009811

TAPE NO. Pots 1 REF. NO. 01 PRECON ________ INITIALS ______

Special Instructions ____________________

1AFTON,,,POTHOOKs8M and roll back,

rm480, By V. A. Pretos10M and +4pts,

1LOCATION: Lat. 50! 39.5' Long. 120! 30.5'sroll back,

rm420,(92I/10E, 9W)

o KAMLOOPS M.D.,,,At approximately 2,100 feet elevation 8 miles west of Kamloops on the south side of the Trans-Canada Highway.

oCLAIMS: AFTON 1 to 7, AFTON Fraction, ADD 1 to 30, POT 5 to 9, POT 1 to 4 and 10 Fractions, ADD 1 Fraction, AD 1 Fraction, BERNIE 7 and 8 Fractions, Mineral Lease M-22 (DOMINION, Lot 1595).

oACCESS: By the Trans-Canada Highway from Kamloops, 10 miles.

oOWNER: Afton Mines Ltd.

oOPERATORS: AFTON MINES LTD., Box 34183, Station D, Vancouver 9 and CANEX PLACER LIMITED, 800, 1030 West Georgia Street, Vancouver 5.

oMETAL: Copper.

oDESCRIPTION:s10I and +4pts,

jHISTORY:sM,,,,Copper mineralization in the area of the Afton claims has been known at least since 1898 when the 330-foot Pothook shaft and several pits and trenches were excavated. This shaft, and its immediate surroundings, located approximately 3,500 feet southeast of the presently known Afton orebody, remained the focus of exploration activity in this area for many years. In 1949 a prospector named Axel Berglund staked eight claims near the Pothook shaft and called them 'Afton' which means 'afternoon' in Swedish (Millar, 1973, p. 33). Since then the property and its surroundings were investigated by Kennecott Copper Corporation in 1952, Graham Bousquet Gold Mines Limited in 1956-57, Noranda Mines, Limited in 1958, and New Jersey Zinc Exploration Company (Canada) Ltd. in 1960. During this period an appreciable amount of diamond drilling, geological, geophysical, and geochemical surveys were done on the property, but mostly in the vicinity of the Pothook shaft.s+4pts,

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jIn 1964, C.,F. Millar, a geological engineer who was then a drilling contractor, persuaded Colonial Mines Ltd. to do percussion drilling near the Pothook shaft. This programme was short lived and in 1965 Mr. Millar formed a private syndicate to continue exploration near the Pothook and on some newly staked claims close to the Trans-Canada Highway. Between 1965 and 1967 this syndicate did a considerable amount of percussion drilling and a fairly extensive induced polarization survey. In 1967 a consultant's report recommended a diamond-drill-hole programme, part of which was completed by 1970. Among these holes, DDH 70-4 was drilled on a small induced polarization 'high' in the east half of the presently known orebody. This hole intersected 250 feet of .41 per cent copper in a zone of strong magnetite veining and of several old pits in which magnetite and minor copper mineralization is visible. The diamond-drill programme was suspended incomplete and Duval Corporation was given the right of first refusal in exchange for an engineering report (Millar, 1973, p. 34) which recommended further diamond drilling. In 1970-71 the property was optioned by Quintana Minerals Corporation which relinquished the option in the summer of 1971 after having drilled several unsuccessful percussion holes over a large part of the property.s+4pts,

jAt this point the property reverted back to Afton Mines Ltd. which, under the direction of C.,F. Millar, in September 1971 began a new series of percussion holes in the immediate vicinity of DDH 70-4, the only hole to that date that had shown any significant mineralization. Most holes in this new series encountered significant mineralization, both as native copper and as sulphides, and several of them were stopped in ore-grade material. Late in 1971 diamond and rotary rigs were added to the percussion machines and the programme continued until June 1972 when work on the property was suspended by a court order due to a litigation between Canex Placer Limited and Teck Corporation Ltd. over control of the property. During the period of September 1971 to June 1972, 24,281 feet in 30 diamond holes, 27,900 feet in 93 percussion holes, and 19,365 feet in 26 rotary drill holes were completed.s+4pts,

jFollowing a verdict from the Supreme Court of British Columbia in December 1972, diamond drilling was resumed on the property early in 1973 under the management of Canex Placer Limited. The litigation at this time is however not finished as Teck Corporation Ltd. has appealed the court decision.s+4pts,

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jDrilling to June 1972 has indicated an orebody which is estimated to contain 31,600,000 tons of 1.06 per cent copper ore with a stripping ratio of 3.26 to 1 or 47,000,000 tons of 0.79 per cent ore with a stripping ratio of 4.55 to 1, both estimates being based on a 0.25 per cent copper cut-off (Millar, 1973, p. 34). The ore zone is still not defined down dip to the south and to the west, although it appears to be also becoming rapidly less accessible to open-pit mining in these directions. The average thickness of overburden as calculated from 22 rotary and 27 vertical diamond-drill holes over the entire area drilled was 58 feet.s10I and +4pts,

jLOCATION:sM,,,,The orebody is centred approximately 600 feet south of the Trans-Canada Highway, some 8 miles west of Kamloops in an area of rolling sagebrush and grassland dotted with ephemeral alkali ponds. One of these ponds directly overlies the orebody (Fig. ,,,,) which is thus known as the Lake Zone.s10I and +4pts,

1GEOLOGYs+4pts,

jGeneral Setting:s10M,,,,The orebody lies on the extreme northwestern edge of the eastern part of the Iron Mask batholith. The close association of copper deposits to the contact zones of this batholith or to major structural breaks through it has long been known. So has been their close relationship to late porphyritic phases of the batholith that are found almost exclusively in these relatively narrow and well-defined zones (sI,Minister of Mines, B.C.,sM, Ann. Rept., 1967, pp. 137-147). In these respects the Afton is similar to several other copper deposits of the Iron Mask batholith. Its main difference, however, is in its larger size, higher primary grade and supergene enrichment.s+4pts,

jStructurally the deposit lies along the southern edge of an east-west trending graben filled with several thousand feet of Middle Eocene Kamloops Group volcanic and sedimentary rocks. The ore zone itself, especially in its western end, is in fact also probably downfaulted with respect to adjacent ground to the east, and this may in part account for the preservation of supergene mineralization in this area.s10I and +4pts,

jDescription of Rock Units:sM,,,,As shown on Figure ,,,, outcrop in the area of the Afton deposit is extremely scarce, and geological interpretation must be based

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largely on examination of diamond-drill core. Following examination of core from most of the diamond-drill holes shown on Figure ,,,,, the various rock types encountered were arbitrarily subdivided into 10 units mostly on the basis of their outward appearance and inferred age. These units range from possible fine-grained volcanic rocks of the Nicola Group to medium-grained diorite of the Iron Mask batholith, fine-grained diorite, monzonite, and syenite porphyry of the Cherry Creek intrusions, and Middle Eocene volcanic and sedimentary rocks of the Kamloops Group. A brief description of these units follows.s+4pts,

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jUNIT,,1:,,,Rocks that could be recrystallized tuff and possibly lava of the Nicola volcanic succession are found on section 92E in drill holes 72-12 and 72-13 (Fig. ,,,). This material is fine to medium-grained, greenish to purple andesite, moderately to strongly saussuritized and completely devoid of K-feldspar. These possible volcanic rocks occur as relatively short sections in altered intrusive rocks of unit 6, and probably represent inclusions of Nicola country rock near the edge of the batholith.s+4pts,

jUNIT,,2:,,,Medium-grained, non-porphyritic, strongly magnetic greenish grey biotite pyroxene diorite is found as relatively short sections in several drill holes. On the basis of general appearance and texture, this rock is believed to be part of the microdiorite division of the Iron Mask batholith (sI,Minister of Mines, B.C.,sM, Ann. Rept., 1967, pp. 137-147). As seen in the drill holes, this unit can be weakly to strongly saussuritized and fractured, and barren to moderately well mineralized.s+4pts,

jUNIT,,3:,,,Medium-grained diorite mapped as unit 3 is found occasionally in some drill holes. This rock is very similar in composition to diorite of unit 2 but is generally slightly porphyritic. It is probably a transitional or contact phase of unit 2.s+4pts,

jUNIT,,4:,,,A rock type mapped sparately as unit 4 and probably correlative to a phase of the Sugarloaf intrusions (sI,Minister of Mines, B.C.,sM, Ann. Rept., 1967, pp. 137-147) is found in the upper part of drill hole 70-3 on section 92E (Fig. ,,,,). This is a grey to pinkish-grey hornblende microdiorite to micromonzonite porphyry which occasionally contains small inclusions of darker, more mafic material. The porphyry is weakly mineralized with pyrite and chalcopyrite and moderately saussuritized.s+4pts,

jUNIT,,5:,,,Rocks mapped as unit 5 are part of the Cherry Creek intrusions and are thought to have played an essential role in the formation of the deposit. They, and what are believed to be their altered equivalents, units 6, 8, and 9, are by far the most common in the Afton deposit. Sections designated as unit 5 in the drill holes include porphyries or micro-porphyries of diorite to syenite composition

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which have preserved their original texture as they have only been weakly or moderately altered. The bulk of unit 5 consists of fine-grained porphyries that range in colour from dark greenish to brownish and pinkish grey and in composition from microdiorite to micromonzonite. They are weakly to moderately altered but almost invariably strongly magnetic. These porphyries grade toward more strongly altered sections of equivalent rock that are designated as unit 6. A very important part of unit 5 is intrusive breccia, which is best displayed in drill holes 72-22, 72-19, and 72-8, but is also found in several other holes. This breccia is believed to have formed at relatively shallow depth during the emplacement of the Cherry Creek suite of porphyries, and is very similar in outward appearance to other bodies of breccia found at several other localities along the northern edge of the Iron Mask batholith. It consists of moderately to well-rounded fragments of fine-grained porphyry which are unevenly distributed in a fine-grained commonly brownish and biotite-rich matrix, and is nearly everywhere well mineralized. The bulk of the breccia appears to form a roughly tabular to lensoid body, some 200 feet thick, elongated in an east-west direction and dipping steeply to the south. The Afton deposit as presently known seems to be centred on this body of breccia and on highly altered rock of units 6 and 9 which may well be largely equivalent to it.s+4pts,

jMost of unit 5 is mineralized, but several small late, relatively fresh, microsyenite dykes are found in some drill holes such as 72-10, 72-12, 72-14, and 72-17 in the eastern part of the deposit. These dykes are only weakly mineralized or barren and appear to cut more altered and better mineralized rocks of units 5 and 6, and also contain rare inclusions of diorite of units 2 and 3. These dykes, though somewhat late to post-mineral in age, are considered to be genetically part of unit 5 and are thus mapped as such but designated by the letters SD in the drill sections.s+4pts,

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jUNIT,,6:,,,Rocks mapped as unit 6 are also very common in the deposit. They consist of light green, green-grey, and pinkish saussuritized rock, much of which is thought to be correlative with unit 5. Alteration has however largely or totally destroyed original textures so that features useful in correlating with other units can only rarely be identified. Sections of altered breccia or porphyry can however be recognized in some places, indicating that at least part of this unit is equivalent to unit 5. The alteration varies in intensity from place to place but generally consists of strong to total replacement by sericite, albite, epidote, and carbonate with variable amounts of chlorite, zoisite, apatite, sphene, and rarely pyroxene. K-feldspar replacement is not as common as it might appear in hand specimen, for much of the pink material seen is actually thought to be albite coloured by finely disseminated hematite. Biotite, either primary as in rocks of unit 2 and some of unit 5 or finely disseminated and secondary as in some parts of unit 5 is destroyed by the saussuritic alteration characteristic of unit 6, as is primary finely disseminated magnetite which is re-introduced in veins that are commonly found in the eastern part of the deposit cutting rocks of both units 6 and 7.s+4pts,

jUNIT,,7:,,,Rocks mapped as unit 7 are intensely altered and consist of massive fine to coarse-grained epidote-chlorite-magnetite replacement of saussuritized rock of unit 6. They generally occur in the eastern half of the deposit and rarely are a good host for mineralization. Patches and veins of massive magnetite with conspicuous apatite crystals and minor amounts of calcite, quartz, and siderite are common within this unit and may occasionally give drill intersections of considerable length such as at the bottom of hole 72-15 on section 128N. The veins, however, dip very steeply and are nearly parallel to the drill holes so that their actual thickness is considerably less than the length of the drill-hole intersections. Similarly it would appear that the intensely altered zones of unit 7 probably also form steeply dipping to subvertical shoots which contain the magnetite veins and probably trend, as the veins do, in an easterly to southeasterly direction as indicated by measurements taken in the few exposures in the northeastern part of the deposit and in drill holes 70-4 and 72-13.s+4pts, TAPE NO. Puto 1 REF. NO. 26 PRECON ________ INITIALS ______

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jUNIT,,8:,,,Material designated as unit 8 consists of totally altered light grey to buff quartz sericite rock with an appreciable amount of pyrite and some chalcopyrite. Unit 8 is known to occur only in the intensely faulted western part of the deposit such as at the top of hole 72-16 and in the upper part of hole 72-21. Rocks of unit 8 appear invariably to be in fault contact with rocks of unit 9, and may represent blocks that have been faulted in their present position from a considerable distance perhaps from the south and west.s+4pts,

jUNIT,,9:,,,The red, hematitic, crumbly rock comprising unit 9 is perhaps one of the more widely known rock types of the Afton deposit because of its spectacular native copper mineralization. This unit is typical of the strongly faulted and oxidized western half of the deposit and is known to occur only west of section 88E (Figs.,,,, ,,,, and ,,,). Its chief characteristics are the abundance of brick red to reddish brown earthy hematite, its generally highly friable nature and the widespread occurrence in it of native copper and cuprite. Where less oxidized and friable, this rock type is seen to consist largely of strongly saussuritized fine-grained porphyry with secondary pink feldspar, and so is also probably equivalent to unit 5.s+4pts,

jUNIT,,10:,,,Rocks of unit 10 are entirely post-mineral in age and consist of tuff, lapilli tuff, sandstone, and minor conglomerate and bentonitic shale of the Middle Eocene Kamloops Group. They are in fault contact with the mineralized rocks of the Afton deposit to the west and north, and also occur as fault wedges within ore in the western half of the deposit. Wherever observed these strata are completely barren and their emplacement within ore must have occurred after all movement of copper-bearing solutions through the orebody had stopped. A short distance north of the Trans-Canada Highway a few diamond-drill holes indicated a thickness of the Tertiary section in excess of 1,500 feet. Fault wedges of barren Tertiary strata within ore are found in sections 84E to 80E (Figs. ,,,, ,,,, and ,,,) and appear to dip moderately to the southeast and thicken to the north and west. Most of the angles between bedding drill core axes in these intersections indicate gentle to moderate dips, but steeper dips also occur. However these may be due in part to original soft sediment folding because such structures can be seen in some of the better preserved core.s10I and +4pts,

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jROCK,,ALTERATION:sM,,,,Rock alteration within the Afton deposit varies greatly from place to place both in intensity and type. As indicated by some of the least altered rocks found in drill holes it appears that the earliest stage of alteration in the less calcic rocks was the development of very finely disseminated brown biotite. This stage can be seen in many parts of unit 5 but may have been completely bypassed in more calcic rocks of units 2 and 3 where saussuritic alteration appears to have developed instead. Saussuritic alteration, accompanied by chloritization of ferromagnesian minerals and in a few places by development of pink K-feldspar appears to have eventually spread to all units and in the eastern part of the deposit progressed to the development of the shoots of massive epidote-chlorite-magnetite alteration of unit 7. In the western part of the deposit the saussurite stage was followed by widespread and locally intense development of sericite which contributed to the destruction of any biotite and K-feldspar and locally produced a light grey to nearly white, totally altered rock with light greenish waxy patches of muscovite.s+4pts,

jIn the intensely fractured part of the deposit west of section 88E the saussurite and probably the sericite stage were followed by locally intense and deep reaching oxidation which produced the red hematite alteration of unit 9 as well as several secondary copper minerals. In some particularly well-fractured areas this oxidation reached considerable depths. In drill hole 72-21 for example the red hematitic alteration and native copper occur to the bottom of the hole at a depth of 1,357 feet, and cuprite, malachite, azurite, and conichalcite are found in highly oxidized rock to a depth of nearly 900 feet. Other secondary minerals that have been detected by X-ray diffraction as occurring in minor amounts in the more highly altered parts of units 8 and 9 are talc, pyrophyllite, montmorillonite, kaolinite, and jarosite.sI & +4,

jMINERALIZATION:s10M,,,,Using the terminology of Sutherland Brown (1969) and of Sutherland Brown,sI, et al.,sM, (1971) the Afton deposit could be defined as a complex syenitic porphyry deposit. It is however distinctive in the fact that it has undergone considerable oxidation and supergene enrichment that are especially profound west of section 85E.s+4pts,

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jEast of section 85E with the exception of holes 72-22, 70-3, and 72-17, the upper 500 to 600 feet of the deposit consists of native copper-chalcocite mineralization with no bornite, chalcopyrite, or pyrite except for isolated minor occurrences in late carbonate veinlets. Conversely, the lower part of the deposit, as far as drilling has reached, consists of bornite-chalcopyrite mineralization, with minor chalcocite and no native copper. Native copper generally disappears abruptly within a few feet of the first appearance of chalcopyrite and very seldom if ever overlaps with this sulphide for any appreciable distance. Bornite, on the contrary, usually appears above chalcopyrite and commonly overlaps with the lower part of the native copper zone. Similarly, chalcocite commonly extends downwards for appreciable distances into the chalcopyrite zone.s+4pts,

jThe three diamond-drill holes mentioned above that are an exception to this rule can be explained as follows. Hole 72-22 goes through the normal sequence of native copper-chalcocite mineralization followed downwards by bornite-chalcopyrite, but in the lower part of the hole chalcocite reappears and chalcopyrite-bornite decrease markedly until at the very bottom of the hole the only mineralization is native copper in red hematitic, highly sheared and oxidized rock of unit 9. This reappearance of native copper at depth is believed to be due to the presence of a strong northerly trending shear zone which passes through the upper part of hole 72-3 and the bottom part of 72-22 and probably provided a good avenue for oxidizing solutions (Figs. 18 and 19). Hole 70-3 is weakly mineralized with pyrite and chalcopyrite throughout its length, but is located south of a fault which probably had considerable post-mineral movement and the rock here may thus have been moved in its present position from some distance away (Fig. 18). Hole 72-17 is exceptional since it has submarginal native copper-chalcocite and bornite-chalcopyrite-pyrite mineralization alternating in short sections from top to bottom (Fig. 21). However this hole is located at the extreme east end of the deposit and probably penetrated the irregular outer boundary of the enriched copper zone with the barren or nearly barren surrounding rock.s+4pts,

Another characteristic of the eastern part of the Afton deposit is the nearly complete

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absence of cuprite and the abundance, especially east of section 90E, of magnetite veins which usually contain conspicuous calcite, apatite, and minor amounts of quartz, siderite, and copper mineralization. Although some of these massive magnetite veins produce considerable intersections in some bore holes, they are believed to be only a few feet thick at the most, to dip very steeply, and for the most part to trend easterly t southeasterly, as indicated in the few surface exposures.s+4pts,

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jm420,sUN-10M/12,West of section 85E, and with the exception of holes 72-21, 72-7, and 72-16, the Afton deposit is characterized by the absence of bornite-chalcopyrite-pyrite mineralization, by a relatively small amount of chalcocite, and by a predominance of native copper and cuprite mineralization that is normally in highly fractured and oxidized rock. Copper values for this part of the orebody are also considerably higher than in the eastern half and this is a direct result of stronger and deeper secondary enrichment which was made possible by the much greater amount of fracturing and was in fact preserved perhaps because of a relative downward movement of this part of the deposit with respect to the eastern parts. Native copper typically occurs in thin seams, dendritic growths and fine disseminations. Chalcocite usually occurs along fractures or in fine disseminations. Cuprite generally occurs as red earthy coatings but may be found well crystallized in vuggy porous rock. Malachite, azurite, and conichalcite are occasionally found in some of the more deeply oxidized material and in hole 72-21 occur at a depth of approximately 900 feet. Magnetite occurs rarely as either disseminations or in veins but commonly is oxidized to hematite.s+4pts,

jFor the three diamond-drill holes mentioned above which are exceptions to these generalizations there are plausible explanations. Holes 72-21 and 72-7 have an upper zone of pyritic saussuritized and quartz-sericite altered rock which overlies in fault contact red hematitic rock mineralized with native copper, chalcocite, and cuprite. Here again it is believed that an appreciable amount of post-mineral movement has taken place and probably accounts for the juxtaposition of these incompatible mineral assemblages. Hole 72-16 has an upper portion of quartz-sericite altered rock that is mineralized with chalcopyrite and pyrite and overlies in fault contact a long section of native copper mineralization in red hematitic rock. In the lower part of the hole the native copper gives way to chalcopyrite-pyrite mineralization in somewhat less broken and altered rock which in turn is in fault contact with a bottom section of highly broken and altered material mineralized with native copper and chalcocite. The structure in the vicinity of this hole is very poorly understood partly because it is on the fringe of the drilled zone. There are indications that the hole was collared a short

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distance to the west of another northerly trending and probably westerly dipping shear zone or break (Fig. ,,,) and, if this is the case, it may have been largely drilled within or close to this zone. The upper zone of pyritic mineralization at the top of the hole could perhaps be explained in the same way as similar zones in holes 72-21 and 72-7, and the highly sheared zone of native copper-chalcocite mineralization at the bottom of the hole below the chalcopyrite-pyrite mineralization could perhaps be due to the downward projection of the northerly trending shear zone in a fashion similar to that that is believed to occur in hole 72-22.s+4pts,

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jA final feature which is common to the whole of the Afton deposit is the nearly complete lack of any capping of leached rock immediately below the cover of overburden. Many drill holes begin in ore-grade material, some of it very rich, at the onset as they enter bedrock. This is probably due to removal of any leached capping and perhaps also of a portion of the enriched native copper zone by glaciation during the Pleistocene.s10I and +4pts,

jSTRUCTURE:sM,,,,A structural synthesis of the Afton deposit is difficult because the deposit is entirely in intrusive rocks, is almost completely covered by overburden, and lacks marker horizons other than the fairly regular plane that marks the bottom of the native copper zone in the eastern half.s+4pts,

jThe deposit lies on the northwestern edge of the Iron Mask batholith, an area which is known to be the locus of much faulting. The area of the deposit, and especially the western half, is however so strongly faulted, and so much of this deformation partly or totally post-dates mineralization that little can be understood at this time of the pre-mineral fault and fracture pattern. However, the ore zone as a whole and some of the rock units are thought to trend in an easterly direction and to dip steeply to the south, as do some important faults as indicated in section 88E (Fig.,,,20). This attitude is in part followed by magnetite veins in the eastern half of the deposit and probably parallels the general trend of several other old faults and of the northern edge of the batholith in this area. However the majority of the east-trending faults that can be identified, particularly in the western half of the deposit, are post-mineral and, in the writer's interpretation, are normal faults that dip to the north.s+4pts,

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jThe distribution of Middle Jurassic and Early Tertiary rocks in south-central British Columbia has long been thought to be controlled by narrow depressed fault blocks or grabens (Carr, 1962, p. 48) and in some areas, such as in the Republic graben, a long and complex history of Early Tertiary volcanism and sedimentation accompanying the development of a graben has been well documented (Parker and Calkins, 1964). The very appreciable thickness of Kamloops Group sedimentary and volcanic rocks that is known to occur immediately north of the Trans-Canada Highway in an area of nearly flat topography must have been preserved from erosion by down-faulting relative to the block occupied by the Iron Mask batholith. It is further suggested that the Kamloops Group may have been deposited in this graben during its development, and that the wedges of barren Tertiary strata which are known to occur interlayered with mineralized intrusive rock in the western part of the deposit may have been emplaced by a process involving one or more landslides near the developing graben border. A set of branching normal faults along this border may have been active continuously or intermittently over a period of time and may have triggered the slides which were later cut by continued movement resulting in a gradual stepwise northward down-dropping of blocks and corresponding southward rotation, such as illustrated schematically on Figure ,,;.s+4pts,

jAll such faulting must have occurred at a sufficiently late time when any redistribution of copper by downward moving solutions had stopped because even the thinnest wedges of tertiary rocks that are found in the orebody are completely barren. Before the development of these post-mineral normal faults, a set of northerly trending and probably westerly dipping shear zones or breaks appears to have segmented the presently known orebody into at least three blocks and probably to have provided avenues for downward percolation of copper-bearing solutions. At the time of graben formation these cross-shears or breaks may have had further movement along them, probably also of the normal type, thus contributing to further depressing the western part of the orebody with respect to the eastern part. The net result of the fault pattern and movements described above was to considerably depress the block of ground occupied by the presently known Afton

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deposit with respect to ground to the east and south of it, and thus allowing the zone of enriched copper mineralization to be capped by Tertiary strata and to be preserved from total removal by erosion during the Pleistocene.s10I and +4pts,

jSUMMARY,,OF,,GEOLOGIC,,HISTORY:sM,,,,The geologic history of the Afton deposit begins with the emplacement probably during Late Triassic time of the earlier gabbroic and dioritic phases of the Iron Mask batholith along a northwesterly trending zone of weakness into a succession of Nicola Group volcanic and sedimentary rocks of virtually the same age. This batholithic mass, as it differentiated, evolved from a relatively deep epizonal to mesozonal level to a much shallower epizonal to subvolcanic level at which time the fine-grained porphyries and bodies of breccia of the Cherry Creek suite were emplaced along the northern edge of the batholith and the porphyries of the Sugarloaf suite (sI,Minister of Mines, B.C.,sM, Ann. Rept., 1967, pp. 137-147) along the south edge. The almost complete segregation of these two porphyry suites along separate contact zones of the batholith or along major fault zones is believed to be due to structural reasons.s+4pts,

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jAs one of the last intrusive phases of the Cherry Creek porphyry suite a body of porphyr breccia was emplaced within porphyry at the site of the Afton deposit. Considerable faulting along planes trending east-west and dipping steeply to the south probably precede and accompanied this stage and controlled the emplacement of the various bodies of porphyry and of the breccia. Either during this time or shortly after, hydrothermal alteration of the various types described affected several of the rock types. Development of secondary biotite appears to have been one of the first stages of alteration and was followed by widespread saussuritization that, especially in the east half of the deposit, culminated with the emplacement of many magnetite veins and the development of the shoots of massive epidote-chlorite alteration of unit 7. Copper mineralization in the form of chalcopyrite and bornite with very little pyrite was introduced at this time and impregnated a crudely tabular zone some 200 to 250 feet thick, trending east-west, dipping steeply to the south, and centred roughly on the main body of intrusive breccia. As the hydrothermal stage continued, a zone of pyritic quartz-sericite altered rock developed to the west and, probably, to the south of the orebody.s+4pts,

jSometime between Upper Triassic and Middle Eocene time, a set of cross-shears and fractures was imposed on the deposit. Uplift sometime before the Middle Eocene caused the deposit to be unroofed and subsequently oxidized and secondarily enriched to a considerable depth. Abundant hematite, native copper, chalcocite, cuprite, and several other secondary copper minerals were produced at this time. Secondary enrichment continued until downward percolation of solutions was stopped either by changes in climate or by covering of the deposit by the first veneer of Tertiary strata.s+4pts,

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TAPE NO. Preto 2 REF. NO. 05 PRECON ________ INITIALS ______

Special Instructions ______________________________

jIn Early Tertiary time a graben became established immediately north of the orebody and, as it developed, became filled by a thick succession of volcanic and sedimentary strata. Normal faulting along the southern edge of this graben depressed the ground occupied by the Afton deposit in a series of northward lowering steps and caused an apparent widening of the ore zone in its western half, and by triggering slides caused the imbrication of wedges of barren Tertiary strata within the ore. Normal movement along pre-existing cross-shears or breaks may have also occurred at this time. As volcanism and sedimentation continued, the deposit was eventually covered by a layer of Tertiary strata of sufficient thickness to protect it from most of the erosion during the Pleistocene, so that when ice covered the area, only the protective Tertiary cover, the leached capping, and only a part of the enriched zone of the orebody were removed.s+4pts,

oWORK DONE: Claims and topography mapped; induced polarization survey, 7 line-miles covering Dominion, Pot 4 Fraction, Afton Fraction, Afton 1, 2, 5-7, and Add 1-4, 15, 16; surface diamond drilling, 3 holes totalling 1,794 feet on Dominion, Pot 2 Fraction and Pot 4 Fraction and 25 holes totalling 21,563 feet on Pot 3, 4, and 10 Fractions, Afton 7, and Add 3; rotary drilling, 26 holes totalling 19,065 feet on the same claims; percussion drilling, 93 holes totalling 27,900 feet on the same claims.

oREFERENCES:sI, B.C. Dept. of Mines & Pet. Res.,sM, G.E.M., 1971, p. 297; Carr, J.,M. (1962), Geology of the Princeton, Merritt, Kamloops Area of Southern B.C.,sI, Western Miner and Oil Review,sM, February, 1962, Vol. 35, No. 2, pp. 46-49; Millar, C.,F. (1973), The Afton Discovery,sI, Western Miner,sM, February, 1973, Vol. 46, No. 2, pp. 33-36; sI,Minister of Mines, B.C.,sM, Ann. Rept., 1967, pp. 137-147; Parker, R.,L. and Calkins, J.,A. (1964), Geology of the Curlew Quadrangle, Ferry County, Washington,sI, U.S. Geol. Surv.,sM, Bull. 1169; Sutherland Brown, A. (1969), Mineralization in British Columbia and the Copper and Molybdenum Deposits,sI, C.I.M.,sM, Trans., Vol. LXXII, pp. 1-15; Sutherland Brown, A., Cathro, R.,J., Panteleyev, A., and Ney, C.,S. (1971), Metallogeny of the Canadian Cordillera,sI, C.I.M.,sM, Vol. LXXIV, pp. 121-145.

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