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Record No. 1956/52.

Geological and Geophysical Investigations at the Coronation Hill Reservation. N.T.

by
J.B. Firman, J. Taylor, & G.F. Clarke.

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SUMMARY

This report deals with the regional geology of the Bureau of Mineral Resources' Coronation Hill Reservation, with the detailed geology of the uranium-bearing deposits within the reservation and with the geophysical investigations carried out during the 1955 field season.

Lower Proterozoic rocks, which include siltstone, "Banded Iron Formation", limestone (including Collenia-type bioherms), greywacke and a chloritic breccia, trend 300 degrees and have a near vertical dip. They are known across a horizontal width of 20,000 ft. and even if some of this is due to repetition by folding there are sufficient exposures to be sure that the sequence is at least 10,000 ft. thick. The sedimentary rocks have been intruded by sills of igneous rock of intermediate to basic composition.

Upper Proterozoic rocks, conglomerate, sandstone, greywacke and volcanics, overlie the Lower Proterozoic rocks with a marked unconformity.

Both Upper Proterozoic and Lower Proterozoic rocks have been fractured by three separate fault systems. The system formed first has fractures striking between north-west and south-west, and that formed next has fractures striking between north and east. The system formed last has fractures disposed in two sets; one striking north, the other north-east.

The uranium-bearing deposits are aligned parallel to the trend of the Lower Proterozoic rocks and are close to an unconformity between Lower and Upper Proterozoic rocks. Argillaceous siltstones of Lower Proterozoic age are favourable host-rocks. Faults are present at each deposit; they may have served as channels for the introduction of primary uranium minerals.

Geological and geophysical investigations, the latter including radiometric prospecting, borehole logging, gridding and assaying, indicate that the grade and tonnage of the deposits is so low that they could not be worked economically.

INTRODUCTION

Situation and access

The Coronation Hill Reservation is a rectangular area of 30 square miles surrounding Coronation Hill in the Northern Territory. The hill is situated on the south-west side of the valley of the South Alligator River about 80 miles by road east of Pine Creek (Plate 1) and appears on the Mt. Evelyn one-mile map sheet of the Australian Military Series. The south-west corner of the reservation is 22 miles from Goodparla Homestead on a bearing of 113 degrees, and from this datum the reservation boundaries extend 5 miles northward and 6 miles eastward. A graded road from Pine Creek to Coronation Hill gives access during the dry season. An airfield which will be suitable for light aircraft, is being constructed two and a half miles north-east of Coronation Hill on the south side of Bamboo Creek.

Previous Investigations

The Coronation Hill uranium prospect was discovered in June 1953 by the Bureau of Mineral Resources' Arnhem Land Geological Party, which was engaged in mapping the area covered by the Mt. Evelyn sheet of the army four mile map series. Some reconnaissance scintillograph flights were made by the Bureau's aircraft, VH-BUR, in and around the Coronation Hill area in July 1953. Detailed geological mapping, geophysical surveying, pitting, costeaning and diamond drilling were carried out in the same year. (Allen, 1954, Misz, 1954, Barlow and de Groot, 1956). Three benches were bulldozed across the prospect to aid geological mapping and radiometric testing in November, 1954 (Gardner, 1955).

A second radioactive prospect, now known as BMR No.1, was reported in November 1954 in a position three miles north-west of Coronation Hill; and a third, BMR No.2, was located nearby (Fordon-Delgrove, 1954).

In 1955 Bureau of Mineral Resources' geologists under the leadership of B. P. Walpole carried out regional mapping on and outside the reservation.

Geological mapping, radiometric gridding, costeaning and diamond drilling were carried out on No.1 and No.2 prospects as part of the detailed geological and geophysical investigation of the reserve during the 1955 field season.

PART I REGIONAL GEOLOGY by J. B. Firman and J. Taylor

The geology of the Coronation Hill Reservation was mapped using air-photos at a scale of 1:50,000 and enlargements of these photos at a scale of 1:16,000 (approximately). The work was carried out during the 1955 field season as part of the detailed geological and geophysical investigation of the reservation. D. B. Dow assisted the writers at the beginning of the season.

The area covered by the Coronation Hill Reservation is included in a reconnaissance geological map of portion of the area covered by the Mt. Evelyn sheet of the army four mile series. This map was prepared by the Bureau of Mineral Resources Arnhem Land Geological Party in 1953 (Walpole, 1953). Regional mapping was continued in 1955 on and outside the reservation by the Randford Geological Party. Detailed mapping of the mineralized belt was carried out by a team including Taylor and Dow and led by Walpole.

Stratigraphy

Lower Proterozoic (Brock's Creek Group)

Sedimentary rocks. The sedimentary rocks of the Brock's Creek Group, here referred to as the Koolpin beds, are argillaceous siltstone with limestone lenses and Collenia-type bioherms, "Banded Iron Formation" (which may be a carbonaceous dolomitic marl in part), ferruginous siltstone, fine grained carbonate-bearing metasediment, a flaggy impure sandstone (Coirwong Greywacke), and a chloritic breccia.

The "Banded Iron Formation" occurs in three, and possibly four, beds which lens out within the mapped area. The Coirwong Greywacke forms a good marker horizon. The Koolpin Beds exposed in the Reservation, according to the writers' views, have a thickness of 20,000 feet, while the Regional Parties put the thickness of the sequence at half, or less, of this figure, as they consider that those beds or their equivalents are repeated to the north east by a synclinal fold trending north west.

Igneous rocks. Intrusive igneous rocks of intermediate to basic composition, which have been given the field names diorite, syenodiorite and epidiorite, appear to be sills within the sedimentary sequence. A granite stock, the Middle Creek Granite, has invaded the sediments of the Koolpin Beds and makes a discordant contact with them. The stock is medium grained near the centre and has a finer grained aplitic phase near its northern margin. The finer grained phase is clearly discernible on air-photos.

Upper Proterozoic

The Upper Proterozoic rocks may be divided into the following units, beginning with the oldest: Coronation Formation, Edith Volcanics, Kurrundie Sandstone, Dinner Volcanics and Callanan Sandstone.

The Coronation Formation is a basal sequence of conglomerate, sedimentary breccia, conglomeratic sandstone and sandstone (greywacke?) which overlies the Lower Proterozoic Koolpin Beds with a marked unconformity. A coarse angular sedimentary breccia, which is found on a topographic high on the old erosion surface near No.1 and No.2 Prospects, grades laterally into the conglomerates. The formation may be underlain by volcanic rocks in some places.

The Edith Volcanics include rhyolitic rocks, altered porphyry, intermediate volcanics, tuffaceous sandstone and agglomerate containing chlorite and angular fragments of pelitic sediment. The volcanics are extensive but are not present in some places where the Kurrundie Sandstone directly overlies sedimentary breccia of the Coronation Formation.

The Kurrundie Sandstone crops out in the south-west corner of the reservation. A stratigraphic correlation with arkose and pebble bed in the south-east corner of the reservation is suggested. Typical rock types are conglomerate, conglomeratic sandstone and cross-bedded sandstone.

The Dinner Volcanics include andesitic and amygdaloidal volcanics with lenses of tuffaceous sandstone. The volcanics are intercalated between the Kurrundie Sandstone and the overlying Callanan Sandstone and are well exposed and persistent along the strike.

The Callanan Sandstone is a sequence including conglomerate, conglomeratic sandstone and sandstone. In some places the sandstone is cross-bedded and shows oscillatory ripple marks.

The presence of tuffaceous sandstones in both the Edith and Dinner volcanics suggests that the volcanics were flows extruded near the littoral, and that they indicate only short breaks in Upper Proterozoic sedimentation.

Structure

Folding.

The sediments of the Lower Proterozoic Koolpin Beds have a regional trend of 320 degrees and a near-vertical dip. There is a change in trend near Middle Creek where the beds trend 290 degrees. Collenia-type structures in the limestone south-east of Pul Pul indicate that the beds have been locally overturned. Drag folds have been developed in the Banded Iron Formation, but the writers did not observe evidence of repetition by folding within the reservation.

Upper Proterozoic sediments are disposed in a broad anticlinal structure upon which minor basin structures have been developed. The Coronation Formation has been deposited on an irregular erosion surface and the beds show considerable variation in dip and elevation. This variation has probably been accentuated by folding and faulting. The formations overlying the Coronation Formation have been eroded near the axis of the anticline, but they are present in the south-west and south-east corners of the mapped area.

Faulting.

Faults, which trend between north-west and south-west with a most common orientation of 320 degrees, are marked by brecciation, silicification and, in some places, chloritization and late vein quartz injection. These faults were probably formed first. Other quartz filled faults trend between north and east and contain sulphide minerals in some places. Some of the stress applied during this later period of faulting was released along some of the faults marked by brecciation and silicification, and vein quartz and sulphide mineral was introduced. A complex system of faults with a slight movement indicated by slickensides is best developed in the Callanan Sandstone. Faults of this system were not mineralized.

In those places where brecciation and silicification are present the original characteristics of the sediment have been destroyed.

PART II GEOLOGY OF THE URANIUM-BEARING DEPOSITS by J. B. Firman

No.1 Prospect

No.1 Prospect is shown on Plates 2 and 3. A rough track joins the main South Alligator road approximately 2 miles north-west of the Coronation Hill, and runs east across the South Alligator River and along the north bank of Bamboo Creek to the prospect ridge.

Stratigraphy

The rocks at No.1 Prospect are crystalline limestone, interbedded with siltstone of the Koolpin Beds of Lower Proterozoic age, and sedimentary breccia and sandstone which in the opinion of the writers belong to the Scinto Formation of Upper Proterozoic age.

The limestone cropping out on the north-east slope of the prospect ridge is associated with siliceous rubble containing worm-like structures. Other Lower Proterozoic rocks, the Corwong Greywacke and the "Banded Iron Formation", crop out on ridges at about the same elevation.

The Lower Proterozoic rocks are overlain unconformably by a sedimentary breccia which contains angular pebbles of quartz and rounded pebbles of greywacke. The coarse, ilsorted and angular nature of the larger sized clastic material indicates deposition close to a shore-line or, alternatively, the deposit may have been a talus breccia formed on a topographic high on the erosion surface present at the beginning of Upper Proterozoic sedimentation. Bureau of Mineral Resources' Regional Parties which mapped this area considered the breccia at both No.1 and No.2 prospects to be a silicified reef breccia of Lower Proterozoic age.

Structure

No bedding is visible at No.1 Prospect, but the unconformable contact between the sedimentary breccia and the underlying limestone appears to follow the slopes of the prospect ridge. This suggests that the breccia was deposited on a ridge which existed before deposition of the Upper Proterozoic rocks.

Two north-east trending, steeply-dipping, quartz-filled faults have been mapped. There is insufficient outcrop near the faults to measure displacement, but it appears from inspection of the outcrop on either side of the faults that the displacement is small.

Mineralisation

No uranium minerals have yet been identified from this prospect. The host rock is an apatite-rich ferruginous breccia in which the radioactivity is associated with iron oxide. The rock is seen only as floaters amongst talus derived from sedimentary breccia and sandstone and is believed to occur as a lens in the breccia. Petrographic examination (Appendix 6) shows that it contains about 60% apatite and 40% hematite, mostly in coarse angular fragments set in a much finer matrix of the same minerals. It is now much altered and reconstituted but is considered to have been originally a fine-grained clastic sedimentary rock.

The long axis of the 5 x background radiometric contour strikes at 80° magnetic. The contour encloses an area approximately 450 ft. long by 100 ft. wide, but it is probable that the radioactivity of a large part of this anomaly can be attributed to creep.

A costean was dug in a zone of high radioactivity near the geophysical baseline (Plate 3.), but no solid outcrop was encountered and the radioactivity appeared to decrease with was 0.02% eU_3O_8, and the average of all samples less than 0.01% eU_3O_8.

Small amounts of malachite occur along a fault south-east of the zero peg on the geophysical baseline and in other fractures south-east of the prospect. There is no anomalous radioactivity associated with the copper.

No diamond drilling was carried out in the area of No.1 Prospect and on the available evidence the prospect is considered to have no economic significance.

No.2 Prospect

The No.2 Prospect is shown on Plates 2 and 5. The prospect is connected to the main South Alligator road by a rough track, which passes through the N.A.U.C. camp on the east side of the South Alligator River approximately three and half miles north-west of Coronation Hill. The prospect is on a col on the same ridge on which No.1 Prospect is situated.

Stratigraphy

Argillaceous siltstone is the principal host-rock. The siltstone, which belongs to the Koolpin Formation of Lower Proterozoic age, is overlain unconformably by sedimentary breccia of the Scinto Formation and abuts against tuffaceous sandstone and agglomerate of the Edith Volcanics.

The sedimentary breccia contains coarse, angular and subangular fragments of quartz set in a matrix which is silty and has a high percentage of iron oxides. The matrix is similar in hand specimen to the argillaceous siltstone underlying the breccia. The appearance of the matrix and the angular shape of the coarse clastic material suggests that the rock is a talus breccia. On regional evidence the Regional Parties have considered this rock type to be a silicified reef breccia.

Structure

The Lower Proterozoic siltstone strikes 320 degrees and dips vertically. The Upper Proterozoic sedimentary breccia probably follows the slope of the unconformity which approximates to the slope of the ridge as it exists at present.

A fault trending north-east has been inferred on either side of the prospect (Plate 5). The inferred fault is marked by change in lithology, gullies on either side of the prospect and by the col on the crest of the ridge. The most prominent structural feature is an east-trending fault zone marked by a fault breccia which has been silicified. The fault is a reverse fault which dips steeply to the south.

A system of closely spaced steeply dipping fractures in the siltstone shows slickensides and trends north-east. These fractures are interpreted as fracture cleavage related to the last movement on the fault zone. They indicate a transcurrent movement, the north block moving east (Plate 8).

Mineralisation

The secondary uranium minerals torbernite and autunite are found on fracture cleavage faces in the siltstone and on irregular fracture surfaces in the fault breccia. The dip of the deposit is assumed to be nearly vertical and is possibly controlled by a fault. The strike of the long axis of the mineralized area at the surface is north east and parallel to the fault. The deposit has been partly delineated by 4 costeans which indicate a length of about 130 feet and a width of about 60 feet. The mineralisation probably extends beyond the area tested by costeaning and may be within the 5 x background radiometric contour shown on plate 5. The grade is very low. The average grade indicated by channel samples cut in the four costeans is 0.05% eU_3O_8. The highest assay was 0.31% eU_3O_8. Of the 71 samples taken for assay only seven showed assays higher than 0.1% eU_3O_8. The higher assays were not confined to a particular zone. Drilling showed that the mineralisation extends to at least 70 feet vertical depth but without any improvement in grade.

Diamond Drilling

Diamond Drill Hole No.1. Diamond Drill Hole No.1 was put down to test uranium mineralization in the oxidized zone. The drill was directed across the trend of the radioactive anomaly beneath and parallel to No.2 Costean to provide a correlation between radioactivity at the surface and at shallow depths: it was continued through the siliceous fault breccia into rocks which were masked by rubble at the surface. The drill was collared 55 feet south of the south end of No.2 Costean so that it would enter the mineralized zone below the south end of the costean at a depth greater than could be reached by pitting. The drill was depressed to intersect any extension of uranium mineralization vertically below No. 2 Costean at a maximum depth of about 50 feet. This depth was chosen because mineralization was weak at the surface and might not continue below 50 feet.

Drilling revealed torbernite as a coating on thin irregular fractures at drill depths between 94 feet and 130 feet, but drill core samples all assayed lessthan 0.1 per cent e U_3O_8 over sample lengths of 5 feet. The following channel samples, which were taken over sample lengths of 5 feet from No.2 Costean vertically above D.D.H. 1, assayed over 0.1 per cent e U_3O_8: 50 feet to 55 feet (0.22 per cent), 55 feet to 60 feet (0.12 per cent) and 80 feet to 85 feet (0.14 per cent). Channel sample assay results are set out in Appendix 1 and drilling and assay data are set out on plates 8 and 9. Core sample assays show a slight increase in grade towards the fault zone. The increase is from less than 0.01 % e U_3O_8 at the collar of the hole to 0.07% e U_3O_8 adjacent to the fault. Uranium mineralization near the drill hole is not of sufficiently high grade or extent to warrant mining.

Diamond Drill Hole No.2. Diamond Drill Hole No.2 was put down to cross the trend of the anomaly 100 feet west of Diamond Drill Hole No.1. The drill was directed to pass beneath and parallel to No. 4 Costean and was depressed to test uranium mineralization 100 feet vertically below No.4 Costean. The drill was collared 10 feet south of the main outcrop of sedimentary breccia in a position such that it would test the vertical extent of the breccia.

The secondary uranium minerals torbernite and autunite were found in the core as coatings on thin irregular fractures at drill depths between 56 feet 3 inches and 109 feet. The highest drill core sample from 80 feet to 85 feet assayed 0.13 per cent e U_3O_8. Channel samples from Costean No.4, vertically above this drill hole, assayed lessthan 0.1 per cent e U_3O_8 (Appendices 1 and 2 and plates 8 and 10). It is probable that the drill passed through vertically dipping fractures carrying the secondary uranium mineral at this depth, and that the true thickness of the mineralized zone is less than 5 feet. This part of the deposit is 70 feet vertically below the surface and the grade is so low that it could not be mined profitably.

Estimation of Tonnage and Grade

The deposit was tested by four costeans and two inclined diamond drill holes. The area tested is approximately 8000 square feet and is defined by a boundary which includes all assays of 0.01 per cent e U_3O_8 and greater.

It is assumed that the costeaning and drilling provide adequate samples for the calculation of possible tonnage and grade, and that 14 cubic feet of 'ore' is equivalent to 1 long ton.

The average grade of the tested portion of the deposit is taken to be the average of all assays from the costeans and diamond drill holes, excluding the margin of the deposit assaying less than 0.01 per cent e U_3O_8. The grade is about 0.05 per cent e U_3O_8 (0.048 per cent by calculation).

The tested portion of the deposit contains about 28,000 long tons of mineralised rock of grade 0.05 per cent e U_3O_8, assuming that the deposit extends to a vertical depth of 50 feet.

Radiometric profiles for the four costeans, shown on Plate 7, indicate a smaller surface area of higher grade within the tested area. This portion of the deposit has a surface area of approximately 4,600 square feet and is defined by a boundary which excludes all assays on the margin of the deposit of lower grade than 0.04 per cent e U_3O_8. Tonnage calculated on these figures for the higher grade portion of the deposit is about 16,000 long tons.

The average grade of the higher grade portion of the deposit is about 0.07 per cent e U_3O_8 (0.067 per cent). The average includes assays from costeans and drill holes, but excludes assays less than 0.04 per cent e U_3O_8 on the margin of the deposit.

The higher grade portion of the deposit contains about 16,000 long tons of possible 'ore' of grade 0.07 per cent e U_3O_8.

Small patches of 'ore' of higher grade than 0.07 per cent e U_3O_8 occur in both drill holes and in the four costeans. One patch of grade higher than 0.25 per cent e U_3O_8 occurs in No. 5 Costean. Similar small patches may occur in untested portions of the deposit. Wagon drilling of possible extensions of the small patches of higher grade could be carried out by a local company having a wagon drill available.

Coronation Hill Prospect *

The workings are situated on the lower slopes on the north-east side of Coronation Hill.

Stratigraphy

Allen (1953) shows that metamorphosed argillaceous sediments of Lower Proterozoic age are overlain with a marked unconformity by volcanics and sediments of Upper Proterozoic age. The rocks adjacent to the unconformity are important for uranium minerals.

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* Based on reports by Allen, R. B. (1953), Gardner, D. E. (1954) and Walpole, B. P. (1953) ...

Structure

Lower Proterozoic rocks strike 325 degrees and dip vertically. Upper Proterozoic rocks exposed on the hill above the prospect strike 300 degrees and dip to the south-west between 25 and 40 degrees.

A prominent fault striking 090 degrees is marked 100 feet north of the mineralized area by zone of brecciaion, silicification and late vein quartz injection. West of the outcrop the major fault is displaced by a minor fault striking 340 degrees. Shearing in metamorphosed argillaceous sediments (chlorite schist) trends 325 degrees. Gardner (1954) recognizes two directions of faulting, 010 degrees and 075 degrees, and states that high radioactivity is found near the fault intersections.

Mineralization.

Scattered exposures of autunite and torbernite are found over an area approximately 550 feet in length and 200 feet in width. The uranium minerals occur as thin flakes or films on joints surfaces. Metamorphosed argillaceous sediments of Lower Proterozoic age and "angular conglomerate" which Allen (1953) describes as "weathered rubble and pebbles from an old land surface, heterogeneously mixed with detritus from the softer products of vulcanism" are thought to be the host rocks to uranium.

The metamorphosed argillaceous sediment (chlorite schist) has been silicified and later intruded by stringers and veinlets of quartz. Quartz veinlets contain pyrite in some of the workings. The fault 100 feet north of the radioactive area contains veins of quartz and malachite and stringers of chalcocite. Diamond drilling of the fault zone by North Australian Uranium Corp. revealed visible pyrite and chalcopyrite in the core, and some feeble radioactivity.

Two drillholes were bored beneath the surface prospect by B.M.R. One of the holes revealed pyrite, bravoite (a nickel sulphide), marcasite, chalcopyrite, sphalerite and galena. A finely dispersed secondary uranium mineral occurs disseminated through the host-rock and the sulphides. This suggests hydrothermal mineralization (Dallwitz, quoted by Allen, 1953). The secondary uranium mineral may have been derived from an early deposited primary mineral.

Other Prospects within the Coronation Hill Reservation.

A programme of radiometric prospecting was carried out throughout the reservation. Rock types and structures known to be favourable for uranium mineralization were carefully examined, and grab samples from areas of significant radioactivity were assayed. Areas investigated and results obtained are plotted on Plate 2. Details of the geophysical investigations carried out on the ground, and a discussion of the location and significance of radioactive anomalies found by the B.M.R. D.C.3 aircraft, are set out in Part II.

Five traverses, which cross the regional trend of the rocks, were made across the reservation from west to east at intervals of one mile. Geological and radiometric information was collected during traversing. No areas of significant radioactivity were found along the traverse lines. The radioactivity of important rock types tested during traversing is set out in Appendix 5.

Six radioactive anomalies were investigated on the ground (Plate 2). Three of these are situated on volcanic rocks, which are more radioactive than other rock types in the area with the exception of granite; one is situated on the "Banded Iron Formation", one is situated on rubble and the other is situated on an alluvial flat near Middle Creek and contains monazite from the Middle Creek Granite (Appendix 6). None of these anomalies were sufficiently radioactive or extensive to warrant further investigations.

PART III RADIOMETRIC INVESTIGATIONS by G. F. Clarke

Description of method & equipment

For the detailed radiometric gridding a base line was surveyed parallel to the probable strike of the beds, and cross traverses were pegged at intervals of 25 feet along this base line. A Harwell Carpet Sweeper Ratemeter, Type 1277B, fitted with three G24H GM tubes, was carried along the cross traverses and integral multiples of the background count of the instrument were recorded by the operator.

For prospecting over a large area, a base line was pegged at intervals of 500 feet. Cross traverses at intervals of 100 feet were located by two observers walking line abreast at this interval and using compass and chain to fix their position. The 500-foot pegs in the baseline served as check points as the prospecting progressed. Austronic PRM 200 Ratemeters were used and readings were taken at intervals of 100 feet along the cross traverses.

The radiometric logging of the diamond drill holes on No.2 Prospect was done with an Austronic Ratemeter, Type BRV-1, fitted with a GM.5 Special G.M. tube. Readings were taken at intervals of 1 foot, or at intervals of 6 inches if a sudden change in radioactivity was detected.

The background counts of the 1277B and the PRM 200 ratemeters, 180 counts per minute and 50 counts per minute respectively, were recorded at a site in the Botanical Gardens, Darwin. The Gardens were selected because they are in an area of low background count and because of their convenience to the Laboratory.

Work done and results obtained

Two prospects, No. 1 and No. 2, were gridded in detail, as described above.

No. 1 Prospect

Because the strike of the beds was not known, a 600-foot baseline, bearing 330 degrees magnetic, was surveyed parallel to the axis of the col on which the prospect is located. Cross traverses were extended 2000 feet to the west and 1000 feet to the east. The radiometric contours are shown on Plate 4.

Readings with a PRM Ratemeter were also taken both on the surface and along the bottom of Costean No. 1, which was dug through a radioactive high spot. The two profiles are included in Plate 7.

No. 2 Prospect

A baseline 600 feet long and bearing 340 degrees magnetic was surveyed parallel to the strike of the beds. Cross traverses were extended 2000 feet to the west and 1000 feet to the east. The radiometric contours are shown on Plate 6.

Four costeans were dug on this prospect and readings were made with a Harwell 1277B Ratemeter both on the surface and along the bottom of the costeans. The results are shown as profiles on Plate 7.

Unfortunately, No. 1 and No. 2 costeans had been started by United Uranium N.L. and therefore surface readings for those two costeans are not available.

Two diamond drill holes were logged and the results are shown on Plates 9 and 10.

Coronation Hill Prospect

A large area south of, and including, Coronation Hill was systematically prospected at 100-foot intervals. The baseline used in this area was 16,000 feet long, bearing 133 degrees magnetic, and was pegged at 500-foot intervals. The principal results are shown on Plate 2.

All airborne anomalies located by the Bureau's D.C.3 aircraft were investigated and comments on them are made under the next heading.

Discussion of results

From the numerous localised high spots which appear on the radiometric contour plan of No. 1 Prospect (Plate 4), and from the decrease in radioactivity shown on the radiometric profile along No. 1 Costean (Plate 7), it appears that the radioactivity is confined to boulders lying at or near the surface. The source of these boulders is unknown. A sample (specimen E7646) sent to Canberra for analysis contained 60% apatite and 40% hematite. No radioactive mineral was identified and it was suggested (Appendix 6) that the radioactivity in this type of rock is usually due to thorium. Radiometric assays done in the Darwin laboratory gave 0.1% and 0.17% e U_3O_8. From absorption tests done on these samples, the equilibrium condition indicates that the radioactivity is probably due to uranium, not thorium.

The radioactive anomaly on No. 2 Prospect (Plate 6), is more clearly defined than any on No. 1 Prospect. The anomaly is bounded by the 5 x background contour. Torbernite occurs in fractures in a siliceous fault breccia which outcrops at the surface, and in siltstone through which the costeans have been dug.

Acid volcanics on the northern portion of the prospect are responsible for the 4 x background contour not being closed.

Contouring within the 8 x background contour was not possible as the area had been disturbed by costeaning.

Assays of channel samples taken in the costeans of No. 1 and No. 2 Prospects are shown in Appendix 1. The borelogging results, including the reduction of the counts per minute to %eU_3O_8, are shown on Plates 9 and 10.

The results of the radiometric prospecting of the area south of, and including, Coronation Hill indicate three areas (Plate 2) in which readings range from 3 x to 5 x background (150 to 250 cpm) on the PRM 200 Ratemeter. These areas were further investigated by the geologists.

Of the five airborne anomalies on the reservation (Plate 2), four coincide with anomalies located by ground survey.

Dealing with the airborne anomalies in order:

No. 6 coincides with No. 1 Prospect.

No. 7 is doubtful. A high hill known as Pul Pul is on the eastern bank of the South Alligator River, on the opposite side of the river from the position of the anomaly as plotted on Plate 2. Acid volcanics on Pul Pul give up to 6 x background (1030 cpm) on the Harwell 1277B Ratemeter, but there is no significant radioactivity where the airborne anomaly is shown. The topography is such that radioactive rocks on Pul Pul could account for No. 7.

No. 8 is due to acid volcanics which give up to 5 x background (250 cpm) on the PRM Ratemeter.

No. 9 is due to acid volcanics which give up to 5 x background (900 cpm) on the Harwell 1277B Ratemeter.

No. 10 is on an alluvial flat along Middle Creek. The source of this anomaly was traced to the radioactive Middle Creek granite. Samples taken from the bed of Middle Creek were sent to Canberra for analysis. The results show that the radioactivity is due mainly to monazite (Appendix 6).

Conclusions on the radiometric investigations

Detailed gridding has shown the degree and extent of the radioactive anomalies on No. 1 and No. 2 Prospects.

Systematic prospecting, on what were considered likely uranium-bearing horizons, has not revealed any areas which are significant.

No airborne anomaly appears to coincide with No. 2 Prospect, but the locations of the anomalies found by the Bureau's DC3 aircraft, elsewhere on the reservation, correlate well with their actual location on the ground.

CONCLUSIONS

Geological investigations have shown the following factors to be related to uranium mineralization. The factors apply, in part, to other deposits outside the reservation in the South Alligator valley:

1. The distribution of deposits is aligned parallel to the regional trend of the Lower Proterozoic rocks.

2. The deposits are close to a major unconformity between Lower Proterozoic and Upper Proterozoic rocks.

3. Lower Proterozoic argillaceous sediments ("Banded Iron Formation", siltstone and metamorphosed fine-grained sediments) are host rocks or crop out close to the deposits. Dolomite occurs in these rocks as lenses, interbeds and Collenia-type bioherms. Photographic evidence shows that the "Banded Iron Formation" is a pyritic carbonaceous dolomitic marl containing chert lenses and nodules.

4. Faults are present at each deposit which may have served as channels for the introduction of primary uranium minerals. No primary mineralisation has been seen on the reserve but elsewhere along the Valley underground exploration has shown the presence of pitchblende at depth.

No. 1 Prospect

The radioactive host-rock is a much altered apatite-hematite rock, occurring as floaters amongst talus derived from sedimentary breccia and sandstone, and believed to be originally a fine-grained clastic rock occurring as a lens in the sedimentary breccia. Radiometric testing and petrographic examination indicates that the radioactivity is associated with the hematite, but as yet no uranium mineral has been identified as the source.

A costean was dug in a zone of relatively high radioactivity, but no solid outcrop was encountered, no uranium mineral was found and radioactivity decreased with depth. The highest channel sample assay was only 0.02 per cent e U_3O_8, and the deposit is considered to give no promise of economic mineralisation.

No. 2 Prospect

The secondary uranium minerals torbernite and autunite have been found in sedimentary breccia, in a silicified fault breccia and on fracture cleavage surfaces in a silicified banded ironstone of sedimentary origin. The fracture cleavage surfaces appear to be developed by movement along an east-trending reverse fault.

The prospect was tested by four costeans and two inclined diamond drill holes. Channel samples were taken for assay from each costean. The highest channel sample assay was only 0.31 per cent e U_3O_8. All drill core samples from the first drillhole assayed less than 0.1 per cent e U_3O_8. The highest drill core sample from the second drill was 0.13 per cent e U_3O_8.

It is estimated that the portion of No. 2 Prospect tested by costeaning and diamond drilling contains approximately 23,000 long tons of mineralised rock, with an average grade of 0.05 per cent e U_3O_8. Small patches of higher grade material occur and any extension of these along the strike could be tested by wagon or other drilling.

Coronation Hill Prospect

Scattered exposures of secondary uranium minerals are found over an area 550 ft. long by 350 ft. wide in Upper Proterozoic rocks some distance above their unconformable contact with underlying Lower Proterozoic rocks. Costeaning and drilling in the Upper Proterozoic rocks did not reveal material of ore grade and testing was discontinued.

More recently the important role of the unconformity as one of the loci of ore formation has been demonstrated by developments in prospects outside the boundaries of the Reserve. For this reason it is felt that any further exploration of the Coronation Hill prospect should be aimed at greater depth to test, in the first instance, a comparatively narrow zone on either side of the unconformable surface beneath the surface showings.

General

The investigation of radioactive prospects No. 1, No. 2, and Coronation Hill by surface geological mapping, and diamond drilling, pitting and costeaning did not succeed in outlining ore suitable for commercial exploitation. The investigation, however, was limited in scope and was confined in each case to the zone of secondary alteration. Recent developments elsewhere in the field have shown that disperse secondary mineralisation results in some cases from narrow seams of more concentrated primary mineralisation at depth. The orebodies so far discovered are not of great extent and would constitute difficult targets for drilling. Anyone undertaking systematic search for such targets might have to be prepared for the expenditure of much effort in the face of discouraging initial results.

No important radiometric prospects were found elsewhere in the Reserve and the known anomalous areas would constitute focal points about which any future testing might be directed.

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Appendix 1

CHANNEL SAMPLE ASSAY RESULTS

No. 1 and No. 2 Prospects

No. 1 Prospect No. 1 Costean

Measurements begin at south-west end

Slope distance (feet)	Assay (Percent e U_3O_8)
0-3	less than 0.2
3-6	less than 0.01
6-9	less than 0.02
9-12	less than 0.01
12-15	less than 0.01
15-18	less than 0.01
18-21	less than 0.01
21-24	less than 0.01
24-27	less than 0.01
27-30	less than 0.01
30-33	less than 0.01
33-36	less than 0.01
36-39	less than 0.01

No. 2 Prospect No. 1 Costean

Measurements begin at south end of costean

Slope distance (feet)	Assay (percent e U_3O_8)
0-3	0.01
3-6	0.01
6-9	0.01
9-12	0.01
12-15	0.01
15-18	0.02
18-21	0.04
21-24	0.08
24-27	0.16
27-30	0.13
30-33	0.05
33-36	0.04
36-39	0.03
39-42	0.11
42-45	0.07
45-48	0.09
48-51	0.13
51-54	0.09
54-57	0.05
57-60	0.05
60-63	0.05
63-66	0.05
66-69	0.05
69-72	0.03
72-75	0.03
75-78	0.05

No. 2 Prospect No. 1 Costean Continued

Measurements begin at south end of costean

Slope distance (feet)	Assay (percent e U_3O_8)
78-81	0.03
81-84	0.05
84-87	0.03
87-90	0.02

No. 2 Prospect No. 2 Costean

Measurements begin at south end of costean

Slope distance (feet)	Assay (percent e U_3O_8)
5-10	0.01
10-15	less than 0.01
15-20	less than 0.01
20-25	less than 0.01
25-30	0.01
30-35	0.03
35-40	0.05
40-45	0.04
45-50	0.08
50-55	0.22
55-60	0.12
60-65	0.07
65-70	0.08
70-75	0.08
75-80	0.08
80-85	0.14
85-90	0.03
90-95	0.02
95-100	0.02

No. 2 Prospect No. 3 Costean

Measurements begin at south end of costean

Slope distance (feet)	Assay (percent e U_3O_8)
34-37	0.02
37-40	0.02
40-43	0.03
43-46	0.03
46-49	0.07
49-52	0.31
52-55	0.03
55-58	0.02
58-61	0.02
61-64	0.02
64-67	0.02
67-70	0.02
70-73	0.03

No. 2 Prospect No. 4 Costean

Measurements begin at south end of costean

Slope distance (feet)	Assay (percent e U_3O_8)
0-3	0.05
3-6	0.08
6-9	0.04
9-12	0.01
12-15	0.01
15-18	0.01
18-21	0.01
21-24	less than 0.01
24-27	less than 0.01

Appendix 2

DRILL CORE ASSAY RESULTS

No. 2 Prospect

Diamond drill holes Nos. 1 and 2

No. 2 Prospect

Diamond Drill Hole No.1

Drill depth (feet)	Assay (Percent e U_3O_8)
60-65	less than 0.01
65-70	less than 0.01
70-75	less than 0.01
75-80	less than 0.01
80-85	less than 0.01
85-90	0.01
90-95	0.03
95-100	0.03
100-105	0.02
105-110	0.02
110-115	0.02
115-120	0.01
120-125	0.01
125-130	0.01
130-135	0.05
135-140	0.07
140-145	0.03
145-150	0.01
150-155	0.03
155-160	0.04
160-165	0.07
165-170	0.04
170-175	0.07
175-180	0.03
180-185	less than 0.01

No. 2 Prospect

Diamond Drill Hole No. 2

Drill depth (feet)	Assay (Percent e U_3O_8)
50-55	less than 0.01
55-60	0.05
60-70 two lengths taken together. Only 6" of core recovered between 63'5" and 69'9".	0.03
80-85 Core lost from 69'9" to 83'	0.13
85-90	0.02
90-95	0.04
95-100	0.07
100-105	0.02
105-110	0.05

Hole ends at 128 ft. 3 ins.

No. 2 Prospect

Diamond Drill Hole No. 1 (Plates 8 & 9)

Drill Depth From	To	Summary Geological Log
0	13'6"	Siltstone detritus
13'6"	40'	Reddish-brown and greyish-brown argillaceous siltstone. Thin fractures (¼" to ½" in width), showing slickensides in some places, trend 40 degrees to hole. Fracture at 24' contains biolite. Fractures sub-parellel to hole between 33' and 37', 38', and 39' are coated with hematite.
40'	44'	Reddish-brown argillaceous siltstone with bands and lenses of greyish-white. Corelated with bedding striking 340 degrees and dipping vertically at surface.
44'	55'	Reddish-brown argillaceous siltstone with fractures 45 degrees to hole. Fracture sub-parellel to hole between 44' and 48' contains grey clay gouge.
55'	65'	Reddish-brown argillaceous siltstone with bands and lenses of greyish-white 45 degrees to hole direction.
65'	69'	Reddish-brown argillaceous siltstone with thin fractures 45 degrees to hole.
69'	71'6"	Reddish-brown argillaceous siltstone with grey bands and lenses.
71'6"	73'	Reddish-brown argillaceous siltstone.
73'	98'	Reddish-brown argillaceous siltstone with greyish bands and lenses. Thin fractures between 73' and 77' are parallel to lenses. Sheared between 77'6" and 78' and from 80' to 80'4" with shear direction 45 degrees to hole. Torbernite on fractures without any particular orientation from 94' to 99'4".
98'	103'	Reddish-brown argillaceous siltstone. Torbernite on thin fractures 40 degrees to hole at 102'.
103'	113'	Reddish-brown argillaceous siltstone. Fractures 40 degrees to hole. Torbernite in thin flakes on fractures in broken core at 110'. Torbernite on irregular fractures face trending 40 degrees to hole at 111'.
113'	121'6"	Reddish-brown argillaceous siltstone.
121'6"	131'6"	Reddish-brown argillaceous siltstone.

No. 2 Prospect

Diamond Drill Hole No. 1 (Plates 8 & 9)

(Continued)

Drill Depth From	To	Summary Geological Log
121'6"	131'6"	Reddish-brown argillaceous siltstone with slight development of greyish bands and lenses. Torbernite on thin fracture parallel to banding at 130'.
131'6"	141'	Grey and brownish-grey argillaceous siltstone. Fractures thin and irregular with mean orientation 45 degrees to hole. Torbernite at 132'6".
141'	162'	Light brownish siltstone with reddish-brown siltstone between 157' and 159'6". Grey banding, lenses and mottling. Fractures 45 degrees to hole strike perpendicular to strike of bands.
162'	173'3"	Bleached grey argillaceous siltstone. Torbernite on fractures without any particular orientation between 162' and 164'6". Torbernite on fractures 45 degrees to hole between 164'6" and 170'. Torbernite at 173'3".
173'3"	180'	Reddish-brown siliceous quartz breccia (fault breccia) very small amount of torbernite between 175' and 176'3". Torbernite flakes on thin fracture 30 degrees to hole between 176'3" and 177'6". Torbernite on irregular fractures between 178'9" and 180'.
180'	200'	Dark reddish-brown tuffaceous sandstone with abundant clorite. No torbernite.

End of hole.

No. 2 Prospect.

Diamond Drill Hole No. 2 (Plates 5 & 10)

Drill Depth From	To	Summary Geological Log
0	6'	Soil and rubble
6'	23'3"	Very weathered rock, mottled grey, yellow brown and reddish-brown. Contains fragments of dark grey quartz from pebble to sand size. Most of the rock is silt and clay. Siliceous quartz breccia from 23' to 24', Red and yellow colours due to iron oxides.
23'3"	63'5"	Silicified quartz breccia (sedimentary breccia). Silty matrix from 41' to 50'5"; silty matrix with very angular fragments of quartz from 55' to 56'6". Dark grey silt with abundant hematite from 62'6". Thin irregular fractures at 38'9" (coated with iron oxides), 39'9" to 40'6" (coated with kaolin), at 48'6", 49'3", 52'3". Thin quartz veinlets with hematite infilling from 60'4" to 60'8". Tectonic brecciation from 50'3" to 51' and 52'6" to 52'9". Torbernite on thin irregular fractures at 56'3". The torbernite is later than the hematite coating this fracture. Torbernite on irregular fractures from 56'6" to 59'2" from 59'9" to 60' and at 61'6".
63'5"	98'	Reddish-brown argillaceous siltstone. Some grey banding between 97'3" and 98'. Chlorite occurs in the bands as small round grains. Silicified quartz breccia between 83' and 83'2". Small amount of torbernite on irregular fractures between 84'2" and 84'9" and on fractures 30 degrees, 45 degrees, and 60 degrees to hole between 84'9" and 86'9". Saleeite (?) on thin fractures intersecting banding at 93'6". With banding oriented to strike 340 degrees and dip vertically the fracture strikes east-west and dips vertically. No core recovered between 69'9" and 83'.
98'	128'3"	Tuffaceous sandstone containing angular fragments of clay and silt size, angular fragments of quartz, a few rounded pebbles about 2" in diameter and angular fragments of chlorite between 116' and 118' and 127'6" and 128'3". Thin fracture with clay gouge at 116'. Sub-parallel fractures striking 45 degrees to hole between 118' and 124' are correlated with parallel fractures in the silicified fault breccia at the surface. Saleeite(?) on thin irregular fractures from 98' to 101' and torbernite on thin irregular fractures from 103'6" to 109'.

Appendix 4

DRILLING DATA

No. 2 Prospect. 1955 (Edeco Hill)

Drill Hole	R.L. (Feet)	True Bearing	Depression (Degrees)	Drill Depth (Ft.ins.)	Footage Drilled (per week)	Percentage Core Recovery
1	713.5	11°30'	-33	200'	67	74
2	694.3	12°	-53	128'3"	43	70

Appendix 5

RADIOACTIVITY OF TYPICAL ROCK TYPES

Rock Type	No. of readings	Counts per minute			
		Range	Minimum	Maximum	Average
Granite	8	50	190	240	217
Volcanics	21	90	100	190	152
Dioritic rocks	9	40	80	120	97
"Branded Iron Formation"	18	70	60	130	99
Argillaceous sediments	58	70	80	140	108
Sedimentary breccia (Scinto Formation) near No. 1 and No. 2 prospects	5	20	50	70	60
Sedimentary breccia (East side of Coronation Hill)	3	40	80	120	100
Sandstone and conglomerate (Upper Proterozoic)	29	70	60	130	70
Goirwong Greywacke	4	70	50	120	88
Soil alluvium	66	90	60	150	100

Appendix 6

PETROGRAPHIC AND MINERAGRAPHIC NOTES

Examination of core specimen (Sample No. E3796) from 94'6" in D.D.H.2. No. 2 Prospect, Coronation Hill Reservation, N.T.: by R. D. Stevens.

1: RADIOACTIVE MINERALS:

The uranium mineral required to be identified has been determined as the secondary uranium mica Autunite. It forms bright yellow-green plates and scaly aggregates distributed irregularly through the rock, and concentrated particularly along an indefinite irregular fracture plane transecting the core obliquely to the banding.

The mineral is strongly fluorescent in yellow-green, has an average refractive index of approximately 1.570, (-) 2V is very small (tending to uniaxial), and straight extinction. These properties indicate that it is weakly hydrated autunite approaching meta-autunite.

2: PETROGRAPHY

The core specimen is a soft, finely banded red and grey rock. The colour bands have been puckered and folded on a small scale, but it cannot be determined whether this deformation has been due to depositional slumping or tectonic processes. Similarly, it is not certain whether or not the banding actually represents sedimentary bedding, though it is considered likely that this is the case.

In thin-section the red bands are seen to consist of masses of limonite, in some cases with cores of hematite, and subordinate quantities of pale yellow-green, fibrous, scaly, and micaceous nontronitic material, fine silica and iron-stained clay. The grey bands, on the other hand, consist largely of fine chalcedonic and cryptocrystalline silicia with lenses, bands, and patches of pale nontronite, and small aggregates of limonite. Finely granular leucoxenised sphene is relatively abundant in the grey bands. One micaceous plate of autunite was detected in thin-section. It measures approximately 1.5x1.0 mm, and is sharply bounded against the surrounding nontronite, quartz, and limonite; it also contains inclusions of these three minerals.

The rock may be considered as a finely banded, siliceous iron-stone of doubtful origin, but probably sedimentary.

Examination of radioactive host-rock (specimen No. B7646) from No. 1 Prospect, Coronation Hill, Reservation N.T. by [illegible].D.Stevens:

SPECIMEN B.7646

A very much altered and reconstituted rock consisting almost entirely of apatite and hematite. The apatite is crystalline, often euhedral, and forms equant grains averaging about 0.2 mm across. The abundant hematite is often crystalline but usually finely powdered, and the rock owes its distinctive colour in hand-specimen to this high content of hematite. The powdery hematite is included in the apatite rendering it translucent in many cases, while the crystalline and more massive hematite fills the intergranular spaces between apatite crystals. Magnetite also occupies intergranular spaces and vein-like structures. Apatite constitutes about 60% of the rock and iron oxides some 40%, most of which is hematite.

The rock has an apparently fragmental texture, consisting of angular coarse-grained apatite-hematite bodies in a much finer hematite-apatite matrix. Thus, hematite is most abundant in the "cementing material" between the fragments. The coarse apatite of the fragments still contains included hematite but in lesser quantities. Rare, narrow elongated sericitic patches have also been observed. It is suggested that the original rock may have been a fine breccia, but whether igneous or sedimentary, intraformational or tectonic cannot be determined.

Since the radioactivity of the specimen is low (200 c.p.m. max) it has not been possible to isolate or identify the source of this activity. Several other occurrences of mildly radioactive apatite-hematite rocks have been reported and in these also it has not been possible to pin down the radioactive mineral definitely. It appears, however, that the radioactivity is associated with the iron oxides which, it will be noted, are later than the apatite. It has also been found that the element involved is often thorium rather than uranium. Chemical tests, if required, will settle this question.

Examination of sand sample from Middle Creek Coronation Hill Reservation N.T. by J. Ward.

1: The sample received was of the order of 1000 grams and was reduced with a Jones Sampler to about 220 grains. The reduced sample was partially concentrated to approximately 30 grms by panning. Final concentration of heavy minerals was effected by heavy liquid separation with acetylele tetra-bromide-SG.2.8. Weight of heavy minerals recovered amounted to 1.78 grams.

2: A portion of the concentrate was first subjected to electro-magnetic separation with a Frantz Isodynamic Separator. This resulted in three fractions - Fraction A, a moderately magnetic fraction composed of opaque iron oxides v and small amounts of amphibole and tourmaline; Fraction B - a weakly appreciable amount of monazite and minor proportions of cassiterite and amphibole; Fraction C - a non-magnetic fraction made up principally of topaz, hydrated oxides of iron, zircon and minor amounts of cassiterite and rutile.

3: Each of the three fractions ø was tested radiometrically with an Austronic (BGR1) Ratemeter and grain-counts were made on portions of each fraction.

Details of percentage composition and radioactivity of the three fractions are given in Table 1.

TABLE 1

PERCENTAGE COMPOSITION AND RADIOACTIVITY OF FRACTIONS OF HEAVY MINERAL CONCENTRATE FROM CORONATION HILL No.3 PROSPECT

Fraction	Weight of Fraction in grams	Radioactivity due to fraction (times background)	Hydrated Oxides ⁂	Opaque Iron Oxides	Topaz	Zircon	Monazite	PERCENTAGE COMPOSITION			
								Cassiterate	Amphibole	Tourmaline	Rutile
A	0.08	2x	-	93.0	-	-	-	0.1	3.4	3.5	-
B	0.33	9x	89.8	7.7	-	-	1.7	0.3	0.3	-	-
C	0.17	Nil	36.8	-	50.9	8.9	-	2.5	-	-	0.9

v It is possible that a small percentage of chromite was grouped under this heading. Unfortunately, lack of mounting media at the time of the separation prevented the preparation of polished sections.

ø Tailings from the concentration were also tested radiometrically but showed no radioactivity.

⁂ Composed of leucoxene and limonitic material.

4. A qualitative, spectrographic analysis of each of the three fractions was carried out by W.M.B. Roberts.

Results of the analyses are given in Table 2.

TABLE 2

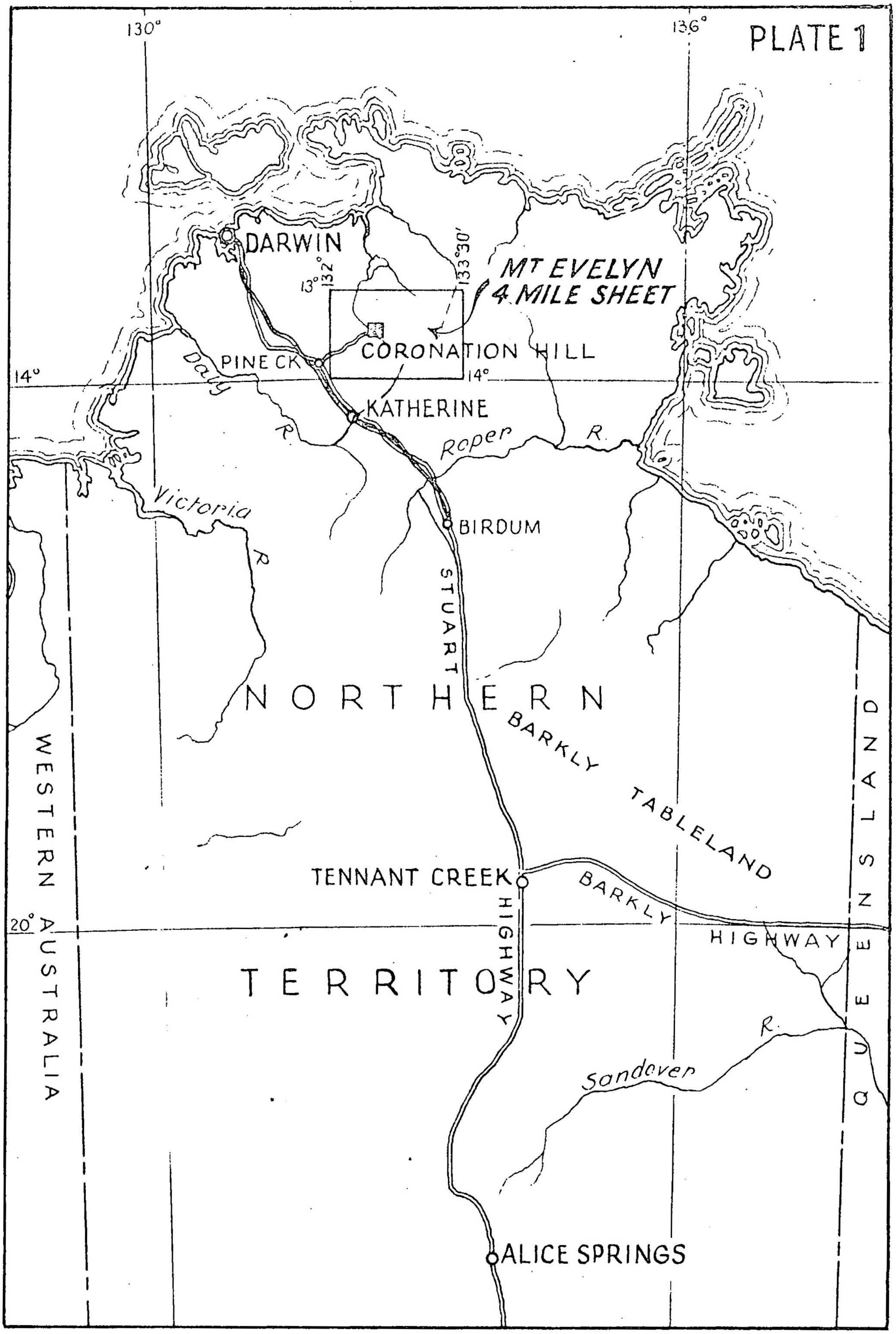
SPECTROGRAPHIC ANALYSIS OF FRACTIONS OF HEAVY MINERAL CONCENTRATE FROM [illegible] HILL RESERVATION, N.T.

Fraction	Spectrographic Analysis				
	Thorium	Tin	Titanium	Iron	Chromium
A	Nil	Medium to low percentage	Low percentage	Medium to high percentage	Low percentage
B	Medium to high percentage	Low percentage	Strong trace	Strong trace	Nil.
C	Nil	High percentage	Trace	Trace to strong trace	Trace

It will be noted from Table 2 that there was no element detected which would explain the radioactivity connected with Fraction A. Again, no uranium was detected in the sample.

5. Percentage composition of the heavy mineral concentrate, calculated from figures in Table 1, is given below.

Hydrated Oxides	=	61.9
Opaque Iron Oxides	=	17.2
Topaz	=	14.9
Zircon	=	2.6
Monazite	=	1.0
Cassiterite	=	0.9
Amphibole	=	0.7
Tourmaline	=	0.5
Rutile	=	0.3



LOCALITY MAP
CORONATION HILL
RESERVATION

SCALE OF MILES

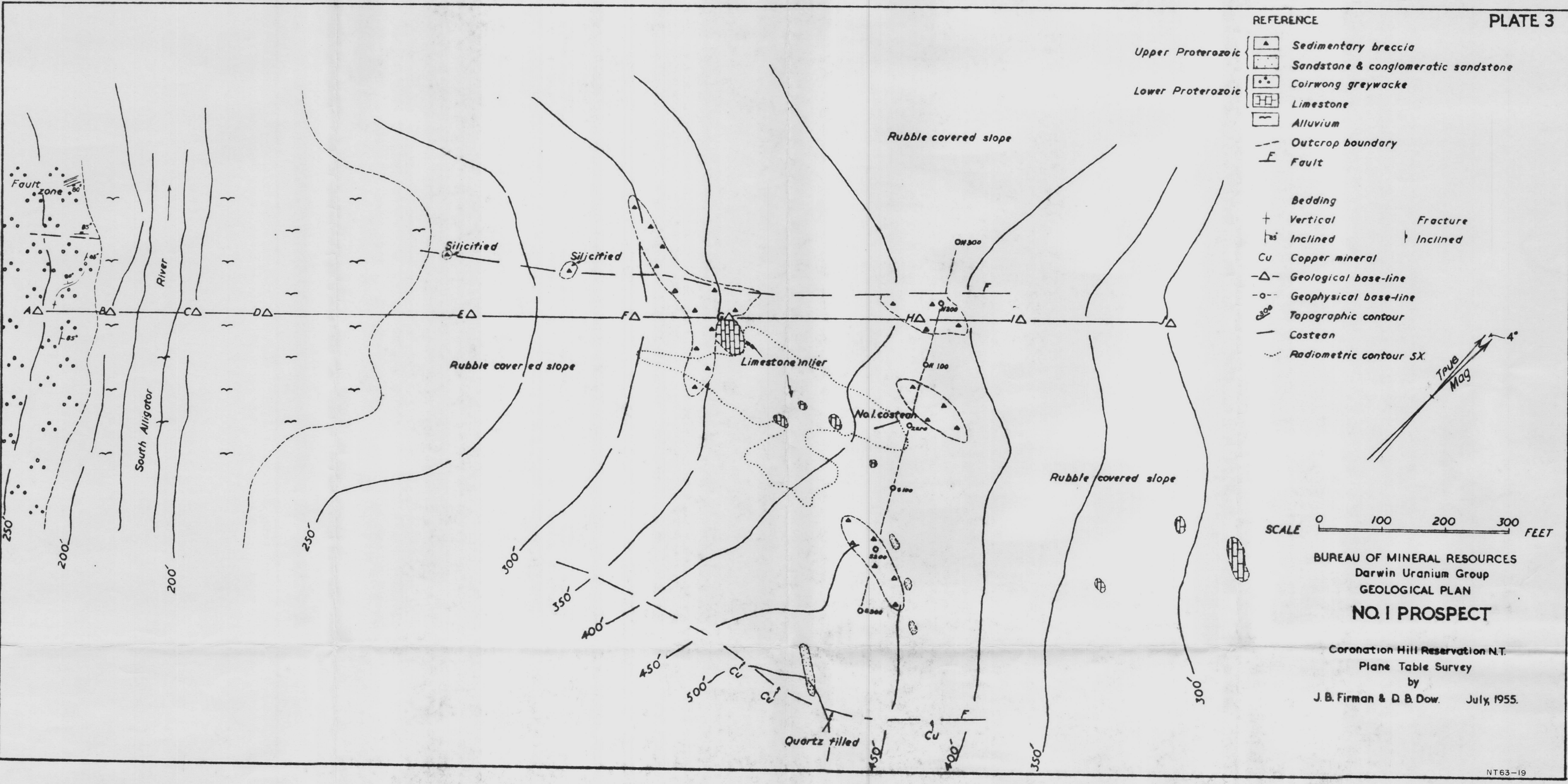
100 0 100 200 300

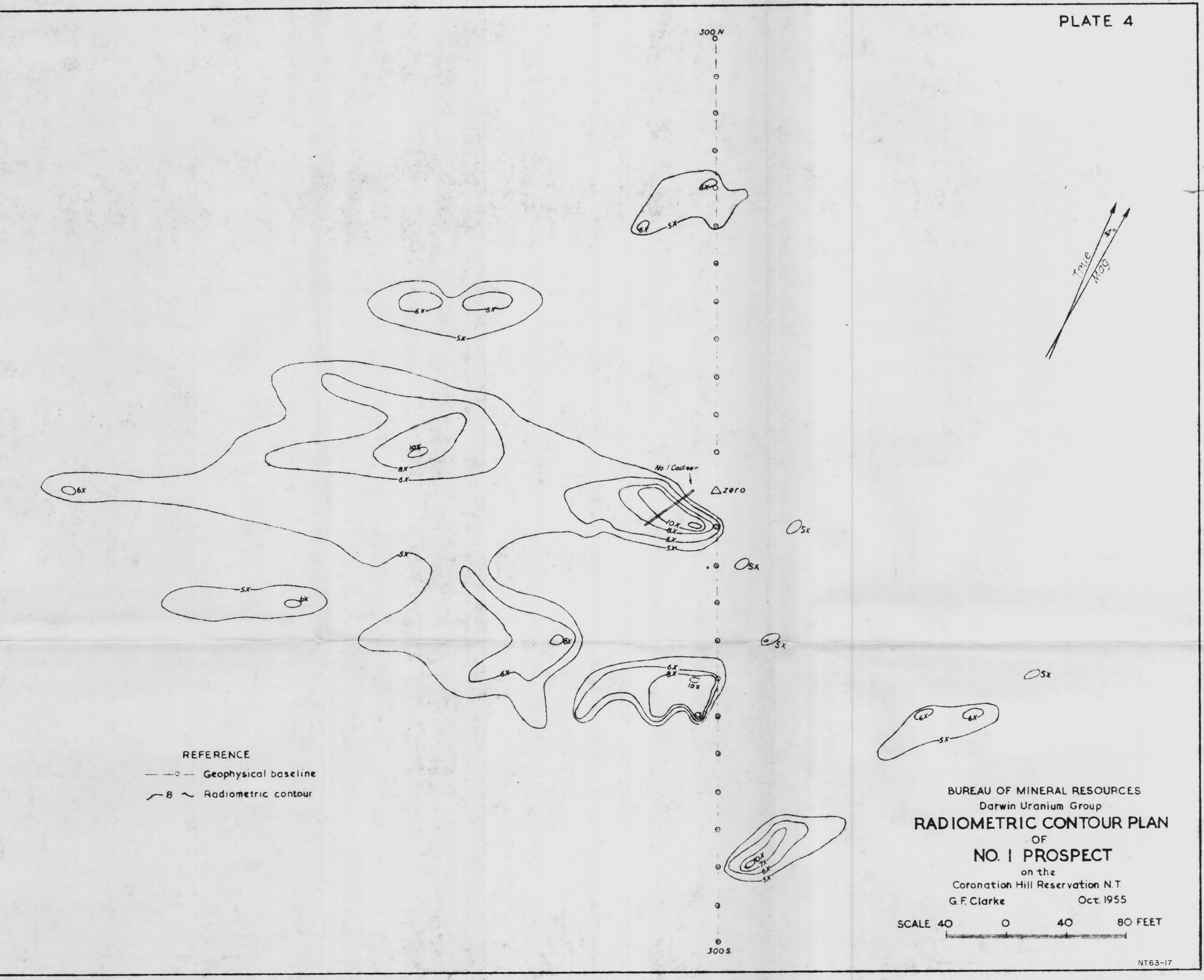
Bureau of Mineral Resources, Geology & Geophysics

NT C2 12


PLATE 2
REFERENCE
SOIL & ALLUVIUM
UPPER PROTEROZIC
CALLANAN SANDSTONE
CONGLOMERATE & SANDSTONE
DINNER VOLCANICS
ANDESITIC & AMYGDALOIDAL VOLCANICS & TUFFACEOUS SANDSTONE
KURRUNDIE SANDSTONE
CONGLOMERATE & SANDSTONE
SEDIMENTARY BRECCIA — CORONATION HILL
ARKOSE
PEBBLE BED
WESTERN MARGIN OF MIDDLE CREEK GRANITE
EDITH VOLCANICS
RHYOLITE, PORPHYRY, INTERMEDIATE VOLCANICS - UNDIFFERENTIATED
AGGLOMERATE
TUFFACEOUS SANDSTONE
CORONATION FORMATION
CONGLOMERATE & SANDSTONE
SEDIMENTARY BRECCIA (SCINTO BRECCIA?)
LOWER PROTEROZIC
BROCKS CREEK GROUP
MIDDLE CREEK GRANITE
GRANITE
DIORITE
SYENODIORITE
FINE-GRAINED BASIC IGNEOUS
EPIDIORITE
KOOLPIN BEDS
SILTSTONE
CARBONATE-BEARING METASEDIMENT
"BANDED IRON FORMATION"
LIMESTONE
COIRWONG GREYWACKE
CHLORITIC BRECCIA
DOLERITE
SYENITE
PORPHYRY
DEFINITE OUTCROP BOUNDARY
BOUNDARY AROUND SCATTERED OUTCROP
GEOLOGICAL BOUNDARY
FRACTURE-INCLINED
SHEAR
TECTONIC BRECCIATION
BEDDING
VERTICAL
INCLINED
SPOT HIGHT
STREAM
FAULT
BRECCIATED & SILICIFIED
QUARTZ FILLED
BARREN
INFERRED
High radioactivity located by ground radiometric traversing
8X/0·03 Multiplex instrument background/assay percent eU_3O_8
A6 Airborne scintillometer anomaly
Geological-radiometric traverses
Boundary of radiometric prospecting guided by geological features
Boundary of semi-detailed radiometric prospecting
LOCALITY MAP
No. 2 Prospect
No. 1 Prospect
SECTION
Bamboo
Creek
Proposed airfield United Uranium
Pul Pul
Silicified siltstone
Silicified mudstone
Scattered outcrops siltstone & vein quartz debris
Vein quartz debris
Siltstone & Vein quartz debris
Coronation Hill Prospect
Middle
Creek
South
13X/0·00, 0·02 THORIUM (MONAZITE)
4X/0·03 RUBBLE
3X/0·01
A6
A7
A8
A9
A10
Fault pattern photo interpreted

PLATE 3


REFERENCE
Upper Proterozoic
Sedimentary breccia
Sandstone & conglomeratic sandstone
Lower Proterozoic
Coirwong greywacke
Limestone
Alluvium
Outcrop boundary
F Fault
Bedding
Vertical
Inclined
Fracture
Inclined
Cu Copper mineral
Geological base-line
Geophysical base-line
Topographic contour
Costean
Radiometric contour SX.
True
Mag
4°
SCALE 0 100 200 300 FEET
Fault zone
South Alligator River
Silicified
Silicified
Rubble covered slope
Rubble covered slope
Rubble covered slope
Limestone inlier
No.1 costean
Quartz filled
A B C D E F G H I J
250'
200'
200'
250'
300'
350'
400'
450'
500'
450'
400'
350'
300'
BUREAU OF MINERAL RESOURCES
Darwin Uranium Group
GEOLOGICAL PLAN
NO. 1 PROSPECT
Coronation Hill Reservation N.T.
Plane Table Survey
by
J. B. Firman & D. B. Dow. July, 1955.
NT63-19



56/52
PLATE 4
300 N
300 S.
zero
No. I Costeen
True
Mag
4°
5X
6X
8X
10X
7X
REFERENCE
Geophysical baseline
8 Radiometric contour
BUREAU OF MINERAL RESOURCES
Darwin Uranium Group
RADIOMETRIC CONTOUR PLAN
OF
NO. I PROSPECT
on the
Coronation Hill Reservation N.T.
G. F. Clarke
Oct. 1955
SCALE 40 0 40 80 FEET
NT63-17

PLATE 5

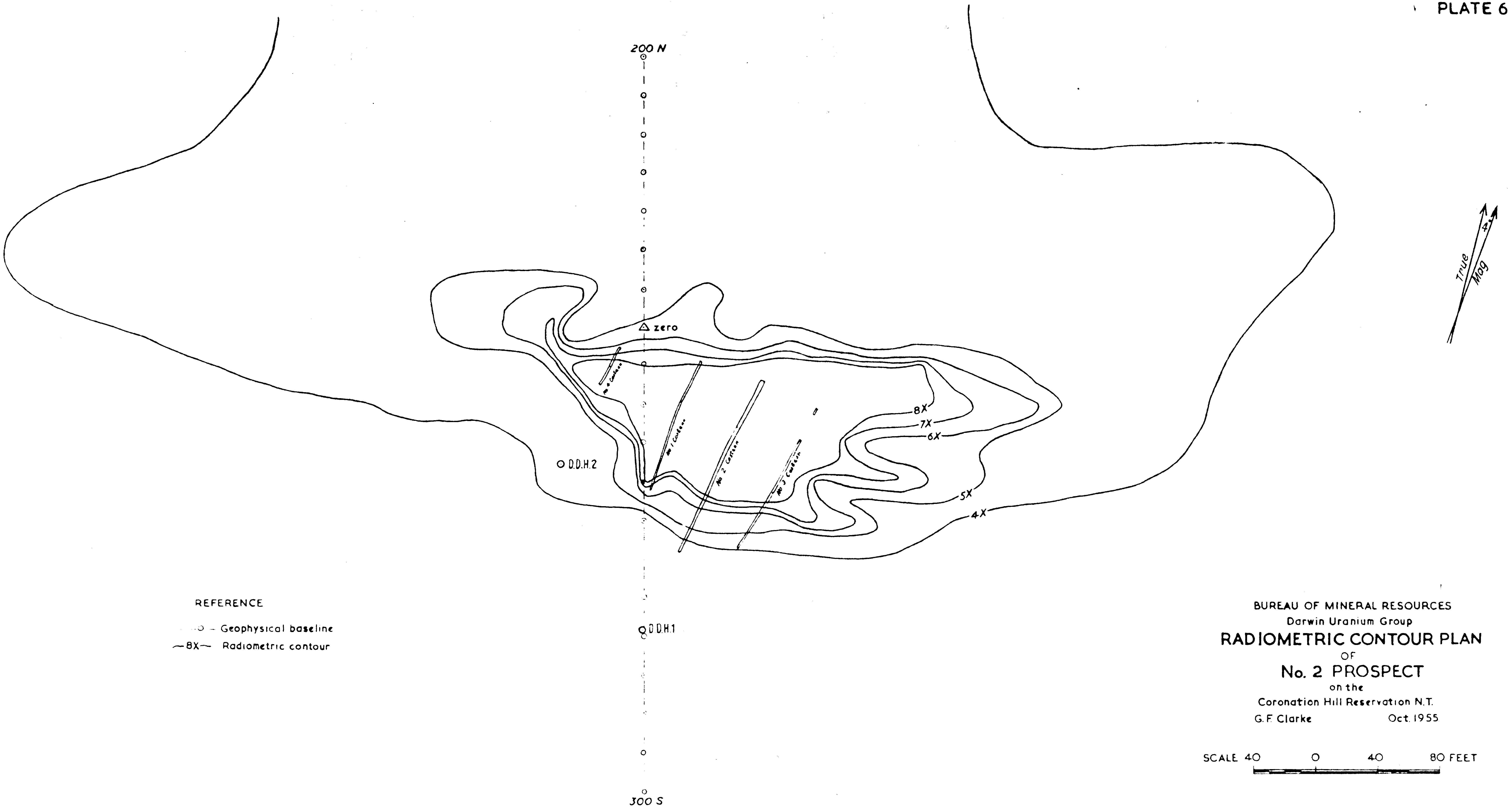
BUREAU OF MINERAL RESOURCES
Darwin Uranium Group
GEOLOGICAL PLAN

NO. 2 PROSPECT

Coronation Hill Reservation N.T.
Plane Table Survey D.B. Dow. July, 1955.

NT63-24

PLATE 6



REFERENCE

—O — Geophysical baseline

—8X— Radiometric contour

BUREAU OF MINERAL RESOURCES

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RADIOMETRIC CONTOUR PLAN

OF

No. 2 PROSPECT

on the

Coronation Hill Reservation N.T.

G. F. Clarke Oct. 1955

SCALE 40 0 40 80 FEET

NT63-20

PLATE 7

No 2 PROSPECT
REFERENCE
Silicified fault breccia
Sedimentary breccia
Counts per minute on the surface
Counts per minute on the bottom of costean
Geophysical baseline
8X Radiometric contour
1 inch vertical = 1000 cpm on 1277B Ratemeter
zero
50 S
100 S
No. 4. Costean
No. 1. Costean
No. 2. Costean
No. 3 Costean
8X
True
Mag
No 1 PROSPECT
1 Inch vertical = 100 cpm on PRM 200 Ratemeter
REFERENCE as for No 2 Prospect
25 N
zero
25 S
No. 1 Costean
BUREAU OF MINERAL RESOURCES
Darwin Uranium Group
RADIOMETRIC PROFILES OF COSTEAN NOS 1, 2, 3, 4.
at
No 2 PROSPECT
and
COSTEAN NO. 1
at
No 1 PROSPECT
on the
Coronation Hill Reservation N.T.
G. F. Clarke
Oct. 1955.
SCALE 10 0 10 20 FEET
NT63-18

BUREAU OF MINERAL RESOURCES
Darwin Uranium Group

GEOLOGICAL PLAN OF NO. 2 PROSPECT

Coronation Hill Reservation N.T.
Plane Table Survey by J Taylor August, 1955

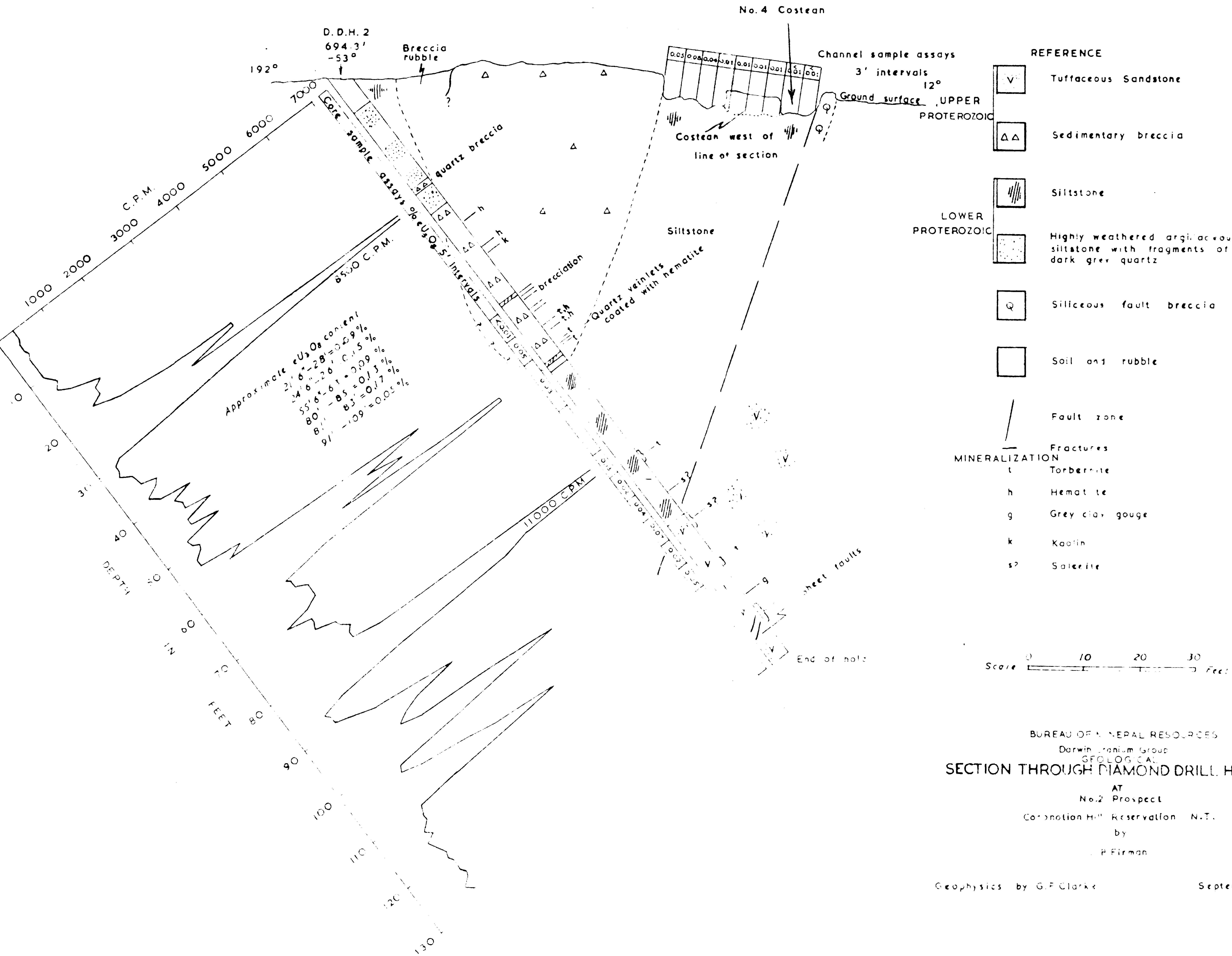
BUREAU OF MINERAL RESOURCES
Darwin Uranium Group
GEOLOGICAL

SECTION THROUGH DIAMOND DRILL HOLE No.1

AT
No.2 Prospect
Coronation Hill Reservation N. T.
BY
J.B.Firman

Geophysics by G.F.Clarke September 1955

NT63-21



BUREAU OF MINERAL RESOURCES

Darwin Uranium Group

GEOLOGICAL

SECTION THROUGH DIAMOND DRILL HOLE No. 2

AT

No. 2 Prospect

Coronation Hill Reservation N.T.

by

P. Firman

Geophysics by G.F. Clarke

September 1955.

NT 63-23