014377 (1)

(53°12T SE)(93E6E/2) THIS PROPERTY

RED BIRD (CAFB) CONSISTS OF A LARGE GROUP OF CLAIMS (154/121?) CENTRED ON A PARTLY SEPARATED MINOR PEAK OF RED BIRD MTN WHICH IS BETWEEN HAVEN LAKE & THE WEST END OF EUTSUK LAKE. THE PROPERTY HAS ~~FORMERLY~~ PREVIOUSLY BEEN CALLED CAFB AFTER THE ORIGINAL CLAIM GROUP AND INFORMALLY CALLED BONE LAKE & HAVEN LAKE. IT IS HELD BY ~~MESA~~ ASITPORA MINES LTD. A WHOLLY OWNED SUBSIDIARY OF THE PHELPS DODGE CORPORATION OF CANADA; HEAD OFFICE 55 YONGE ST., TORONTO, PRESIDENT , MANAGER OF WESTERN EXPLORATION JOHN DELEEN. A.J. SCHMIDT HAS BEEN GEOLOGIST IN CHARGE OF EXPLORATION AT THE PROPERTY SINCE 1964.

CLAIMS ~~HAVE BEEN~~ WERE LOCATED ~~INTERMITTENTLY~~ ON MINOR COPPER SHOWINGS ON REDBIRD MOUNTAIN SINCE IN THE LATE 1930'S. PHELPS DODGE PROSPECTED IN THE VICINITY IN 1958 & LOCATED MANY OF THE CLAIMS IN 1959. THE FIRST DRILLING WAS IN 1963 BUT MOST WAS DONE IN 1965 & 1966. TO DATE A TOTAL DIAMOND DRILLING IS ABOUT 46,000 FT. ~~OF AX & AX OF ALL TYPES OF DIAMOND DRILLING HAS BEEN~~ OF WHICH ABOUT 10000 WAS DRILLED IN 1966. ~~IN ADDITI~~ FROM 1960 TO 62 SURFACE TRENCHING & GEOPHYSICAL SURVEYS. DRILLING STARTED IN 1963 & CONTINUED EACH YEAR SINCE WITH 10 AX-WL HOLES, TOTALLING 11,060 FEET, DRILLED IN 1966. ~~TO MA~~ TOTAL DRILLING TO DATE IS 45,299 FEET. IN 61 HOLES.

THE MAIN ACCESS PREVIOUSLY HAS BEEN BY ~~FLEE~~ FLOAT PLANE ~~TO HELICOPTER~~ HAVEN LAKE & BY HELICOPTER TO THE DRILL CAMP & SITES. IN 1966 AN 11 MILE ROAD WAS BUILT FROM AN AIRFIELD PREPARED ~~IN TALL~~ OPEN COUNTRY NEAR ~~EARLY~~ THE MOUTH OF BONE CREEK ON PONDOSY BAY. TO HAVEN LAKE. AN ADDITIONAL 2 MILES OF ROAD WAS BUILT TO A PORTAL

IN 1966 A 2500 FOOT LONG AIRSTRIP WAS BUILT IN OPEN COUNTRY NEAR THE OUTLET OF BONE CREEK ON PONDOSY BAY & AN 11 MILE ROAD FROM ~~HERE~~ TO HAVEN LAKE. ~~FROM~~ AN ADDITIONAL 2 MILE ROAD CLIMBS FROM THE LAKE AT ABOUT 3400' TO ~~THE~~ A PORTAL SITE AT ABOUT 5000' WHICH WAS CLEARED & FACED.

PROPERTY FILE

93E026.

GEOLOGY.

THE GEOLOGY OF THE AREA OF BONE CREEK & ~~SURROUNDING~~ HAVEN LAKE IS SHOWN IN FIGURE . THIS ~~AGGMONDS & SLIGHTLY~~ REMONDS. THE GEOLOGY SHOWN MAP. 1064A, WHITESAIL LAKE*. THE AREA IS MAINLY UNDERLAIN BY THE UPPER VOLCANIC DIVISION OF THE HAZELTON GROUP AS MAPPED BY DUFFELL*. ~~THESE ROCKS ARE~~ IN THE VICINITY OF HAVEN LAKE THESE ARE MOSTLY ~~VOLCANIC CLASTIC~~ CLASTIC ROCKS OF VOLCANIC ORIGIN, ~~TUFFS~~ AS TUFFS & VOLCANIC SANDSTONES. THE FRAGMENTS ARE DOMINATED BY FINELY PORPHYRITIC ANDESITES BUT SCORACEOUS & MASSIVE BASALT, & WELDED RHYOLITE TUFF FRAGMENTS ARE PRESENT. A MILE WEST OF HAVEN LAKE THESE ROCKS ARE IN CONTACT WITH A METAMORPHIC COMPLEX. THE VALLEY OF BONE CREEK IS ERRODED FROM THE CORE OF AN ANTICLINE. THREE SMALL INTRUSIVE BODIES CUT THE HAZELTON GROUP. A RED GRANITE ON KEY MOUNTAIN, A GRANODIORITE TONGUE SIMILAR TO COAST RANGE ROCKS NORTH OF RED BIRD MOUNTAIN, & ~~A~~ QUARTZ MONZONITE PORPHYRY WEST OF RED BIRD MOUNTAIN. THE LATTER BODY IS THE HOST ~~PROBABLE SOURCE~~ OF THE RED BIRD MOLYBDENUM DEPOSIT. & IS THE SUBJECT OF REMAINING DISCUSSION.

THE RED BIRD PLUTON IS FAIRLY EQUANT SHAPED BODY THE MAIN MASS OF WHICH IS ABOUT 2500' EASTWEST BY 3500 FEET NORTH SOUTH

THE RED BIRD PLUTON IS AN IRREGULAR ELLIPTICAL BODY WITH A CONNECTED SEMICIRCULAR DYKE AROUND THE NORTHERN CIRCUMFERENCE. THE MAIN MASS IS ABOUT 2500' BY 3500' IN MAJOR & MINOR AXES. THE NORTHERN DIKE IS ABOUT 150 TO 500 FEET WIDE & IS SEPARATED BY A SCREEN OF HORNFELS SOME 800' WIDE. THE CONTACTS ARE IRREGULAR IN DETAIL & SMALL PERIPHERAL DYKES ARE COMMON. & INTERLEAVING OF SMALL CONCENTRIC DYKES & HORNFELS SCREENS ARE NORMAL. RADIAL DYKES OCCUR IN LESSER DEGREE.

THE WALL ROCKS ARE ALMOST ENTIRELY PYROCLASTIC ROCKS THAT HAVE BEEN DEFORMED, METAMORPHOSED & METASOMATIZED. NOT UNCOMMONLY WHERE ORIGINAL TEXTURES CAN BE OBSERVED, CLOSE TO THE CONTACT IT IS EVIDENT THAT THE ROCKS HAVE BEEN FLATTENED OR ROLLED OUT, GIVING A FOLIATION PARALLEL WITH THE CONTACT. AT A DISTANCE FROM THE CONTACT THE ROCKS SHOW THE GENTLE DIP OF THE NORTH LIMB OF THE BONE CREEK ANTICLINE. THE PYROCLASTIC ROCKS ARE ALL THERMALLY & SOME SHOW INITIAL TRANSITION TO ACTINOLITE METAMORPHOSED TO BIOTITE GRADE. IN ADDITION MOST HAVE BEEN ALTERED METASOMATIZED BY ADDITION OF POTASH & SILICA. IRON & SULPHUR AS A RESULT ORTHOCLASE OR CHERT IS THE ONLY FELDSPAR, MOST ROCKS ARE PYRITIC, & SOME ARE TRANSFORMED TO WHITE, VAGUELY SLIGHTLY BANDED. ROCKS COMPOSED OF A FINE MOSAIC OF QUARTZ WITH INTERSTITIAL ORTHOCLASE & MINOR MUSCOVITE & PYRITE.

THE BULK OF THE RED BIRD PLUTON IS FORMED OF ONE ROCK TYPE, A QUARTZ MONZONITE PORPHYRY THAT MAY BE LIGHT GREY & PINK FRESH, OR ALTERED SLIGHTLY BY THE GROWTH OF ORTHOCLASE POIKILOBLASTS, OR HIGHLY ALTERED AS DESCRIBED BELOW. A MINOR PORTION OF THE PLUTON IS FORMED OF A DARK GREY MONZONITE PORPHYRY THAT IS YOUNGER THAN THE QUARTZ MONZONITE PORPHYRY. WITH THE EVIDENCE OF THE STRUCTURE OF THE CONTACT & OF THE PARTIAL RING-DIKE IN MIND IT AT LEAST SEEM POSSIBLE THAT NOT ALL THE QUARTZ MONZONITE PORPHYRY WAS INTRUDED IN ONE PULSE

~~MICROSCOPICALLY THE~~

THE MINERAL COMPOSITION OF THE ROCKS OF THE RED BIRD PLUTON IS SHOWN ON THE ACCOMPANYING TABLE. THE FRESH QUARTZ MONZONITE PORPHYRY IS ~~COMPOSED OF~~ CHARACTERIZED BY PROMINENT ONLY SLIGHTLY CORRODED QUARTZ ~~PHENOCRYSTS~~ PHENOCRYSTS. CRYSTALS THAT CLOSELY APPROACH BEING SIX SIDED DOUBLE PYRAMIDS. & ~~ARE UP TO 5 MM IN SECTION~~. PLAGIOCLASE PHENOCRYSTS ARE HIGHLY ZONED WITH 3 TO 6 OCCILATORY CYCLES OVER THE RANGE An_{35} to An_{20}. COMPLEX JOINED ~~GRAIN~~ CRYSTALS & TWINS ARE COMMON ALTHOUGH CARLSBAD TWINNING IS ABSENT. SERICITIC ALTERATION MAY BE SLIGHT. ~~CRYSTALS RANGE FROM 5 MM TO 0.2 MM IN LONG DIMENSION.~~ THE POTASSIUM FELDSPAR PHENOCRYSTS ARE ORTHOCLASE, & MAY BE SLIGHTLY POIKILITIC. ~~QUARTZ & FELDSPAR~~ BIOTITE OCCURS IN PART IN FAIRLY EQUIDIMENSIONAL BOOKS. A FEW CRYSTALS OF APATITE OR SPHENE ARE BIG ENOUGH TO BE CALLED PHENOCRYSTS. OPAQUE MINERALS, ~~ARE~~ EITHER ILMENITE OR PYRITE ARE MINOR. QUARTZ & FELDSPAR PHENOCRYSTS ~~ARE~~ RANGE FROM 0.2 TO 5 MM. IN LONG DIMENSION; MATRIX ~~IS~~ RANGES FROM 0.01 TO 0.015 MM. & IS COMPOSED OF SUBEQUAL AMOUNTS OF QUARTZ & FELDSPAR ONLY A SMALL PART OF WHICH IS ~~THE~~ PLAGIOCLASE.

THE SLIGHTLY ALTERED Q.M.P. DIFFERS FROM THE ABOVE CHIEFLY IN CONTAINING A MUCH HIGHER PERCENTAGE OF ORTHOCLASE "PHENOCRYSTS" OF MUCH LARGER SIZE & IN BEING PINK IN COLOUR. THE "PHENOCRYSTS" ARE POIKILITIC, MAY BE UP TO 15 MM IN SECTION, & ARE SHOWN TO BE PORPHYROBLASTS BY THE NATURE OF THE ENCLUSIONS. FOR EXAMPLE PLAGIOCLASE PHENOCRYSTS MAY BE SEEN ONLY PARTLY ENCLOSED ~~BY AN~~ BY ORTHOCLASE & YET SHOW COMPLETE 6 CYCLE OCCILATORY ZONING WHEREAS IN THE INTERIOR ~~THE~~ ADJACENT "~~FRAGMENTS~~ IRREGULARLY ROUNDED PALIMPSEST, PLAGIOCLASE INCLUSIONS MAY BE SEEN TO BE PALIMPSEST REMNANTS OF ONE CRYSTAL BY ~~IRREGULAR CURVED OUTLINE~~ IDENTICAL TWINNING. ~~IN THESE ROCK THE PLAGIOCLASE, WHICH ORIGINALLY WAS THE SAME AS IN THE UNALTERED PORPHYRY IS~~ MOST OF THE POTASSIUM FELDSPAR IS SLIGHTLY POIKILITIC. PLAGIOCLASE IS COMMONLY COMPLETELY ALTERED TO SERICITE, ~~OR~~ KAOLINITE, OR BOTH PLUS MINOR CALCITE. THE QUARTZ PHENOCRYSTS MAY BE RECRYSTALLIZED

THE ALTERATION ~~(FROM THE TWO)~~ APPEARS TO GRADE BETWEEN ~~FROM~~ THE TWO TYPES DESCRIBED ALTHOUGH SOME CORE SHOWS SHARP TRANSITIONS ~~CONTACTS~~ THAT MAY ~~BE FAULTS~~ INDICATE ~~INTRUSION~~ OR EARLY PHASES THAT EXIST ~~ARE~~ WERE ALTERED & THEN INTRUDED

BY LATER UNALTERED PORPHYRY.

ALTERATION PROCEEDS BEYOND THE TYPE DESCRIBED ABOVE TO A ROCK THAT IS SCARCELY DIFFERENT THAN SOME METASOMATIZED WALL ROCKS, BE COMPOSED OF A MOSAIC OF FINE QUARTZ IN A MATRIX OF POTASSIUM FELDSPAR. IN SUCH CASES THE ROCKS ARE CRISS-CROSSED BY A STOCKWORK OF ~~FINE~~ QUARTZ VEINS. BETWEEN THE EXTREME ALTERATION AND THE SLIGHTLY ALTERED PORPHYRY IS A STAGE IN WHICH FORMER PLAGIOCLASE PHENOCRYSTS ARE RECOGNIZED AS RECTANGULAR CLOTS IN WHICH KAOLINITE IS PREDOMINANT, QUARTZ PHENOCRYSTS ARE STRAINED & RECRYSTALIZED, POTASSIUM FELDSPAR IS PERTHITE, & BIOTITE IS ~~REPLACED~~ REPLACED IN PART BY CALCITE. THE MATRIX WILL HAVE BEEN RECRYSTALLIZED TO A COARSER MOSAIC ABOUT 0.075 MM. IN AVERAGE GRAIN SIZE.

THE DARK MONZONITE PORPHYRY IS A SEPARATE YOUNGER PHASE. IT IS SEEN AS SLIGHTLY CHILLED SMALL CROSS CUTTING DYKES & AS LARGER MASSES. ITS RELATION TO MINERALIZATION TO MINERALIZATION IS NOT FULLY ESTABLISED, ~~IT IS~~ IT IS APPEARS TO CUT SOME QTZ MOLYBDENUM VEINS BUT BE HOWEVER CUT BY SOME QUARTZ PYRITE VEINS. ~~IT IS A QUARTZ POOR ROCK, SCARCE SA~~ IT IS MOST LIKELY RELATED TO THE QM. PORPHYRY BUT DIFFERS IN ITS COLOUR, IT TOTAL & BY ITS QUARTZ & MAFIC & ITS TOTAL PERCENTAGE OF PHENOCRYSTS. CONTENT. IT IS A GREY ROCK THAT CONTAINS SCATTERED HIGHLY CORRODED PHENOCRYSTS OF QUARTZ. THE MATRIX IS ALSO ~~FREE~~ NEARLY FREE OF QUARTZ. PLAGIOCLASE IS COMMONLY ALTERED TO SERICITE, KAOLINITE & CARBONATE. HORNBLENDE INVARIABLY ACCOMPANIES BIOTITE ~~& MAY BE MORE COMMON~~. IN SUB EQUAL AMOUNTS (2-3%). THE OPAQUE MINERALS ARE CHIEFLY PYRITE; & SPHENE & APATITE ARE COMMON ACCESSORIES. ~~MATRIX IN COARSER~~ IN RELATIVELY COARSE GRAINED SPECIMENS PHENOCRYSTS MAY BE AS LARGE AS 4 MM. ~~THE LONG~~ DIAMETER & THE MATRIX AVERAGE ABOUT 0.05 MM. ~~THE MATRIX~~ IN SUCH SPECIMENS THE MATRIX IS COMPOSED ~~OF~~ LARGELY OF ANTIPERTHITE & ORTHOCLASE & MINOR BIOTITE.

MINERALIZATION.

~~ECONOMIC MINERAL~~

THE REDBIRD PLUTON IS HOST TO A ~~PERIPHERAL~~ CONCENTRIC ZONE OF MOLYBDENUM MINERALIZATION THAT IS CHIEFLY CONTAINED WITHIN THE MAIN MASS OF THE PLUTON BUT EXTENDS A VARIABLE AMOUNT INTO THE WALLS. ~~MUCH OF THE PLUTON IS FRACTURED & CUT BY THE MARGINS OF THE PLUTON ARE HIGHLY FRACTURED & CUT BY A STOCKWORK OF~~ IN VARYING DEGREE THE PLUTON HAS BEEN FRACTURED & CUT BY A STOCKWORK OF QUARTZ VEINLETS. ~~THIS IS CHIEFLY SO~~ PARTICULARLY NEAR THE CONTACT WHERE THE ~~INTENSITY OF VEINING ALTERATION~~ VEINING, ALTERATION & MINERALIZATION ARE INTENSE & IS HIGHEST GRADE. ~~THE MAJOR~~ PREFERRED FRACTURE DIRECTIONS IN THE STOCKWORK ARE IN DECREASING ORDER, N40°EAST, ~~OFF~~; NORTH 20°WEST & NORTH SOUTH, ALL WITH NEAR VERTICAL DIPS. THE INTENSITY OF VEINING DECREASES SHARPLY BEYOND THE PLUTON BUT ~~SOME~~ VEINING OCCUR. ~~FROM OVER~~ FOR SEVERAL THOUSAND FEET. A PYRITIC ~~AUREOLE~~ HALO IN SOME OF THESE CHALCOPYRITE IS COMMON. EXTENDS FOR ½ TO ONE MILE BEYOND THE PLUTON. COLOURING THE WEATHERED ROCKS IN A CHARACTERISTIC GOSSAN.

~~QUARTZ VEINING WAS OF M~~ THE SEQUENCE OF VEINING & MINERALIZATION ~~WAS~~ WAS COMPLICATED. BEYOND THE ORE ZONE MOST VEINS ARE BARREN ~~QUARTZ~~ WITH SOME SCATTERED PYRITE. A FEW CONTAIN TRACES OF MOLYBDENITE, OTHERS GALENA, SPHALERITE & PYRITE. OR FLUORITE & CALCITE. THESE TYPES APPEAR TO BE SUCCESSIVELY YOUNGER. IN THE ORE ZONE A BARREN ~~STAGE OF~~ QUARTZ VEINING ~~PRECEDE ANTIDATES~~ PRE DATE MINERALIZED VEINS & ~~COMMONLY~~ THREE STAGES OF BARREN VEIN MAY BE RECOGNIZABLE. AS MANY STAGES OF ~~MINE~~ QUARTZ MOLYBDENITE PYRITE VEINS ARE LIKELY BUT TWO TYPES OCCUR, BANDED VEINS & DRUSY VEINS. ~~THEY~~ THESE MAY BE PARALLEL IN MAJOR VEINS. IN GENERAL DRUSY VEINS SEEM YOUNGEST. ~~BOTH~~ DRUSY & BANDED VEINS MAY ~~CONTACT~~ BE CUT BY LATE BARREN QUARTZ ~~& PY~~ WITH MINOR PYRITE. POTASSIUM FELDSPAR FORMS UP TO 10% OF MANY VEINS. BANDED VEINS APPEAR TO HAVE BEEN REPEATEDLY ~~OPEN~~ REOPENED & MINERALIZED. IN THE SMALLEST VEINLETS LAMINAE ~~OF~~ CONTAINING ~~MINE~~ PLATELETS OF MOLYBDENITE ARE COMMONEST AT THE MARGINS OR CENTRE. DRY FRACTURES COATED WITH MOLYBDENITE & PYRITE ARE ONLY COMMON IN THE HORNFELS WALL ROCKS.

IN THE REDBIRD DEPOSIT OXIDATION HAS BEEN DEEP & ON THE SURFACE ~~MOLY~~ MUCH PYRITE HAS BEEN LEACHED & MOLYBDENITE CHANGED TO FERRIMOLYBDATE. IN ~~MOST~~ SURFACE VEINS THE LATTER HAS BEEN PLUSHED

OUT SO THAT THE VEINS LOOK BARREN. ONLY IN VEINS EXPOSED IN THE MAJOR, RAPIDLY ERODING CREEKS IS MUCH PERIMOLYBDATE OR MOLYBDENITE SEEN EVEN OVER THE ORE ZONES.

THE MINERALIZATION ~~ORE ZONES~~ EXTEND AROUND THE WHOLE PERIPHERY OF THE PLUTON BUT ONLY ~~A PORTION~~ THE NORTHERN HALF APPEARS OF ECONOMIC GRADE. THIS IS SURROUNDED BY AN ENVELOP OF MUCH LARGER SUB-ECONOMIC GRADE. NO FIGURES ON GRADE OR TONNAGE HAVE BEEN RELEASED BY THE COMPANY. THE PROJECTED UNDERGROUND PROGRAM IS TO TEST GRADES ESTABLISHED BY DRILLING PRIOR TO THE COMPLETION OF A FEASABILITY REPORT.

[ROEP. ANN. REPT.

1960. p.14
1962 p 17
1963 p.29.
1964 pp.57-58
1965 p.88

Mineral Composition, Redbird Pluton.

	Phenocrysts					Total				
	Quartz	Plagioclase	Orthoclase	Biotite	Other	Quartz	Plagioclase	Orthoclase	Mafic	Average of
Quartz Monzonite Porphyry, Fresh	11.8	31.2	5.0	3.5	0.5	34.7	36.5	26.0	4.5	6.
With Orthoclase Porphyroblasts	11.7	17.3	20.0	3.0		31.0	19.0	44.0	6	3
Monzonite Porphyry	1.3	16	?	2.3	1.7	1.	55	34	10	3 *

* only one coarse enough to count matrix.

40 1000
40 31.6 M. SQ.
1600

180 / 32 / 319 — 130 / 26 / 156

① Q. M. POR.

	Q	Pc	Kf	Bi	O.	TOTAL Q.	Pc	Kf	Mafic	
99.	18	19	7	5	½	43	24	27	6	AN 30±5
116.	15	30	2	3	½	40	35	22	3	
115①	5	45	5	5	½	25	45	25	5	
113 N POR.	15	42	1	2	½	32	42	24	2	AN 25±
112	11	25	10	3	½	36	25	35	4	AN 20±
106.	7	30	5	3	½	32	38	23	7	
105	10	17	20	3		30	22	45	3	AN 20±
103	10	15	20	5		28	15	47	10	
109A.	15	20	20	1		35	20	40	5	
ALT.	35	52				93	57	132	18	
AV/3	11.7	17.3	20	3		31	19	44	6	
FRESH	71	191	30	21	8½	208	219	166	27	
AV/6	11.8	31.2	5	3.5	0.6	34.7	36.5	26	4.5	

67 / 34.7 1.7

② MONZ. POR.

					HB				
117	1	15	?	2	2	1	55	34	10
118?									
145	2	10	?	3					
101									
101	1	23	?	2	3				

POST MIN. MOLY VEIN'S CUT. CA. 115

48. 16 / 13/4

3)	1-2	10-23	?	2-3	2-3	1-2	55±	34	10 ±

⑧ BR. P. INC.

	15		30			35	5	57	3

④ GRD.

25 45 15 15

24 × 40.

CONCENTRIC.