorough (fluid inclusion and isotopic) investigation. It is also unusual that the standard element pathfinders for gold such as Ag, As and Sb do not show any systematic variation with gold and their concentrations are generally very low (0.2 ppm Ag, 5 ppm As and 5 ppm Sb) in most samples.

In the Moly May property, bismuth proved to be a valuable metal (next to gold and molybdenum) for two reasons; 1) It shows an excellent systematic variation with gold, so that it can be considered a valuable pathfinder for gold; and 2) several anomalous bismuth concentrations (occasionally reaching values greater than 10,000 ppm) are reported from this property (see below).

Geochemical Anomalies

Several molybdenum, gold and bismuth geochemical anomalies have been identified within the Moly May intrusion, mainly within the cluster of high-grade showings of the mineralized zones.

Molybdenum;

High Mo values; (higher than 10 ppm Mo) are reported for numerous samples (Table 6). These could be considered anomalous values as the common background value for Mo in the granitic rocks is considered to be under 10 ppm (Mutschler et al., 1981). In an attempt to identify and locate potential metal anomalies of economic interest, we have considered only samples of very high (or anomalous) values; higher than 100 ppm; i.e., more than ten times higher than background values. Those samples with Mo content higher than 100 ppm are listed in Table (1). Although concentrations of Mo are relatively erratic, three areas of Mo-geochemical anomalies surrounded by few scattered anomalous values, have been identified from the plot of our data (Fig. 6). These coincide with the three main zones of mineralization. Molybdenum geochemical anomalies in the Moly May could have been formed as a result of three, local, circulating hydrothermal systems, possibly occured at depth underneath the geochemical anomalies within the mineralized zones. These may later have deposited molybdenite and, occasionally, gold-pyrite minerals in these zones. Isotopic and fluid inclusion studies are nessessary to characterise the mineralized hydrothermal fluids. The fluids may have dissolved alkali feldspars, and deposited molybdenite, possibly at the epithermal stage.

The erratic distribution of Mo values within the Moly May intrusion is somewhat puzzling, but very high concentrations of Mo (greater than one percent) in numerous newly discovered showings as well as previously identified ones, is very encouraging indeed. It is unfortunate that we do not have the actual Mo values for samples with Mo content in the excess of 1% Mo, as this is the upper detection limit for the analytical method used. However, we have estimated (on the basis of visible molybdenite minerals in hand specimens) molybdenite mineralization in the excess of 6 % in some samples from several newly discovered high-grade showings. Although the molybdenite-mineralized showings are highly localized and relatively small, the presence of such high grade showings exposed at the surface may reflect a much larger root of an oro shell at some depth within the Moly May igneous intrusion. Trenches, followed by test drill holes (see below) will, hopefully, define the extent of mineralization at depth.

Gold;

Although gold analyses are obtained only for a limited number of the samples collected, the results plotted in Figure (7) show three areas of Au-geochemical anomalies with two extremo gold concentrations; one is located in the east zone (sample #R9 containing more than 10,000 ppb Au) and the other is located in the west zone (sample # AR227 containing 9,060 ppb Au). Several anomalous gold values (cf., Table 2, Fig. 7) occur also in the vicinitey of those three gold-rich zones, and some occur in the southwest zone.

In view of the systematic variations of Bi with Au in the Moly May (see below), we expect that many of the samples that have not assayed for gold, and specially those that exhibit anomalous Bi concentrations, would also give high to extreme gold values (those are all samples listed in Table 3, excluding samples listed in Table 2). Precise evaluation of gold geochemical anomalies awaites these results.

Bismuth;

Bismuth is similar to molybdenum and gold in showing erratic distribution within the moly May property. Despite that, some extreme concentrations of Bi (cf. Table 3), found to be localized mainly within three areas, where three Bi-geochemical anomalies are identified (Fig. 8). These are surrounded by scattered bismuth anomalous values. The three areas of bismuth anomalies coincide with the three mineralized zones, and with both Mo-, and Au-anomalies (compare Figures 6, 7 and 8). The systematic variation in the concentration of Bi mainly with Au and partially with Mo is striking, and very useful. Similar distribution patterns of bismuth and gold, in particular, may suggest that both metals are co-genetic, and were deposited mainly from the same mineralizing hydrothermal fluids. Both may also have a genetic link with Mo mineralization.

Bismuth in the Moly May proved to be of economic value as it occasionally reaches extreme concentrations (e.g., sample # R9 containing greater than 10,000 ppm Bi) in association with gold. Bismuth had not been investigated or analysed by previous investigators.

Table 1. Anomalous molybdenum values in the Moly May Intrusion.

Sample number assay#	field #	Mo Content (ppm)
128674	R11	>10,000
128286	AR414	>10,000
338055	AR444	158
338057	AR446	1,415
338154	AR346	144
338158	AR650	103
338078	AR617	284
338140	RL7	6,380
338144	RL11	2,920
338198	AR2	1,290
338200	AR2a	107
128651	AR238	142
128653	R4	103
128654	R5	2,430
128655	R6	2,620
128656	R7	>10,000
128657	AR239	134
128664	R8	226
128665	R9	>10,000
128666	AR246	130
128685	R12	>10,000
128686	AR182	95
128694	AR172	1,925
128695	R13	8,900
129301	R15	1,655
129302	R16	3,140
129303	R17	5,940
129304	R18	>10,000
129305	R19	294
129307	AR193	446
128852	AR13	342
128864	AR107	587
128877	AR120	142
128968	AR128 (AR65?)	5,290
128914	AR201	129
128927	R1	6,380
128932	AR219	2,080
128940	AR227	2,980
128976	AR136	195

Table 3. Anomalous bismuth values in the Moly May Intrusion

Sample number assay #	field #	Bi content (ppm)
128257	AR307	6
128264	AR403	6
128282	AR461	10
128673	AR169	26
128674	R11	130
128676	AR171	6
128286	AR414	36
129327	AR311a	64
129328	AR316a	24
129340	AR429	22
338051	AR440	78
338052	AR441	28
338057	AR446	24
338061	AR600	12
338125	R23	16
338130	R22	118
338131	R12	110
338174	AR327	6
338078	AR617	8
338132	AR660	8
338134	RL1	154
338137	RL4	52
338145	RL12	20
338150	RL17	6
338199	AR3	8
338253	RL20	30
128685	R12a	164
128694	AR712	8
128695	R13	42
128696	AR190	126
128697	AR191	170
128698	AR192	8
128852	AR13	10
128853	AR7	6
128864	AR107	10
128873	AR116	70
128876	AR119	8
128887	AR34	6
128891	AR38	6
128954	AR51	8
128964	AR61	10
128968	AR128	14
128651	AR238	10
128653	R4	38

Table 3. continued

128654	R5	8
128655	R6	14
128656	R7	320
128657	AR239	10
128663	AR245	26
128665	R9	>10,000
128666	AR246	176
128667	R10	20
128727	AR63	10
128739	AR75	14
128740	AR76	18
128743	AR79	36
128914	AR201	8
128916	AR203	30
128919	AR206	6
128921	AR208	42
128927	R1	34
128928	AR215	14
128931	AR218	42
128932	AR219	32
128933	AR220	20
128940	AR227	3,390
128941	AR228	40
128942	AR229	14
128944	AR231	10
128948	AR235	138
128949	AR236	18
128976	AR136	8
128978	AR138	6
128980	AR140	208
128981	AR141	14
129000	AR160	14
129310	R15	6
129302	R16	16
129303	R17	12
129304	R18	18
129305	R19	44
129306	R20	46

Evolution of the mineralized fluids in the Moly May

Molybdenum may occur in silicate melts as cation $[Mo]^{+4}$ (Uzkut, 1974), or as $[MoO_3]^{-2}$ (Gevorkyan, 1968). In melts with a combined (Na + K) content of less than 4 to 5 percent, molybdenum occurs as $[Mo]^{+4}$ and can substitute for Ti+3, Fe+3 and Al+3 in early crystallizing minerals like magnetite, sphene, and ilmenite: this explains the lack of Mo-deposits in mafic and calcic magma series more basic than monzonite.

In more felsic granodiorite-granite melts, molybdenum is present as a molybdate anion complex and will be concentrated in the residual melt by various processes (e.g., Westra and Keith, 1981; Mutschler et al., 1981). The Moly May granitic stock contains an alkali content (about 8 wt.% Na2O + K2O; cf., Table 5), and relatively low iron, calcium and titanium contents (about 4, 3, and 1 wt.%, on average, respectively). Such magma chemistry may favour Mo-enrichement in a residual melt, assuming some initial Mo-enrichment in the parent magma (e.g., Westra and Keith, 1981).

In general, characteristic minor elements concentrated in the granite-molybdenum systems include Be, Cs, F, Li, Mo, Nb, Rb, Sn, Ta, Th, U, and W. These and other lithophile elements could reach high concentration in the upper part of a batholithic, felsic magma chamber, possibly as a result of crystal fractionation and convection-aided thermogravitational diffusion processes. These processes, according to Mutschler et al. (1981), could be followed by transfer of silica, volatile-rich magma to high-level, shallow, epizonal environment where further thermogravitational diffusion cause further lithophile element concentration.

With further cooling and crystallizabtion, a vapour-saturated cap will form. Following vapor saturation in the magma, several constituents including molybdenum may be partitioned into the vapor phase where gravitational rise of the vapor phase result in high concentration of volatiles, alkalis and incompatible elements at top of magma chamber. Massive hydrofracturing of roof rocks will occur when fluid pressures exceed confining pressures.

The evolution of a supercritical fluid marks the initiation of processes leading to ore shell formation; molybdenum is normally transported by such Cl-F-rich fluids. The fluid phase plays also an important role for the replacement of pre-existing rocks by hydrothermal alkali feldspars and possibly muscovite and garnet. During such hydrothermal replacement process, the removal of potassium from the fluid and the addition of sodium to it could result in more NaCl-rich brine that boil at some point (Mutschler et al. 1981): precipitation of minerals such as quartz, molybdenite and possibly hydrothermal garnet and muscovite took place, possibly during boiling. The entire cycle of resurgent boiling, hydrofracturing and mineralization could be repeated if fluid pressures increases when rock permeability decreases by precipitation of the hydrothermal mineral assemblage.

In the Moly May, the presence of flakes and rossetts of molybdenite, commonly intergrown with (hydrothermal) muscovite and occasionally localized in fractures, microfractures and lining miarolitic cavities, as well as the abundance of (hydrothermal ?) garnet (and occasionally Au-pyrite minerals) in mineralized molybdenite zones and at high grade showings clearly reflect the activity of hydrothermal fluids in transporting and precipitating molybdenite, as well as gold-pyrite minerals. What is unique about the Moly May is the relatively low F-content and lack of any systematic change of fluorine (as well as Sn, W and Rb) with molybdenum, and the high content of Bi and particularly Au in association with Mo-mineralization. Isotopic and fluid inclusion studies are important to further investigate the origin of such mineral association.

Recommendations For Future Work

1. Pyrite mineralization in several showings, mainly in host leucogranitic and monzonitic rocks, quartz veins, as well as in gossans, found to be associated with gold mineralization. A detailed investigation and comprehensive sampling of all pyrite-rich rocks, gossans, and quartz veins (greater than 10 cm in thickness), within this igneous intrusion should be carried out. The relationship between quartz veins in the Moly May and those in the adjacent region where old gold mines occur in quartz veins (as the Gold Leaf) should be examined.

2. The west zone is the best target area for mineralization (specially molybdenite) as it contains the largest number of high-grade showings, some of which are closely spaced. Blasting and trenching in this zone, if fruitful, could be followed by one or two diamond drill holes (see below), to test mineralization et depth. The south zone proved to contain relatively large showings with very high to extreme concentrations of Mo, Au and Bi; a list of significant targets to be trenched, blasted or drilled is given below.

3. Core loging of the 3 DDH of the east zone indicate that mineralization is not very promising in this zone; no further drilling in this east zone is recommended. However, some soil sampling within this zone that is mostly un-exposed is recommended. Trenching is highly recommended at showing R9 of this east zone.

4. I recommend that the 11 targets of high-grade showings described below should be blasted, trenched and throughly prospected, to enable us to define extent of mineralization. Three diamond (test) drill holes are also recommended (see below).

The presence of high to extreme concentrations of gold and bismuth in association with molybdenum in samples from several high-grade molybdenite showings, clearly reflect a genetic link, though unusual, between those metals.

Targets recommended for trenching, blasting and drilling

Trenching

Objectives of trenching; to define extent of mineralization in all targets, to remove overburden and rusty surfaces for further detailed sampling and to follow mineralized quartz veins for further sampling. For target locations, see Figure (9).

Target 1: located at the northern part of the stock (close to shore line south of Sylvester bay) at sample # AR140 (350 ppb gold and 208 ppm Bi) gold-pyrite mineralization occur in a thick (0.6 meter thick) quartz vein.

Target 2: located at the east zone, sample # R9 (> 10,000 ppb gold, > 10,000 ppm Bi, and > 1% Mo). Molybdenite and gold-pyrite mineralization occur in a small outcrop of highly silicified leucogranite in contact with pegmatitic lense and biotite- monzonite.

Target 3: located at the west zone, sample # R7 (940 ppb gold, 320 ppm Bi and more than 1% Mo (reaching about 5%); molybdenite, pyrite-gold mineralization occur within a small gossan (1.5 X 3 meter) reddish brown, altered leucogranite.

Target 4: located at the west zone, sample # R5 (2,430 ppm Mo and 45 ppb gold) where mineralization (pyrite-gold, molybdenite) occur within a granitic-pegmatitic lense.

Target 5: located at the west zone, sample # R15, R16, R17 (5,940 ppm Mo), where molybdenite mineraliation occur in five high-grade showings (each nearly 1 m. across) within an

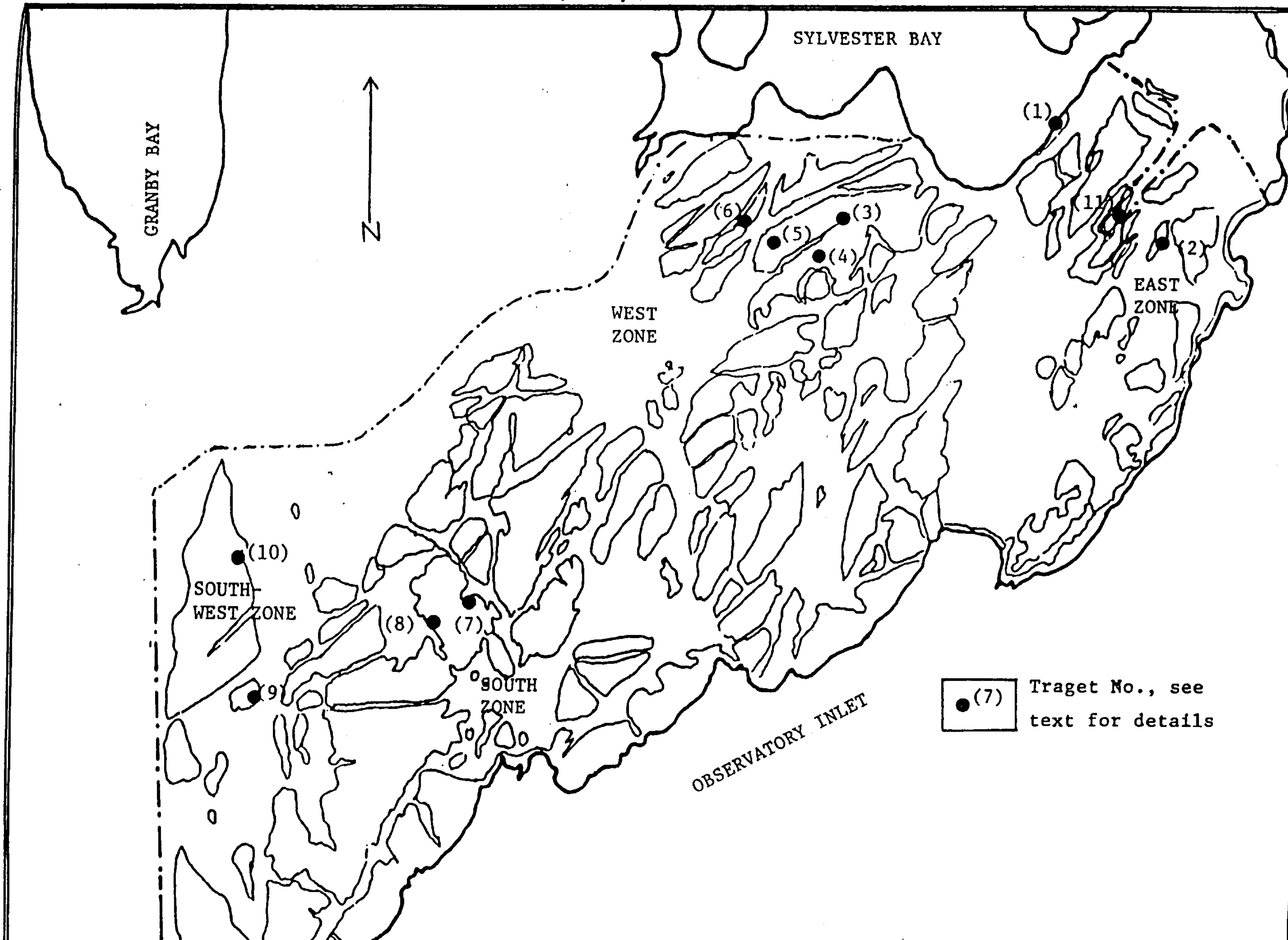


Figure 9. Location of targets recommended for trenching.

area of about 15 meter across. Mineralization occur in weakly altered muscovite-garnet leucogranite.

Target 6: located at the west zone, sample # R227 (2,980 Mo, 9,060 ppb gold, 3,390 ppm, Bi) dissimented molybdenite, pyrite-gold mineralization occur within altered, stained leucogranite (gossan).

Target 7: located at the south zone, sample # R11 (590 ppb gold, > 1% Mo reaching about 4%). Molybdenite, gold-pyrite minerals are dissiminated in greisenized, highly to moderately stained leucogranitic rocks within and at contact of a large gossan (5 X 3 meter) in a host leucogranitic rock.

Target 8: located at the south zone, sample # R12 (845 ppb gold and greater than 1% molybdenum, reaching about 6%). Molybdenite and gold-pyrite minerals are dissiminated in medium to coarse-grained muscovite-garnet leucogranite, and adjacent large gossan (10 meters across).

Target 9: located at the south zone, sample # AR191 (170 ppm Bi, possibly equivalent to about 600 ppb gold). Pyrite mineralization occur in a 0.6 meter thick quartz-porphyry vein.

Target 10: located at the southwest zone, sample # R20 (70 ppb gold), abundant pyrite mineralization in quartz pegmatitic pods, and large gossans in monzonitic, and silicified leucogranitic rocks.

Target 11: located at the east zone, sample # AR246 (490 ppb gold, 176 ppm Bi, and 130 ppm Mo), abundant pyrite-gold mineralization in silicified granitic rocks.

Drilling

1. Drilling area 1: location; the west zone.

Two diamond (test) drill holes, one close to sample # R1, bearing N70° east (opproximately), dipping 60° NE, 250 meters deep. The second should be about 5 meters west of sample # R19, bearing N130° (approximately), dipping 70° southeast, 200 meters deep. Objective; to test the extension of mineralization at depth, and to locate the roots of the high-grade showings of the west zone.

2. Drilling area 2: location; the south zone.

One diamond drill hole, possibly about 10 meters west of sample # R12, bearing N 75° (approximately), dipping 60° northeast, 200 meters deep. Objective; to test extend of mineralization below this extremely high-grade showing (R12) with greater than 6% Mo, and 845 ppb gold, and to intersect the NW, pyrite-gold bearing quartz-porphyry vein (0.6 meter thick) that contains possibly greater than about 600 ppb gold.

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