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GEOLOGY OF COAL CREEK DOME

N.T.S. 116 B 10, 11, 12, 13, 14, 15

CYPRUS ANVIL MINING CORPORATION

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Geology Map of Coal Creek Dome	1" = ½ mile

GEOLOGY OF COAL CREEK DOME

Introduction

Five significant stratabound and breccia filling lead-zinc deposits were found in Helikian dolomite within the Coal Creek Dome during the 1974 field season. Hudson Bay Mining discovered and staked the Og and DEM claims containing galena-sphalerite mineralization in a tectonic dolomite breccia and low grade stratabound sphalerite-galena mineralization in black shales respectively. Dynasty (now Cyprus Anvil) staked the Kiwi claims with high grade smithsonite-galena veins; Tart claims containing high grade sphalerite in dolomite breccias and the Oz Group with sphalerite and galena mineralization in black argillaceous dolomite (with a probable sedimentary origin), as well as higher grade fillings in adjacent dolomite breccias.

Regionally, the 1975 mapping program successfully subdivided the Helikian dolomite in the Coal Creek Dome (units 2a and 2b on Dawson Map No. 1284A) into units relating to distinct environments of deposition. Lateral correlation of individual units was not difficult since most units have good aerial extent. Both tectonic and intraformational brecciation is prominent with general absence of solution collapse features. Most of the potentially economic mineralization occurs as breccia filling and as stratabound narrow bands in the oldest two dolomite units. It is also rumored that Mississippian Valley type lead-zinc mineralization has been found at depth on the Og Group which significantly adds more potential to the area.

Location and Access

The Coal Creek Dome, an elliptical shaped exposure of Helikian shale and dolomite, is situated in the northern portion of the Dawson mapsheet (N.T.S. 115 B and C). The base camp near the central area of the Dome is

roughly 50 miles north of Dawson. Access to much of the area is by helicopter from the base camp. All logistical support was by helicopter from Dawson or Clinton Creek.

Outcrop is abundant with vast amounts of talus and little vegetation cover. Weather during July and August is excellent with very low rainfall.

Regional Setting

The Coal Creek Dome, an east-west trending, 50 mile long elliptical uplifted area of Helikian shales and dolomites, is unconformably overlain by massive light grey Ordovician dolomite in the north and a thrust block of Cambrian to Ordovician schists, grits, volcanics and black interbedded chert and argillite in the south. The units comprising the Coal Creek Dome represent the westward extension of the Hadrynian and Helikian sediments found in the curvilinear Mackenzie fold belt.

Major uplift occurred in the northern portion of the domal area along a roughly east-west trending anticline containing a core of black shale and argillite. Both limbs contain conformably overlying Helikian dolomite units although the north limb is largely covered by unconformably overlying massive Ordovician dolomite. Uplift along the southwest to west trending Mt. Harper fault formed another roughly east-west trending band of southerly dipping black shale, siltstone and argillite conformably overlain by dolomite. Submersion in the western and southern portions of the exposed domal area during Helikian to Hadrynian time formed a large blanket of unconformably overlying massive light grey dolomite.

Most dolomite units can be classed as the "blanket type" due to constant thickness and good aerial extent, probably indicating a gently sloping smooth platform or shelf environment. To date, only one rapid stromatolytic build-up

or reef has been noted.

Three major regional unconformities, produced by uplift to subaerial conditions, interrupted the carbonate depositional sequence during the Helikian within this area.

Major north-south compression appears to have caused the east-west trending fold axes and thrusts, as well as the predominant north-west trending faults, some of which have measurable right lateral movement.

Geology

The following descriptions summarize the weathering characteristics, rock types, bedding characteristics, internal structure, aerial extent, variations in lithology and probable environments of deposition of the various units mapped within the Coal Creek Dome. The units are believed to be in stratigraphic succession, although this presumption may be in error since there are only a few localities where "tops" were noted from stromatolytic rich beds.

Unit 1

Rocks of Unit 1 consist of dark grey to black weathering, thinly bedded, black to dark grey to tan, shale, argillite, siltstone and conglomerate. Dark dull weathering black shale and argillite predominate with intervals less than 10 feet thick of laminated siltstone often with graded bedding and irregular bands of conglomerate.

Although very limited mapping was done in this unit, two sub-units were noted within the upper-most portion near the contact with the overlying dolomites. Unit 1a, a light brown weathering, light brown to grey, thin bedded silty shale is prominent near the top of Unit 1 in the eastern

portion of the Dome. Thicknesses are variable but generally average 50 to 300 feet thick. A light brown weathering, massive bedded, tan to grey quartzite varying between 5 and 100 feet thick is also prominent in the upper portions of Unit 1, predominantly found in the southeast portion of Unit 1 exposures. Sections of Unit 1 were not measured but it is estimated that the thickness exceeds 3,000 feet.

Much of the area underlain by Unit 1 is mountainous with rugged steep faces and irregular sharp ridges. Talus is commonly angular due to strong jointing and axial planar cleavage. Dall sheep favour these exposures, probably because they offer protection rather than the limited vegetation.

Structural imprints, consisting of axial cleavage and tight high amplitude folds, often overturned to the north, trending roughly west to southwest, are common throughout Unit 1. The cleavage is generally at sharp angles (less than 30 degrees) to bedding.

Variations throughout this unit are common and with an absence of marker horizons, measurements of stratigraphic levels were not attempted. Deposition of various sized clastics probably represent a deep water reducing environment near the continental slope with frequent slumping of slope material. Quartzite beds near the top of Unit 1 probably are indicative of shallower water conditions caused by emergence of the continental mass to the east.

Mid-June photo of irregular dark grey to dull black weathering Unit 1 black shale, siltstone and argillite.

Units 2 and 3

Rock of Unit 2 consists of orange to tan weathering grey dolomite, fine to coarse grained dolomite conglomerate with re-crystallized pink calcite, tan finely bedded quartzite and brown to red shales. Lateral extent of this unit is very irregular and sporadic so it has been included into Unit 3 which is more predominant and of similar age. Unit 3 consists of jasper bearing quartzite and dolomite conglomerates, as well as shale. The following two sub-units have been separated due to thickness and aerial extent. Unit 3a - a red to reddish brown jasper, dolomite, quartzite, and shale conglomerate with later fractures filled with quartz, specular hematite,

and minor chalcopyrite. Specular hematite is also found disseminated throughout the matrix of the conglomerate. Unit 3b - interbedded red jasper, tan quartzite and green shale with disseminated grains of pyrite within the quartzite. Interbeds vary in thickness from 1/8 inch to 3 feet but average 1/2 inch.

Units 2 and 3 resting unconformably on Unit 1, represent the first major regional unconformity in the Helikian exposed in the area. Bedding, when noted, was generally at low angles to bedding in Unit 1. Bedded jasper, quartzite and shale is prominent in the northeast area of the Dome, while the jasper bearing conglomerates occur in the west and south portions, suggesting a southwestward submergence. As can be noted on the accompanying "Regional Geology Map of the Coal Creek Dome", the exposures of Units 2 and 3 are very irregular and discontinuous, possibly indicating channel-type deposits rather than a continuous blanket. In the western portion of the Dome, dolomite units largely overlie black shale, also indicating the discontinuous nature of the conglomerates.

Thickness of Unit 3 is highly variable with measurements of over 400 feet made south of the Og Group. Deposition of the jasper, quartzite and dolomite represents an emergence in this area to shallow water conditions with iron and silica enrichment. The source of both silica and iron is likely volcanic. Continued rapid emergence to probable aerial conditions in the east produced conglomerates in the southwest area of the Coal Creek Dome.

Unit 4

Rocks comprising Unit 4 consist of grey weathering, dark grey to black massive to medium bedded crystalline limestone with interbeds of black chert and stromatolites. Bedding, particularly noticeable on weathered surfaces,

is outlined by carbon and silica content. This unit directly overlies Unit 1 and, in some instances, Unit 3. The lower contact with the shales shows a slight angular unconformity and consists of 10 to 300 feet of black limy shale with bright orange weathering dolomite beds (generally 2 to 4 feet thick) as distinctive markers. Unit 4 is lithologically very similar in all areas of the Coal Creek Dome, i.e. - a "blanket-type" carbonate. Bands of algal stromatolites less than 5 feet thick were found on the Tart claims in possible slump structures within the dark grey carbonaceous limestone.

Karsting or solution collapse structures were not noted, although they were reported in drill holes on the Og Group. Intra-formational breccias with little particle rotation and tectonic breccias with extreme fragmentation contain matrix fillings of secondary dolomite, calcite and often sporadic sphalerite-galena mineralization.

Low fracturing and jointing produces a coarse black, conspicuous weathering pattern noticeable for distances up to 5 miles. Thickness of Unit 4 varies between 200 and 800 feet but averages roughly 400 feet. Deposition of this carbonaceous limestone represents a period of submergence in this area probably to a shallow continental, even-sloped, continental shelf.

Good cross-section showing Unit 1 on right overlain by Unit 4 (grey weathering) in turn overlain by Unit 5 (smooth orange weathering) and that, in turn, overlain by a thick Unit 6 (rugged light orange weathering). Width of photo is estimated to be 1.5 mile.

Grey weathering Unit 4 in foreground underlying orange weathering Unit 5 further down the ridge. Similar section visible in the background on the left hand side of the picture. Central background underlain by Unit 10 - notice block of red weathering Unit 9a.

Unit 5

Orange weathering, dark and light grey interbedded dolomite with minor chert bands is the predominant rock type of Unit 5. Varying amounts of argillaceous material causes darkening of the dolomite. Major beds of black weathering argillite, shale and chert (Unit 5a) up to 20 feet thick were only noted on the Oz Group. Thickness of Unit 5 varies from 300 to 800 feet but averages roughly 500 feet. Orange weathering pattern is due to oxidation of very fine grained subhedral pyrite disseminated throughout the unit. Thin bands (< 1/4 inch) of light grey chert occur at various intervals and are conspicuous on weathered surfaces due to differential weathering. Fracturing is low with narrow fillings of quartz and secondary dolomite. Brecciation is rare and the only visible structural elements are large open folds.

Unit 5 weathers readily to blocky talus, so at distances areas underlain by this unit appear smooth. Black shale and argillite weathers recessively forming shallow linear depressions along hillsides and making actual outcrops rare. Vegetation, especially green moss and grass, thrives in areas underlain by Unit 5a.

The orange weathering dolomite rests conformably on Unit 4 with a sharp contact zone. Thickness is relatively constant as is the lithology, indicating platform type deposition. Argillaceous rich beds common on the Oz Group are the only evidence of detrital material during this depositional sequence.

Possible algal stromatolitic beds occur in the orange weathering, black argillaceous dolomite with disseminated galena and sphalerite. Although the mineralization has been re-crystallized, it is believed to be of

sedimentary origin.

Syncline - Unit 4 underlying
orange weathering Unit 5.

Unit 1 on the left overlain by Units 4, 5 and 6.
Light grey weathering massive bedded dolomite in
foreground unconformably overlies Helikian shale
and dolomite.

Unit 6

Rocks of Unit 6 consist of light orange to maroon to green weathering interbedded calcareous maroon and green shale with white to tan crystalline dolomite. Pale orange weathering interbedded shale and dolomite predominates and it is estimated that it forms 80 percent of Unit 6. Maroon weathering bands of maroon calcareous shale with thicknesses over 300 feet are common throughout the unit. Interbeds of the shale and dolomite are consistent within Unit 6 and average 1/2 to 1 inch thick. No definite depositional trends of either shale or dolomite were apparent while mapping sections of this unit. Unit 6 varies from 300 to over 1,500 feet thick, averaging roughly 600 feet, and lies conformably on darker orange weathering Unit 5.

Mountainous areas underlain by Unit 6 are commonly irregular, jagged and steep, with a minor amount of talus. The light orange weathering pattern is due to fine grained pyrite disseminated in the crystalline dolomite. Differential weathering produces ribs of shaly material.

Small scale folding with amplitudes of less than 1 inch is common throughout the unit. Large west to southwest broad, low amplitude folds were noted on the Tart Group and in the eastern portion of the domal area. Tight overturned folds probably account for the great thickness of Unit 6 at the headwaters of Mt. Harper Creek. On the Oz and Dem claims, fresh surfaces of interbedded calcareous shale and crystalline dolomite are dark and light grey respectively, due to increased carbonaceous material. Abrupt thickness changes and large displacements are caused by the many northwest and northeast trending faults.

The depositional environment for Unit 6 was likely very similar to that of

Unit 5, with an addition of detrital material. Changes in sea water chemistry are indicated by the maroon and green shales.

Rugged light orange weathering Unit 6 unconformably overlain by light grey weathering Ordovician dolomite.

Unit 7

The major rock type in Unit 7 is a buff weathering, light grey to tan massive bedded to crystalline dolomite with arenaceous and stromatolytic beds. On the Oz claims, Dickinson (1975 Report, Oz Group) has noted four prominent sub-units; Unit 7a - a buff weathering, grey to light brown quartzite to arkose, marking the unconformable base of Unit 7; overlain by Unit 7b - buff to tan weathering interbedded chert and dolomite; and in turn overlain by the bulk of Unit 7. Near the top of Unit 7, the following two sub-units are prominent: Unit 7c - black weathering, black thin bedded

graphitic shale, argillite and chert; and Unit 7d - a dark grey weathering, dark grey to black massive crystalline limestone.

Total thickness of Unit 7 on the Oz claims is estimated to be 800 to 1,500 feet thick. Laterally, this unit appears to thin abruptly to roughly 200 to 400 feet thick. Thick stromatolytic beds over 100 feet thick with individual stromatolytes over 6 feet in diameter represent a rapid reefoid type build upon the Oz claims.

Unit 7 buff weathering dolomite appears to conformably overlie Unit 6 in the northwest portion of the Coal Creek Dome but, in the northwest corner of the Oz Group, interfingerings of Units 6 and 7 suggest a rapid facies change from platform to reef type environments of deposition.

Tectonic brecciation and fracturing is prominent in this unit. Fragments have little to no rotation and all fracture fillings and matrix is orange weathering ferruginous calcite and often pyrobitumen. Breccias adjacent to the facies boundary in both Units 6 and 7 on the Oz claims often have galena-sphalerite mineralization with the calcite gangue. Open spaces produced by tectonic fracturing and brecciation hosting much of the lead-zinc mineralization on the Oz claims are small compared to the large but absent features formed by karsting. Porosity of Unit 7 is generally higher than in the underlying units.

Units 7c and 7d are restricted to the area southwest of the Oz claims where the thickest accumulation of Unit 7 occurs. Thickness and distribution of Unit 7 indicates the present of northwest trending reef in the southwest corner of the Coal Creek Dome.

Light orange weathering Unit 6 and
buff weathering Unit 7 on Oz Group.

Unit 8

Buff weathering, medium to dark grey cherty dolomite was mapped as Unit 8. Southwest of the Oz Group, the stratigraphically lower section of Unit 8 was subdivided into the following sub-units. A tan weathering, pale grey to tan arkose to quartzite, Unit 8a, unconformably overlies Units 7c and 7d. Unit 8a is overlain by dark grey weathering, dark grey to black dolomite with cherty and quartzitic intervals, Unit 8b, which is in turn overlain by Unit 8c, buff weathering, massive bedded light brown to medium grey siliceous dolomite. A band of buff to light green weathering, thin bedded grey argillaceous quartzite, Unit 8e, occurs near the top of Unit 8. The top of Unit 8 is undefined due to the large overlying regional unconformity. A measured section southwest of the Oz Group, where the largest exposure of Unit 8 occurs, yielded a thickness of roughly 1,000 feet.

Unit 8 buff weathering siliceous dolomite is confined to the south and west limits of the Coal Creek Dome. Bedding trends east-west and dips 30 degrees south in the southern exposures and trends northwest-southeast and dips 35 to 45 degrees to the southwest in the western outcrops.

The weathering characteristics of Unit 8 are very similar to those of Unit 7 such that the two units cannot be separated without detailed observations. Deposition of Unit 8 likely occurred in a shallow water near shore environment.

Unit 9

Unit 9, consisting largely of black to dark grey recessive weathering green to black thin bedded shale, argillite and siltstone, with minor orange weathering dolomite beds, marks a regional unconformity in the south and west portions of the Coal Creek Dome. Thickness of this unit varies from 50 to 400 feet, averaging 200 feet. In the western area, a discontinuous bed, roughly 50 to 100 feet thick, of dark red weathering arkose to quartzite, Unit 9a, occurs within the shale. Mud cracks noted at several localities near Unit 9a suggest very shallow to sub-aerial environments during this depositional sequence. The stratigraphic position of Unit 9a is consistently 50 feet from the base of Unit 9 in the western area of the dome. At one locality, south of the Od Group, red weathering quartzite directly overlies Unit 7 dolomite.

Thickness of Unit 9 decreases eastward. In the south-central area, the shale is absent and the unconformity is marked by Unit 9a, roughly 100 to 200 feet thick. Further eastward in Seela Pass, Unit 9a is also absent, leaving massive light grey weathering dolomite of Unit 10 unconformably overlying Units 4 and 5.

Bedding consistently trends northwest dipping 30 to 40 degrees to the southwest throughout this unit. Outcrop is generally poor due to recessive weathering. Vegetation cover is abnormally high probably caused by good soil development.

Polished bedding surface in graphitic rich beds possibly indicate some thrusting of Units 9, 10 and 11 over younger rocks. The displacement, related to post-Ordovician thrusting, was not estimated but it is expected to be minimal.

Deposition of clastic material into shallow water with both reducing and oxidizing environments and repeated emergence to sub-aerial conditions, as suggested by the mud cracks, indicate an arid shoreline depositional environment.

Unit 10

Rocks comprising Unit 10 consist of massive to thick bedded, light grey weathering, light grey to white crystalline dolomite with minor arenaceous rich beds. The dolomite rests conformably on Unit 9 shale and varies in thickness from 500 to 800 feet. Thickness increases to the east. Bedding trends northwest and dips 30 to 40 degrees to the southwest.

A red weathering quartzite bed, roughly 8 miles long, located in the south-central area of the Coal Creek Dome, occurs near the top of Unit 10. With the exception of the red weathering quartzite, Unit 10 lacks significant markers or notable horizons.

In most regions, Unit 10 underlies Unit 11 but, north of the Oz claims, Unit 10 also appears to overlie Unit 11. This phenomena may be due to one of the following; an unrecognized, overturned syncline; a block of Unit 10 thrust

over Unit 11; or a repetition of depositional environment. Since little economic mineralization was noted in Unit 10, detailed mapping was not undertaken in complex areas, i.e. north of the Oz Group.

Unit 10 weathers readily to small boulder size, sub-rounded talus which appears as smooth hillsides from a distance. Cliffs and jagged peaks are rare. Brecciation and small scale fracturing is absent.

Dark grey weathering, dark grey massive bedded crystalline dolomite, located in the central area of the dome, was mapped as Unit 10a since it appeared to unconformably overlie Units 1 and 3. It is now thought that it is equivalent to Unit 4.

Unit 10, also a "platform type", was likely deposited during stable conditions in a shallow water continental shelf environment with small influx of arenaceous material.

Light grey weathering Unit 10
on south side of Seela Pass.

Unit 11

Light grey to white weathering, white to light grey massive siliceous dolomite, mapped as Unit 11, conformably overlies Unit 10. Although sections were not measured, thickness of this unit is estimated to be between 1,000 and 2,000 feet. Silica content is largely interbedded chert and quartzite, as well as quartz fillings in dolomite breccia. Thickness of this unit decreases eastward and forms thick interbeds of cherty dolomite in Unit 10.

North of the Oz Group, two distinct beds of purple, pink, grey and white massive chert, Unit 11b, as well as black weathering, black oolitic limy chert and shale, Unit 11a, occur near the top of Unit 11. North of the Dem claims, black oolitic chert and shale appears to form the basal portion of Unit 10 marking a slight angular unconformity, with the underlying Unit 11. Due to lack of outcrop and exact measurements, the unconformity was not recognized north of the Oz claims.

Areas underlain by Unit 11, being resistant to weathering due to high silica content, are generally mountainous, rugged, irregular with many cliff faces and have small amounts of talus. Outcrops and rock faces contain sharp and irregular surfaces, formed by differential weathering, which quickly disintegrate boot soles.

Bedding, similar to underlying Unit 10, trends northwest and dips 30 - 40 degrees to the southwest. Most exposures of Unit 11 occur to the west and south of the area mapped.

The environment of deposition of Unit 11 is probably similar to that of Unit 10 with a large influx of siliceous material and chemical precipitation of chert.

Rugged weathering cherty dolomite (Unit 11)
unconformably overlain by Unit 10.

Rugged weathering light grey
cherty dolomite (Unit 11).

Unit 12

In the southwest limit of the map area, a light brown to buff weathering dolomite boulder conglomerate overlies Unit 11. According to G.S.C. Memoir 364, this unit is 300 feet thick at this locality but increases to over 2,000 feet towards the northwest.

Unit 13

Light grey to white weathering, competent, massive to thick bedded light grey crystalline dolomite to limestone was mapped as Unit 13. Although no fossils were noted by the writer, the unit is believed to be Ordovician, equivalent to Unit 8 on G.S.C. Map 1284A.

Unit 13 unconformably overlies Units 1 to 7 and forms the northern edge of the Coal Creek Dome. In both the eastern and western localities, the Ordovician dolomite trends roughly east-west and dips 10 to 25 degrees to the north. In the northeast region of the mapped area, this unit is often flat lying. Very little mapping was done in Unit 13.

Unit 14

Orange to brown weathering, green diorite to gabbro dykes, mapped as Unit 14, of probable lower Cretaceous age, occur in north and northeast trending faults. The dykes are commonly 5 to 50 feet thick and often snake-like in appearance. Unit 14 weathers to cubic blocks with bright orange lichen growth on exposed surfaces.

Mineralization is commonly disseminated pyrite with traces of chalcopyrite. Contact metamorphism along the contacts of the dykes has produced dedolomitization of Units 4 to 7 - a white bleached halo, generally less than tens of feet from the dyke wall, composed largely of secondary calcite and minor amounts of an apple-green unidentified mineral.

The following table summarizes the comparison of geologic units:

<u>Age</u>	<u>Cyprus Anvil</u>	<u>G.S.C.</u>
Helikian	1	1
"	2 - 8	2b
"	9 - 11	2c
"	12	2d
Ordovician	13	8
Lower Cretaceous	14	20

Structural Geology

The structure of the Coal Creek Dome does not appear to be a simple domal uplift but a complex history of repeated uplifts, folding and faulting.

Much of the tight folding in Unit 1 and broad open folding in Units 4 to 8 occurred before the Ordovician. The Mt. Harper fault, with possible northward thrust movement, also pre-dates the Ordovician dolomite. No age is estimated for displacements on northwest trending faults but north and some northeast trending structures displace Ordovician units and contain Lower Cretaceous dykes, thus they are probably Cretaceous or slightly earlier faults. The complex pattern and discontinuity of units is largely due to intense faulting.

This area has undergone many periods of uplift, as evidenced by the number of unconformities. During the Helikian, three uplifts are indicated by Units 3, 9 and 12. Major uplift forming the elliptical dome likely occurred during the early Ordovician when a great thickness of Hadrynian to Cambrian material was stripped off, followed by submergence and deposition of the Ordovician dolomite.

Economic Geology

Three potentially economic modes of zinc-lead mineralization were discovered in Helikian dolomite within the Coal Creek Dome. Probable "sedimentary type" bedded lead-zinc mineralization was noted in argillaceous stromatolytic dolomite, Unit 5a, on the Oz and Dem Groups; tectonic breccias and shear zones containing a matrix of secondary calcite and sphalerite or galena were discovered on the Kiwi, Tart, Oz, Og and Ug claims in Units 4 to 7, and rumoured "Mississippi type" colloform banded sphalerite and galena was found at depth in Unit 4 on the Og Group. Copper mineralization, primarily chalcopyrite, occurs as irregular blebs in dolomite and jasper bearing conglomerates, as well as in veins and shear zones with siderite.

High grade smithsonite and galena mineralization, located in shear zones within light grey dolomite of Unit 10, appears to have insufficient tonnage potential themselves in this remote area, but may represent re-mobilization from larger deposits at depth in Units 4 and 5. The best showing on the Kiwi claims has a known width of 35 feet grading 35 percent combined lead and zinc with 3.5 ounces per ton silver. Estimated length of mineralization is 500 feet. Considering an average width of 10 feet for a depth of 300 feet, this structure could contain roughly 150,000 tons with a gross metal value of approximately \$30,000,000 at present metal prices. The Waz showing, located 6 miles southeast of the Oz Group, also contains high grade smithsonite-galena mineralization in a northeast trending fault zone. The showing has a maximum width of 5 feet and is roughly 50 feet in length.

Stratabound, low grade, disseminated, fine-grained sphalerite-galena mineralization in a thin (less than 3 feet) bed of light orange weathering, dark grey stromatolytic argillaceous dolomite, noted as showings numbers 2, 3, 7 and 9, extends discontinuously over a two mile strike length on

the Oz claims. This narrow bed occurs adjacent to a probable facies change of reef type rocks and possibly represents algal mat development in a back reef inter-tidal environment. A mineralographic study by Rob Carne of sulphide textures of mineralized samples from the Oz claims is included as Appendix I.

Intraformational and tectonic breccias and fracture zones, having large fragments and minor secondary dolomite or calcite fillings with either sporadic and irregular red brown to yellow sphalerite or galena, occur in Units 6 and 7 adjacent to the stratabound mineralization. It is thought they were formed by late remobilization into open space fillings from the proposed "source-bed". It is interesting to note that it is rare to find both galena and sphalerite in equal proportions in the breccia zones; showing No. 12 contains two stages of sphalerite mineralization and showings 1, 8, 10 and 11 are largely galena. Fragments of dolomite in the breccias are commonly bleached or altered suggesting warm ore bearing fluids. A fault zone in black carbonaceous shale, Unit 5a, in Wiz Creek, contains high grade galena and sphalerite, is also related to late stage migration of fluids. Details of Oz Group mineralization may be noted in the "Geology, Geochemical and Diamond Drilling Report on the Oz Claims".

Impressive two-stage, red-brown and honey yellow coloured sphalerite occurs with secondary dolomite and pink ferruginous calcite in a 1,600 foot long breccia zone in Unit 4 dolomite to limestone on the Tart Group. The breccia roughly parallels bedding, suggesting an intraformational breccia. High grade zones occur in breccias with algal blocks oriented at high angles to bedding. It is thought that the blocks represent slumps from an adjacent reef complex. Minor irregular blebs of galena occur in fractures within Unit 4 in the north portion of the Tart claims also indicating a

zoning pattern similar to that found on the Oz Group.

Galena and pyrite mineralization in an east-west trending tectonic breccia within Unit 4 was found by Hudson Bay Mining and staked as the Og claims. Good grade colloform red-brown and yellow sphalerite found at depth during their drilling program suggests open space filling in solution cavities similar to "Mississippi Valley type" deposits. The cavities may have been produced during uplift as indicated by the overlying unconformity, Units 9 and 9a.

Initial work on the Ug Group has outlined a breccia zone in Unit 7 dolomite with pyrite, galena and secondary dolomite fracture fillings. Roughly 1,000 feet to the north, another irregular breccia contains yellow sphalerite over narrow widths.

Minor irregular sporadic blebs of galena were discovered in fractures in Unit 4 limestone and were not staked. An unknown competitor staked the area as the Od Group.

Copper mineralization, consisting of fine-grained disseminations of chalcopyrite with pyrite in banded jasper and quartzite, irregular blebs of chalcopyrite with specular hematite in fractures and clots in jasper bearing conglomerates or breccias, and large blebs of chalcopyrite interstitial to siderite in veins, was discovered in Units 2 and 3. Mineralization was prominent although not restricted to jasper bearing conglomerates in the northeast portion of the dome. The Das and Id claims appear to be staked on copper showings.

Potentially economic lead-zinc mineralization occurs in Units 4 to 7. Unit 4 dark grey dolomite to limestone hosts the Og and Tart showings and should

be the prime target for further detailed exploration. If the Unit 9 unconformity was responsible for the karst and solution features hosting mineralization on the Og Group, this feature should be considered an excellent exploration parameter and used in further follow-up. Two other areas where Unit 9 rests unconformably on Unit 4 are located 2 miles southeast of the Das claims and 4 miles east of the Oz Group. Other specific areas where solution features may exist possibly occur in the top of Units 6, 7 and 8 where they are directly overlain by the red weathering quartzite. Two prominent locations are southwest of the Oz-Dem claims and 4 miles northeast of the Oz Group.

It is also interesting to note that all major mineralization occurs adjacent to strong northwest trending fault zones which may have served as channelways for metal bearing solutions.

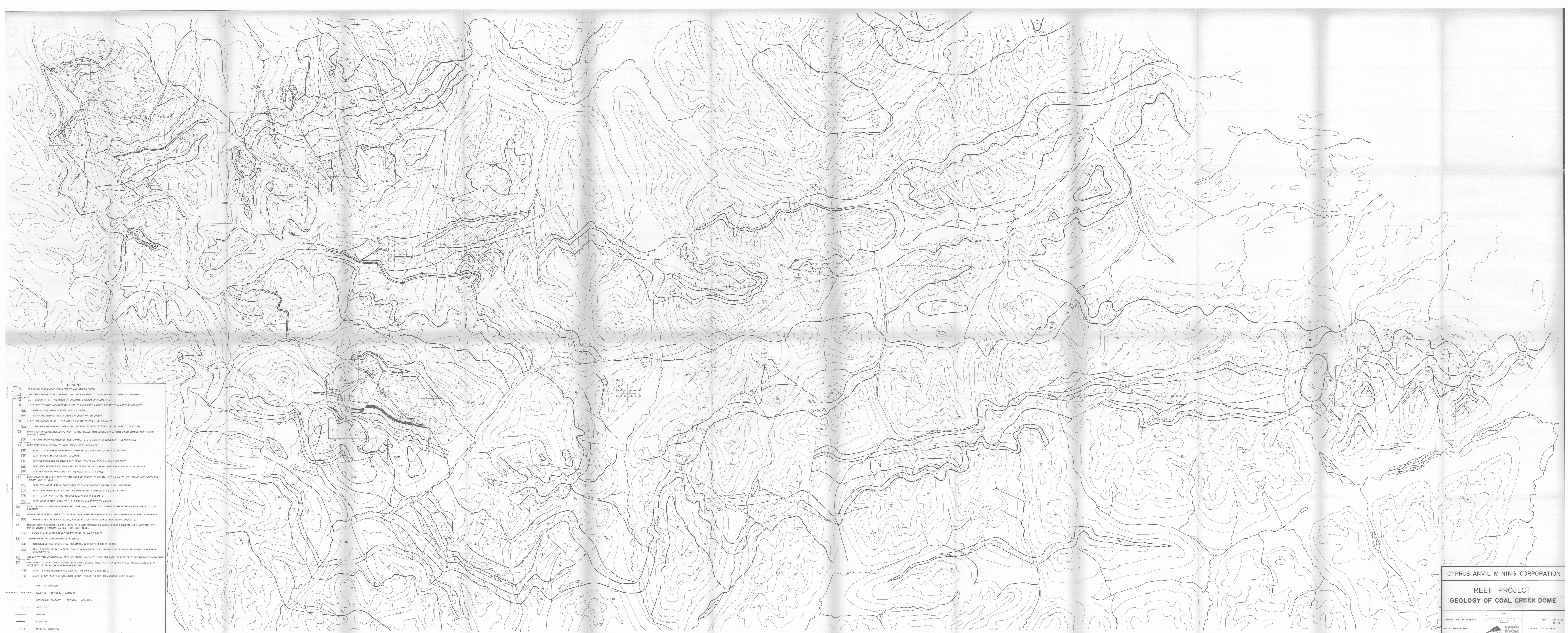
Potentially economic lead-zinc mineralization is located in the southwest portion of the Coal Creek Dome where a facies change between "platform type" and "reef type" carbonates occur. Helikian reefs are absent in the central and eastern portions of the Dome.

Excluding the Og Group, all mineralized breccias found to date are generally small and irregular in outline with segregated high grade zones but with low grades overall. Open spaces were narrow and were totally filled with secondary dolomite and minor mineralization. High tonnage and grade possibilities of these deposits seems limited.

Large solution features host for major mineralization on the Og Group should encourage us in further follow-up on the Ug claims and in other potentially interesting areas previously mentioned in the western region of the Coal Creek Dome.

Respectfully submitted,

W. J. ROBERTS



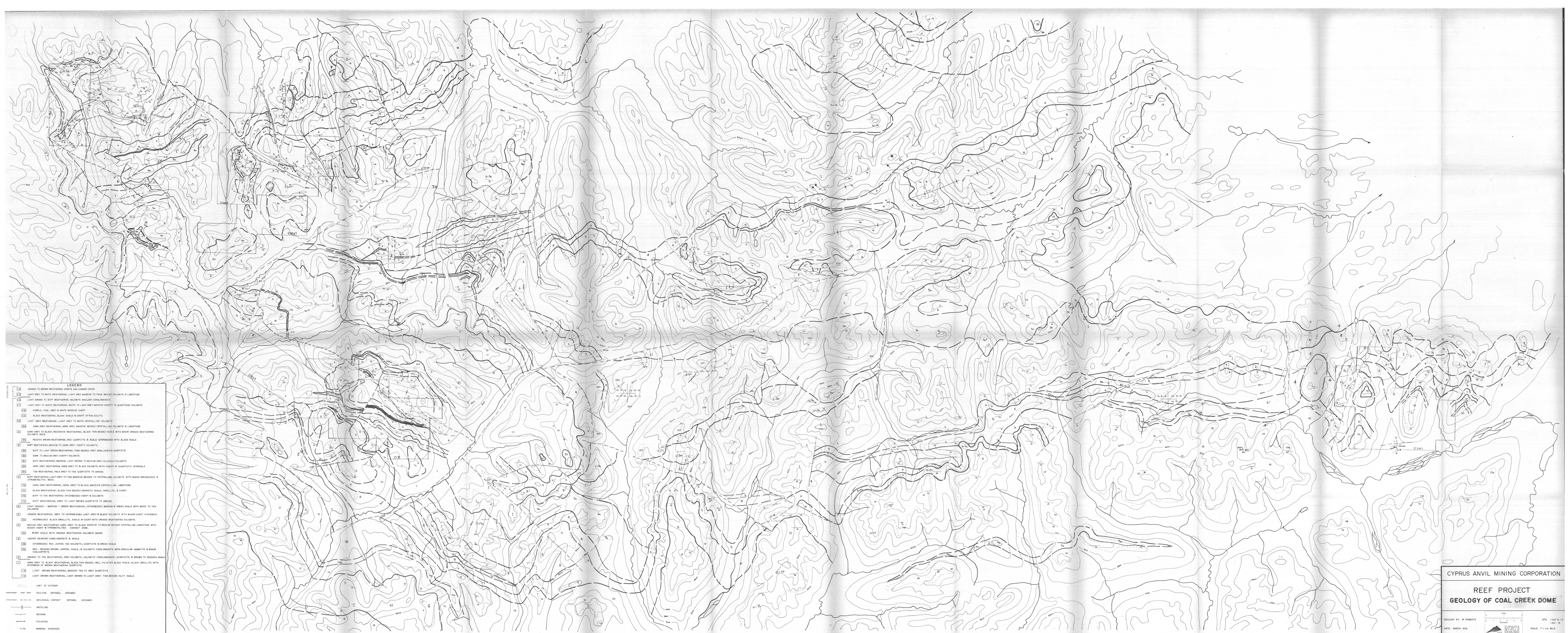
- LEGEND**
- 101 ORANGE TO BROWN WEATHERING, DARK GREY MASSIVE TO THICK BEDED OLIGOCLINE Limestone
 - 102 LIGHT BROWN TO WHITE WEATHERING, LIGHT GREY MASSIVE TO THICK BEDED OLIGOCLINE Limestone
 - 103 LIGHT BROWN TO BUFF WEATHERING, LIGHT GREY MASSIVE TO THICK BEDED OLIGOCLINE Limestone
 - 104 LIGHT GREY TO WHITE WEATHERING, WHITE TO LIGHT GREY MASSIVE TO THICK BEDED OLIGOCLINE Limestone
 - 105 PURPLE, PINK, GREY & WHITE MASSIVE CHEST
 - 106 BLACK WEATHERING, BLACK SHALE & CHEST OFTEN OLIGITE
 - 107 LIGHT GREY WEATHERING, LIGHT GREY TO WHITE CRYSTALLINE OLIGOCLINE
 - 108 DARK GREY WEATHERING, DARK GREY MASSIVE BEDED CRYSTALLINE OLIGOCLINE & LIMESTONE
 - 109 DARK GREY TO BLACK WEATHERING, BLACK THIN BEDED SHALE WITH MINOR ORANGE WEATHERING OLIGOCLINE BEDS
 - 110 REDDISH BROWN WEATHERING, RED QUARTZITE & SHALE INTERBEDDED WITH BLACK SHALE
 - 111 BUFF WEATHERING, MEDIUM TO DARK GREY CHESTY OLIGOCLINE
 - 112 BUFF TO LIGHT GREEN WEATHERING, THIN BEDED GREY ANGLACIOUS QUARTZITE
 - 113 DARK TO MEDIUM GREY CHESTY OLIGOCLINE
 - 114 BUFF WEATHERING, MASSIVE LIGHT BROWN TO MEDIUM GREY SILICIOUS OLIGOCLINE
 - 115 DARK GREY WEATHERING, DARK GREY TO BLACK OLIGOCLINE WITH CHESTY & QUARTZITE INTERNALS
 - 116 TAN WEATHERING, PINK GREY TO TAN QUARTZITE TO JASPER
 - 117 DARK WEATHERING, LIGHT GREY TO TAN MASSIVE BEDED TO CRYSTALLINE OLIGOCLINE WITH MINOR ANGIACIOUS & STROMATOLITIC BEDS
 - 118 DARK GREY WEATHERING, DARK GREY TO BLACK MASSIVE CRYSTALLINE LIMESTONE
 - 119 BLACK WEATHERING, BLACK THIN BEDED OLIGOCLINE, ANGLACIOUS, & CHEST
 - 120 BUFF TO TAN WEATHERING, INTERBEDDED CHEST & OLIGOCLINE
 - 121 BUFF WEATHERING, GREY TO LIGHT BROWN QUARTZITE TO ARGOSE
 - 122 LIGHT ORANGE - MAROON - GREEN WEATHERING, INTERBEDDED MAROON & GREEN SHALE WITH WHITE TO TAN OLIGOCLINE
 - 123 ORANGE WEATHERING, GREY TO INTERBEDDED LIGHT GREY & BLACK OLIGOCLINE WITH MINOR CHEST INTERBEDDED BLACK ANGLACIOUS, SHALE & CHEST WITH ORANGE WEATHERING OLIGOCLINE
 - 124 MEDIUM GREY WEATHERING, DARK GREY TO BLACK MASSIVE TO MEDIUM BEDED CRYSTALLINE LIMESTONE WITH MINOR CHEST & STROMATOLITIC BEDS
 - 125 BLACK SHALE WITH ORANGE WEATHERING OLIGOCLINE BANDS
 - 126 JASPER BEARING CONGLOMERATE & SHALE
 - 127 INTERBEDDED RED JASPER, TAN OLIGOCLINE, QUARTZITE & GREEN SHALE
 - 128 RED - REDDISH BROWN JASPER, SHALE, & OLIGOCLINE CONGLOMERATE WITH SPHERULIC HEMATITE & MINOR CHALCOPRITE
 - 129 ORANGE TO TAN WEATHERING, GREY OLIGOCLINE, OLIGOCLINE CONGLOMERATE, QUARTZITE & BROWN TO REDDISH SHALE
 - 130 DARK GREY TO BLACK WEATHERING, BLACK THIN BEDED, WELL FOLIATED BLACK SHALE, BLACK ANGLACIOUS WITH INTERBEDDED BROWN WEATHERING QUARTZITE
 - 131 LIGHT BROWN WEATHERING, MASSIVE TAN TO GREY QUARTZITE
 - 132 LIGHT BROWN WEATHERING, LIGHT BROWN TO LIGHT GREY THIN BEDED SILTY SHALE
- LIMIT OF OUTCROP
 --- FAULTING DEFINED, ASSUMED
 --- GEOLOGICAL CONTACT DEFINED, ASSUMED
 --- ARTIFICIAL
 --- BEDDING
 --- FOLIATION
 X P MINERAL SHOWINGS

CYPRUS ANVIL MINING CORPORATION

REEF PROJECT
GEOLOGY OF COAL CREEK DOME

DESIGNED BY W. ROBERTS
 DATE: MARCH 1976

NTS 1:100 000
 1:60 000
 SCALE 7 1/2" = 1 MILE



- LEGEND**
- 101 ORANGE TO BROWN WEATHERING QUARTZITE AND LABRADOR DYES
 - 102 LIGHT GREY TO WHITE WEATHERING, LIGHT GREY MASSIVE TO THICK BEDDED DOLOMITE & LIMESTONE
 - 103 LIGHT BROWN TO BUFF WEATHERING, LIGHT GREY MASSIVE TO BOULDER CONGLOMERATE
 - 104 LIGHT GREY TO WHITE WEATHERING, WHITE TO LIGHT GREY MASSIVE CHERT TO QUARTZITE DOLOMITE
 - 105 PURPLE, PINK, GREY & WHITE MASSIVE CHERT
 - 106 BLACK WEATHERING, BLACK SHALE & CHERT OFTEN OLIGITE
 - 107 LIGHT GREY WEATHERING, LIGHT GREY TO WHITE CRYSTALLINE DOLOMITE
 - 108 DARK GREY WEATHERING, DARK GREY MASSIVE BEDDED CRYSTALLINE DOLOMITE & LIMESTONE
 - 109 DARK GREY TO BLACK RECESSIVE WEATHERING, BLACK THIN BEDDED SHALE WITH MINOR ORANGE WEATHERING DOLOMITE BEDS
 - 110 REDDISH BROWN WEATHERING, RED QUARTZITE & SHALE INTERBEDDED WITH BLACK SHALE
 - 111 BUFF WEATHERING, MEDIUM TO DARK GREY CHERTY DOLOMITE
 - 112 BUFF TO LIGHT GREEN WEATHERING, THIN BEDDED GREY ANGLAZIENSIS QUARTZITE
 - 113 DARK TO MEDIUM GREY CHERTY DOLOMITE
 - 114 BUFF WEATHERING, MASSIVE LIGHT BROWN TO MEDIUM GREY SILICEOUS DOLOMITE
 - 115 DARK GREY WEATHERING, DARK GREY TO BLACK DOLOMITE WITH CHERT & QUARTZITE INTERNALS
 - 116 TAN WEATHERING, PALE GREY TO TAN QUARTZITE TO ANHISE
 - 117 DARK WEATHERING, LIGHT GREY TO TAN MASSIVE BEDDED TO CRYSTALLINE DOLOMITE WITH MINOR ANHISEOUS & STROMATOLITIC BEDS
 - 118 DARK GREY WEATHERING, DARK GREY TO BLACK MASSIVE CRYSTALLINE LIMESTONE
 - 119 BLACK WEATHERING, BLACK TAN BEDDED SHALE, ANHISE, & CHERT
 - 120 BUFF TO TAN WEATHERING, INTERBEDDED CHERT & DOLOMITE
 - 121 BUFF WEATHERING, GREY TO LIGHT BROWN QUARTZITE TO ANHISE
 - 122 LIGHT ORANGE - MAROON - GREEN WEATHERING, INTERBEDDED MAROON & GREEN SHALE WITH WHITE TO TAN DOLOMITE
 - 123 ORANGE WEATHERING, GREY TO INTERBEDDED LIGHT GREY & BLACK DOLOMITE WITH MINOR CHERT INTERBEDDED BLACK ANHISE, SHALE & CHERT WITH ORANGE WEATHERING DOLOMITE
 - 124 MEDIUM GREY WEATHERING, DARK GREY TO BLACK MASSIVE TO MEDIUM BEDDED CRYSTALLINE LIMESTONE WITH WHITE CHERT & STROMATOLITIC (ORANGE) ZONE
 - 125 BLACK SHALE WITH ORANGE WEATHERING DOLOMITE BANDS
 - 126 JASPER BEARING CONGLOMERATE & SHALE
 - 127 INTERBEDDED RED JASPER, TAN DOLOMITE, QUARTZITE & GREEN SHALE
 - 128 RED - REDDISH BROWN JASPER, SHALE, & DOLOMITE CONGLOMERATE WITH SPECULAR HEMATITE & MINOR CHALCOPRITE
 - 129 ORANGE TO TAN WEATHERING, GREY DOLOMITE, DOLOMITE CONGLOMERATE, QUARTZITE & BROWN TO REDDISH SHALE
 - 130 DARK GREY TO BLACK WEATHERING, BLACK TAN BEDDED, WELL FOLIATED BLACK SHALE, BLACK ANHISE WITH INTERBEDDED BROWN WEATHERING QUARTZITE
 - 131 LIGHT BROWN WEATHERING, MASSIVE TAN TO GREY QUARTZITE
 - 132 LIGHT BROWN WEATHERING, LIGHT BROWN TO LIGHT GREY THIN BEDDED SILTY SHALE
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