

GEOLOGY OF THE PAR AND DORREEN GROUPS
OF MINERAL CLAIMS ON McDAME MOUNTAIN
(59° 129° SE) LIARD MINING DIVISION, B.C.

104P/5W
By: W.N. Plumb and H.L. Hill

August 16 to August 31, 1953.

0091

Para. 2 from letter No.1961 dated February 1st 1954,
signed by W.N. Plumb, Geologist.

The outcrop areas on the twelve PAR claims shown on the map consist of the brown and green colored areas. Areas shown in yellow are covered by talus or moraine, and areas left white are covered by ice or water. None of the PAR claims is completely devoid of outcrops, although PAR No. 4 and PAR No. 1 Fraction contain only limited outcrop areas. The extreme northeastern corner of PAR No. 9 mineral claim was inaccessible but contained almost continuous outcrops (cliffs) of massive volcanics. The dotted lines shown on the map and referred to in the legend as "Talus Line" represents the edge of the outcrop areas.



Figure 5: Panorama of Glacier on Par 4 Mineral Claim

16

December 22, 1953.

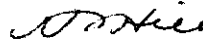
The President and Directors
Dorreen Mines Limited, N.P.L.
2091 West Broadway
Vancouver 9, B. C.

Dear Sirs:

We submit herewith our report and map on
the geology of the Par mineral claims on McDame mountain in
the Liard Mining Division, British Columbia.

Yours very truly,

HILL AND HEMSWORTH



Henry L. Hill

HLH:FE

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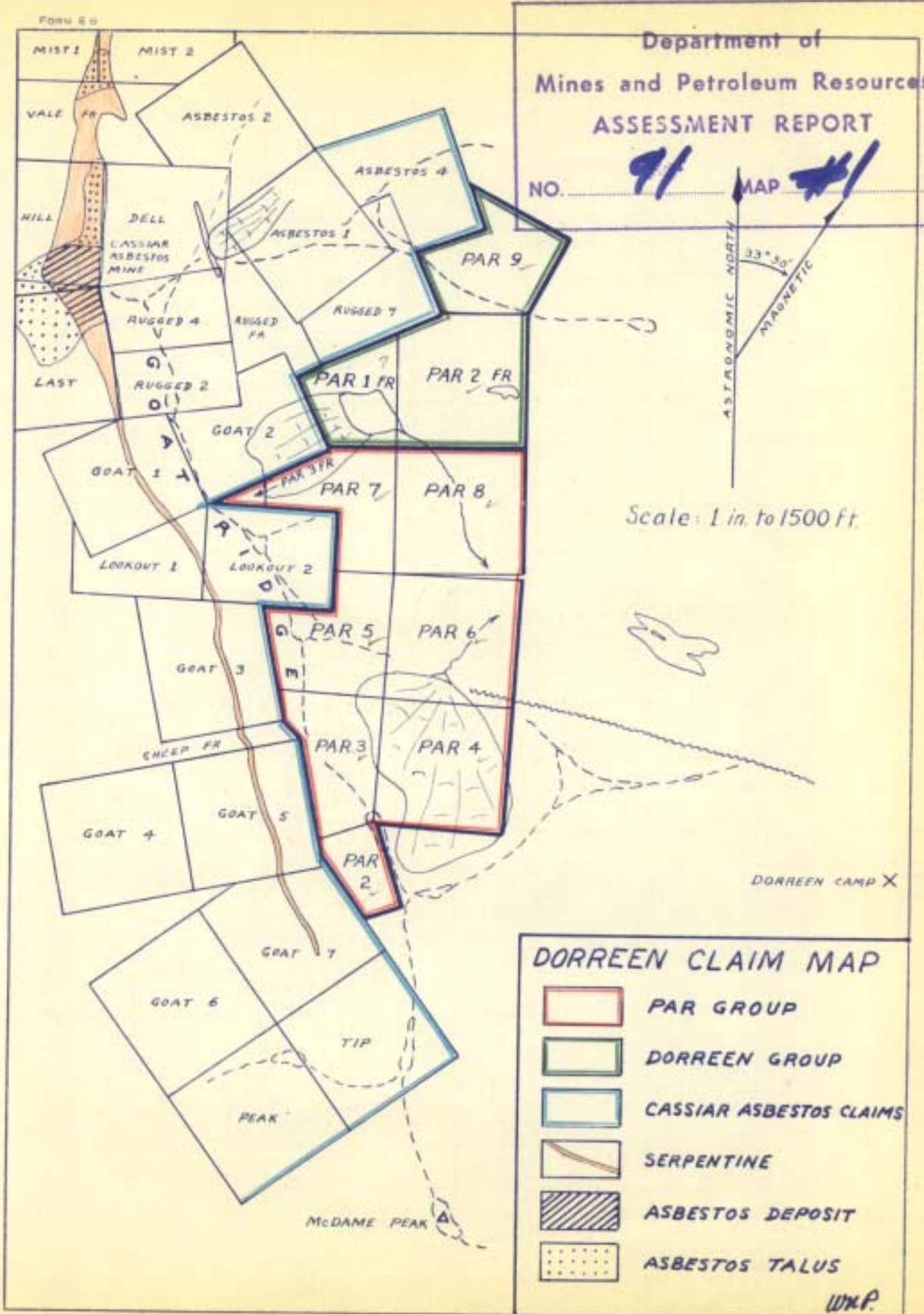
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Department of Mines and Petroleum Resources ASSESSMENT REPORT

NO. **91** MAP **#1**



Scale: 1 in. to 1500 ft.

DORREEN CLAIM MAP

- PAR GROUP
- DORREEN GROUP
- CASSIAR ASBESTOS CLAIMS
- SERPENTINE
- ASBESTOS DEPOSIT
- ASBESTOS TALUS

W.M.P.

GEOLOGY OF THE PAR AND DORREEN GROUPS OF MINERAL CLAIMS
ON McDAME MOUNTAIN (59° , 129° SE) LIARD MINING DIVISION, B. C.

SUMMARY

The eleven mineral claims of the Par and Dorreen groups occupy the east side of McDame mountain, adjacent to the claims of the Cassiar Asbestos Corporation, in the Liard Mining Division of northeastern British Columbia. They are two miles east of the Cassiar batholith and are underlain by the volcanics and interbedded argillites of the McLeod formation. A narrow band of serpentine, 9000 feet long, strikes N 15° W along the western slope of the mountain at an elevation of 6000 feet and dips easterly towards the Par claims. At its northern end, this serpentine contains the Cassiar orebody (a large deposit of excellent quality cross-fibre chrysotile asbestos) which, at its nearest point, is 500 feet north and 2200 feet west of the Par claims. The geology and topography of the Par claims were mapped on a scale of 300 feet to the inch, using Brunton compass, barometer and tape, to determine the structural relationship of the asbestos deposit to these claims. Structural sections indicate that the strata enclosing the serpentine

should underlie the nearest point of the Par claims at a depth of about 3000 feet but, in order to project the Cassiar orebody to this point, the following assumptions would have to be made:

- (1) That the serpentine is conformable to the bedding;
- (2) That it persists for 4000 feet down the dip;
- (3) That the asbestos contained in it rakes southeasterly.

It is concluded that the potential value of these claims remains indeterminate until more is known of the behaviour of the Cassiar orebody at depth.

INTRODUCTION

This report describes the geology underlying the Par and Dorreen groups of mineral claims situate on the eastern slope of McDame mountain in the Liard Mining Division of British Columbia. The author, under the direction of Mr. H.L. Hill, P. Eng., was commissioned by Dorreen Mines Limited (N.P.L.), of Vancouver, B.C., to undertake a geological survey of these claims during the summer of 1953 for the purpose of evaluating their economic possibilities. It was desired to ascertain, firstly, if any asbestos-bearing serpentine outcropped on the Par claims and, secondly, due to the known easterly dips of the strata enclosing the Cassiar Asbestos orebody, whether the downward extension of this deposit was likely to underlie the Par claims. The following programme was adopted:

- (1) To locate the boundaries of the Par claims;
- (2) To prospect these claims for asbestos;
- (3) To prepare a topographical and geological map to determine the structural relationship of the Cassiar serpentine band to the Par claims.

Accordingly, the author, ably assisted by Mr. F. W. Robinson and Mr. G. Cooper, spent sixteen days on the property between August 16th and 31st, 1953, compiling the data for this report and the accompanying maps and sections. The base camp had been established by Mr. Robinson and Mr. Cooper before the arrival of the writer on July 16th. Trails were cut and preliminary prospecting and location work completed prior to commencing the actual survey of the claims.

LOCATION AND ACCESSIBILITY

The Par Group consists of the following eight claims:

Par 2,3,4,5,6,7 & 8 mineral claims and Par 3 Fractional mineral claim. The Dorreen Group, immediately adjoining to the north, comprises Par 1 fractional, Par 2 fractional and Par 9 mineral claims. Par 1 mineral claim was allowed to lapse on August 15th, 1953. These claims occupy about 500 acres on the eastern slopes of Goat Ridge, which trends northerly from McDame peak (Latitude $59^{\circ} 18'$ North, Longitude $129^{\circ} 47'$ West). They lie immediately to the east of, and are contiguous with the following claims held by the Cassiar Asbestos Corporation Limited: Goat 7, Goat 5, Sheep Fractional, Goat 3, Lookout 2, Goat 2, Rugged Fractional, Rugged 7 and Asbestos 4 mineral claims. These claims, which include the asbestos-bearing serpentine, lie on the western slope of the same ridge. Please refer to Claim Map in the appendix.

The above claims are reached by a 98-mile motor road from Watson Lake on the Alaska Highway to the bridge across Quartzrock creek, then by horse-trail for five miles up the west fork of Quartzrock creek to an alpine valley at the 5000-foot elevation one mile east of McDame peak.

From this point the claims are reached on foot by circumventing the east end of a mountain spur to the north and entering a high glacial cirque.

Alternately, access may be obtained from the end of the Cassiar mining road, on the Last mineral claim, by climbing steep talus slopes to Goat Ridge and descending similar slopes on the eastern side, but this route is unsuitable either for horses or back-packing and could not be used to establish a base-camp.

FIELD METHODS

The Dorreen camp was established at 5000 feet elevation, as close to the Par claims as it was practicable to bring horses. Reconnaissance trips were made to locate the Par claims in relation to the topography and to the surveyed corner posts of the adjoining Cassiar claims. A series of Brunton-barometer-tape traverses were then run on all accessible areas of the Par claims and on appropriate portions of the adjoining ground. Traverses were closed whenever possible and tied at many points to the Cassiar surveys. In addition, approximate triangulations were made from various high points to a cairn at elevation 6600 on McDame peak. Barometer readings fluctuated rapidly due to extremely variable weather conditions, so elevations were checked frequently by taking vertical angles with the Brunton. Elevations obtained were in substantial agreement with those shown on a map contained in the 1952 Annual Report of the Cassiar Asbestos Corporation (1). The geology was mapped concurrently with the topography.

The map was drawn on a scale of 300 feet to the inch, using as control B.C.L.S. plats of the adjoining Cassiar claims obtained from

the Surveyor General. Two structural sections were prepared from the completed map to show the probable relationship between the Cassiar serpentine band and the Par claims.

In this report, the geology of the Par claims and the adjacent Cassiar claims are considered as a single unit. The geology in the vicinity of the Cassiar orebody was derived in part from personal observation and in part from records kindly made available by the staff of the Cassiar Asbestos Corporation, whose co-operation is hereby gratefully acknowledged. The 300 Adit was examined once, and the orebody twice, by the writer. The 1950 and 1951 Reports of the B.C. Minister of Mines were also used in the compilation of the report.

PHYSICAL FEATURES

The topography is extremely rugged, exhibiting the maximum relief of the erosion cycle. Knife-edged, serrated Goat Ridge, 6600 to 7000 feet in elevation, trends northeasterly from McDame peak, parallelling the strike of the rock formations. Similar spur-like ridges project easterly from Goat Ridge, following the direction of the prominent jointing. Between the spurs lie high alpine valleys, opening to the east and heading in glacial cirques. The north faces of the spurs slope precipitously into the cirques and are usually unscalable. Slopes facing east, west and south vary from 35 to 50 degrees and many can be climbed with caution. Remnants of valley glaciers still occupy the heads of some of the cirques, with ice-sheets probably as much as 200 feet thick.

The Par claims occupy one of these high valleys and the slopes leading down into it from Goat Ridge. This valley, which is approximately one mile wide between slightly converging spurs, is composed of three cirques at different elevations, two of them "hanging" above the third. The highest, which occupies most of Par 4 mineral claim, contains a thick ice-sheet and extends from elevation 6600 at Goat Ridge to elevation 5800, where it ends in a vertical cliff and a waterfall drops 200 feet to the talus slopes below. The second hanging cirque, covering most of Par 1 fractional, Par 2 fractional and Par 8 mineral claims, has a gently sloping floor at an average elevation of 5500 feet. This has been grooved and polished by recent ice-action and is largely free of debris except in the northwest corner, where a thin ice-sheet covers the slope leading down from Goat Ridge. Moraine and talus about 50 feet thick surround a melt-water pond at the base of the ice, from which a small stream flows over a sharp drop and disappears into the talus in the valley below. This lowest valley starts on Par 6 mineral claim and extends eastward for 3000 feet where, at elevation 5000, it falls off steeply towards Quartzrock creek. It is filled to an unknown depth with moraine, partly overlain by recent talus from the precipitous slopes of the high spur enclosing it on the south. Glacial grooves on the smooth rock of the north wall indicate that the ice moved easterly. The maximum relief on the Par claims is 2000 feet, from a 7200-foot peak on Par 5 mineral claim to elevation 5200 at the east boundary of Par 6 mineral claim.

Coarse talus mantles all the slopes, starting a few feet below the ridges, and fans out from narrow saddles crossing the ridges. It lies at angles of repose averaging 35 to 40 degrees. Most of it is quite fresh, indicating a high rate of erosion. The depth is not great, as bedrock occasionally projects through it, but is sufficient to make accurate mapping of formations difficult. The talus varies in size from huge angular blocks ten feet thick, below the massive andesite cliffs at the eastern ends of the spurs, to small elongate, splintery pieces (resembling bundles of sticks) that are typically found below the interbedded argillites and thin andesitic layers in the vicinity of Goat Ridge.

Tree-line is approximately 4500 feet above sea level. Below this elevation a rather sparse growth of spruce, poplar, willow and dwarf birch lines the valley bottoms and straggles up the mountainsides. These are rapidly replaced by isolated patches of ground-balsam which spread fanlike up the slopes two feet above the ground. Bunch grass and moss on the lower slopes give way to heather and lichen at about 5000 feet. Above the talus slopes all the mountains are bare of vegetation.

Lying slightly south of the 60th Parallel, this area is in a belt of perpetually disturbed air and consequently the summer weather is extremely variable. Being mountainous in addition, the weather is also very localized. With rare exceptions, precipitation in the form of rain, hail or snow occurs during some part of every day, interspersed with sunny, cloudy or foggy periods. Small fog patches form in the valleys

and drift towards the peaks at random. Winds veer through all compass directions and vary continually in strength. Small patches of snow remain on north and east slopes throughout the summer. Glaciers melt very slowly and are more dormant than receding. Although the Cassiar asbestos deposit is frozen for at least 300 feet from the surface, there is no apparent indication of permafrost elsewhere on the mountain or in the surrounding valleys.

REGIONAL GEOLOGY

McDame Mountain is about two miles east of the Cassiar granitic batholith and is composed of rocks belonging to the Permian (?) Dease Formation and the overlying Jurassic (?) McLeod Formation, named and described by Hanson and McNaughton in 1936 (2). The former is a sedimentary series of argillite, quartzite, chert and thick limestone beds; the latter a "complex interbedded assemblage" of thick volcanic flows and thinner pyroclastics and sediments. The contact between these formations, apparently conformable, lies about 500 feet west of Goat Ridge and is occupied by the band of serpentine in which the Cassiar Asbestos orebody occurs. These rocks strike slightly west of north and dip about 60 degrees easterly into a broad syncline, the axis of which lies several miles to the east.

STRATIGRAPHY

1. Dease Formation

Within the mapped area, the Dease Formation is wholly confined to the western slope of the mountain below the Cassiar serpentine band. It

is largely obscured by talus but one very prominent dolomitic limestone band, 400 feet thick, can be traced by its white-weathering talus and occasional outcrops for several miles, serving as an excellent marker. horizon about 550 feet below the top of the formation. Beds below the limestone horizon were not measured but a thick black layer of limy slate was observed - a band that weathered to produce a rich black soil. A thick band of thin-bedded, dark-grey argillites, containing many $\frac{1}{2}$ -inch to 4-inch beds of chert and cherty quartzite, overlies the limestone and extends to the serpentine contact. Where exposed in a gulch on Goat 7 mineral claim, these beds strike N 25° W and dip 53 degrees to the east. The contact with the serpentine is talcose and obscured by talus but beds a few feet south were found to strike N 15° W and dip 70 degrees east. No evidence of faulting or of hydrothermal alteration was apparent in these beds.

2. McLeod Formation

The Par and Dorreen Groups are entirely underlain by the volcanics and associated fragmental and clastic beds of the McLeod formation. There is a gradual transition from predominantly argillaceous to predominantly volcanic phases eastward from the contact with the underlying Dease formation. Thin volcanic flows appear immediately above the serpentine contact, marking a distinct break from the totally sedimentary Dease formation. The McLeod argillites and thin volcanic layers have a "ropy" structure, elongate in the direction of strike and undulating down dip which, when weathered, produces peculiar, splintery, talus blocks resembling blocks of wood. This feature was not observed in the argillites

of the Dease formation. In view of these factors, the contact between the two formations has been placed at the serpentine band, which itself could conceivably belong to either formation or be transgressive into both. Similar attitudes were measured above and below the serpentine band, so the two formations are believed to be conformable.

The volcanic rocks are a light olive-green and are predominantly aphanitic, although some slightly porphyritic phases with incipient white or dark-green phenocrysts were found. They are considered to be andesites in this report. The argillites are black or dark greenish-grey. The volcanic agglomerates contain angular particles of black argillite up to $\frac{3}{4}$ -inch in diameter, with smaller fragments of grey chert and of porphyritic volcanic debris. Many of the fragments were elongated parallel to the strike of the beds. A few thin beds of light-grey chert and of dark-grey limestone were found near the base of the formation. Some of the thin bands of light-green "andesites" may actually be tuffs but were not recognized as such in the field.

Most contacts between argillite and andesite, while apparently sharp from a distance, were found to be transitional upon closer inspection. In some cases, angular splinters of argillite were intercalated into the andesite; in others, the argillite had been slightly metamorphosed, gradually increasing in hardness and becoming greener in color until it imperceptibly merged with the andesite. Some contacts were distinctly transgressive along strike. Although it was frequently difficult to measure attitudes at these contacts, the average of a number of readings was usually recorded. The proportion of argillite progressively decreased,

and the andesite became more massive, towards the eastern boundaries of the Par claims.

INTRUSIVES

1. Serpentine

All serpentine outcrops in the area occur on claims held by the Cassiar Asbestos Corporation. Three occurrences have been noted by previous investigators but two of these are believed to represent the same, or main band, and are shown as one unit on the accompanying map. The other, smaller occurrence outcrops on the Dell Mineral Claim.

The main band extends for approximately 9000 feet northerly from the middle of the Goat 7 mineral claim to the centre of the Mist 1 mineral claim. Throughout its length it occupies the contact between the underlying cherty argillites of the Dease formation and the overlying andesites and argillites of the McLeod formation. It strikes approximately N 15° W and dips vary from 47 to 70 degrees east. All measurements of attitude are necessarily approximate, however, due to the sinuous nature of the contacts. At its southern end, on Goat 7 mineral claim, it disappears under talus and fails to reappear on the next transverse ridge, 1500 feet to the south. Similarly, at its northern extremity it appears to terminate under overburden in the cirque on Mist 1 mineral claim. For the southern 7000 feet it maintains a fairly uniform width of from 50 to 70 feet but as it enters the Last mineral claim it broadens gradually and on the Hill mineral claim Dr. W.V. Smitheringale (1) has estimated its thickness at about 500 feet. Thereafter, it narrows slightly to its northernmost

exposure, where McCammon (3) reports an outcrop width of 450 feet. Its stratigraphic position, rapid terminations and variable widths indicate that the serpentine is probably an altered basic sill-like intrusive, but these factors do not preclude the possibility that it has been derived from a basic volcanic flow.

The original nature of the rock from which the serpentine is derived is unknown. Along the hanging wall contact there are areas of partly altered light-green igneous rock, quite similar in appearance to the andesites of the McLeod formation. These are referred to by McCammon as "slightly serpentinized andesitic rock" and he states "thin sections show this rock to be composed largely of about equal parts of andesine, in various stages of alteration, and of augite, partly or almost completely altered to actinolite." O'Grady (4) describes them as "Two discontinuous sill-like bodies" that "consist predominantly of serpentine but include some indefinite areas of peridotite and augite porphyrite showing little or no serpentinization." Hanson and McNaughton (2) report that thin-section studies (from nearby areas) "yield very little information on the original character of the rock. Most of the sections studied are made up of colorless serpentine and small amounts of magnetite which follows the original outline and cleavage cracks of olivine grains." There are also unsubstantiated reports that "ghost" remnants of pyroxenes have been found in the Cassiar serpentine, but none was observed by the writer.

The serpentine is soft, unctuous, greasy-lustred and varies in color from a very dark bluish-green to a light olive-green. Towards the margins and the southern end it is gradational into bands of whitish talc varying up to ten feet thick. It is very easily weathered and the

fragments tend to remain "in situ", effectively obscuring most outcrops but enabling the band to be traced from a distance by the color of its talus. The contained asbestos is described under Economic Geology.

The second serpentine outcrop occurs on the Dell mineral claim, about 1200 feet east of the main band, on the eastern rim of the cirque that contains the main showing. It is 50 feet wide, bordered on each side by wide talc bands, and extends for about 300 feet into the cirque. It strikes approximately N 20° W and dips about 50 degrees east. For 500 feet it is obscured by talus and a thin ice-sheet. It then reappears as a zone of serpentine talus trending southeast for 100 feet before disappearing under thick McLeod talus on the Rugged fractional mineral claim. It was not found on the Par claims 1500 feet along strike. It is mainly of the dark-green slickensided variety and contains actinolite and talc but no asbestos was observed in it. A few insignificant threads of asbestos "fluff" was scattered through the talus around the ice-sheet.

2. Dykes and Quartz

A light-purplish-grey, aphanitic dyke is exposed for 4000 feet along the north side of the mountain spur that extends eastward from Par 4 mineral claim. It strikes from N 70° W to N 85° W and dips vertically. It is from 15 to 20 feet wide throughout and, due to differential weathering, lies in a nearly straight trench 10 feet below the steeply sloping surface of the mountain, bounded by sheer walls on its upper side and by isolated pinnacles on its lower side. Its western end enters the high cirque on Par 6 mineral claim but it does not reappear on the other side of the cirque. To the east it disappears under talus.

The dyke is impregnated with pyrite and some pyrrhotite and contains irregular stringers of quartz, slightly mineralized with pyrite and chalcopyrite. A gossan capping about an inch thick covers the outcrop, and a number of large boulders that lie in the talus below are also heavily oxidized. Specimens assayed failed to show any significant amounts of gold or copper.

Trenching across this dyke revealed five inches of fault gouge along its northern margin, where it was in contact with 15 inches of quartz, as well as a number of iron-stained fractures in the dyke. No evidence of differential movement could be found in the massive andesite that formed both walls. Near the cirque, thin argillite bands in the andesite were contorted but, as this is a feature commonly found in the McLeod formation, it could not be attributed specifically to fault movement along the dyke. On the basis of macroscopic examination this is termed a "Felsite" dyke and, as it cuts the McLeod formation, it is probably Post-Jurassic in age. Similar dykes, described by Hanson and McNaughton, occur in Quartz Creek canyon five miles to the southeast. Veins, stringers and irregular masses of barren white quartz also occur throughout the thin-bedded portions of the McLeod formation.

STRUCTURAL GEOLOGY

As illustrated in the accompanying map and sections, the strata underlying the Cassiar ground and the adjoining Par claims strike N 15° W and dip at 50 to 60 degrees eastward into the regional syncline. Superimposed on this simple structure is a single shallow, monoclinial fold, the axis of which strikes about N 30° W and plunges southeasterly at about 20 degrees.

Except for minor contortions, the beds then resume their normal steep easterly dips to the boundaries of the Par claims. The remaining rocks, exposed for 3000 feet to the east, are all massive andesites and show no structural trend. Due to the rugged terrain, it was not possible to map the minor fold in detail. It is, however, well exposed to observation on nearly vertical bluffs in at least three locations: on the weathered north faces of two high peaks surmounting Goat Ridge on the Rugged 2 and Rugged 4 mineral claims; and on a north-facing scarp below the glacier on Par 6 mineral claim. At these places, light-green andesitic bands show in sharp contrast against the darker argillites, with which they are interbedded, on prominent joint-controlled surfaces almost perpendicular to the regional strike. The origin of the monoclinal fold is uncertain, but if the Cassiar serpentine band is intrusive, its emplacement could readily account for minor folding of this magnitude.

From the cross-sections it will be seen that this fold is quite pronounced near the Cassiar orebody, where the serpentine is thickest, (Section A-A), and that it diminishes rapidly in amplitude towards the south (Section B-B). From this it could be inferred that the serpentine is plug-like at depth and that the magmatic solutions emanated from the vicinity of the present asbestos-bearing area and spread out along a zone of weakness represented by the contact between the Dease and McLeod formations.

Such a mass would, upon cooling, contract the most at its widest part, thus producing a greater number of shrinkage cracks, which could account for the localization of the subsequent asbestos mineralization. The evidence is far too inconclusive to support this theory at present, but it has been advanced

here as a possible explanation of the observed structure.

A widespread system of smooth, vertical, east-west joints is well developed in all the rocks of the McLeod formation and is responsible for much of the rugged topography, especially the steep, north-facing bluffs. The joints appear to have formed subsequent to the folding, as they cut indiscriminately across folded beds without offsetting them. The average strike is about N 80° E.

ECONOMIC GEOLOGY

1. The Cassiar Asbestos Deposit

Excellent quality, long cross-fibre asbestos occurs in commercial quantities in the main serpentine band on the Last and Hill mineral claims. This deposit is approximately 2200 feet west and 500 feet north of the northwest corner of Par 1 Fractional mineral claim. It is 900 feet long, from 200 to 500 feet wide, and at least 300 feet deep. An adit driven easterly, 300 feet below the outcrop, penetrated 251 feet of good ore without reaching the hanging wall of the deposit. The footwall contact with the argillites is faulted and strikes N 15° W and dips 47 degrees east. Permafrost was encountered on the surface and in the adit. Nothing more is known of the behaviour at depth of the orebody. Above the adit, ore reserves (as of September 30, 1952) have been estimated at 5,892,000 tons, averaging 7.5% grade 3K, plus undetermined amounts of "crude" and grade 4 fibre. (1)

Surrounding the outcrops and extending down the western side of the mountain is a circular area about 1000 feet in diameter, covered from three to seven feet deep with asbestos talus. Another talus area about 2000 feet by 200 feet extends into the cirque to the north. These "fluff"

areas are estimated to contain 280,000 tons of 7% grade 3R plus 5% 4K fibre. (1)

On the Vale fractional mineral claim, near the north end of the main serpentine band, an accumulation of large boulders contains short-fibre asbestos, but the amount has not been estimated.

To the south of the main orebody, the asbestos veinlets decrease rapidly in width and abundance, and no ore has been discovered in the serpentine between the Last and Goat 7 mineral claims.

The chrysotile fibres are yellowish-green in the rock and become white when pulled apart and fluffed. They can be split almost indefinitely, have a high tensile strength, and spin readily. Lengths vary from 1/32 to 1 7/8 inches, with a fair proportion greater than 1/2 inch. They fill a network of veinlets that run in all directions in the serpentine.

Good descriptions of this deposit appear in the 1950 and 1951 reports of the B.C. Minister of Mines.

2. Par Mineral Claims

No asbestos, serpentine or other economic minerals outcrop on the Par claims. The principal reason for holding this ground, however, was the possibility that the Cassiar serpentine band might underlie the Par claims and contain economic concentrations of asbestos. The ground has now been carefully mapped, and the serpentine has been found to roughly parallel the western boundaries of the Par claims and to dip easterly towards them, but it has not proved possible to accurately predict its behaviour at depth. This is chiefly because serpentine is an alteration product of a basic igneous rock and it could not be determined whether the original rock

was an intrusive sill, in which case it would not necessarily follow the bedding at depth, or a volcanic flow, in which case it probably would conform to the attitudes of the enclosing sediments.

Assuming, however, that the serpentine does follow the structural trend, cross-section A-A shows that it first dips fairly steeply to the east, then flattens through a monoclinial fold, and finally resumes steep easterly dips, passing under the Par 1 fractional mineral claim about 3000 feet vertically below the erosion surface. Similarly, section B-B, at the southern end of the claims, indicates that the serpentine would underlie Par 2 mineral claim at a depth of about 1000 feet.

It should also be noted that section A-A passes through the nearest point on the Par claims to the actual asbestos deposit and that the serpentine projected on the section is 800 feet south of the asbestos-bearing zone. In order, therefore, to underlie the Par ground, the Cassiar Asbestos orebody would have to rake southeasterly within the serpentine band and continue down dip for nearly 4000 feet. When more exploratory work has been done on the Cassiar orebody, it may be possible to predict its depth extension with a little more certainty.

CONCLUSIONS

As a result of this examination, it is concluded that:

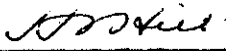
1. No asbestos or serpentine outcrops on the Par mineral claims.
2. It cannot at present be determined whether or not the Cassiar Asbestos orebody underlies the Par claims at depth. Two factors that could assist in projecting the ore would be:

- (a) More work at depth by the Cassiar Asbestos Corporation.
- (b) More information on the nature of the serpentine host-rock.

Respectfully submitted



W. N. Plumb, B.A.Sc.



H. L. Hill, B.A.Sc., P. Eng.

WNP:FE

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Figure 1

Goat Ridge and Cassiar
Asbestos Workings

Figure 2

Dorreen Camp and south
side of Spur Ridge

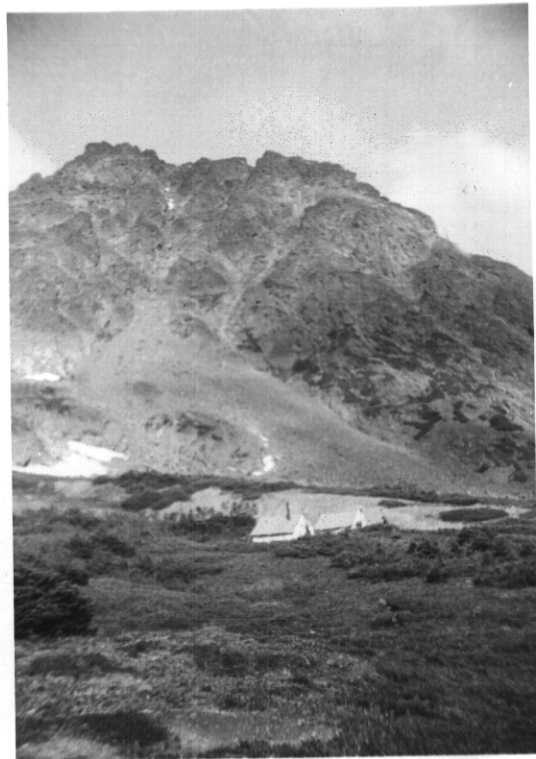




Figure 3

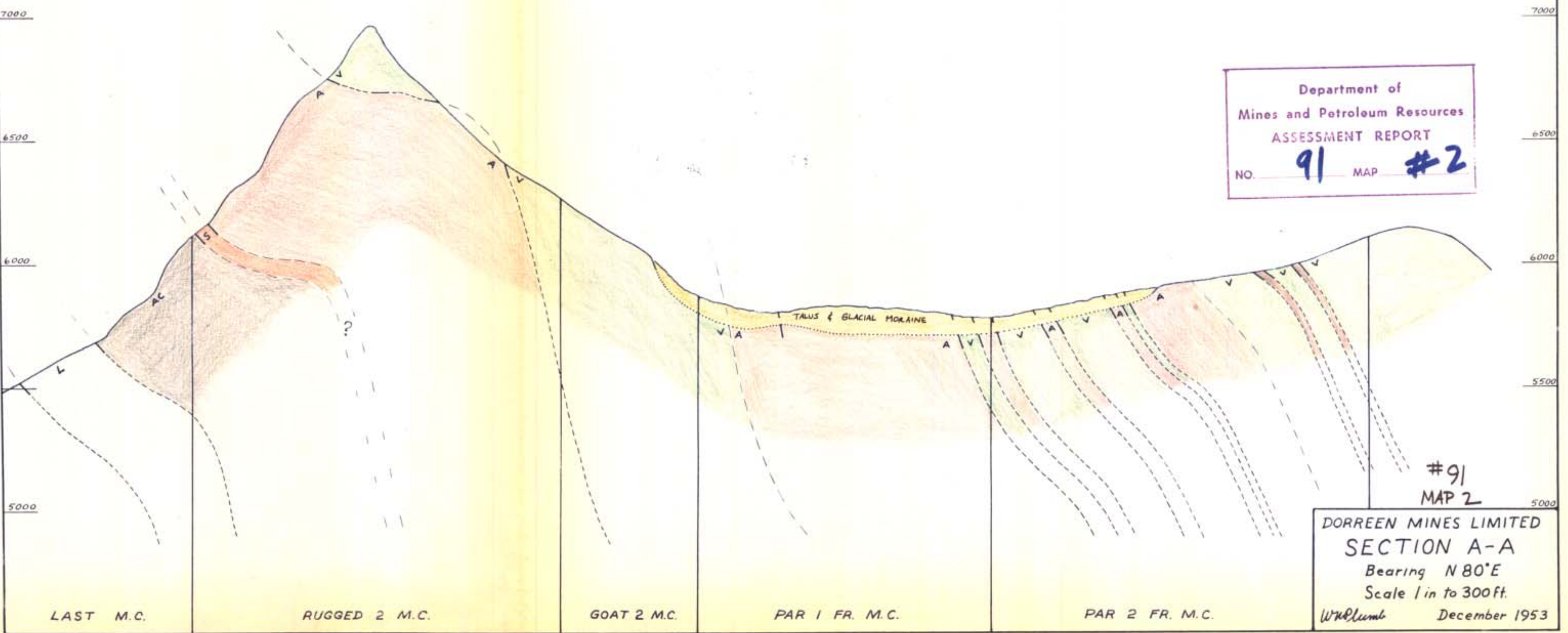
Weathered Dyke in trench,
North side of Spur Ridge



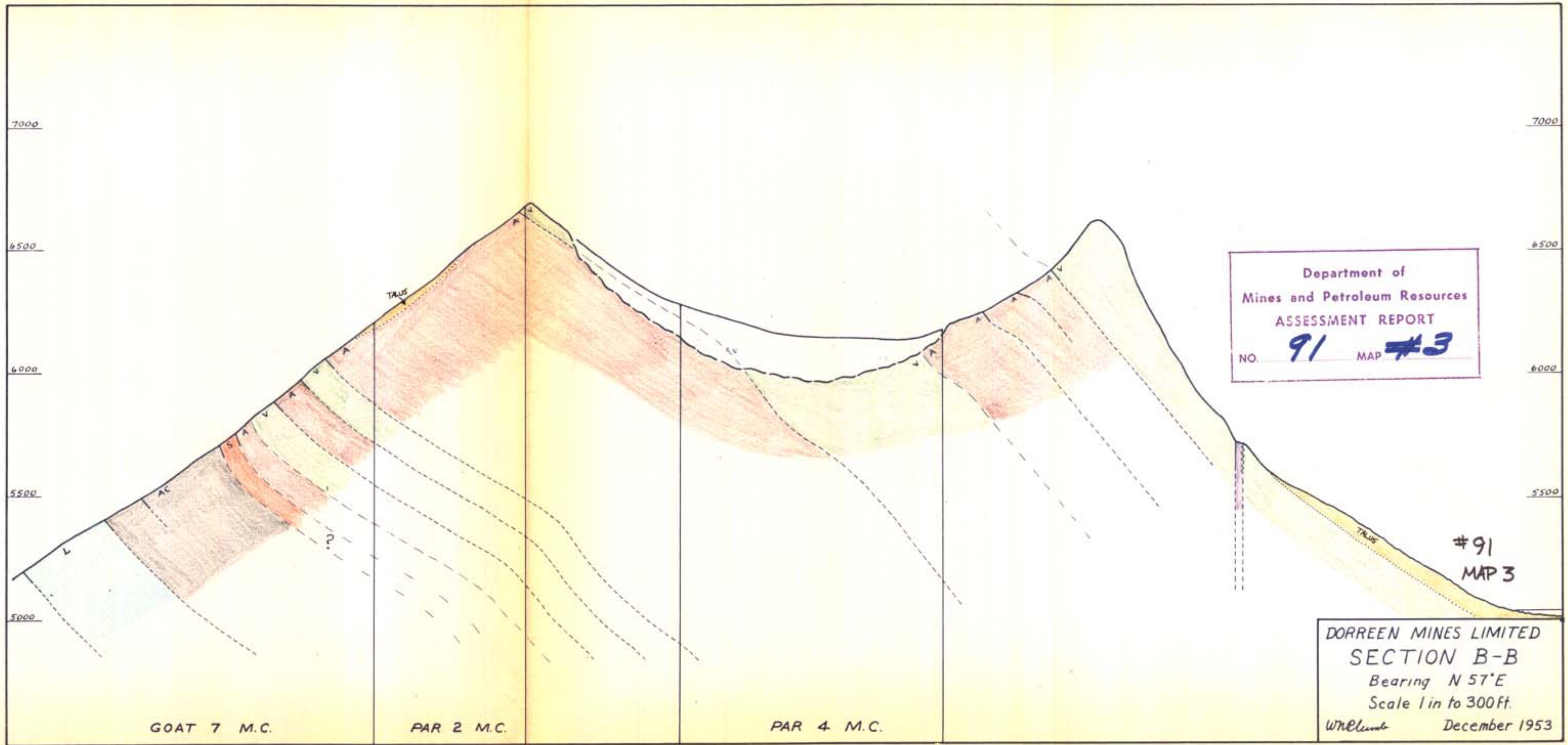
Figure 4

View of Par Ground;
Looking northwest
from Spur Ridge

Department of
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 ASSESSMENT REPORT
 NO. **91** MAP **#2**



#91
 MAP 2
 DORREEN MINES LIMITED
 SECTION A-A
 Bearing N 80° E
 Scale 1 in to 300 ft.
 W.R. Plumb December 1953



Department of
 Mines and Petroleum Resources
 ASSESSMENT REPORT
 NO. **91** MAP **#3**

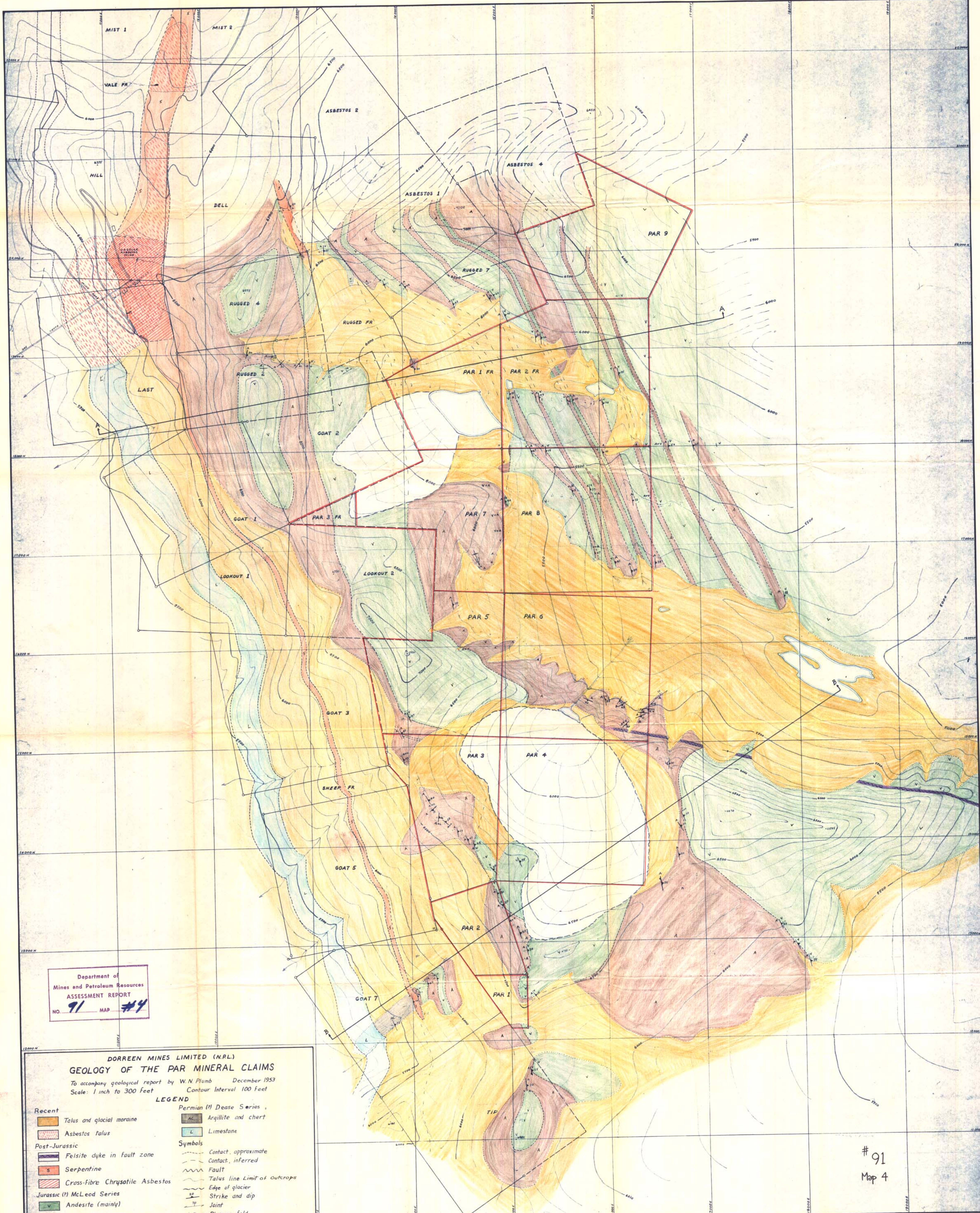
GOAT 7 M.C.

PAR 2 M.C.

PAR 4 M.C.

#91
MAP 3

DORREEN MINES LIMITED
 SECTION B-B
 Bearing N 57° E
 Scale 1 in to 300 ft.
 Wm. Elms December 1953



Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 91 MAP #4

DORREEN MINES LIMITED (N.P.L.)
GEOLOGY OF THE PAR MINERAL CLAIMS
To accompany geological report by W.N. Plumb December 1953
Scale: 1 inch to 300 feet Contour Interval 100 feet

LEGEND

- | | | | |
|-----------------------------------|------------------------------------|---------------------------------|------------------------------|
| Recent | Talus and glacial moraine | Permian (?) Dease Series | Argillite and chert |
| | Asbestos talus | | Limestone |
| Post-Jurassic | Felsite dyke in fault zone | Symbols | Contact, approximate |
| | Serpentine | | Contact, inferred |
| | Cross-fibre Chrysotile Asbestos | | Fault |
| Jurassic (?) McLeod Series | Andesite (mainly) | | Talus line Limit of outcrops |
| | Argillite and fragmentals (mainly) | | Edge of glacier |
| | | | Strike and dip |
| | | | Joint |
| | | | Plunging fold |

#91
Map 4