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1964/60

DIAMOND DRILLING RESULTS - IRON BLOW MINE. N.T.

by

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SUMMARY

A total of 2,333 feet of diamond drilling was carried out at the Iron Blow Mine by the Mines Branch, Northern Territory Administration, under an agreement with United Uranium No Liability, between January and June, 1963. This footage comprised six holes, of which three were designed to test extensions at depth of the main lode beneath the old workings, two were designed to test geophysical anomalies to the north and south of the old workings, and one was designed to test the western shear for any mineralisation at depth.

Drill holes Nos. 1,2 and 6 proved that the northern lens of the main lode does not persist in depth and that the southern lens persists but is very narrow. Drill hole No. 5 proved that the western shear is mineralised and forms a lode parallel to the main lode. The mineralisation encountered in the 1912 hole is the western lode at depth beneath the open cut, the hole having passed between the two lenses of the main lode. Drill hole No. 2 showed that, at the southern end of the mine area, the zone of sheared, altered rocks extends between the main and western lodes, and that the western lode at depth is a pyrrhotite orebody which is probably the source of the magnetic anomaly over the alluvial flats just south of the mine workings. The core samples were assayed for gold, silver, copper, lead, zinc, and a few for tin; the results were all disappointingly low, with the exception of the continuation at depth of the thin southern lens of the main lode, intersected in Drill Hole No. 2, which gave high silver values.

The two drill holes Nos. 3 and 4 which were sited to test a magnetic and a turam anomaly respectively, did not reveal any bodies at the depth predicted from the geophysical interpretation. The turam anomaly to the north of the mine workings may be caused by the dumps and the large magnetic anomaly to the south of the mine workings is probably caused by a continuation of the pyrrhotite lode found in Drill Hole No. 2 but situated about 100 feet deeper than the forecast depth to the centre of the body.

It is concluded that the quantity of ore remaining is too small and its grade too low to make the re-opening of the mine an economic proposition.

INTRODUCTION

The Iron Blow Mine is situated about 125 miles south of Darwin by the shortest road route and about two miles south of Grove Hill Siding on the North Australian Railway (Plate 1). It is accessible by tracks going north from the Stuart Highway at the 111-mile and the 123-mile. The 111-mile route comprises a sealed road to Fountain Head siding and a dry weather track parallel to the railway from there to Grove Hill, at which point a track leads south to the Yam Creek Smelter, where there is a turnoff to the Iron Blow Mine half a mile distant. The 123-mile route is all-weather and is followed for about eight miles to the Iron Blow turnoff at the Yam Creek Smelter.

The diamond drilling programme was carried out by Mines Branch, Northern Territory Administration, under an agreement with the lessees, United Uranium No Liability, who undertook to carry out the assays of the mineralised sections of drill core. Drilling started on January 7th. 1963, and was completed on June 15th, 1963.

PREVIOUS WORK

The orebody was discovered in 1873; between 1886, when mining began, and 1906, when the mine was closed down, the Iron Blow Mine produced an estimated 20,000 tons of ore (Dunn, 1961). In 1905, before its closure, H.Y.L. Brown visited the mine and described the ore as becoming poorer with depth (Brown, 1906). In 1912, a borehole was put down and a total of 76 feet 6 inches of lode material (true thickness, 60 ft) at depth beneath the open cut (377 feet 6 inches to 454 feet along the hole; vertical depths 342 feet 6 inches to 411 feet 6 inches) (Jensen, 1915). A transverse section in the plane of this hole is shown on Plate 3 and the assay results have been included in Appendix 2, in order that they may be compared with the 1963 assay results.

The leases were taken up in 1912 and work was commenced with Government assistance. The mine was dewatered to the 100-foot level but attempts to dewater the workings below this were unsuccessful. It was found that less ore than expected remained at and above the 100-foot level. During 1914, the lessee placed machinery at the mine and erected a furnace, but the outbreak of war disorganised metal prices and the lessee found it necessary to surrender both mine and plant to the Government (Hossfeld, 1937). In 1914 or 1915, Jensen carried out a regional geological survey of the Margaret District and reported on the mines in the area, including the Iron Blow Mines (Jensen, 1916).

Since 1914, no developmental work has been done on the mine so that it became completely flooded and the underground workings have been inaccessible ever since. In 1937, members of the Aerial, Geological and Geophysical Survey of Northern Australia made a geological and geophysical survey of the mine area (Hossfield, 1937; Rayner and Nye, 1937). The geophysical work indicated a possible northward extension of the Iron Blow lode beyond its worked portion. (Rayner and Nye, op. cit.). Geologists of the Australian Mining and Smelting Co. Ltd., mapped the area in 1957 (Thomas, 1957). In 1959, geochemical sampling of the banks of the Margaret River was carried out (Corbett, 1960) and very strong reactions were obtained in the mine area and in the Margaret River downstream from the mine. These reactions were attributed to the presence of zinc which possibly was derived from a concealed northward extension of the Iron Blow lode. (Corbett, op. cit.).

Work preparatory to the present diamond drilling programme comprised a geological survey of the mine area (Dunn, 1961) and a geophysical survey of the same area (Skattebol, 1962), both of which were carried out in November, 1960. As a result of these surveys, Dunn recommended five diamond drill holes to evaluate the prospect, two of them being designed to test geophysical anomalies.

In 1962, the present lessees of the mine, United Uranium No Liability, put down thirteen short waggon drill holes; twelve of these were designed to test an anomaly to the north of the mine workings and one was designed to test the western shear. In an unpublished report on this work (Larsen, 1963), it was stated that testing of the anomaly by wagon drilling was not successful due to the shallow depth of the water table. The hole drilled to test the western shear intersected quartz gossan from 45-55 feet. All samples were panned, but no economic minerals were seen. (op.cit.).

Geological Background

The regional geological setting of this area can be seen from the Pine Creek 1 : 250,000 Geological Series Sheet (Malone, 1962). The rocks in the mine area are included within the Golden Dyke Formation, which is reported to consist of quartz sandstone; pyritic carbonaceous siltstone, in places slumped and brecciated, containing chert lenses and nodules, and in places capped by iron ore; thin-bedded siltstone; dolomite; massive, bedded and nodular chert; and silicified dolomitic slump breccia (Malone, op. cit.). About half a mile west of the mine workings the map shows a contact between Golden Dyke Formation and Burrell Creek Formation, the latter formation is described as consisting of siltstone, greywacke - siltstone, greywacke, silcified calcareous greywacke, mica schist and andalusite mica schist (Malone, op. cit.).

The geology of the mine area was described in detail by Dunn (1961); the country rocks were described as "——mostly slates, some of which are carbonaceous or sericitic, with a thick lens of siliceous slate to the west of the main mine workings." Boulders of gossan which form the ridge along the west side of the open cut, are remnants of the prominent outcrop from which the mine was named. The mineralisation is associated with a steeply east - dipping shear zone (the "main shear") which is exposed in the open cut. A second shear (the "western shear") approximately parallel to the first, is exposed in No. 3 shaft, but there are no surface indications that it is mineralised. This fact, together with the presence of lode material at depth beneath the open cut, resulted in a number of conflicting views concerning the attitudes and relations of the lodes at depth.

Workings and Lodes

The orebody comprises lenses of sulphide minerals that were deposited along a major shear zone. The workings of the mine consist of two main levels, the 100 and 200-foot levels, with sub-levels and stopes between the 100-foot level and the surface. On the 100-foot level the ore occurs in two lenses; the northern lens is about 170 feet long and about 25 feet wide, and the southern lens is about 90 feet long with a maximum width of 27 feet. These lenses are connected by a narrow section of the lode. On the 200-foot level the two lenses are separated by a barren gap of 70 feet. The northern lens is about 120 feet long and has a maximum width of 35 feet on this level. The southern lens was cut by the drive, but was investigated for only about 20 feet and its total dimensions are not known (Dunn 1961, based on Hossfeld, 1937). The lenses dip at about 75° E between the two main levels; the northern lens pitches at about 80° N, whereas the southern lens is almost vertical in longitudinal section.

Attitude of Lodes

Conflicting views have been put forward regarding the attitude of the main lode and the identity and relationships of the lode material intersected in the 1912 drill hole. Jensen quotes at length from Brown's description of the geology of the mine, which states that both country rock and lode dip to the east (Brown, 1906, quoted in Jensen, 1916). Jensen disagreed with this interpretation and he stated that"——the lode bends over at the 300 ft. (sic) level, and the dip of the lode itself becomes westerly." (op.cit.)

With regard to the lode matter intersected in the 1912 drill hole, Hossfeld (op. cit.) stated "The position of this ore in plan, — indicates that if it represents the downward continuation of the lode the latter must undergo a reversal of dip below 200 feet and dip at approximately 70° to the west. Alternatively, the lode worked may peter out in depth and a new lens exist some 50 feet to the west." Dunn (1961) summarised the position as follows: "According to Hossfeld's plans, the main shear between the surface and the 200-foot level dips east at about 75°, and if these plans are accurate, the presence of this mineralisation vertically beneath the open cut can be explained in one of three ways:- by a reversal of dip of the main shear; a downward east-dipping extension of the western shear; or separate lode that does not crop out." Geologists of the Australian Mining and Smelting Co. Ltd., considered that the second alternative was the most likely (Thomas, 1957). Dunn, after his work at the mine in 1960, formed the opinion that a reversal of dip of the eastern lode below the 200-foot level was more likely (Dunn , op. cit.)

DRILLING RESULTS

Maps and Sections

The geological map (Plate 2) is taken from the report by Dunn (1961), with modification of some section lines and the positions of some of the drill hole collars. The transverse sections (Plates 3 - 5) have been constructed using Dunn's accurate positions of the shafts, in conjunction with Hossfeld's plans and sections of the underground workings (1937, mainly based on maps and sections in Jensen, 1916), the accuracy of which is suspect. In the transverse sections, the accurate surface positions of the shafts and drill hole collars and of the lode intersections in the drill holes are a credible fit with Hossfeld's underground workings and his position of the lode. In the longitudinal section (Plate 6), the use of the accurate surface information results in a considerable shortening of the lodes in a north-south direction because Hossfeld's surface map included large errors in the positioning of the shafts. It is, of course, impossible to check on the lengths of the lenses given in Hossfeld's report because of the inaccessibility of the workings.

The plotted position of the collar of the 1912 drill hole has been altered from that shown in previous reports (Dunn, op. cit., Hossfeld, op.cit.), because the collar of the old hole was discovered by the drillers during the present investigation. It was located beneath debris at the south end of the spoil dump and its position has been plotted on the map, Plate 2. The inclination of this drill hole is to the west but its exact bearing is uncertain. It has been taken as 273° magnetic from Jensen's map (Jensen, 1916).

Country Rock

The country rock of the mine area, as seen in the drill cores, consists chiefly of phyllitic slate with interbeds of greywacke and quartz greywacke. It is considered that the pelitic rocks are intermediate in grade between slate and phyllite, indicating that therocks have undergone low-grade regional metamorphism, which affected the argillaceous sediments but left the greywackes relatively unaltered. A small amount of recrystallisation may have taken place in the greywackes but no obvious alteration is present.

The zone of weathering in the phyllitic slates and greywackes extends to about 40 feet below the surface and in this zone the rocks are usually yellow to greyish, whereas the unweathered rocks are dark blue-grey to blue-black.

Siliceous phyllitic slate was encountered to the west of the mine workings and corresponds to the lens of siliceous slate on the geological map (Dunn, op.cit.). Beds of massive, hard, crypto-crystalline, siliceous, blue-grey rock also occur within the phyllitic slate-grey-wacke succession; this rock type has been termed hornfels. It is thought that these beds are indurated, silicified and probably recrystallised country rock, mainly phyllitic slates, but some recrystallised greywackes occur. These rocks occur on the flanks of the more intensely altered rocks along the main shear zone, and in association with minor shears or other possible solution channels elsewhere in the country rock. Thin chert beds also occur in the succession.

Minor shear zones which occur in the country rock away from the main shears generally consist of quartz veins with disseminated pyrite. Graphite also occurs in some of these minor shear zones, and very thin beds of graphitic slate occur in the country rock succession.

Sedimentary features in the rocks have generally been preserved. Slumping at the contacts between phyllitic slate and greywacke beds is common and penecontemperaneous small-scale compaction faulting is displayed in the sediments above the slumps in a few places.

Mineralised Shear Zones

The rocks along the main shear zone are much altered; shearing, brecciation and recrystallisation with quartz and calcite veining are common features in this zone. The drill hole intersections indicate that distinct lodes rich in sulphide minerals occur in a broader zone of sheared, altered rocks with disseminated sulphide mineralisation, chiefly pyrite. The old mine workings apparently followed these sulphide orebodies within the zone of sheared rocks. The lode along the western shear zone was never worked, presumably because no mineralisation was observed in the only exposure of this shear, in No. 3 Shaft.

The altered rocks consist of hornfels, chloritic hornfels and quartz - chlorite - carbonate rocks, with white quartz veins, calcite veins and disseminated sulphide minerals. Chert occurs in this zone, both as thin lenses in hornfels and as thick, massive lenses, varying from green to black in colour. A vein of black crystalline calcite was encountered in drill holes Nos. 1, 2 and 3. The intersections of this distinctive rock type are shown on the transverse sections. Both the calcite and the chert carry very sparse disseminated pyrite.

Diamond Drill Holes

The following holes were drilled during the present programme:-

No.	Location of Collar	Magnetic Bearing	Depression	Length of Hole
1	978N / 522W	270°	49°	433' 6"
2	836N / 555W	270°	55°	517' 7"
3	650N/692W	270°	60°	300' 0'
4	1200N / 700W	270°	60°	250' 0'
5	872N / 905W	270°	70°	231' 5"
6	978N / 522W	270°	60°	600' 6"
			TOTAL FOOTAGE	2333' 0'
1912 Drill Hole	866N / 670W	273°(?)	65°	467' 0"

Drill Hole No. 1 was designed to intersect the northern lens of the main lode and to prove whether or not there was a reversal in the dip of the lode. An intersection of sheared and altered rocks was obtained between 282 feet 8 inches and 405 feet 7 inches along the hole (vertical depths 202 to 283 feet). This zone carried disseminated sulphides (chiefly pyrite) through most of the intersection, with a relatively narrow lode rich in sulphide minerals from 341 feet 10 inches to 359 feet 7 inches along the hole (vertical depths 241 to 254 feet, true width 16 feet). This sulphide lode occurs 50 feet below the position of the northern lens on the 200 - foot level and slightly east of it. There is, therefore, no indication of a reversal of the lode but this hole alone was not conclusive because the intersection was too close to the 200-foot level. Consequently, it was decided that a further hole from the same collar but depressed at a greater angle would be desirable, both to settle the question of lode reversal conclusively and to ascertain the persistence in depth of the substantial channel of sulphide mineralisation discovered in drill hole No. 1

Drill Hole No. 6 was designed to intersect the northern lens at a vertical depth of about 100 feet greater than that of the sulphide lode intersection in drill hole No. 1. This drill hole intersected sheared and brecciated, quartz - chlorite lode material with disseminated sulphide mineralisation from 394 feet 2 inches to 419 feet 7 inches along the hole (vertical depths 326 to 346 feet). The mineralisation consisted of an intricate network of pyrite veins with sparse chalcopyrite and galena.

The intersections obtained in drill holes 1 and 6 show that there is no reversal of dip of the northern lens of the main lode, and the dip of the lode below the 200-foot level is approximately 80°E. The sulphide lode has been interpreted as thinning at depth and cutting out above the intersection in drill hole No. 6, which also indicates a thinning of the main zone of sheared rocks at depth.

The sections of core showing evidence of mineralisation were split and assayed, the assay lengths being determined by visual examination of the core. The core from the sulphide lode in drill hole No. 1 was assayed for gold, silver, copper, lead and zinc, whereas that from the zone of sheared rocks containing disseminated pyrite was assayed for gold and silver only. Four samples from drill hole No. 1, comprising two from the sulphide lode and two selected from the rest of the intersection of mineralised rocks, were assayed for tin because cassiterite had been identified from the nearby Mt. Bonney orebody. (Munn, 1961). The assays for tin were negative and the rest of the results were very low (Appendix 2.)

Drill Hole No. 5 was designed to test the western shear, about which little was known because it was exposed only in the 15-foot deep No. 3 shaft. This hole intersected a zone of mineralisation between 130 feet and 180 feet along the hole (vertical depths 117 to 163 feet; true width 30 feet), comprising sheared quartz - chlorite rocks with abundant disseminated pyrite. Unlike the northern lens of the main lode, this lode had been extensively leached and was in a very friable condition. Core recovery varied from 8% to 67%, often solely as sludge, in contrast to the recovery of lode material in drill holes Nos. 1 and 6, which did not fall below 97%. The core was sampled in lengths that were decided largely by the recovery percentage, so that individual samples did not include portions with widely divergent recoveries. The samples were assayed for gold, silver and copper, the results being very low indeed. (Appendix 2).

This drill hole proved the existence of mineralisation along the western shear zone; following this, drill hole No. 6, which was being drilled at the same time, was continued in the hope of intersecting the western lode at depth beneath the open cut. Drilling was stopped at 600 feet 6 inches, the only indication of any lode being a zone of thin, pyrite - bearing quartz shears between 514 feet and 521 feet 7 inches along the hole (vertical depths 420 to 425 feet). This narrow zone (true width 6 feet) has been correlated tentatively with the postulated position of the western shear (Plate 4), which therefore contains negligible sulphide mineralisation at depth in the northern part of the mine workings.

Drill Hole No. 2 was designed to intersect the southern lens beneath the only place where it had been encountered on the 200-foot level, which had been driven only a short distance into the lode. In view of the absence of any reversal of dip of the northern lens, the depression of this hole was increased from the original recommendation by Dunn (1961). It was also decided to lengthen the hole to intersect the western lode at depth beneath the south end of the open cut.

The drill hole entered sheared and somewhat brecciated lode material at 306 feet 10 inches (vertical depth 238 feet) after which a white quartz lode was intersected between 315 feet and 320 feet 5 inches (vertical depths 254 to 259 feet; true thickness 5 feet). The quartz contained a number of large cavities lined with crystalline pyrite and smaller amounts of arsenopyrite, sphalerite, chalcopyrite and a few cubic crystals of fluorite. This lode is the continuation of the narrow southern lens, being situated 30 feet east of and 50 feet deeper than the intersection of the southern lens by 200-foot level.

From 320 feet 5 inches to 447 feet the intersection comprised sheared and brecciated hornfelsic slates, with quartz and calcite veins, cherts and a thick lens of black, crystalline calcite identical to that encountered in drill hole No. 1. Spare disseminated pyrite is the only mineralisation in this zone.

A second sulphide lode (the western lode) was intersected in this drill hole between 447 feet and 480 feet along the hole (vertical depths 338 to 362 feet; true thickness 33 feet). This lode was flanked on both walls by a few feet of sheared quartz - chlorite - carbonate - biotite rock with abundant disseminated pyrite and pyrrhotite. The rest of the lode comprised massive sulphide minerals with minor amounts of quartz and chlorite. The predominant sulphide mineral was pyrrhotite but pyrite was also abundant. A few zones within the lode were rich in acicular crystals of arsenopyrite; galena, sphalerite and chalcopyrite were present in smaller amounts throughout the intersection.

The core between 306 feet 10 inches and 480 feet was split and assayed, the assay lengths depending on visual examination of the core. The samples from the southern lens were assayed for gold silver, copper and zinc whereas those from the altered rocks along the shear zone were assayed for gold and silver only, with copper and zinc assays on a few selected samples; the samples from the pyrrhotite lode were assayed for gold, silver, copper, lead and zinc. (Appendix 2). The thin southern lens gave relatively high gold and silver values but the sheared rocks were found to carry virtually no values and the pyrrhotite lode was found to contain only trace amounts of the metals for which it was assayed.

In view of the presence of pyrrhotite in the western lode and the recent description of a number of copper - bismuth minerals and a cobalt mineral from the nearby Mt. Ellison Mine (Lawrence, 1963), a qualitative analysis was done on a composite sample of the pyrrhotite lode. This showed the presence of arsenic, manganese and aluminium and absence of bismuth, cadmium

nickel and cobalt.

A further three composite chip samples, representing the pyrrhotite lode intersection obtained in drill hole No. 2, were sent to the Bureau of Mineral Resources, Canberra, for spectrographic determination of all metals. The results of this spectrographic work are given in Appendix 2.

After the drilling of holes Nos. 1, 6 and 5, it was apparent that the main lode dipped east, that a second or western lode existed parallel to the main lode, and that the 1912 drill hole passed between the two lenses of the main lode below the 200-foot level and intersected the western lode at depth beneath the south end of the open cut. The pyrrhotite lode in drill hole No. 2 correlates well with the intersections in the 1912 hole and drill hole No. 5. The leached, friable nature of the lode in drill hole No. 5 appears to be due to the pyrrhotite having been oxidised and leached out much more readily than the pyrite, with the result that the lode at shallower levels consists predominantly of pyrite, the crushed samples from this intersection being non-magnetic.

If the assay results of the pyrrhotite lode are bulked, the average grade is similar to that of the intersection in the 1912 drill hole. The average gold and silver values are approximately the same, but the zinc value is lower and the copper value higher in the 1963 intersection.

Fifteen small samples of core were selected from the intersections of the western lode and the northern and southern lenses of the main lode, and sent for mineragraphic determinations to the Bureau of Mineral Resources, Canberra. (Pontifex, 1964).

Drill Hole No. 3 was designed to test Anomaly M, a prominent magnetic anomaly over alluvial flats to the south of the mine workings. The anomaly was interpreted as being due to a spherical body 150 feet in diameter, the centre of which is situated at a depth of 250 feet below the surface (Skattebol, 1961). The drill hole reached a vertical depth of 260 feet and passed close to the interpreted position of the centre of the large magnetic body; it did not, however, intersect anything that could have caused the anomaly. It did intersect a zone of recrystallised, sheared rocks with calcite veins from 205 feet to 245 feet (vertical depths 180 to 212 feet), including 4 feet of black crystalline calcite, similar to that in the shear zone intersections in drill holes Nos. 1 and 2. No sulphide mineralisation occurs along the shear at this point. The southern-most portion of the southern lens on the 100-foot level occurs some 115 feet north of the plane of drill hole No. 3. (Plate 6). The southward extension of the southern lens at deeper levels is still not proved but it is unlikely to extend much farther south than its limit on the 100 foot level because the lode is very thin both on the 200-foot level and in drill hole No. 2.

The cause of the magnetic anomaly is still not absolutely certain, but the pyrrhotite lode along the western shear has a high magnetic susceptibility and it seems most likely that Anomaly M is caused by a southward extension of this lode. Plate 7 shows the vertical projection of the pyrrhotite body in relation to the anomaly, and it can be seen that the lode occurs at a vertical depth approximately 100 feet greater than that forecast from the geophysical interpretation. The question could only be settled by further drilling, which was considered to be unwarranted on economic grounds.

Drill Hole No. 4 was designed to test Anomaly E, a turam anomaly to the north of the main workings, which was postulated as being caused by a northward extension of the main lode (Skattebol, 1961). No underground development exists beneath the anomaly and any such extension of the lode would not have been encountered in the old workings.

Details of the drill hole can be seen from Plate 8. The vertical depth of 152 feet below the centre of the anomaly was considered to be about the optimum level at which to intersect any extension of the lode, but nothing that could have caused the anomaly was encountered and it is suggested that the spoil heaps were largely responsible for the turam anomaly.

Surveys

Initially tropari surveys were tried in drill hole No. 1, but results were unsatisfactory, largely due to the fact that only EX size aluminium rods were available at that time, and it was necessary to survey NX and BX size holes. Consequently, most of the subsequent holes were surveyed by the acid tube method. All the holes lifted, the average being 2° per 100 feet; only small deviations from the magnetic bearing occurred in drill holes No. 1 and 6, the only ones in which tropari surveys were carried out.

ORE RESERVES

GRADE

100 foot to 200 foot levels.

Prior to the closure of the Iron Blow Mine in 1906, an assay plan was prepared and an estimate of the average grade of ore was made. In 1912-1914, when the mine was dewatered to the 100-foot level, a series of samples was taken on this level and the mean grade again calculated. In 1937, Hossfeld, being unable to sample the lodes in the old workings, took a number of samples from dumps that were thought to comprise material from the 100-foot level. The average grade of the dump samples agreed reasonably well with both sets of earlier samples. The average grades were:

	Gold dwts/ton	Silver ozs/ton	Copper %	Lead %	Zinc %
1905	5	12	0.5	5	6
1912-14 (Average 12 samples)	4.8	22	1.2	not determined	
1937 (Average 8 samples)	6.0	15.3	0.24	4.5	14.3

(Hossfeld, 1937).

These results indicated that the bulk of the remaining ore was probably of economic grade, although no detailed information was available concerning the grade of ore on the 200-foot level.

Below 200-foot level

Main Lode. The assay results obtained during the present investigation (Appendix 2) indicate that the greater part of the lode is not of economic grade. The best values were those obtained for the thin southern lens, where a true width of 3'6" (315'-318'8" along the hole) gives an average grade of 3.5 dwts. gold and 27 ozs. silver per ton.

The average grade of the northern lens of the main lode (true thickness 16 feet) is:

Au. dwts/ton	Ag. oz/ton.	Cu. %	Pb. %	Zn. %
0.6	1.02	0.29	0.64	7.28

Western Lode. The average grade of the pyrrhotite lode intersected in drill hole No. 2 (true thickness 33 feet) proved to be very low and comparable with the average grade for this lode obtained from the 1912 intersection (true thickness 60 feet). The average grades are:-

	Au dwt. tons	Ag Oz ton	Cu.%	Pb%	Zn.%
Drill Hole No. 2	1.1	0.91	0.82	0.35	4.05
1912 Drill Hole	1.4	0.65	0.35	not determined	5.75

It is perhaps worthy of note that a section of the pyrrhotite lode from 458 feet to 476 feet along the hole (true thickness - 17 feet) gives an average grade of 1.1% copper, although the grade of the other metals is still very low.

QUANTITY

100 foot to 200 foot levels

When the mine was dewatered between 1912 and 1914, the ore reserves between the two main levels were estimated to be 33,000 tons, In 1937, it was estimated that 30,000 tons of probable ore remained in the northern lens between the two levels and 7,000 tons of possible ore in the southern lens between the same levels (Hossfeld, 1937). If these estimates are correct, this amount remains in the mine and earlier sampling indicates that the bulk of it is of economic grade (see above).

Below 200-foot level

Main Lode Calculations based on the dimensions of the lodes obtained from the diamond drilling results, using a figure of 2½ tons/cubic yard for the ore density, indicate the presence of approximately 8400 tons of probable ore in the northern lens below the 200-foot level, and 600 tons of probable ore in the southern lens below that level. Possible ore in the southern lens may amount to an additional 1,000 tons, but the southern limit of this lens at depths greater than the 200 foot level has not been proved. This would bring the total ore in the southern lens up to about 1,600 tons.

The total ore in both lenses of the main lode below the 200-foot level is therefore only about 10,000 tons.

Western Lode. Calculations of low-grade lode material in the western lode have been made on the same basis as those for the main lode. Material at vertical depths less than 150 feet (the approximate vertical depth of the intersection in drill hole No. 5) has been disregarded. The probable tonnage in the western lode is estimated to be 140,000 tons, although the additional possible tonnage to the south of the plane of drill hole No. 2 may be substantially larger than this.

DISCUSSION

When the intersection of the pyrrhotite lode was obtained in drill hole No. 2, another drill hole was tentatively planned, the collar of which would probably have been situated at 650N or 700N and at 600W. A hole drilled from such a collar at a magnetic bearing of 270° and depressed at 60° would reach a vertical depth of about 350 feet below the centre of the magnetic anomaly, allowing for lift. About 500 feet of drilling would have been necessary to complete an intersection of the postulated pyrrhotite lode under the anomaly.

However, after the very poor assay results obtained from the pyrrhotite lode intersection in drill hole 2, it was decided that another drill hole, although of interest on academic grounds, was economically unwarranted.

CONCLUSION

The conclusion to be drawn from the 1963 diamond drilling project at the Iron Blow Mine is that the quantity of ore present in both main aand western lodes is too small and its grade too low for the mine to be considered an economic proposition.

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ADDENDUM

After the completion of this report, a record of a drill hole that was put down in 1906 was discovered (Brown 1907). This drill hole is not mentioned in any later report on the Iron Blow Mine, including that of Hossfeld (1937), which otherwise contains a comprehensive discussion of work prior to 1937.

The drill hole was called No. 1 Bore (the 1912 drill hole was No. 2 Bore) and was drilled"--- to test continuity of lode at the Ironstone Blow Mine, for the Northern Territories Mines of Australia," The drill hole" --- was sunk 173 feet from the main shaft on a bearing of 127° 15', and 210 feet from the outcrop at right angles. The inclination of the bore was 70°, and the depth attained 444 feet." The collar of the drill hole, therefore, was situated at 904N 623W; no indication of its direction was given but it is safe to assume that it was close to 270° Magnetic.

The drill hole intersected "mineralised lode formation" between 323 feet and 350 feet along the hole (vertical depths 303 feet to 329 feet).

If the position of the drill hole is plotted on the map (Plate 2) and longitudinal section (Plate 6), it is evident that it passed below the southern part of the northern lens, as known on the 200-foot level. Also, if the section in the plane of this hole is projected north on to the plane of drill holes Nos. 1 and 6 (Plate 4), the intersection of "mineralised lode formation" is almost coincident with the position of the intersection of sheared, mineralised rocks in drill hole No. 6.

It was stated that "As the lode had not been passed through at the depth calculated by the company's manager, and for other reasons, chiefly relating to the wear and tear of diamonds, the boring was discontinued." The first stated reason for discontinuing the drill hole indicates either that no massive sulphide lode was intersected at all or that such a lode was intersected but in an unexpected position.

The second alternative is difficult to believe because the intersection was where it might have been expected to be from a knowledge of the position and attitude of the lode on the 200-foot level. Thus, it seems likely that the "mineralised lode formation" was similar to the material intersected in drill hole No. 6., namely sheared rocks with abundant pyrite mineralisation, in contrast to the massive sulphide lode intersected in drill hole No. 1.

There is no record of what happened to the core from this drill hole, nor is there any record of assays, so that "No. 1 Bore" is of academic interest only. It merely shows that the thin extension in depth of the zone of sheared, mineralised rocks flanking the northern sulphide lens of the main lode was intersected in the 1906 hole.

REFERENCE

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APPENDIX

ONE

LOGS OF DIAMOND

DRILL HOLES

Co-ordinates of Collar	:	978N/522W
Bearing	:	270° Magnetic
Depression	:	49°

Surveys	Type	Depth	Depression	Bearing
	Tropari	100'	47°	270°
	Acid & Tropari	300'	42°	271°

Total Depth	:	433'6"
Size of Hole	:	NX 0' - 180'0" BX 180' 0" - 433' 6"

Footage	Recovery	Description of Core
0'-13' 0"	1' 8"	Light brown sandy soil. Weathered light grey phyllitic slate and greywacke.
13' 0" - 40' 6"	5'11"	Weathered grey - blue phyllitic slate and greywacke with quartz fragments from small faults. Recovery mostly as fragments.
40' 6" - 63' 6"	16' 0"	Blue phyllitic slate with greywacke interbeds.
63' 6" - 125'	40' 6"	Blue-grey phyllitic slate with interbeds of medium to coarse-grained quartz greywacke.
125' 0" - 125' 2"	0' 2"	Quartz fragments with slickensides - small shear.
125' 2" - 129' 9"	1' 6"	Blue phyllitic slate.
129' 9" - 130' 0"	0' 2"	Quartz fragments with slickensides - small shear.
130' 0" - 141' 3"	9' 6"	Blue phyllitic slate and greywacke. Sparse pyrite at 133'.
141' 3" - 144' 3"	1' 0"	Greywacke with slickensided quartz fragments from zone of small shears. Angle between shear and core axis = 10°.
144' 3" - 178' 0"	24' 3"	Blue and grey phyllitic slate, in places showing bedding. Bedding/core angle = 30°. Some pyrite at 168'. Quartz fragments at 178'.
178' 0" - 211' 0"	30' 7"	Blue-black phyllitic slate with bands of black chert.
211' 0" - 244' 0"	30' 0"	Black hornfels with bands of phyllitic slate; some pyrite; one small quartz shear.
244' 0" - 276'11"	29' 0"	Blue phyllitic slate.

Footage	Recovery	Description of Core
276' 11" - 282' 8"	3'9"	Hornfels with some slate; one small quartz shear.
282' 8" - 283' 0"	0' 3"	White quartz along shear zone; sulphide mineralisation - start of mineralised zone.
283' 0" - 289' 0"	6' 0"	Hornfels with altered phyllitic slates and some chert. Disseminated pyrite and chalcopyrite with galena stringers. Irregular calcite veining is common and some shearing and brecciation is evident.
289' 0" - 298' 1"	9' 0"	Hornfels with grey-green chert veining and some dolomitic veins.
298' 1" - 317' 0"	18' 4"	Black crystalline calcite with chert bands and secondary calcite veins.
317' 0" - 333' 6"	15' 11"	Black hornfels with chert bands; disseminated sulphides.
333' 6" - 337' 0"	3' 6"	Black crystalline calcite.
337' 0" - 341' 10"	4' 10"	Hornfels and chert with some calcite veins; disseminated sulphides.
341' 10" - 359' 7"	17' 9"	Richest portion of lode. Chiefly massive sulphides with pyrite, arsenopyrite, sphalerite, galena and chalcopyrite visible. Galena, sphalerite and chalcopyrite best developed between 349' 7" and 354' 10". Calcite, chlorite and quartz are minor constituents.
359' 7" - 367' 10"	8'0"	Sheared and brecciated chloritic hornfels with secondary quartz and calcite. Sulphides disseminated and in small stringers. One 3" vein of sulphides at 364'.
367'10" - 376'10"	9' 0"	Sheared and brecciated quartz - chlorite-calcite - dolomite rock with hornfels fragments. Disseminated sulphides with a 6" vein at 371' and a 3" vein at 376'.
376'10" - 385' 0"	8' 0"	Sheared and brecciated quartz - chlorite-calcite rock with hornfels fragments. Sulphides very sparse.
385' 0" - 395' 7"	10' 7"	Sheared and brecciated chloritic hornfels with considerable amount of disseminated sulphides.
395' 7" - 405' 7"	10' 0"	Sheared and brecciated chloritic phyllitic slate with secondary quartz and calcite and disseminated sulphides. End of mineralised zone.
405' 7" - 420" 9"	14' 6"	Sheared and brecciated chloritic phyllitic slate, with quartz and calcite veins. Sulphides very sparse indeed.

Footage	Recovery	Description of Core
420' 9" - 426' 2"	5' 2"	Phyllitic slate with chlorite, quartz and calcite along sheared and brecciated zones. No sulphides.
426' 2" - 433' 6"	6' 9"	Chloritic phyllitic slate with bands of blue-black chert - no sulphides.

End of hole

Co-ordinates of collar	:	836N/555W.	
Bearing	:	270° Magnetic	
Depression	:	55°	
Acid Surveys	:	Depth	Depression
		100'	54°
		200'	52°
		300'	49°
		400'	46°
		495'	45°
Total Depth	:	517' 7"	
Size of hole	:	NX 0' - 126' 0" BX 126' 0" - 517' 7"	

Footage	Recovery	Description of Core
0' - 7' 0"	1' 0"	Yellow-brown sand and ferruginous gravel.
78' 0" - 35' 0"	16' 0"	Brown to greyish weathered phyllitic slate and greywacke.
35' 0" - 96' 10"	40' 0"	Blue grey phyllitic slate and greywacke small-scale slump structures and penecontemporaneous compaction faults well displayed.
96'10" - 110'7"	9' 6"	Greywacke.
110' 7" - 126' 0"	1' 6"	Hard quartz greywacke and blue-black hornfels.
126' 0" - 131' 2"	0' 6"	Bleached hornfels.
131' 2" - 131' 8"	0' 4"	Shear zone; banded blue-black hornfels and chert with specks of pyrite and some graphite; shear/core angle = 30°.
131' 8" - 175' 10"	37' 0"	Hard blue-grey hornfels with some chert; thin quartz shear with brecciation and slickensides at 140' also specks of chalcopyrite; shear/core angle = 15°. Quartz vein 0.1 ins. thick at 165' - 165' 8". Vein/core angle = 20°.
175'10" - 194' 3"	17' 3"	Blue-grey to whitish hornfels with some blue-black chert.
194' 3" - 223' 6"	28' 9"	Blue-grey hornfelsic phyllitic slate with some hornfels; quartz-graphite shear at 212'.
223'6" - 239' 0"	15' 0"	Grey-green hornfels with finely crystalline quartz hornfels; vein of carbonate at 234' - 235' with cavities after pyrite.

Footage	Recovery	Description of Core
239' 0" - 256' 5"	17' 5"	Blue hornfels and hornfelsic phyllitic slate. Three ¼" thick quartz-pyrite veins at 249' 6", 255' and 255' 6". Shear zone with black quartz and some carbonate at 256' 5".
256' 5" - 282' 2"	25' 0"	Blue phyllitic slate with thin beds of fine-grained quartz greywacke.
282' 2" - 294' 11"	1' 3"	Blue phyllitic slate
294' 11" - 306' 10"	12' 3"	Blue to bluish-grey hornfelsic phyllitic slate.
306' 10"		Start of lode; shearing and some brecciation with pyrite and chalcopyrite veins.
306' 10" - 315' 0"	8' 2"	Dark grey hornfelsic phyllitic slate with dolomite veins; pyrite and chalcopyrite veins.
315' 0" - 320' 5"	5' 5"	Portion of lode richest in sulphides. Chiefly secondary white quartz with fragments of sheared hornfelsic slate in the quartz; dolomite veins common and minor chlorite present. Abundant sulphides-pyrite, arsenoprite, galena, sphalerite and minor chalcopy-rite. Two cavities in the quartz lined with cubic crystals of lilac fluorite.
320' 5" - 340' 0"	19' 3"	Fragments of sheared hornfelsic phyllitic slate in a matrix of dolomite; small amount of chert. Disseminated pyrite; one small shear with graphite.
340' 0" - 356' 0"	16' 0"	Sheared and brecciated hornfelsic slate with secondary quartz, dolomite and calcite. Pyrite and minor chalcopyrite occur disseminated and as thin veins.
356' 0" - 372' 0"	16' 0"	Black crystalline calcite with chert. Pyrite occurs disseminated and in thin veins.
372' 0" - 416' 6"	44' 6"	Finely crystalline quartz and carbonate with chert bands; pyrite disseminated and in thin veins.
416' 6" - 422' 9"	6' 3"	Black-veined green chert with disseminated pyrite.
422' 9" - 433' 0"	10' 3"	Chert and carbonate with disseminated pyrite; last 3" rich in pyrite.
433' 0" - 446' 7"	13' 7"	Black chert, changing to green chert at 444'; pyrite disseminated, also forms crystalline patches and thin veins.

FOOTAGE	RECOVERY	DESCRIPTION OF CORE
446' 7" - 449' 1"	2' 6"	Start of pyrrhotite lode along western shear; sheared quartz-chlorite-carbonate rock with abundant sulphides mainly pyrite with some pyrrhotite.
449' 1" - 461' 0"	11' 11"	Mostly massive sulphides; small amount of quartz, predominantly pyrrhotite with patches and veins of pyrite and minor chalcopyrite, galena and sphalerite.
461' 0" - 467' 0"	6' 0"	Mostly massive sulphides; small amount of quartz; pyrrhotite and crystalline patches and veins of pyrite, and a number of zones, approximately 3" - 6" wide, that are rich in acicular striated crystals of arsenopyrite with galena and sphalerite.
467' 0"- 476' 0"	9' 0"	Mostly massive pyrrhotite with veins and crystalline patches of pyrite.
476' 0" - 480' 0"	4' 0"	Sheared chlorite-quartz-biotite rock with some carbonate; disseminated pyrite and pyrrhotite.
480' 0" - 480' 9"	0' 7"	Sheared black to green chloritic phyllitic slate with disseminated pyrite and pyrrhotite.
480' 9" - 485' 0"	3' 10"	White crystalline quartz (about 9") followed by finely crystalline quartz and chert. Flakes of chlorite are common.
485' 0" - 511' 0"	22' 0"	Mostly crypto-crystalline silica; varies from chert to a quartz rock comprising small quartz grains in a matrix of chert. Bands of crystalline white quartz with carbonate occur.
511' 0" - 517' 7"	5' 0"	Hard black, slightly chloritic horn-fels with thin quartz veins carrying a few specks of pyrite.

END OF HOLE

Co-ordinates of Collar	:	650N/692W
Bearing	:	270° Magnetic
Depression	:	60°
Total Depth	:	300' 0"
Size of Hole	:	BX 0' - 166' 0" AX 166'0" - 300'0"

Footage	Recovery	Description of Core
0' - 30' 3"	1' 9"	Quartz and ironstone pebbles and fragments.
30' 3" - 42' 0"	1' 9"	Quartz, phyllitic slate and greywacke fragments - possibly some brecciated ground.
42' 0" - 52' 3"	0' 6"	Grey mud, probably from phyllitic slate; some quartz fragments.
52' 3" - 70' 0"	6' 9"	Blue-grey phyllitic slate with chert bands.
70' 0" - 80' 0"	5' 0"	Hard blue-grey hornfels with chert bands; some bedding (bedding/core angle = 48°).
80' 0" - 90' 0"	0' 9"	Black phyllitic slate, some quartz rubble, probably a small shear.
90' 0" - 108' 0"	13' 0"	Hard blue and grey hornfels, some bedded (bedding/core angle = 49°), with bands of chert; small quartz shear at 97'. Some boxworks probably after pyrite.
108' 0" - 137' 0"	13' 6"	Soft blue phyllitic slate.
137' 0" - 144' 0"	0' 9"	Hard blue-grey hornfels.
144' 0' - 149' 0"	1' 3"	Very fine-grained greywacke, probably recrystallised.
149' 0" - 178' 5"	7' 6"	Blue-grey phyllitic slate.
178' 5" - 205' 0"	9' 6"	Dark blue phyllitic slate with a few pyrite stringers. Banding in slates at same angle as pyrite stringers i.e. 45° to core.
205' 0" - 210' 0"	5' 0"	Very fine-grained recrystallised greywacke with disseminated pyrite and chalcopyrite.
210' 0" - 211' 6"	1' 6"	Blue-black hornfels.
211' 6" - 217' 5"	4' 6"	Very fine-grained recrystallised greywacke with chert bands.
217' 5" - 219' 0"	1' 6"	Blue-black hornfels with specks of pyrite.

Footage	Recovery	Description of Core
219' 0" - 223' 0"	4' 0"	Black crystalline calcite.
223' 0" - 233' 0"	9' 0"	Blue-black hornfels with chert bands and a few specks of pyrite. One calcite vein.
233' 0" - 245' 0"	6' 6"	Sheared hornfels with calcite veining. Quartz and chert fragments from small quartz shears.
245' 0" - 300' 0"	39' 0"	Blue-black hornfels and chert with a small quantity of disseminated pyrite. A pyrite vein ½" thick occurs at 275'.

END OF HOLE

DIAMOND DRILL HOLE NO. 4

Co-ordinates of Collar	:	1200N/700W
Bearing	:	270° Magnetic
Depression	:	60°
Total Depth	:	250'
Size of Hole	:	NX 0' - 178'
		AX 178' - 250'

Footage	Recovery	Description of Core
0' - 9' 0"	0' 6"	Red sandy soil and ferruginous gravel.
9' 0" - 26' 0"	6' 9"	Weathered light grey phyllitic slate.
26' 0" - 36' 0"	6' 6"	Blue-grey phyllitic slate with beds of medium to coarse-grained greywacke. Thin shear at 36'.
36' 0" - 45' 0"	5' 9"	Greywacke with thin bands and lenses of phyllitic slate. ½" quartz vein parallel to core - some slumping.
45' 0" - 75' 0"	6' 2"	Blue-grey phyllitic slate with greywacke and chert beds.
75' 0" - 101' 0"	8' 3"	Green-blue hornfels and blue phyllitic slate.
101' 0" - 102' 0"	0' 4"	Small shear; quartz with sparse pyrite.
102' 0" - 104' 0"	1' 4"	Blue phyllitic slate.
104' 0" - 133' 0"	16' 7"	Grey and blue hornfels with boxworks after pyrite at 117'. 3" quartz vein with pyrite at 130'.
133' 0" - 142' 0"	7' 0"	Blue phyllitic slate with thin bands of hard blue hornfels. Sparse disseminated pyrite.
142' 0" - 162' 0"	14' 6"	Blue-black phyllitic slate with beds of medium-grained greywacke.
162' 0" - 167' 0"	4' 0"	Blue phyllitic slate; quartz vein along shear at 167' carrying sparse pyrite.
167' 0" - 172' 0"	1' 3"	Blue hornfels; thin shear at 172' with quartz, graphite and disseminated pyrite.
172' 0" -178' 0"	4' 3"	Blue phyllitic slate and hornfels, sparse disseminated pyrite.
178' 0" - 197' 0"	8' 6"	Hard blue - black hornfels with chert; 1" thick quartz shear with pyrite at 194'.
197' 0" - 200' 0"	3' 0"	Blue-black hornfels and phyllitic slate. This zone contains a number of thin quartz shears.
200' 0" - 213' 0"	3' 8"	Blue-black hornfels.

Footage	Recovery	Description of Core
213' 0" - 230' 0"	6' 0"	Blue-black hornfels and black phyllitic slate. A few very thin quartz shears.
230' 0" - 244' 0"	11' 9"	Blue-black hornfels with slivers and lenses of black hornfelsic slate within it.
244' 0" - 250' 0"	6' 0"	Blue-grey hornfelsic slate with disseminated pyrite.

END OF HOLE.

DIAMOND DRILL HOLE NO. 5

Co-ordinates of Collar	:	872N/905W
Bearing	:	270° Magnetic
Depression	:	70°

Surveys	Type	Depth	Depression
	Acid	100'	68°
	Acid	200'	68°

Total Depth	:	231' 5"
Size of Hole	:	NX 0' -47' 6" BX 47' 6" - 146' 0" AX 146' 0"-231' 5"

Footage	Recovery	Description of Core
0' - 3' 0"	2' 6"	Gravel and ferruginous sandy soil.
3' 0" - 30' 8"	18' 3"	Light grey siliceous phyllitic slate, colour due to bleaching by weathering.
30' 8" - 40' 0"	0' 8"	Weathered phyllitic slate; some quartz and ironstone fragments. Some larger fragments of phyllitic slate show numerous cavities containing limonite.
40' 0" - 47' 6"	1' 4"	Weathered phyllitic slate. Recovery as greyish-pink sludge.
47' 6" - 58' 3"	1' 10"	Pink phyllitic slate, fractured and with some cavities.
58' 3" - 67' 6"	2' 2"	Light grey siliceous phyllitic slate with some iron staining. Numerous small fractures and cavities.
67' 6" - 74' 4"	3' 2"	Greyish-white phyllitic slate, some iron staining.
74' 4" - 75' 0"	0' 7"	Quartz fragments - some cavities after pyrite; probably a small shear.
75' 0" - 78' 0"	2' 5"	Greyish-white phyllitic slate with iron staining (pink) and a number of small shears; some slickensides.
78' 0"		Quartz shear. At this point, an abrupt change occurs from whitish-grey phyllitic slate to blue-black phyllitic slate. Weathering to this level has been assisted by the presence of a number of shallow small shears.
78' 6" - 82' 9"	2' 3"	Blue phyllitic slate, somewhat iron-stained; small shears still evident.
82' 9" - 97' 6"	13' 9"	Soft blue phyllitic slate, some disseminated pyrite.
97' 6" - 115' 0"	10' 6"	Soft blue phyllitic slate. Some very thin (0.1 ins. thick) quartz veins.
115' 0" - 117' 0"	1' 2"	White vein quartz with pyrite; cavities contain crystalline quartz and pyrite.

Footage	Recovery	Description of Core
117' 0" - 124' 8"	8' 6"	Soft blue-grey phyllitic slate.
124' 8" - 130' 0"	0'10"	Hard blue-black hornfels - recovered as fragments.
130' 0" - 141 0"	2' 6"	Start of lode along western shear; sheared chlorite-quartz rock with abundant disseminated pyrite.
141' 0" - 160' 0"	4' 2"	Mostly pyrite with minor quantity of chalcopyrite. Recovered as small lengths of core (up to 4") and fragments.
160' 0" - 171' 0"	1' 4"	Pyrite sludge; pyrite with some quartz and chlorite.
171' 0" - 180' 0"	3' 4"	Mostly pyrite; recovered as small pieces of core and fragments with sludge. End of lode intersection.
180' 0" - 189' 0"	3' 6"	Slightly chloritic blue - black hornfels.
189' 0" - 195' 6"	3' 8"	Blue black hornfels.
195' 6" - 212' 6"	13' 3"	Grey-green, slightly chloritic hornfels and hornfelsic slates.
212' 6" - 217' 0"	4' 9"	Blue-green hornfels with very small quartz shears.
217' 0" - 227' 0"	9' 6"	Chloritic hornfels with small quartz-chlorite shear zones; some purple staining occurs along the shear zone.
227' 0" - 231' 5"	0' 8"	Hard dark blue hornfels with quartz-chlorite shear.

END OF HOLE

DIAMOND DRILL HOLE NO. 6

Co-ordinates of Collar : 978N/522W

Bearing : 270° Magnetic

Depression : 60°

Surveys	Type	Depth	Depression	Bearing
	Acid	100'	59°	-
	"	200'	57°	-
	"	300'	55°	-
	"	400'	52°	-
	Acid and tropari	500'	50°	274°
	Acid	600'	46°	-

Total Depth : 600' 6"

Size of Hole : NX 0' - 169' 9"
BX 169' 9" - 445' 10"
AX 445' 10" - 600' 6"

Footage	Recovery	Description of Core
0' - 3' 0"	1' 6"	Light to dark brownish-red ferruginous clay with ironstone gravel.
3' 0" - 15' 0"	3' 9"	Decomposed greywacke - recovered as fragments, some ochreous clay with quartz fragments.
15' 0" - 35' 0"	2' 6"	Decomposed greywacke and grey phyllitic Slate.
35' 0" - 44' 0"	2' 9"	Alternating bands of greywacke and blue-grey phyllitic slate - still iron-stained and somewhat weathered.
44' 0" - 56' 0"	6' 6"	Greywacke and soft blue-grey phyllitic slate.
56' 0" - 56' 9"	0' 9"	Bed of very coarse-grained quartz greywacke.
56' 9" - 120' 6"	44' 6"	Blue-grey phyllitic slate with beds of medium to coarse-grained greywacke.
120' 6" - 122' 4"	0' 6"	Blue-green hornfels.
122' 4" - 126' 4"	2' 0"	Greywacke with small quartz vein at 126' - probably a shear.
126' 4" - 167 6"	38' 1"	Blue-grey phyllitic slate with greywacke interbeds.
167' 6" - 169' 9"	1' 3"	Blue-black hornfels.
169' 9" - 171' 6"	0' 9"	Blue phyllitic slate.
171' 6" - 187' 10"	9' 9"	Blue-green and blue hornfels.
187'10" - 206' 0"	14' 3"	Blue-black phyllitic slate with bands of black chert.

Footage	Recovery	Description of Core
206' 0" - 247' 3"	39' 5"	Hard grey-blue hornfels with some chert bands.
247' 3" - 249' 9"	2' 6"	Blue hornfels with thin quartz bands containing pyrite.
249' 9" - 265' 0"	15' 0"	Blue hornfels.
265' 0" - 292' 9"	25' 0"	Blue phyllitic slate with fine and medium-grained greywacke bands.
292' 9" - 293' 0"	0' 2"	Small shear; quartz fragments with pyrite.
293' 0" - 310' 1"	15' 0"	Black phyllitic slate with hornfels. Quartz shear with pyrite at 295' and band of graphitic slate with pyrite at 310'.
310' 1" - 335' 2"	20' 3"	Hard black hornfels with chert bands.
335' 2" - 350' 0"	12' 4"	Blue phyllitic slate with greywacke; quartz shears with pyrite and graphite. Calcite veining common.
350' 0" - 378' 7"	27' 3"	Hornfels and black phyllitic slate; calcite and pyrite occur in veins associated with small shear zones; some brecciation. Also some disseminated pyrite.
378' 7" - 385' 0"	13' 3"	Hornfels with some chert; disseminated pyrite and some in stringers with graphite.
385' 0" - 394' 2"	9' 0"	Hornfels and some greywacke with shearing and brecciation from 393' - much replacement by quartz.
394' 2" - 419' 7"	25' 2"	Sheared and brecciated quartz-chlorite lode material with sulphides. Pyrite with minor chalcopyrite and galena identified; richest sulphides between 403' and 406' 6".
419' 7" - 445' 10"	19' 6"	Quartz-chlorite rock and chloritic phyllitic slate with chert bands. Calcite veining common.
445' 10" - 461' 0"	6' 0"	Blue-black hornfels with numerous calcite veins. Chloritic to 450'.
461' 0" - 481' 4"	10' 6"	Blue-black hornfels with a few thin pyrite veins.
481' 4" - 487' 10"	5' 6"	Black phyllitic slate and fine-grained greywacke; hornfels band at 487'. Small veins and crystalline patches of pyrite in this zone.

Footage	Recovery	Description of Core
487' 10" - 492' 6"	4' 3"	Phyllitic slate and fine-grained quartz greywacke. Disseminated pyrite as crystalline patches.
492' 6" - 503' 0"	9' 0"	Very fine-grained quartz greywacke with phyllitic slate and hornfels. Very sparse disseminated pyrite.
503' 0" - 508' 7"	2' 0"	Very fine-grained greywacke.
508' 7" - 514' 0"	2' 9"	Hornfels and fine-grained greywacke. Sparse disseminated pyrite.
514' 0" - 521 7"	6' 9"	Dark blue phyllitic slate with thin bed of greywacke. A number of small quartz shears up to $\frac{1}{2}$" thick, with pyrite.
521' 7" - 550' 1"	19' 0"	Very fine-grained quartz greywacke and beds of structureless blue-black hornfels.
550' 1" - 598' 6"	35' 9"	Hornfelsic phyllitic slate with some hornfels. One bed of greywacke at 580'
598' 6" - 600' 6"	2' 0"	Very fine-grained blue quartz greywacke.

END OF HOLE.

APPENDIX TWO

ASSAY RESULTS

AND

SPECTROGRAPHIC DETERMINATIONS

DRILL HOLE	SAMPLE NUMBER	DEPTH FROM	DEPTH TO	RECOVERY	Au dwts./ton	ASSAY RESULTS Ag ozs/ton	Cu%	Pb%	Zn%	Sn%
D.D.H. NO. 1	20914	282' 8"	287' 0"		Trace	nil				
Assays by United Uranium N.L.	20915	287' 0"	292' 0"							
	20916	292' 0"	297' 0"							
	20917	297' 0"	302' 0"		Nil					
	20918	302' 0"	307' 0"		Nil					
	20919	307' 0"	312' 0"		Nil					
	20920	312' 0"	317' 0"	57'10"	Nil					
	20921	317' 0"	322' 0"		Nil					
	20922	322' 0"	327' 0"		Nil	1.28	Trace	0.03	0.30	
	20923	327' 0"	332' 0"		Nil	Nil				
	20924	332' 0"	337' 0"		Trace	Nil				
	20925	337' 0"	341' 10"		Nil	Nil				
See also	20926	341' 10"	345' 10"		Trace	3.652	0.09	1.34	8.75	
A.M.D.L. Assay	20927	345' 10"	349' 7"		0.5	1.310	0.47	1.30	11.82	
Reseults below	20928	349' 7"	352' 1"	17' 9"	0.5	0.054	0.38	0.13	6.30	Nil
	20929	352' 1"	354' 10"		0.7	Nil	0.41	0.13	10.58	Nil
	20930	354' 10"	359' 7"		1.8	Nil	0.06	0.44	5.63	

DRILL HOLE	SAMPLE NUMBER	DEPTH FROM	DEPTH TO	RECOVERY	ASSAY RESULTS Au dwts./ton	Ag ozs./ton	Cu%	Pb%	Zn%	Sn%
D.D.H. NO. 1 (continued	20931	359' 7"	364' 7"		Nil	Trace	Trace	0.01	2.40	
	20932	364' 7"	369' 7"		Nil	0.16	Trace	0.32	1.50	
	20933	369(7"	375' 7"		Trace	Trace				
	20934	375' 7"	380' 7"		Nil	Nil				
	20935	380' 7"	385' 7"	45' 7"	Trace	Nil				
	20936	385' 7"	390' 7"		Trace	Nil				Nil
	20937	390' 7"	395' 7"		Trace	2.21	0.06	0.84	8.10	
	20938	295' 7"	400' 7"		Trace	Nil				
	20939	400' 7"	405' 7"		Nil	Nil				
D.D.H. No. 1 Assays by Australian Mineral Development Laboratories.	145501	341'10"	345' 10"		0.8	2.70	0.22	1.56	8.85	
	145502	345' 10"	349' 7"		0.4	2.15	0.35	1.60	12.52	
	145503	349' 7"	352' 1"	17'9"	0.4	0.40	0.59	0.22	7.15	
	145504	352' 1"	354' 10"		0.4	0.35	0.65	0.345	9.92	
	145505	354' 10"	359' 7"		1.2	1.65	0.175	0.525	5.79	

DRILL HOLE	SAMPLE NUMBER	DEPTH FROM	DEPTH TO	RECOVERY	ASSAY RESULTS Au dwts./ton	Ag ozs./ton	Cu%	Pb%	Zn%	Sn%
D.D.H. No. 2	20948	306'10'	315' 0"	8' 2"	Trace	1.406				
	20949	315' 0	316' 10"		3.6	23.94	0.10		0.53	
Assays by United Uranium N.L.	20950	316' 10"	318' 8"	5' 5"	3.4	30.22	0.12		1.96	
	23798	318' 8"	320' 5"		Trace	4.627	0.03		4.47	
	23799	320' 5"	330' 0"		4.2	2.614				
	23800	330' 0"	340' 0"		Trace	1.990				
	A851	340' 0"	348' 0"		Trace	Nil	0.01		1.71	
	A852	348' 0"	356' 0"		Trace	Nil	Trace		0.88	
	A853	356' 0"	363' 0"		Trace	Nil				
	A854	363' 6"	372' 0"		Trace	Nil				
	A855	372' 0"	381' 0"		Trace	0.586				
	A856	381' 0"	389' 0"	126' 3"	Trace	0.826				
	A857	389' 0"	395' 0"		Trace	Nil				
	A858	395' 0"	405' 0"		Trace	0.50				
	A859	405' 0"	415' 6"		Trace	Nil				
	A860	415' 6"	422' 0"		Trace	Nil				
	A861	422' 0"	433' 0"		Trace	Nil			0.78	
	A862	433' 0"	440' 0"		Trace	Nil				
	A863	440' 0"	447' 0"		Trace	Nil				

DRILL HOLE	SAMPLE NUMBER	DEPTH FROM	DEPTH TO	RECOVERY	ASSAY RESULTS Au dwts./ton	Ag. ozs./ton	Cu%	Pb%	Zn%	Sn%
D.D.H. NO. 2 (continued)	A864	447' 0"	452' 0")		Trace	0.494	0.53	0.20	3.00	
	A865	452' 0"	458' 0")		0.8	3.030	0.43	0.87	5.18	
	A866	458' 0"	461' 0")		2.6	Nil	1.42	0.33	3.79	
	A867	461' 0"	464' 0")		2.4	2.630	1.53	0.47	2.90	
	A868	464' 0"	467' 0")		Trace	0.856	0.50	0.35	5.19	
	A869	467' 0"	473' 6")		Trace	0.232	1.12	0.07	0.39	
	A870	473' 0"	476' 0")		Trace	Nil	0.88	0.08	3.19	
	A871	476' 0"	480' 0")		3.0	Nil	0.16	0.41	8.76	
D.D.H. NO. 5 Assays by United Uranium N.L.	23791	130' 0"	141' 0"	2' 6"	Trace	2.48	0.03			
	23792	141' 0"	146' 3"	2' 10"	Trace	Nil	0.06			
	23793	146' 3"	150' 0"	0' 6"	Trace	Nil	0.09			
	23794	150' 0"	160' 0"	0:10"	Trace	Nil	0.06			
	23795	160' 0"	171' 0"	1' 4"	Trace	1.54	0.04			
	23796	171' 0"	174' 0"	2' 0"	Trace	Nil	0.05			
	23797	174' 0"	180' 0"	1' 4"	Trace	1.08	0.03			

DRILL HOLE	SAMPLE NUMBER	DEPTH FROM	DEPTH TO	RECOVERY	ASSAY RESULTS Au dwts./ton	Ag ozs./ton	Cu%	Pb%	Zn%	Sn%
D.D.H. No. 6	20940	394' 2"	397' 3"		Trace	Nil				
Assays by United Uranium N.L.	20941	397' 3"	400' 2"		0.6	1.94				
	20942	400' 2"	403' 0"		0.5	3.60				
	20943	403' 0"	406' 0"		Trace	Nil				
	20944	406' 0"	409' 0"	25' 2"	0.5	Nil				
	20945	409' 0"	412' 0"		0.6	0.64				
	20946	412' 0"	415' 10"		Trace	1.12				
	20947	415'10"	419' 7"		Trace	3.10				
1912										
D.D.H. (for comparison)	1st bulk sample	377' 6"	439' 0"		2.0	0.65	0.53		4.50	
	2nd bulk sample	439' 0"	454' 0"		0.8	0.65	0.16		7.00	

QUALITATIVE ANALYSIS

A composite sample of A861 and A864 to A871 (that is, the whole length of the pyrrhotite lode) showed arsenic, manganese and aluminium present and bismuth, dadmium, nickel and cobalt absent.

However, further work by the Bureau of Mineral Resources Laboratory, spectrographically detected the following metals in samples of the pyrrhotite lode in D.D.H. 2.

Sample 145556 447' to 458' Mn,Fe,Cu,Zn,As,Sb,Cd,Sn,Pb,W

Sample 145557 458' to 467' Mn,Fe,Cu,Zn,As,Cd,Pb,W

Sample 145558 467' to 480' Mn,Fe,Cu,Zn,As,Sb,Cd,Pb,W

APPENDIX THREE

DETAILS OF SAMPLES SENT FOR MINERAGRAPHIC DETERMINATION

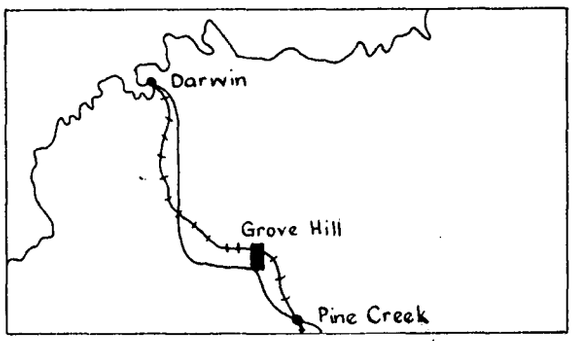
The list below gives details of the fifteen small samples of core that were selected from the intersections of the western lode and the northern and southern lenses of the main lode, and sent for mineragraphic determinations to the Bureau of Mineral Resources, Canberra. A report on the determinations is issued separately (Pontifex 1964)

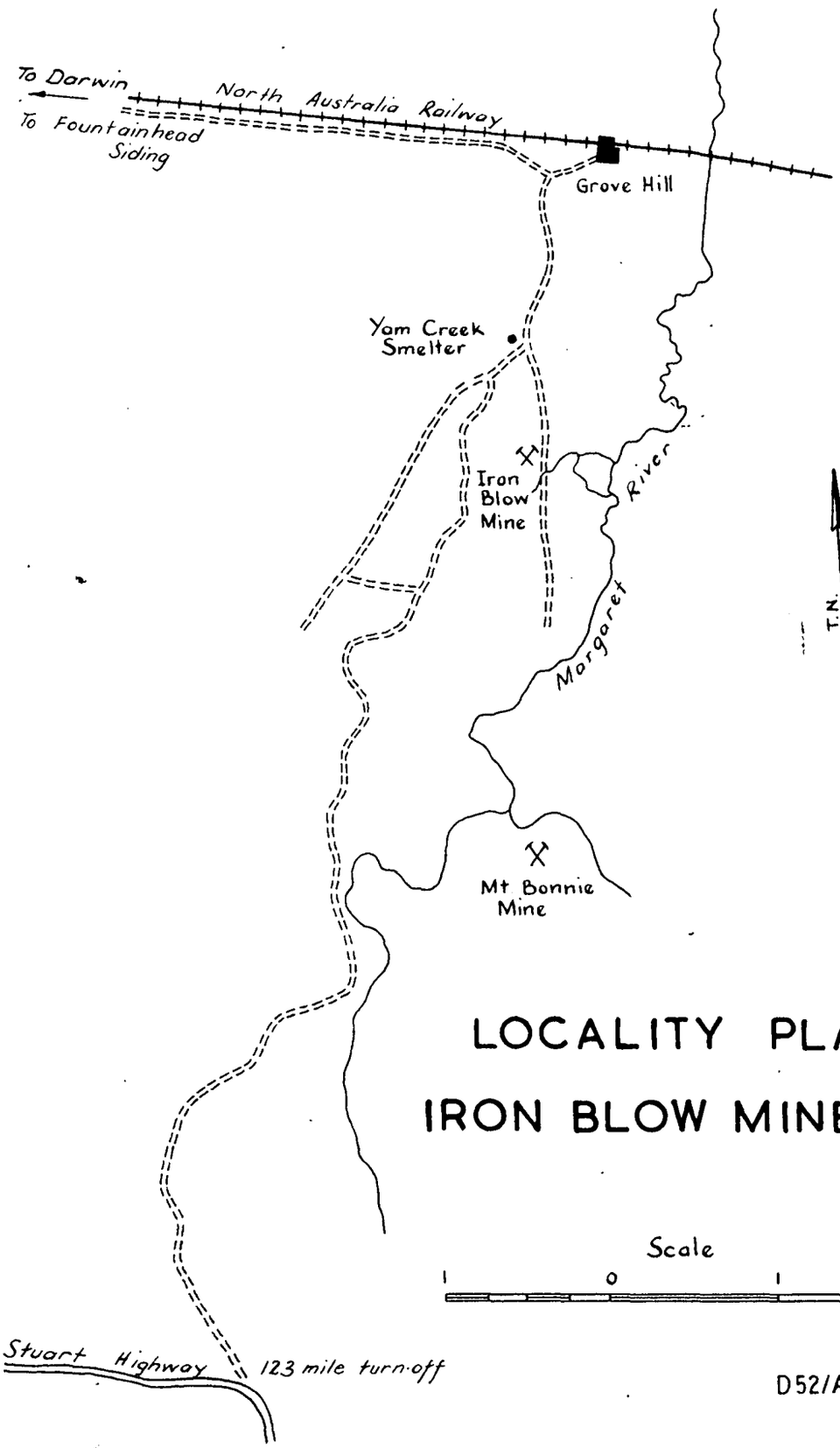
Drill Hole	Location of Mineragraphic Sample (Depth along hole)	Mineragraphic Sample No.	Corresponding Assay Sample No.
Drill Hole No. 1 (Northern lens - main lode)	346' 7"	145506)	
	347' 6"	145507)	145502
	353' 6"	145508	145504
	357' 11"	145509	145505
Drill Hole No. 2 (Southern lens - main lode)	315' 10"	145510)	
	316' 10"	145511	20949
	317' 4"	145512)	
	317' 9"	145513	20950
	319' 4"	145514	23798
Drill Hole No. 2 (Western Lode)	446' 9"	* 145515	A863
	453' 3"	* 145516	A865
	459' 5"	145517	A866
	462' 6"	145518	A867
	466' 0"	145519	A868
	479' 4"	* 145520	A871

* For petrographic description only, the rest being for mineragraphic determination only.

D52/8/DM/1

PLATE 1





LOCALITY PLAN

IRON BLOW MINE, N.T.

D52/A8/97

Resident Geologists Office, Bureau of Mineral Resources, Darwin March 1961

To accompany Record No. 1964/~~126~~ 60

D52/8/DM/2

PLATE 2

1300 W 1200 W 1100 W 1000 W 900 W 800 W 700 W 600 W 500 W

1800 N 1700 N 1600 N 1500 N 1400 N 1300 N 1200 N 1100 N 1000 N 900 N 800 N 700 N 600 N 500 N 400 N

Alluvium

Zone of quartz veins conformable with the cleavage

Lease peg

Slate float

Quartzite float

Float of siliceous slate

Costeans

No 2 North Prospecting Shaft

Cut in hill

No 1 North Prospecting Shaft

Main Shaft

No 1 North Air Shaft

Open cut

No 1 South Shaft

No 3 Shaft

DDH 5

1912 DDH

DDH 4

DDH 1

DDH 6

DDH 2

No 2 South Air Shaft

Costean

Slate

DDH 3

Magnetic North

Float and small outcrops of siliceous slate

Alluvium

Reference

- Slate
- Siliceous slate
- Shear zone
- Sulphide mineralization
- Gossan in place
- Spoil dump
- Vertical bedding
- Cleavage
- Parallel bedding and cleavage, vertical and inclined
- Shaft
- Diamond drill hole
- Geological section. Direction of drill hole and vertical projection of end of hole are shown on transverse section lines.

100 0 100 200 FT.

GEOLOGY OF IRON BLOW MINE, N.T.

P.G. DUNN

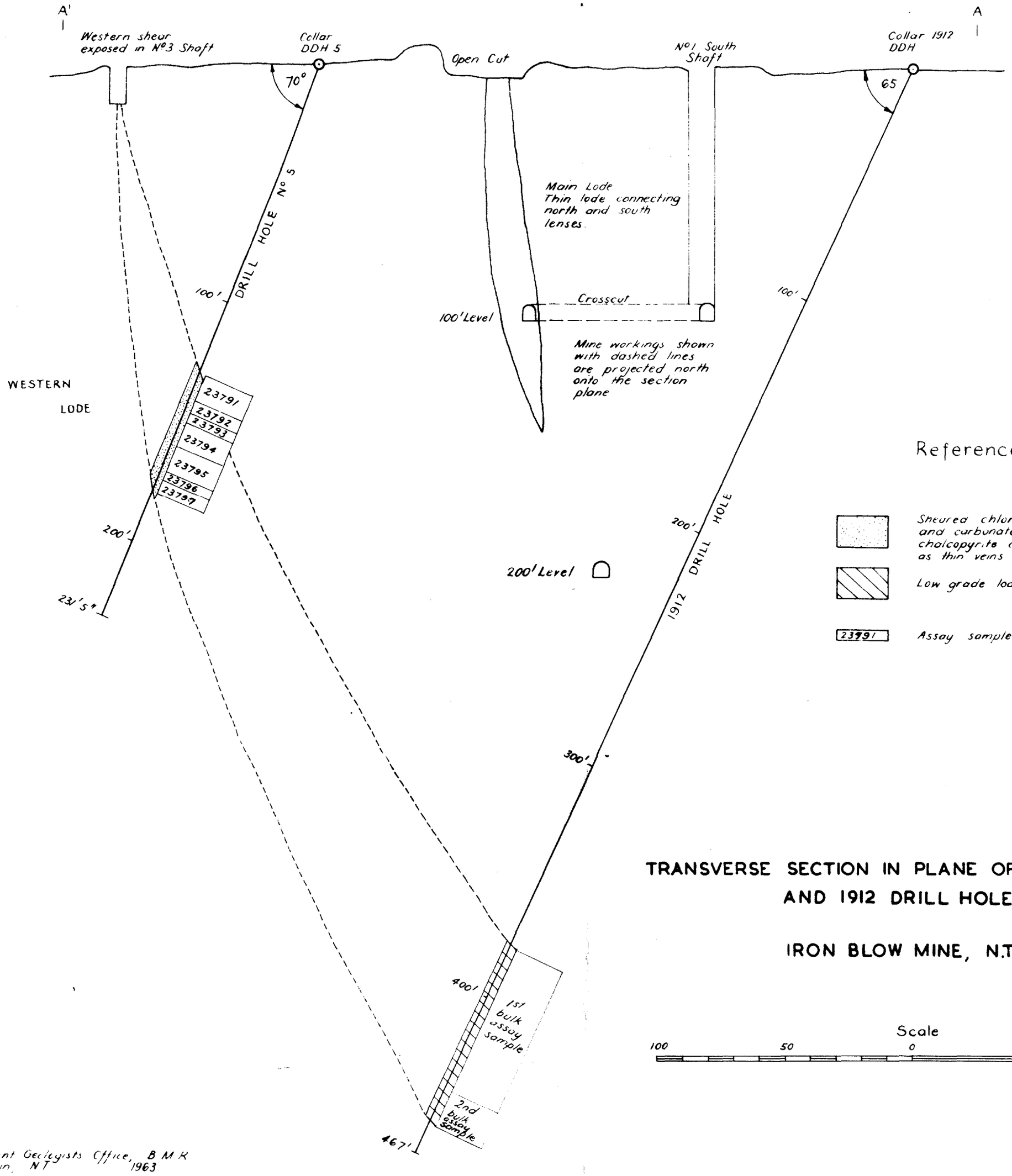
D52/A8/98

Resident Geologists Office, Darwin N.T. Bureau of Mineral Resources, 1963

To accompany Record No. 1964/60

DS2/8/DM/3

PLATE 3



Reference

Sheared chloritic rocks with quartz and carbonate veins. Pyrite and chalcopyrite occur disseminated and as thin veins

Low grade lode material

23791 Assay sample number

TRANSVERSE SECTION IN PLANE OF DRILL HOLE 5 AND 1912 DRILL HOLE

IRON BLOW MINE, N.T.

Scale

100 50 0 100 FT

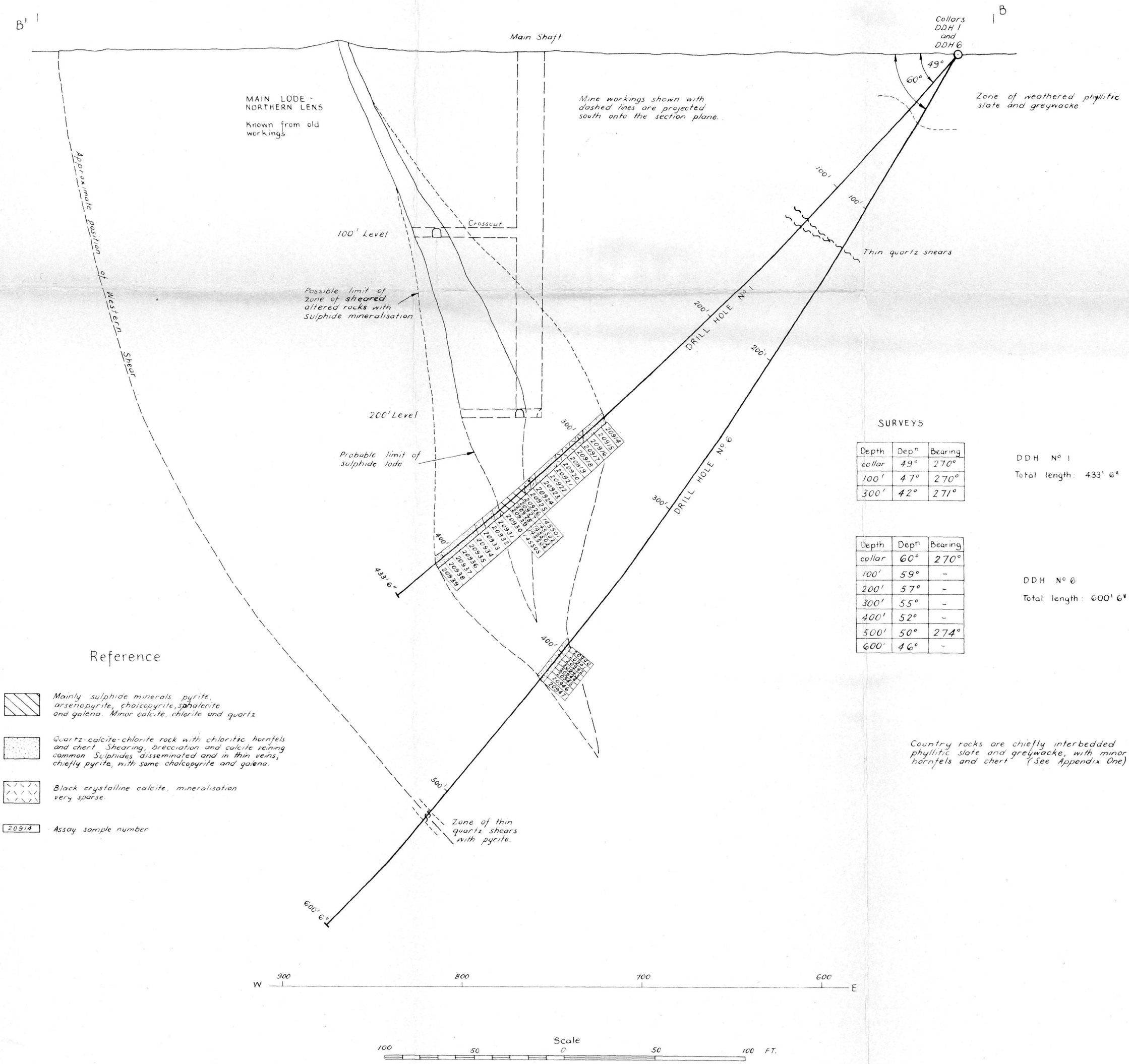
Resident Geologists Office, B M R
Darwin, N T 1963

D52/A8/99

To accompany Record No. 1964/60

D52/8/DM/4

PLATE 4



Reference

- Mainly sulphide minerals pyrite, arsenopyrite, chalcopyrite, sphalerite and galena. Minor calcite, chlorite and quartz
- Quartz-calcite-chlorite rock with chloritic hornfels and chert. Shearing, brecciation and calcite veining common. Sulphides disseminated and in thin veins, chiefly pyrite, with some chalcopyrite and galena.
- Black crystalline calcite, mineralisation very sparse.
- 20914 Assay sample number

SURVEYS

Depth	Depn	Bearing
collar	49°	270°
100'	47°	270°
300'	42°	271°

DDH No 1
Total length: 433' 6"

Depth	Depn	Bearing
collar	60°	270°
100'	59°	-
200'	57°	-
300'	55°	-
400'	52°	-
500'	50°	274°
600'	46°	-

DDH No 6
Total length: 600' 6"

Country rocks are chiefly interbedded phyllitic slate and greywacke, with minor hornfels and chert (See Appendix One)

TRANSVERSE SECTION IN PLANE OF DRILL HOLES 1 AND 6

IRON BLOW MINE, N.T.

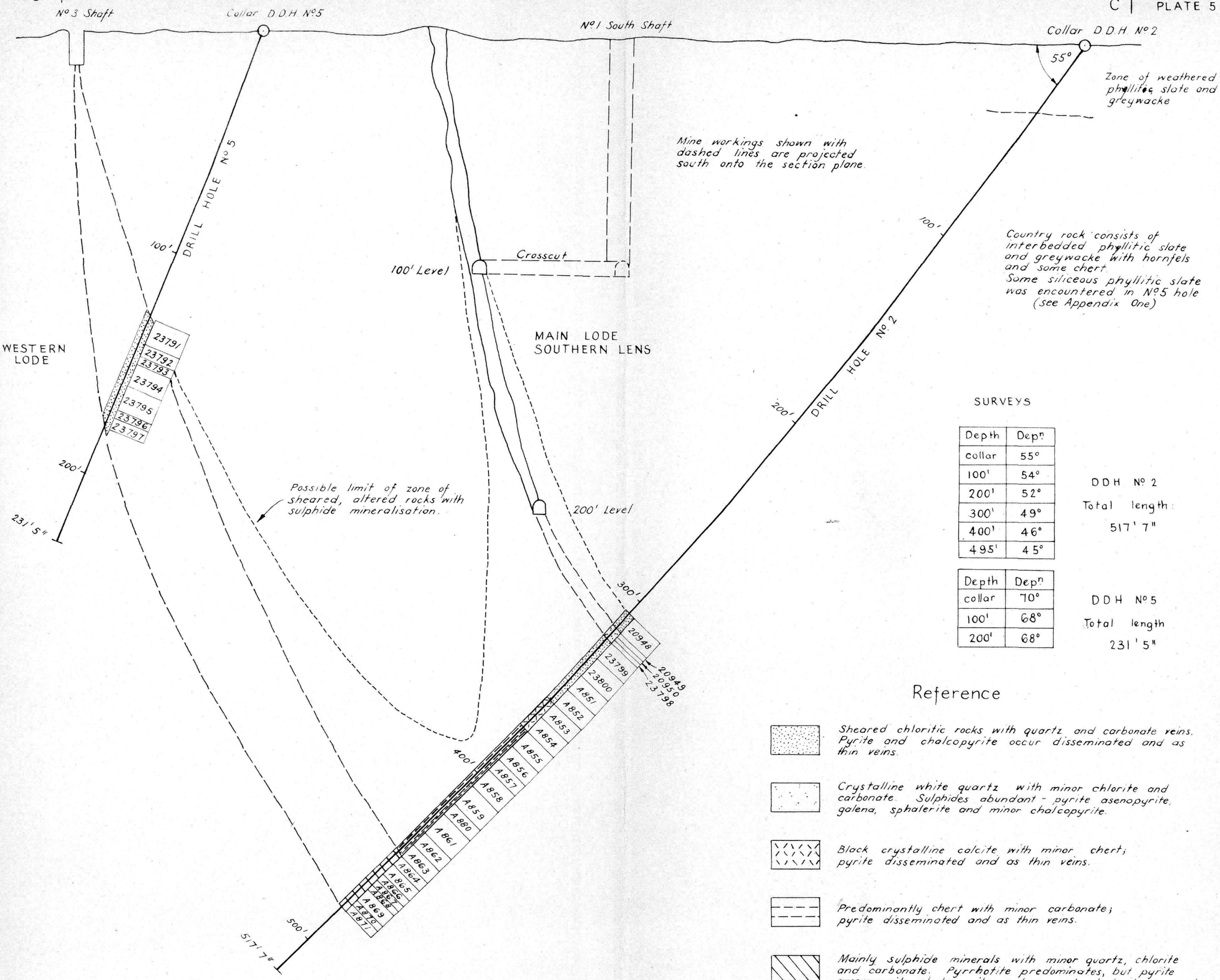
D52/A8/100

Resident Geologists Office, B.M.R. Darwin N.T. 1963

To accompany Record No. 1964/60

D52/8/DM/5

C' | C | PLATE 5



SURVEYS

Depth	Depn
collar	55°
100'	54°
200'	52°
300'	49°
400'	46°
495'	45°

DDH No 2
Total length:
517' 7"

Depth	Depn
collar	70°
100'	68°
200'	68°

DDH No 5
Total length
231' 5"

Reference

- Sheared chloritic rocks with quartz and carbonate veins. Pyrite and chalcopyrite occur disseminated and as thin veins.
- Crystalline white quartz with minor chlorite and carbonate. Sulphides abundant - pyrite asenopyrite, galena, sphalerite and minor chalcopyrite.
- Black crystalline calcite with minor chert; pyrite disseminated and as thin veins.
- Predominantly chert with minor carbonate; pyrite disseminated and as thin veins.
- Mainly sulphide minerals with minor quartz, chlorite and carbonate. Pyrrhotite predominates, but pyrite arsenopyrite, chalcopyrite, galena and sphalerite occur also.
- 23791 Assay sample number

TRANSVERSE SECTION IN PLANE OF DRILL HOLE 2 IRON BLOW MINE, N.T.

D52/A8/101

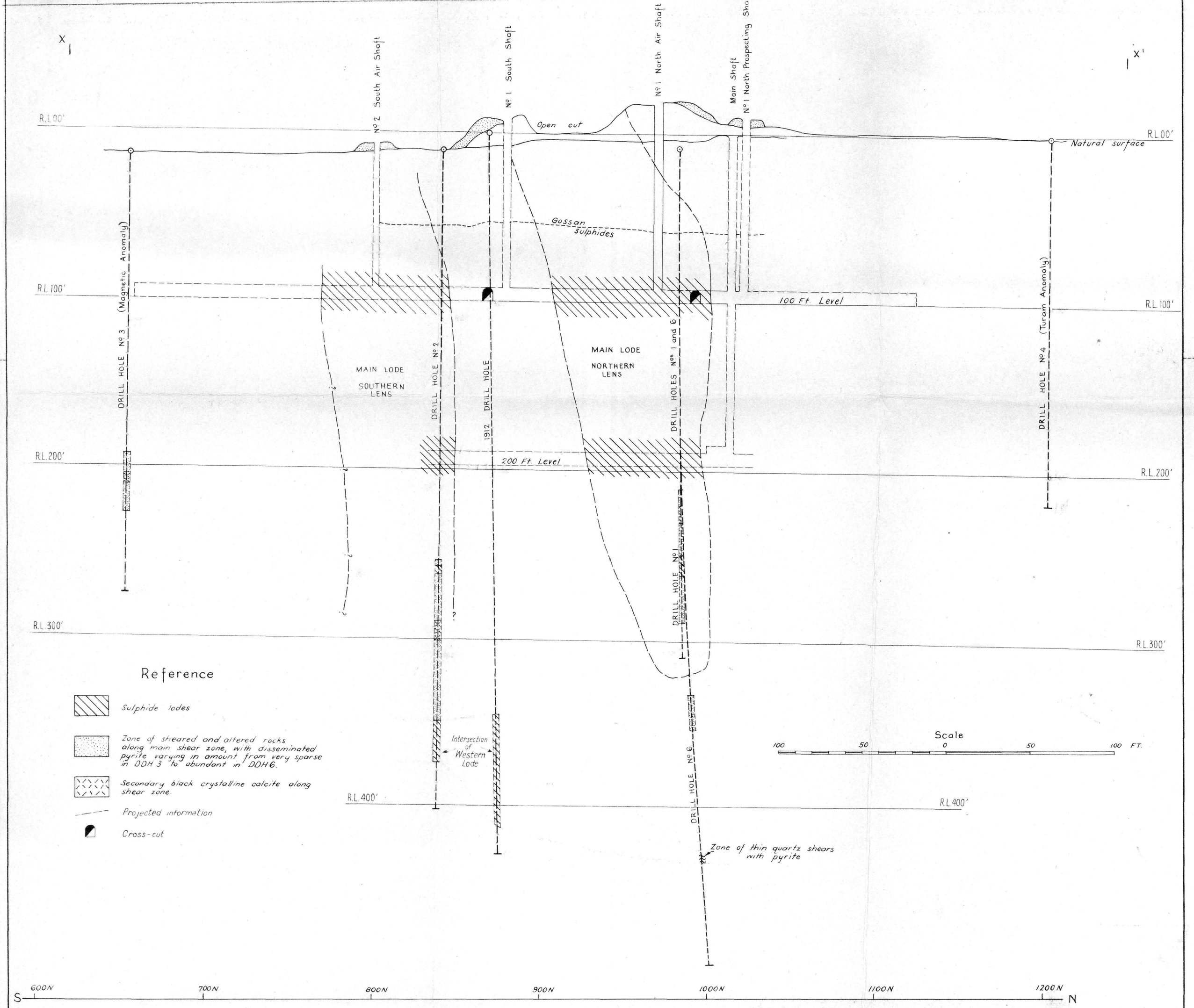
Drill hole 5 has been projected south onto this plane.

Resident Geologists Office, B.M.R. Darwin N.T. 1963.

To accompany Record No. 1964/60

D52/8/DM/6

PLATE 6



Reference

- Sulphide lodes
- Zone of sheared and altered rocks along main shear zone, with disseminated pyrite varying in amount from very sparse in DDH 3 to abundant in DDH 6.
- Secondary black crystalline calcite along shear zone.
- Projected information
- Cross-cut

LONGITUDINAL SECTION X-X' IRON BLOW MINE, N.T.

Modified after Hossfeld 1937 and Dunn 1961

D52/A8/102

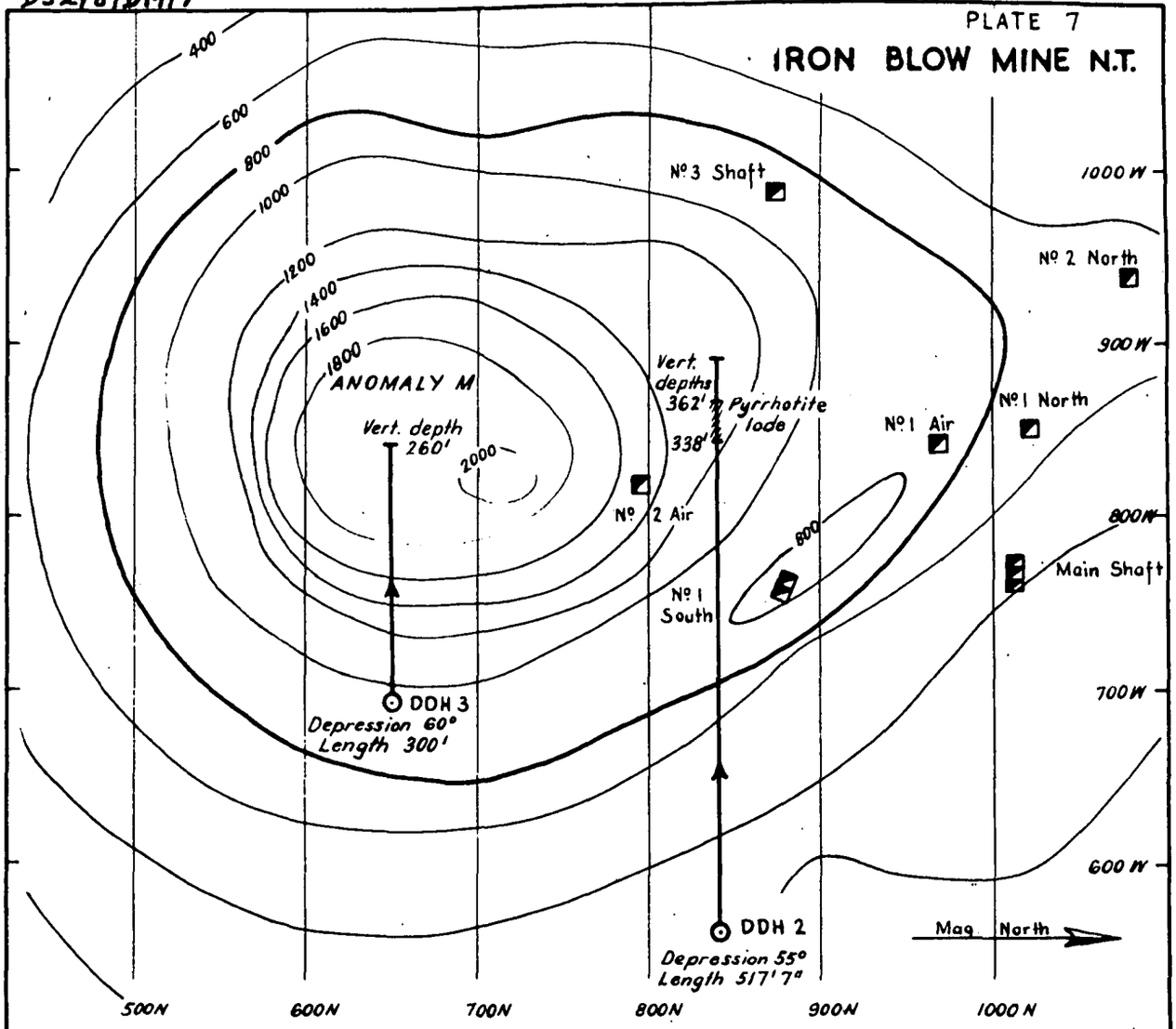
Resident Geologists Office. B.M.R. Darwin N.T. 1963

To accompany Record No. 1964/60

D52/8/DM/7

PLATE 7

IRON BLOW MINE N.T.



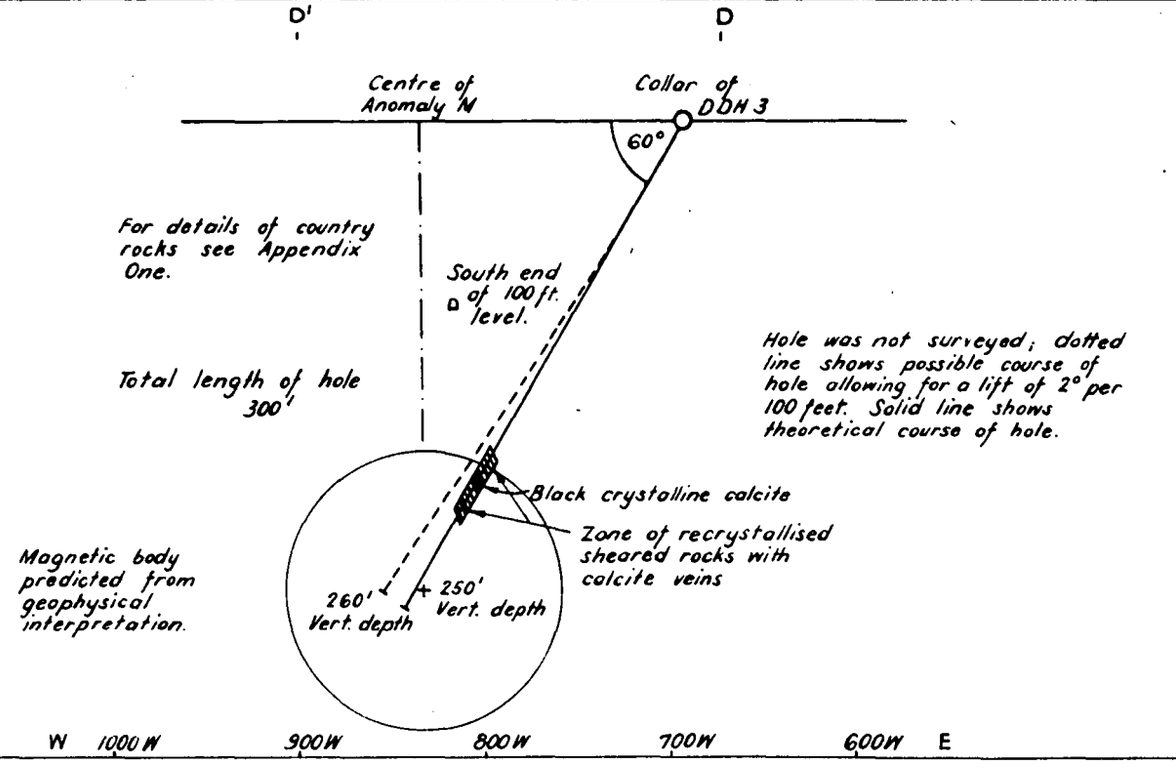
VERTICAL MAGNETIC FORCE (Z) CONTOURS (from Skattebol)

VERTICAL PROJECTIONS DRILL HOLES 2 & 3

Contour Interval: 200 gammas

Scale

100 0 100 200 FT.



DIAGRAMMATIC TRANSVERSE SECTION IN PLANE OF DRILL HOLE 3

Scale

100 0 100 200 FT.

D52/A8/103

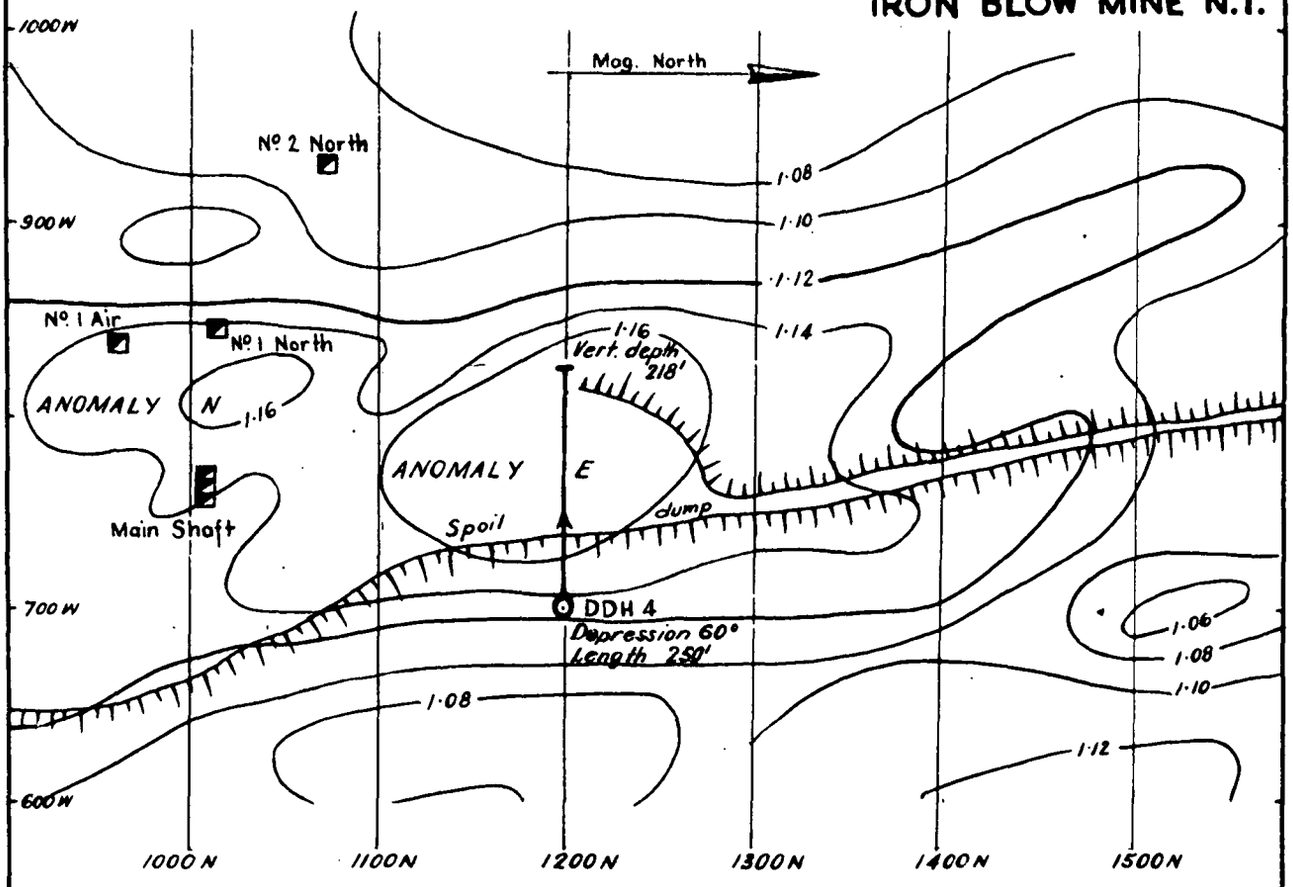
Resident Geologists Office. B.M.R. Darwin N.T. 1963

To accompany Record No. 1964/60

D52/8/DM/8

PLATE 8

IRON BLOW MINE N.T.

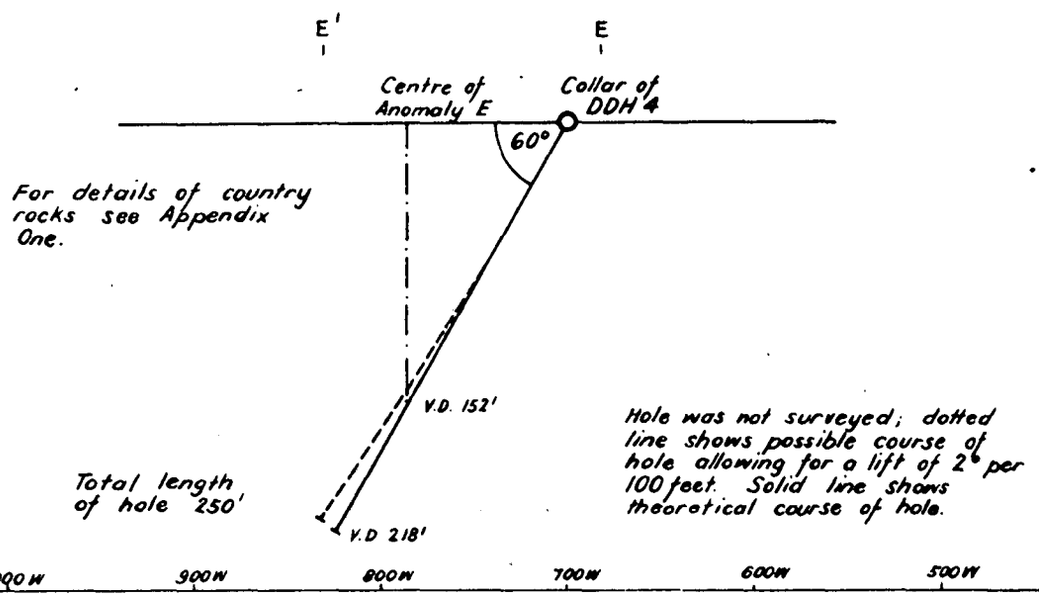


TURAM RATIO CONTOURS (from Skattebol)
VERTICAL PROJECTION DRILL HOLE 4

Contour Interval : 0·02

Scale

100 0 100 200 FT.



DIAGRAMMATIC TRANSVERSE SECTION IN PLANE OF DRILL HOLE 4

Scale

100 0 100 200 FT

D52/A8/104

Resident Geologists Office, B.M.R. Darwin, N.T. 1963. To accompany Record No. 1964/60