DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
MINERAL RESOURCES DIVISION

TARCOOLA - ALICE SPRINGS RAILWAY BALLAST SUPPLIES

TARCOOLA - MABEL CREEK SECTION

(Commonwealth Railways)

by

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ABSTRACT

The regional distribution of rock types suitable for ballast along this section of the route is discussed.

Suitable material occurs in the Precambrian basement rocks which outcrop between Tarcoola and Birthday Trig. Another isolated outcrop occurs at Perfection Well, but further north the basement is covered by flat-lying Mesozoic sediments of the Great Artesian Basin.

Ballast sites were selected in outcrops of Gawler Range Volcanics near Birthday Trig at the 51 km (32 mile) mark, and at Perfection Well sixteen km (ten miles) east of the proposed route at the 113 km (70 miles) mark. Diamond drilling proved 0.5 million cubic metres (0.7 million cubic yards) of high grade rock at each site, and large additional reserves exist.

Seismic and magnetic surveys north and west of Perfection Well failed to disclose occurrences of suitable material at shallow depth.

Investigation has shown that deposits of silcrete are too small, but there is a possibility of obtaining low grade material suitable for sub-ballast from gravels in Long Creek, southwest of Coober Pedy.

INTRODUCTION

Construction of a standard gauge railway between Tarcoola and Alice Springs (840 kilometres (520 miles)) is proposed to replace the existing narrow gauge track from Marree to Alice Springs (870 kilometres (540 miles)).

Ideally ballast sites are required at 80 kilometre (50 mile) intervals but a reconnaissance of possible sites along the South Australian section of the route in October 1970 showed that this would not be possible (Hiern, 1970).

In consultation with Commonwealth Railways engineering personnel, a programme of exploration and site testing was prepared as summarized below.

1. Proving of 0.4 million cubic metres (0.5 million cubic yards) of ballast in the vicinity of Birthday Trig near the 51 km (32 mile) mark.

2. Seismic surveys to locate buried extensions of the porphyry mass at Perfection Well, 16 km (10 miles) east of the proposed route at the 113 km (70 mile) mark, nearer to the proposed alignment, to be followed by proving of 0.4 million cubic metres (0.5 million cubic yards) of ballast at the best site.

3. Seismic surveys of buried basement ridges known to exist south west of Coober Pedy (177 km (110 mile) mark) and near Mabel Creek (225 km (140 mile) mark).

4. Detailed evaluation of sandstone capped mesas on Long Creek 8.0 km (5 miles) downstream from the 163 km (101 mile) mark.

5. Investigation of creek gravels between Long Creek and Mabel Creek.

Field work for this programme was carried out intermittently between January and April, 1971, and is described in this report.

GEOLOGICAL SETTING

General

The area from Tarcoola northwards to the vicinity of Perfection Well is underlain by Precambrian basement rocks of the Gawler Platform. These outcrop sporadically as low rises, and elsewhere lie at shallow depth beneath a veneer of younger sediments.

Beyond Perfection Well is the western portion of the Great Artesian Basin which contains a thick sequence of upper Palaeozoic and Mesozoic sediments capped by thin accumulations of Tertiary and younger materials.

Buried basement ridges are known to occur at relatively shallow depth west of Coober Pedy and in the vicinity of Mabel Creek.

Precambrian basement rocks of the Gawler Platform (see plan 72-741)

Systematic mapping of the poorly exposed basement rocks of the Gawler Platform has not yet been undertaken and only the broad geological framework is known. The oldest rocks outcropping are meta-sediments of Lower Proterozoic age which include iron formations described by Whitten (1958, 1968).

Tectonic movements in Middle Carpentarian times were accompanied by widespread intrusion of granite, examples of which can be seen at Gibraltar rocks and other localities in the vicinity of Carnes Station.

The Tarcoola Beds (Whitten, 1968), overlie the meta-sediments and granites and outcrop in the vicinity of Tarcoola as a flat dipping sequence of conglomerate, sandstone, slate and dolomite. The existing ballast quarry at Tarcoola is developed on a dolomite member of this sequence.

An extensive sheet of extrusive rhyolitic rocks known as the Gawler Range Volcanics forms the Gawler Range to the south of Tarcoola. Isolated outcrops of these rocks and fine grained granite possibly associated with them occur north of Tarcoola. The Birthday and Perfection Well sites are located in porphyritic rhyolites of this type.

Buried basement ridges located west of Coober Pedy and near Mabel Creek have been detected during oil exploration activities in the Artesian Basin. Detailed exploration associated with the ballast search showed the shallowest of these to be the Coober Pedy Ridge, but the highest point on it, in the vicinity of the proposed railway, lies approximately 32 m (104 ft) below th surface.

Sediments of the Artesian Basin (see plans 72-741 and 72-742)

The sequence in the Artesian Basin proper comprises Permian clays, siltstones and sands (Ludbrook, 1961) overlain by Mesozoic sandstones and shales.

The basal Mesozoic Unit is the Algebuckina Sandstone of upper Jurassic age, consisting predominantly of cross-bedded white kaolinitic sandstone and conglomeratic sandstone. The Mesozoic sediments lap onto the Gawler Platform, and kaolinitic sandstone with boulder beds believed to be the equivalent of the Algebuckina Sandstone is common in water storage dams around Ingomar Station. Similar sediments have been intersected in water bores as far south as Birthday Trig.

Lower Cretaceous sediments overlying the Algebuckina Sandstone in the basin proper are the Cadna-owie Formation and the Bulldog Shale. In the Lake Phillipson-Kingoonya area the Cadna-owie Formation is represented largely by the Mount Anna Sandstone Member (Wopfner et al., 1970).

Cainozoic Sediments and Rocks

A sequence of sands and gravels of Tertiary age occurs near Marree and have been named the Murnpeowie Formation (Forbes, 1966). Thin beds of similar lithology are widespread in the Artesian Basin and are believed to be equivalent to the Murnpeowie Formation.

Rocks formed by secondary silicification occur extensively in the Artesian Basin, including the area along the proposed railway route. Silcrete represents silicification on a mature Tertiary land surface, and is commonly developed on mesas and breakaways underlain by Tertiary and some Mesozoic rocks. Porcellanite (silicified claystone) often underlies silcrete. Coloured jaspers occur at various positions in the landscape, and possibly represent later silicification of reworked material.

Gibber plains with their distinctive carpet of rounded silcrete pebbles extend from Robin Rise northwards beyond Mabel Creek, while to the south red sand spreads and dunes occur.

Creek beds are filled with locally derived alluvial material, and gravels containing various size ranges occur in some stream channels which dissect the gibber plains.

BALLAST SOURCES

General Considerations

Although a variety of durable rocks occur along the section of the route considered in this report, many are unsuitable for ballast sources on account of location or other factors. The following is a resume of the general ballast potential. Localities referred to below are shown on plans 72-741 and 72-742.

The dolomite quarry at Tarcoola has provided good quality ballast for use on the Trans-Australian railway for several years and the deposit is reported to contain adequate reserves for the first section of the proposed railway. Quartzite and other rocks in the vicinity of Tarcoola are alternative sources.

Gawler Range Volcanics at Birthday Trig and Perfection Well have been investigated in detail and are described in a later section of this report.

Granite outcrops in the area between Tarcoola and Birthday Trig are coarse-grained and would require thorough laboratory testing before their suitability for use as ballast could be established. The outcrops are unstressed and almost completely free of joints, and would therefore be expensive to quarry. The Birthday site is preferred on account of its location.

Commonwealth Hill, 9 km (5.5 miles) west of the proposed route at the 95 km (60 mile) mark is comprised of iron formation. Whitten (1958) evaluated the deposit as a source of iron ore, and estimated about 10 million tons (10.16 million tonnes) to exist to a depth of 30 metres (100 feet) below the hill crest. The rock is a banded haematite quartzite, which from surface exposure appears to be suitable for ballast.

Jack (1931) reported basement gneiss beneath a capping of silcrete in a northerly-trending breakaway ridge approximately 13 km (8 miles) west of the route between the 95 and 110 km (60 and 68 mile) marks. Only weathered gneissic rock was seen during a brief inspection of the area.

Silcrete is the only rock type with suitable physical characteristics in the area north of Perfection Well. Deposits in the Stuart Range escarpment at Coober Pedy, (34 km (21 miles) east of the route) contain large quantities in a capping up to 2 m (6 ft 6 in) thick, but along the route silcrete generally occurs only in small isolated masses of insufficient quantity for this project.

A more extensive development of silicified sandstone, genetically equivalent to silcrete, was tested by drilling at Long Creek (163 km (101 mile) mark), but was shown to be too small. This part of the investigation is described in greater detail in a later section.

Porcellanite and jasper are hard, brittle rocks of low density, which are physically unsuitable for use as ballast.

The gibber plains contain large total quantities of hard, durable rock, but the deposits have many deficiencies as a source of ballast. The gibbers, comprised mainly of silcrete, form a pavement only one stone thick lying on parent red clay soils which contain only occasional stones. While techniques could no doubt be developed to "harvest" the stone pavement, a severe dust problem would be created until the surface once more became stable. In addition to problems in winning, the product would be generally less than 2.5 cm (1 inch) in size, consisting of rounded, polished material.

Creek gravels occur in some of the streams draining through the gibber plains. The largest deposit and hardest material occurs in the Long Creek area, where the route is nearest to the Stuart Range escarpment. The

deposits are of variable particle size, but the coarsest deposits lie adjacent to outcrops of silcrete. A more detailed evaluation of creek gravels is given in a later section of this report.

Site Investigations

Birthday Site

The proposed railway crosses the eastern edge of a group of low hills approximately 50 km (30 miles) north of Tarcoola. Birthday Trig is located on the highest point. Access is gained by bush track which turns south off the Bulgunnia Homestead - Carnes Outstation graded track 6 km (3.75 miles) east of Carnes Outstation.

The hills are underlain by Gawler Range Volcanics and fine grained granite. Many topographically suitable ballast sites exist.

A site was selected for detailed testing on a low rise near pegs 292 & 293 on the surveyed trial line (see plan 72-6). The final location of the railway is expected to be approximately 400 metres (440 yards) east of the trial line. At this site a quarry opened from the south-western side would be out of view from the main line. Crushers and stockpiles could be established to the north of the quarry and a spur line could be run to the main track around the northern nose of the rise.

A stadia survey was carried out by J. Erkelens and the author between 17/3/71 and 19/3/71, and three diamond core holes were drilled between 24/3/71 and 4/4/71. Logs of these holes are shown in Appendix 4.

Outcrop at the site is hard, red-brown quartz porphyry. Inspection of outcrops and diamond drill cores shows well developed closely spaced jointing which will facilitate breakage in quarrying.

Overburden is almost non-existent and the drilling showed fresh rock from the surface downwards.

Reserves are large. A quarry opened in the area outlined on plan 72-6 to a depth of 20 metres (65 feet) would provide over ½ million cubic metres (0.7 million cubic yards) of ballast, and reserves extend outside of the area shown.

Los Angeles abrasion and sulphate soundness tests were carried out in the Highways Department testing laboratories on a size range approximating the specification for ballast (i.e. +¼" - 1¼"). Results are tabulated below.

Birthday Drill Site Hole Number	Depth of Drill Hole	Depth of Sample	% Loss (L.A. Test)	% Loss (Sulphate Soundness Test
DDH1	19.81 m	16.15-19.30 m	19	-
DDH3	19.81 m	6.25- 9.30 m	19	0.9

Samples were submitted to the Australian Mineral Development Laboratories, and petrological reports show no deleterious minerals (see Appendix 6).

Investigation of the site showed that large reserves of high quality ballast exist suitably located near the railway.

Perfection Well Site

A low rise underlain by quartz-feldspar porphyry occurs at Perfection Well located 16 km (10 miles) east of the 113 km (70 mile) mark on the proposed railway.

Examination of aerial photographs and ground reconnaissance of the surrounding area failed to locate any other surface outcrops closer to the railway alignment.

Seismic surveys were carried out in the area between Perfection Well and the alignment to locate porphyry under shallow cover. This work, described in detail by Nelson (1971a) outlined a basement ridge extending WNW from Perfection Well at depths estimated to range from 20.7 metres (68 feet) downwards.

Seven exploratory holes were drilled with a Mayhew rig (see plan 72-144). The shallowest intersection of porphyry was 20.4 metres (67 feet) in a hole only 5 km (3.1 miles) west of the outcrop.

A stadia survey of the Perfection Well outcrop was carried out by J. Erkelens and the author between 22/3/71 and 23/3/71 at the site shown on plan 72-5. Three diamond core holes were drilled between 7/4/71 and 16/4/71. Logs are given in Appendix 4.

The rock at Perfection Well is generally similar to that at Birthday, but joint spacing is broader, and the rock shows less tendency to break along the joint planes.

Fairly abundant soil cover occurs over the western end of the mass, but at the site tested, overburden is almost non-existent. As at Birthday, drilling showed no weathered zone, although inspection of the well on the flats adjoining the porphyry mass showed deep weathering. Reserves to a depth of 20 metres (65 feet) in the area outlined on plan 72-5 amount to ½ million cubic metres (0.7 million cubic yards). Large reserves extend beyond the area tested.

Los Angeles abrasion and sulphate soundness tests were carried out in the Highways Department testing laboratories, on a size range approximating to the specification for ballast (i.e. +¼" - 1¼"). Results are tabulated below.

Perfection Well Drill Site Hole Number	Depth of Drill Hole	Depth of Sample	% Loss (L.A. Test)	% Loss (Sulphate Soundness Test)
DDH1	19.81 m	10.12-13.11 m	25	-
DDH3	19.60 m	10.08-11.21 m	23	0.1

Samples were submitted to the Australian Mineral Development Laboratories and petrological examination revealed no deleterious minerals (Appendix 6).

The site is 16 km (10 miles) east of the proposed railway and it seems probable that crushed rock will be hauled by road.

Gritty, white kaolinitic material (weathered porphyry) which can be seen in the well could easily be won by a bulldozer. This material, with its high clay content would make a good binder to crusher or quarry rubble, and woul provide a reasonably good wearing but dusty surface for a road to the railway alignment.

Basement Ridges North of Perfection Well

Earlier seismic work had shown the presence of basement ridges in the area north of Perfection Well (Milton, 1969). However this work was on a region scale, and more detailed surveys were undertaken to map the relief of the ridges in the vicinity of the proposed railway. Seismic profiling was supported by reconnaissance magnetometer traverses.

The work is described in detail by Nelson (1971b) and is summarized below. Logs of all seismic shot holes are attached in Appendix 1.

Robin Rise area

"Nothing that could be regarded as shallow crystalline basement" was found in traverses over the basement high located 20 km (13 miles) southwest of Robin Rise. (174 km (97 mile) mark).

Coober Pedy Basement Ridge (see plan 71-689)

Traversing of the ridge in the vicinity of the proposed railway indicated the shallowest basement rock to lie at a depth of at least 30.5 metres (100 ft).

A rotary air hole (MCP1) drilled at this point intersected basement at 31.7 metres (104 feet) beneath 10.1 metres (33.1 feet) of Quaternary sandy soil and 21.6 metres (71.0 feet) of conglomeratic sandstone equated with the Algebuckina Sandstone of Jurassic age.

Petrographic examination by the Australian Mineral Development Laboratories described the rock as a "coarsely crystalline rock of adamellite composition". (see Appendix 5). Only 2.6 metres (8.5 feet) were penetrated by the drill, the lower 1.4 metres (4.6 feet) being unweathered and suitable for ballast.

However, the presence of 32 metres (104 feet) of overburden is prohibitive. The drill hole demonstrated the reliability of the seismic depth estimates.

Mabel Creek Basement Ridge

Seismic and magnetometer traverses were carried out in two areas (see plan 71-690) but younger cover appears to be 90 metres (295 feet) and thicker. Nelson (1971b) considered that there was little prospect of suitable ballast sites being located in the area.

Long Creek Silicified Sandstone

Several low mesas capped by hard silicified sandstone were located in Long Creek 8.0 km (5 miles) downstream from the proposed railway (163 km (101 mile) mark) during the initial reconnaissance.

Further ground reconnaissance and aerial photograph interpretation showed the original discovery to be the best development of the capping in the area. The mesas were mapped on an enlarged aerial photograph, and this detailed work indicated that the massive, continuous capping was restricted to the frontal areas of each mesa adjacent to Long Creek, with the more distant (and larger) areas comprised mainly of silcrete rubble.

Thirteen test holes were drilled with a rotary-air rig at locations shown on plan 71-856. Rapid penetration was possible using only a tricone bit in eleven of the holes, confirming the conclusions reached from mapping.

Logs of holes MLC1 to MLC13 are shown in Appendix 4.

A preliminary estimate showed approximately 10 000 cubic metres (13 000 cubic yards) of silicified sandstone to occur in the three mesas mapped. However, large quantities of soil and silcrete pebbles less than 5 cm (2 inches) in diameter would be quarried in winning this volume. The deposit is considered to be uneconomic, and no laboratory testing of samples was carried out.

Creek Gravels

Gravels of varying lithology and grain size occur in streams dissecting the gibber plains. Reconnaissance of the proposed railway route between Robin Rise and Mabel Creek showed the best development in respect to grading and quantity, to occur in the Long Creek area west of Coober Pedy.

The grading varies considerably in these creeks, the coarsest material accumulating in the near vicinity of thick silcrete masses in the banks of a creek.

Specifications given during the time of this investigation required a large proportion of the gravel to be in excess of 5 cm (2 inches). Only small areas of this size gravel were located.

More recently it has been proposed that gravel down to 6 mm (¼") could be used as temporary ballast. The Long Creek gravels were investigated by bulldozing and sampling of trenches under the supervision of R. Jeune of the Engineering Geology Section of the Geological Survey, who reports that up to ½ million cubic metres (0.7 million cubic yards) of gravel could be extracted from a length of 21 kilometres (13 miles) of Long Creek but probably over 70% of this would be wastage below 6 mm (¼").

SUMMARY AND CONCLUSIONS

Crystalline basement rocks provide the best ballast in terms of

quality and available quantity along the portion of the route investigated. However, outcrops are confined to the section of the route south of Perfection Well (0 to 113 km (0-70 miles)).

Geological and geophysical investigation of buried basement rocks west of Perfection Well and north of Robin Rise did not locate any deposits close enough to the surface to permit working.

Silicified Tertiary and younger rocks are the only potential source of ballast materials north of Robin Rise. Of these, silcrete is physically suitable, but porcellanite and various jaspers are too light and brittle to be considered for use.

The dolomite quarry at Tarcoola was not included in the investigation described in this report but is expected to provide suitable ballast for the first section of the railway. Other alternative sources exist at Tarcoola.

Testing of sites at Birthday (51 km (32 miles)) and at Perfection Well (113 km (70 miles)) has shown large quantities of high quality ballast to exist. Diamond drilling has shown that no surface weathering has occurred, and the sites are free of overburden.

Silcrete occurs as a residual capping to breakaways and small mesas, in a stone pavement on the gibber plains, and as gravel in some creeks which dissect the gibber plain country. The largest development of silcrete residuals adjacent to the proposed route is along Long Creek 8 km (5 miles) downstream from the proposed railway. Evaluation showed that the capping is not continuous even at this site, and only about 10 000 cubic metres (13 000 cubic yards) of material are present. This volume lies in a formation containing a large quantity of soil and small fragments.

Long Creek contains the largest amounts of creek gravel in the area, and is the only one which offers any potential as a ballast source. Preliminary sampling has shown wide variation in grading along the 21 km (13 miles) of

creek bed investigated but the deposits have some potential as a source of temporary or bottoming ballast. Further investigation is necessary.

The gibber plains contain large quantities of durable rock in the form of silcrete pebbles and some boulders. However, this material occurs in a surface pavement only one stone thick, and serious problems in winning exist.

The best development of the residual silcrete capping is in the Stuart Range escarpment some distance to the east, and investigation of this area is recommended if it is considered essential to have a source of ballast in the vicinity of Mabel Creek.

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BIBLIOGRAPHY

Anderson, E., 1949. Report on the geology and hydrology of the area north and north-west of Tarcoola. Dept. Mines S.Aust. Rept.Bk.No. 25/117 (unpublished).

Forbes, B.G., 1966. The geology of the Marree 1:250 000 map area. Dept. Mines S.Aust. Report of Investigations No. 28.

Hiern, M.N., 1970. Reconnaissance survey of ballast sources Tarcoola - Alice Springs standard gauge railway, Tarcoola - Kulgera Section. Dept. Mines S.Aust. Rept.Bk.No. 70/191 (unpublished).

Jack, R.L., 1931. Report on the geology of the region to the north and north-west of Tarcoola. Bull. geol. Surv. S.Aust. 15.

Jessup, R.W., 1951. The soils, geology and vegetation of northwestern South Australia. Trans. Roy. Soc. S.Aust., 74, pp. 189-273.

Jessup, R.W. and Norris, R.M., 1971. Cainozoic stratigraphy of the Lake Eyre Basin and part of the arid region lying to the south. J. Geol. Soc. Aust., 18(3) pp. 303-331.

Ludbrook, N.H., 1961. Permian to Cretaceous subsurface stratigraphy between Lake Phillipson and the Peake and Denison Ranges, South Australia. Trans. Roy. Soc. S.Aust., 85. pp. 67-80.

Milton, B.E., 1969. Western Arckaringa Basin. Depths to basement from seismic investigations. Quart. geol. Notes geol. Surv. S.Aust. 32.

Nelson, R.G., 1971a. Tarcoola - Alice Springs railway ballast seismic survey. Report No. 1: The Perfection Well area, in Ingomar and McDouall 1:63 360 sheet areas. Dept. Mines S.Aust., Rept.Bk.No. 71/57 (unpublished).

Nelson, R.G., 1971b. Tarcoola - Alice Springs railway ballast seismic survey. Report No. 2: Robin Rise to Mabel Creek. Dept. Mines S.Aust. Rept. Bk.No. 71/127.

Parkin, L.W. (Editor), 1969. Handbook of South Australian Geology Geological Survey of South Australia. Adelaide.

Thomson, B.P., 1970. A review of the Precambrian and Lower Palaeozoic tectonics of South Australia. Trans. R.Soc. S.Aust. 94 pp. 193-221.

Whitten, G.F., 1958. Iron ore deposits and aeromagnetic anomalies near Tarcoola. Mining Review Adelaide 108 pp. 22-27.

Whitten, G.F., 1966. Suggested correlation of iron ore deposits in South Australi Quart. geol. Notes, geol. Surv. S.Aust., 18 pp. 7-11.

Whitten, G.F., 1968. Type Section of Iron Formations, Tarcoola District. Quart. geol. Notes, geol. Surv. S.Aust., 26.

Wopfner, H., Freytag, I.B., and Heath, G.R., 1970. Basal Jurassic - Cretaceous rocks of the western Great Artesian Basin, South Australia: stratigraphy and environment. Bull. Am. Ass. Petrol. Geol. 54(3) pp. 383-416.

TARCOOLA-ALICE SPRINGS RAILWAY BALLAST SURVEY

APPENDIX I

SEISMIC SHOT-HOLE DRILLING

DESCRIPTION OF BOTTOM-HOLE SAMPLES

TARCOOLA-ALICE SPRINGS RAILWAY BALLAST SURVEY
SEISMIC SURVEY, PERFECTION WELL AREA

DESCRIPTION OF BOTTOM HOLE SAMPLES FROM SHOT HOLES

FOR LOCATION OF HOLES REFER TO PLAN 72-144

SEISMIC SPREAD	DRILLER'S NOTATION	DEPTH	DESCRIPTION
MTA1	PW1	5.5 m	Pale brownish-red quartz sand. Medium grained with subrounded to sub-angular quartz grains from 1 mm to 3 mm diameter. Silcrete fragments.
MTA2	PW2	5.5 m	Red, sandy silty soil, cemented in parts by white carbonate. Some calcrete rubble.
MTA3	PW3	5.5 m	Red and brown ferruginous silty sandy soil and hard, silcrete rubble.
MTA4	PW4	5.5 m	Fine off-white to very pale pink silty quartz sand with 45% subangular to angular quartz grains up to 1½ mm diameter.
MTA5	PW5	10.4 m	Off-white to very pale pink silty quartz sand with 50% sub-rounded to angular quartz grains up to 3 mm diameter.
MTA6	PW6	10.4 m	Off-white to pale grey very clayey, silty sand. Poorly sorted. Contains 45-50% sub-rounded to angular quartz grains up to 3 mm diameter.
MTA7	PW7	10.4 m	Fine, soft pale grey to off-white shale.
MTA8	PW8	15.2 m	Pale grey to off-white soft clayey sandy silt.
MTA9	PW9	15.2 m	Soft, pale grey clayey slightly sandy silt.
MTA10	PW10	7.6 m	Off-white to pale pink silty, clayey quartz sand with sub-rounded to angular quartz grains up to 3 mm diameter. Carbonate rubble.
MTA11	PW11	5.5 m	Medium to dark grey shale.
CDA1	CD1	10.4 m	Soft, pale grey to off-white shale.
CDA2	CD2	10.4 m	Coarse grey silty sand. Consits of 80% sub-rounded to angular quartz grains up to 3 mm diameter, in fine grey silty clay matrix.
CDA3	CD3	10.4 m	Fine, soft, pale grey shale.
CDA4	CD4	7.6 m	Olive-green to grey green shale.
CDA5	CD5	?	Fine, pale brown silty sand with sub-rounded to angular quartz grains up to 1½ mm diameter.

SEISMIC SPREAD	DRILLER'S NOTATION	DEPTH	DESCRIPTION
CDA6	CD6	4.0 m	Red sandy soil with minor carbonate.
WDB1	WDB1	5.5 m	Red, ferruginous cemented silty sand.
WDB2	WDB2	5.5 m	Pale grey to off-white very clayey quartz sand with sub-rounded to angular quartz grains up to 1½ mm diameter.
WDB3	WD3	5.5 m	Dark grey-brown sandy silt containing 15-20% sub-rounded to angular quartz grains up to 3 mm diameter.
WDB4	WD4	15.2 m	Dark to medium grey sandy clay containing 20% sub-rounded to angular quartz grains up to 3 mm diameter.
PWA1	PWA1	7.6 m	Ferruginous, red silty sand, cemented in part by carbonate. Fairly abundant brown and white calcrete rubble.
PWA2	PWA2	4.9 m	Brown ferruginous soil with abundant silcrete fragments.
PWA3	PWA3	5.5 m	Brown ferruginous soil with abundant silcrete fragments.
PWA4	PWA4	10.4 m	Moderately soft, pale grey to off-white shale.

TARCOOLA-ALICE SPRINGS RAILWAY BALLAST SURVEY

SEISMIC SURVEY: COOBER PEDY RIDGE AREA

DESCRIPTION OF BOTTOM HOLE SAMPLES FROM SHOT HOLES
FOR LOCATION OF HOLES REFER TO PLAN 71-689

SEISMIC SPREAD	DRILLER'S NOTATION	DEPTH	DESCRIPTION
CPA1	CP1	6.1 m	Soft pale grey shale with gypsum crystals up to ½" diameter.
CPA1	CP2	5.5 m	Red sandy, silty soil with rubbly silcrete fragments, and fragments of pale grey, gypsum impregnated shale.
CPA2	CP3	5.5 m	Fine red silt with abundant gypsum and occasional small rounded silcrete fragments.
CPA3	CP4	5.5 m	Pale to medium grey shale with abundant coarsely crystalline gypsum.
CPA4	CP5	5.5 m	Fine red silty soil with abundant chips of hard, brittle, red white and grey jaspery silicified shale.
CPA5	CP6	5.5 m	Fine red silty soil with chips of hard, brittle, red, white and grey jaspery silicified shale.
CPA6	CP7	5.5 m	Fine red silty soil with abundant chips of hard, brittle, red, white and grey jaspery silicified shale.
CPA7	CP8	5.5 m	Pale to medium grey shale with some red shale fragments. Some coarsely crystalline gypsum. Fragments of grey and white jaspery silicified shale.
CPA8	CP9	5.5 m	Moderately soft, pale grey shale impregnated by coarsely crystalline gypsum.
CPA9	CP10	5.5 m	Moderately soft, pale grey shale.
CPA10	CP11	5.5 m	Moderately soft, pale grey shale impregnated by medium to coarsely crystalline gypsum.
CPA11	CP12	5.5 m	Moderately soft pale grey shale impregnated by medium to coarsely crystalline gypsum.
CPA12	CP13	5.5 m	Fine red silt with some pale grey gypsum - impregnated shale fragments.
CPA13	CP14	5.5 m	Fine red silt with some silcrete and red and white jasper rubble.

SEISMIC SPREAD	DRILLER'S NOTATION	DEPTH	DESCRIPTION
CPB5/CPA14	CP15	5.5 m	Fine red silty soil with some silcrete and red and white jasper rubble.
CPA15	CP16	5.5 m	Fine pale brownish red silty soil with fragments of pale grey shale and silcrete and red and whi jasper rubble.
CPA16	CP17	5.5 m	Fine, brownish red silty soil with fragments of silcrete and red and white jasper rubble.
CPA17	CP18	5.5 m	Fine, brownish red silty soil with silcrete rubl
CPA18	CP19	5.5 m	Fine brownish red silty soil with silcrete rubb
CPA19	CP20	5.5 m	Fine, pale grey soft shale with some brownish r silt and silcrete rubble.
CPA20	CP21	5.5 m	Fine, soft pale brownish grey silty shale impregnated by crystalline gypsum. Silcrete rubble.
CPA21	CP22	5.5 m	Fine red silty soil with silcrete rubble.
CPA22	CP23	5.5 m	Fine, pale brownish-grey soft silty shale with silcrete rubble and some fine red silt.
CPA23	CP24	5.5 m	Fine red silty soil with abundant silcrete rubb and red and white jasper rubble.
CPB4	CP25	5.5 m	Fine, reddish-brown gypsum-impregnated silt and shale with rubble, of silcrete and red and whit jasper.
CPB3	CP26	5.5 m	Fine, pale orange-brown silty shale impregnated by coarsely crystalline gypsum.
CPB2	CP27	5.5 m	Soft, pale grey to off-white shale impregnated by medium to coarsely crystalline gypsum.
CPB1	CP28	5.5 m	Soft pale grey to off-white shale with some red silt and jasper and silcrete rubble.
CPB6	CP29	9.1 m	Predominantly hard, brittle, pale grey jasper (silicified shale) with some brown and red and white mottled jasper.
CPB7	CP30	7.9 m	Grey, brown and red jasper (silicified shale) hard, brittle.
CPB8	CP31	9.1 m	Fine, pale reddish grey silty shale with some fine red silt and abundant grey, brown and red jasper fragments.

SEISMIC SPREAD	DRILLER'S NOTATION	DEPTH	DESCRIPTION
CPB9	CP32	7.3 m	Fine pale to medium grey silty shale, and abundant grey, brown and red brittle jasper fragments.
CPB10	CP33	9.1 m	Fine, soft, pale grey shale with some pale orange-brown ferruginous staining in parts.
CPB11	CP34	7.6 m	Fine, soft pale grey shale with some pale orange-brown ferruginous staining in parts. Some silcrete and jasper rubble.
CPC4	CP35	9.1 m	Fine red silty soil with abundant silcrete rubble and pale grey shale fragments.
CPC3	CP36	9.1 m	Red silty soil with silcrete rubble and fragments of brown, white and grey jasper.
CPC2	CP37	9.1 m	Fine orange-brown silt with quartz grains to 2 mm diameter and some silcrete fragments.
CPC1	CP38	9.1 m	Fine reddish-brown silt with abundant rounded rubbly fragments of silcrete, and red-brown and pale grey jasper.
CPC6	CP39	9.1 m	Moderately soft pale grey shale with some patchy pale orange-brown ferruginous staining.
CPC7	CP40	9.1 m	Moderately soft, pale grey shale. Some fine red silt and silcrete rubble.
CPC8	CP41	9.1 m	Moderately soft, pale grey shale with some patchy pale orange-brown ferruginous staining.
CPC9	CP42	9.1 m	Pale grey and white shale. Some pale reddish brown silt with rubble of silcrete and brown, red and white jasper.
CPD1	CP43	5.5 m	Red silty soil with abundant silcrete rubble and rubbly red, white and brown jasper.
CPD2	CP44	5.5 m	Fine, very pale reddish-brown silt with abundant fragments of predominantly white with some red and brown jasper (silicified shale).
CPD3	CP45	9.1 m	Soft, pale grey shale impregnated by coarsely crystalline gypsum.
CPD4	CP46	9.1 m	Soft pale grey shale impregnated by coarsely crystalline gypsum.

SEISMIC SPREAD	DRILLER'S NOTATION	DEPTH	DESCRIPTION
CPD6	CP47	5.5 m	Fine, very pale reddish brown silt with abundant pale brown, pale red, and grey silty shale fragments and white and pale brown jasper (silicified shale) fragments. Some silcrete rubble.
CPD7	CP48	9.1 m	Pale brown, grey and off-white silty shales. Minor purplish red staining.
CPD8	CP49	5.5 m	Soft brown sandy silt with 40% sub-angular to angular quartz grains up to 2 mm diameter.
CPD9	CP50	-	Missing.
LKA1	CP88	5.5 m	Pale grey slightly silty gypsum-impregnated shale with some brown staining.
RGA1	CP89	5.5 m	Pale grey gypsum-impregnated shale with brown staining.
JAA1	CP90	5.5 m	Pale grey, brown and red silty shales with abundant fragments of hard brittle grey, brown, red and white jasper (silicified shale).
GTA1	CP91	9.1 m	Pale grey shale with some gypsum. Fragments of hard, brittle, pale grey, brown and red jasper (silicified shale).
GTA2	CP92	5.5 m	Hard, brittle, white jasper (silicified shale).

TARCOOLA-ALICE SPRINGS RAILWAY BALLAST SURVEY
MABEL CREEK SEISMIC SURVEY - FEB. 1971

DESCRIPTION OF BOTTOM HOLE SAMPLES FROM SHOT HOLES
FOR LOCATION OF HOLES REFER TO PLAN 71-690

SEISMIC SPREAD	DRILLER'S NOTATION	DEPTH	DESCRIPTION
LWA1	CP51	9.1 m	Pale grey to off-white bleached shale.
LWA2	CP52	9.1 m	Fine, soft, pale brown and red silts with some rubbly semi-indurated mod. soft silt fragments.
LWA3	CP53	9.1 m	Fine, soft, red silts with jasper and white silicified shale fragments.
LWA4	CP54	9.1 m	Moderately soft pale grey shale.
LWA5	CP55	5.5 m	Spotted red and white jasper and white silicified shale.
LWA6	CP56	5.5 m	Fine red silt with semi-indurated ferruginous patches and fragments of white silicified shale.
LWA7	CP57	5.5 m	Fine red silt with rubbly, rounded pebbles and angular fragments of silicified shale and spotted red and white jasper.
LWA8	CP58	5.5 m	Moderately soft bleached white and pale grey shal
LWA9	CP59	5.5 m	Fine red silt - patchily silicified to form rubbly white, and red and white spotted jasper.
LWA10	CP60	5.5 m	Soft, fine pale grey to off-white bleached shale.
RNA1	CP61	5.5 m	Fine red silt almost completely silicified to red and red and white spotted jasper.
RNA2	CP62	5.5 m	Mottled, white, pale grey and off-white jasper (silicified silts and shale).
RNA3	CP63	5.5 m	Red and white spotted jasper - almost completely silicified red silt with fine white silicified shale fragments.
RNA4	CP64	5.5 m	Mottled white and grey jasper with some patchy red and white spotted jasper.
RNA5	CP65	5.5 m	Mottled white and grey jasper with some patchy red and white spotted jasper.

SEISMIC SPREAD	DRILLER'S NOTATION	DEPTH	DESCRIPTION
RNA6	CP66	5.5 m	Red and white spotted jasper - almost completely silicified red silt with fine white silicified shale fragments.
RNA7	CP67	5.5 m	Mottled white, grey and off-white jasper with some patchy red and white spotted jasper.
RNA8	CP68	5.5 m	Fine orange and red silt patchily silicified to red and white spotted jasper.
RNA9	CP69	5.5 m	Pale grey to off-white jasper.
RNA10	CP70	5.5 m	Fine red silt patchily silicified to buff and red jasper.
RNA11	CP71	4.9 m	Mottled grey and off-white jasper with some red and white spotted jasper fragments.
RNA12	CP72	5.5 m	Fine buff to pale red silt with buff, brown and pale red silicified jaspery fragments.
RNA13	CP73	5.5 m	Predominantly brown to buff silicified jasper with some red and white fragments.
RNA14	CP74	5.5 m	Pale grey, off-white and red and white spotted jasper.
JHA1	CP76	5.5 m	Fine red and grey silts silicified to red, white and grey jasper.
WCW10	CP75	5.5 m	Pale grey jasper.
JHA2	CP77	5.5 m	Fine red silt patchily silicified to buff, and pale red, and red and white spotted jasper.
JHA3	CP78	5.5 m	Rubbly off-white pink and red patchy jasper.
JHA4	CP79	5.5 m	Fine red silt with fragments of white, off-white and red jasper.
JHA5	CP80	5.5 m	Pale brown, buff and white fine silts patchily silicified to pale brown, buff and white jasper.
JHA6	CP81	5.5 m	White silicified shale and jasper.
JHA7	CP82	5.5 m	Pale brown and buff fine silts, patchily silicified to pale brown, buff, white and red jasper.
JHA8	CP83	5.5 m	Pale brown and buff fine silts, patchily silicified to pale brown, buff, white and red jasper.

SEISMIC SPREAD	DRILLER'S NOTATION	DEPTH	DESCRIPTION
JHA9	CP84	5.5 m	Pale brown and buff fine silts, patchily silicifie to pale brown, buff, white and red jasper.
JHA10	CP85	5.5 m	Red, white and off-white silicified silts (jasper) with some fine red silt.
GG1	CP86	5.5 m	Predominantly white and pale grey patchily silicified silts (jasper).
GG2	CP87	-	Sample missing.

TARCOOLA-ALICE SPRINGS RAILWAY

APPENDIX II

SEISMIC SURVEY

LOGS OF FOLLOW-UP ROTARY AIR DRILLING

PERFECTION WELL AREA AND

COOBER PEDY BASEMENT RIDGE

SHEET 1. OF 2. | HOLE Nº | MWD1

AGE	DEPTH m	LOG	DESCRIPTION
QUATERNARY			0·00 to 0·46m — RED AEOLIAN SAND
			0·46 to 3·05m — PALE BROWN CLAYEY SOIL with occasional calcareous mottles and gypsum crystals.
MESOZOIC			3·05 to 3·66m — FINE WHITE SILTY CLAY.
			3·66 to 4·12m — PALE GREY MOIST CLAY.
	5		4·12 to 5·79m — OFF-WHITE CLAYEY SAND. 70% sub-rounded to angular quartz in fine off-white silty clay matrix.
			5·79 to 7·01m — PALE GREY TO OFF-WHITE CLAY.
			7·01 to 7·32m — MOTTLED WHITE AND MUSTARD YELLOW CLAY.
			7·32 to 10·06m — MUSTARD YELLOW SLIGHTLY SANDY CLAY.
	10		10·06 to 10·52m — PALE YELLOW SLIGHTLY SANDY CLAY.
			10·52 to 13·72m — VERY DARK BROWN MOIST CLAY with 1-2% fine quartz grains up to 1mm diameter. Becomes grey with depth.
	15		13·72 to 21·34m — PALE TO MEDIUM GREY SILTY, SLIGHTLY SANDY CLAY with 4-5% sub-angular to angular, clear and milky quartz grains up to 2mm in diameter.
	20		

MINERAL RESOURCES DIVISION

Compiled: T. Pain.

Drn. D.W.W. Ckd. J

DEPARTMENT OF MINES — SOUTH AUSTRALIA

TARCOOLA - ALICE SPRINGS RAILWAY BALLAST SURVEY

LOG OF ROTARY - PERCUSSION HOLE

WEBBS DAM AREA

FOR LOCATION SEE PLAN 72-144

Date: 21·4·72

Drg. No. S9793a Bb

994·2+81

SHEET 2 OF 2 | HOLE Nº MWD1

AGE	DEPTH m	LOG	DESCRIPTION
MESOZOIC	20		as above
			21.34m to 24.38m SANDY CLAY. As above but sand content increases to 15% with depth.
	25		24.38 to 28.96m. SANDY CLAY. 30-35% subangular to angular quartz grains up to 3mm in diameter in fine silty clay matrix. Pale to medium grey colour.
	30		END OF HOLE 28.96 metres.

MINERAL RESOURCES DIVISION

Compiled: T. Pain.

Drn. D.W.W. Ckd. ✓

DEPARTMENT OF MINES – SOUTH AUSTRALIA

TARCOOLA – ALICE SPRINGS RAILWAY BALLAST SURVEY

LOG OF ROTARY - PERCUSSION HOLE

WEBB'S DAM AREA

FOR LOCATION SEE PLAN 72-144

Date: 24.4.72

Drg. No. S9793b. Bb

994.2+81

SHEET. 1. OF. 2. | HOLE Nº | MWD 2

AGE	DEPTH m	LOG	DESCRIPTION
QUATERNARY	0		0-3·05 m. RED SANDY SOIL with some white calcareous staining and minor gypsum.
			3·05-6·10 m. MOIST RED CLAYEY AND SANDY SOIL with minor amounts of gypsum in upper part of interval.
	5		
MESOZOIC			6·10-8·23 m. PALE GREY TO OFF-WHITE SILTY SAND consisting of 70% angular to subrounded quartz grains up to 3·0 mm in diameter.
			8·23-8·84 m PORCELLANITE. Hard, white, brittle silicified shale.
			8·84-10·67 m PALE YELLOWISH GREY SANDY CLAY with 20-30% subrounded to angular quartz grains.
	10		
			10·67-16·15 m. GREY SANDY CLAY. Similar to above but grey in colour. Quartz content increases slightly with depth.
	15		
			16·15-16·76 m. WHITE AND PALE YELLOW MOTTLED SANDY CLAY
			16·76-24·23 m. PALE YELLOW TO PALE BROWN CLAYEY SANDS with up to 25% feldspar grains. Clay content increases slightly with depth.
	20		

MINERAL RESOURCES DIVISION

Compiled: *T. Pain.*

Drn. T.J.E. Ckd.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

TARCOOLA - ALICE SPRINGS RAILWAY BALLAST SURVEY
LOG OF ROTARY - PERCUSSION HOLE
WEBBS DAM AREA
FOR LOCATION SEE PLAN 72-144

Date: 21 APRIL 1972

Drg. No. S9794a Bb

994·2+81

SHEET 2 OF 2. | HOLE Nº | MWD 2

AGE	DEPTH m	LOG	DESCRIPTION
MESOZOIC	20		as above
			END OF HOLE 24·25 metres
	25		

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Compiled: T. Pain.

Drn T.J.E. Ckd.

DEPARTMENT OF MINES – SOUTH AUSTRALIA

TARCOOLA – ALICE SPRINGS RAILWAY BALLAST SURVEY

LOG OF ROTARY - PERCUSSION HOLE

WEBBS DAM AREA

FOR LOCATION SEE PLAN 72-144

Date: 21 APRIL 1972

Drg. No. S9794 b Bb

994·2+81

SHEET 1. OF 2. | HOLE Nº | MWD 3

AGE	DEPTH m	LOG	DESCRIPTION
QUATERNARY	0		0-4·88 m. BROWN SANDY SOIL with small quartz grains to 1mm in diameter and occasional patches of calcareous staining
	5		4·88-6·10m. BROWN CLAY. Slightly moist clay with occasional small quartz grains.
MESOZOIC			6·10-6·71m. PALE GREY MOIST CLAY (PLASTIC).
			6·71-12·50m. OFF-WHITE SLIGHTLY SANDY CLAY. Abundant gypsum as tabular crystals up to 4 mm long.
	10		
			12·50-13·72 m. PALE YELLOWISH-BROWN SANDY CLAY 35% angular to subangular quartz grains to 2 mm diameter set in fine pale yellow-brown clay matrix.
			13·72-16·76 m. As above but colour changes to pale grey with depth.
	15		
			16·76-20·73 m. BROWN SLIGHTLY SANDY CLAY.
	20		

MINERAL RESOURCES DIVISION

Compiled: T. Pain.

Drn. T.J.E. Ckd.

DEPARTMENT OF MINES – SOUTH AUSTRALIA

TARCOOLA – ALICE SPRINGS RAILWAY BALLAST SURVEY

LOG OF ROTARY - PERCUSSION HOLE

WEBBS DAM AREA

FOR LOCATION SEE PLAN 72-144

Date: 21 APRIL 1972

Drg. No. S9795a Bb

994·2+81

SHEET.2 OF.2. | HOLE Nº | MWD 3

AGE	DEPTH m	LOG	DESCRIPTION
MESOZOIC	20		as above 20·73-21·95 m. PALE GREY SANDY CLAY 21·95-24·23 m. DARK TO MEDIUM-GREY CLAY
			END OF HOLE : 24·23 metres
	25		

MINERAL RESOURCES DIVISION

Compiled: T. Pain.

Drn. T.J.E. Ckd.

DEPARTMENT OF MINES – SOUTH AUSTRALIA

TARCOOLA – ALICE SPRINGS RAILWAY BALLAST SURVEY

LOG OF ROTARY - PERCUSSION HOLE

WEBBS DAM AREA

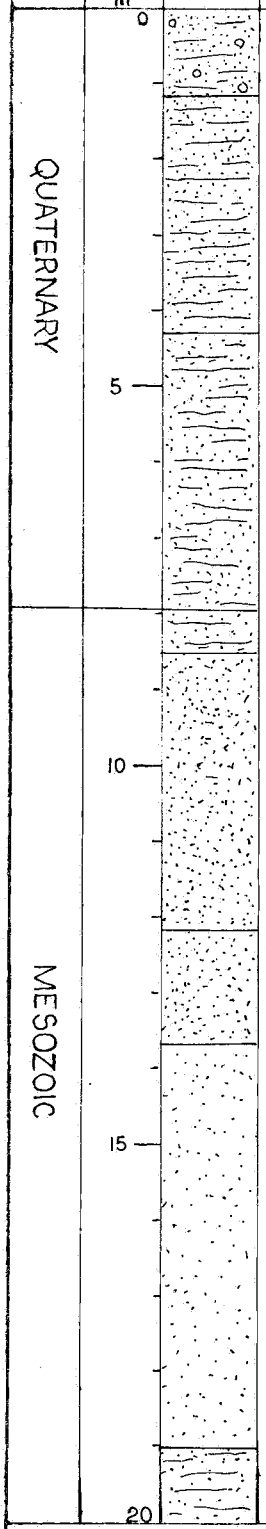
FOR LOCATION SEE PLAN 72-144

Date: 21 APRIL 1972

Drg. No. S9795b Bb

994·2+81

SHEET 1. OF 2. | HOLE Nº | MWD 4



AGE	DEPTH m	DESCRIPTION
QUATERNARY	0	0-1·07 m. RED BROWN SANDY SOIL with accasional silcrete pebbles
		1·07-4·27 m. SANDY CLAY. Pale orange to off-white silty clay with 35-40% angular to subangular quartz grains. Abundant gypsum crystals up to 3mm in diameter.
	5	4·27-7·93 m. SANDY CLAY. As above but colour becomes very pale red.
MESOZOIC		7·93-8·53 m. CLAYEY SILTY SAND 60% subrounded to subangular quartz grains in fine white silty matrix.
	10	8·53-12·19 m. SILTY SAND. Pale orange-yellow silty sand with 45% subrounded to angular quartz grains in orange-yellow clayey silt.
		12·19-13·72 m. SILTY SAND. Similar to above but pale red in colour.
	15	13·72-19·05 m. SANDY SILT. Bright orange-brown sandy silt.
	20	19·05-22·56 m. SANDY CLAY. Off-white moist slightly silty clay with 20-25% quartz grains up to 3 mm diameter

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DEPARTMENT OF MINES — SOUTH AUSTRALIA

TARCOOLA - ALICE SPRINGS RAILWAY BALLAST SURVEY

LOG OF ROTARY - PERCUSSION HOLE

WEBBS DAM AREA.

FOR LOCATION SEE PLAN 72-144

Date: 24 APRIL 1972

Drg. No. S9796 a Bb

994·2+81

SHEET 2. OF 2. | HOLE Nº | MWD 4

AGE	DEPTH m	LOG	DESCRIPTION
MESOZOIC	20		as above
			22·56 - 24·23 m. SANDY CLAY. Similar to above but pale grey in colour.
			END OF HOLE : 24·23 metres
	25		

MINERAL RESOURCES DIVISION

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DEPARTMENT OF MINES – SOUTH AUSTRALIA

TARCOOLA – ALICE SPRINGS RAILWAY BALLAST SURVEY
LOG OF ROTARY - PERCUSSION HOLE
WEBBS DAM AREA.
FOR LOCATION SEE PLAN 72-144

Date: 24 APRIL 1972

Drg. No. S9796b Bb

994·2+81

SHEET 1. OF 2. | HOLE Nº | MWD 5

AGE	DEPTH m	LOG	DESCRIPTION
QUATERNARY	0		0-4·88 m. RED BROWN SANDY SOIL with some calcareous stains in upper 1·0 metres. Grades down to red clayey soil
MESOZOIC	5		4·88-7·32 m. PALE RED SILTY SAND. Poorly sorted sand with predominantly angular quartz grains up to 3mm diameter
			7·32-10·97m. WHITE SILTY SAND. Consists of 60% angular to subangular quartz grains from 0·2 mm. to 0·3 mm. in diameter. Poorly sorted.
	10		10·97-15·55 m. PALE BROWN TO OFF-WHITE FINE SILTY SAND
	15		15·55-17·68 m. OFF-WHITE FINE SLIGHTLY SANDY SILTY CLAY.
			17·68-20·42m. GREY CLAYEY FINE SAND consisting of 45% quartz grains from 0·2 to 2·0 mm.
	20		20·42-21·34 m. GREY FINE MOIST CLAYEY SILT END OF HOLE : 21·34 metres

MINERAL RESOURCES DIVISION

DEPARTMENT OF MINES – SOUTH AUSTRALIA

Compiled: *T. Pain.*

Drn. T.J.E. Ckd.

TARCOOLA – ALICE SPRINGS RAILWAY BALLAST SURVEY
LOG OF ROTARY - PERCUSSION HOLE
WEBBS DAM AREA.
FOR LOCATION SEE PLAN 72-144

Date: 24 APRIL 1972

Drg. No. S9797 Bb

994·2+81

SHEET. 1. OF. 2. | HOLE Nº | MPW 1

AGE	DEPTH m	LOG	DESCRIPTION
QUATERNARY	0		0-3.35 m. FINE RED AEOLIAN SAND with quartz grains to 1mm in diameter.
	5		3.35-6.40 m. RED SANDY CLAY. Slightly moist clay with 25% to 30% subrounded to subangular quartz grains up to 2 mm in diameter. Some white calcareous mottling.
MESOZOIC	10		6.40-7.62 m. WHITE SLIGHTLY CLAYEY SAND with 70% subangular quartz grains from 0.1mm to 0.2mm diameter in fine white silty clay matrix. Minor amounts of gypsum in upper part of interval. 7.62-11.13 m. WHITE SLIGHTLY CLAYEY SAND. as above, but becomes more clayey with depth. Occasional angular quartz fragments up to 10 mm diameter occur near base of interval.
	15		11.13-13.72 m. OFF-WHITE TO PALE BROWNISH YELLOW SLIGHTLY CLAYEY SAND. Poorly sorted consisting of 80% subrounded to angular quartz grains up to 4 mm in diameter. 13.72-16.46 m. OFF-WHITE TO PALE BROWNISH YELLOW SLIGHTLY CLAYEY SAND as above but colour slightly paler with depth.
	20		16.46-18.29 m. PALE YELLOW SILTY CLAYEY SAND. Consists of 50% subrounded to angular quartz grains from 2mm to 5 mm diameter pale mustard-yellow silly clay matrix. 18.29-20.42 m. SILTY CLAYEY SAND - as above but colour grades to pale grey or off-white with depth.

MINERAL RESOURCES DIVISION

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DEPARTMENT OF MINES – SOUTH AUSTRALIA

TARCOOLA – ALICE SPRINGS RAILWAY BALLAST SURVEY

LOG OF ROTARY - PERCUSSION HOLE

PERFECTION WELL AREA

FOR LOCATION SEE PLAN 71-144

Date: 18 APRIL 1972

Drg. No. S 9791 a. Bb

994-2+81

SHEET 2 OF 2. | HOLE Nº | MPW1

AGE	DEPTH m	LOG	DESCRIPTION
PRECAMBRIAN BASEMENT	20		
			20·42 - 21·18 m QUARTZ-FELDSPAR PORPHYRY. Soft white, kaolinitic weathered rock
			21·18 - 22·25 m QUARTZ-FELDSPAR PORPHYRY. Hard very fine grained red siliceous matrix with phenocrysts of quartz and feldspar up to 5mm in diameter.
	22·25		END OF HOLE - 22·25 metres
	25		

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DEPARTMENT OF MINES – SOUTH AUSTRALIA

TARCOOLA – ALICE SPRINGS RAILWAY BALLAST SURVEY

LOG OF ROTARY - PERCUSSION HOLE

PERFECTION WELL AREA

FOR LOCATION SEE PLAN 71-144

Date: 21 APRIL 1972

Drg. No. S9791b. Bb

994·2+81

SHEET 2 OF 2. | HOLE Nº | MPW2

AGE	DEPTH m	LOG	DESCRIPTION
MESOZOIC			as above.
			22·86 to 23·93m. BROWN SILTY CLAYEY SAND consisting of 40% sub-rounded quartz grains up to 4mm. diameter in fine brown silty clay.
	25		23·93 to 25·91m. LIGHT TO MEDIUM GREY CLAY. 25
			25·91 to 26·52m DARK GREY CLAY.
			26·52 to 27·43m DARK GREY SILTY CLAY consisting of 5% quartz grains up to 2mm in diameter.
			END OF HOLE 27·43 metres.
	30		30

MINERAL RESOURCES DIVISION

Compiled: T. Pain.

Drn. D.W.W. Ckd.

DEPARTMENT OF MINES – SOUTH AUSTRALIA

TARCOOLA – ALICE SPRINGS RAILWAY BALLAST SURVEY

LOG OF ROTARY - PERCUSSION HOLE

PERFECTION WELL AREA

FOR LOCATION SEE PLAN 71-144

Date: 20·4·72.

Drg. No. S9792b. Bb

994·2+81

SHEET 1. OF 2. | HOLE Nº MPW2

AGE	DEPTH m	LOG	DESCRIPTION
QUATERNARY	5		0 to 8·53 m. RED SANDY SOIL with some white calcareous staining. Concentration of small silcrete pebbles up to 100 mm. diameter between 7·93 metres and 8·53 metres.
MESOZOIC	10		8·53 to 9·14 m. FINE OFF-WHITE POWDERY SILTY SLIGHTLY SAND consisting of 7% quartz grains to 1 mm. in diameter.
			9·14 to 17·37 m. PALE GREY TO OFF-WHITE CLAYEY SAND consisting of 10% subangular to rounded quartz grains up to 3 mm. in diameter in fine clayey silty matrix.
	15		
			17·37 to 18·59 m. PALE GREY CLAY. Moist grey clay with occasional small patchy orange mottles.
			18·59 to 18·90 m. PALE GREY TO BROWN MOIST CLAY.
	20		18·90 to 22·86 m. DARK GREY TO BROWN MOIST CLAY. Becoming slightly darker with depth.

MINERAL RESOURCES DIVISION

Compiled: T. Pain.

Drn. D.W.W. Ckd.

DEPARTMENT OF MINES – SOUTH AUSTRALIA

TARCOOLA – ALICE SPRINGS RAILWAY BALLAST SURVEY

LOG OF ROTARY - PERCUSSION HOLE

PERFECTION WELL AREA

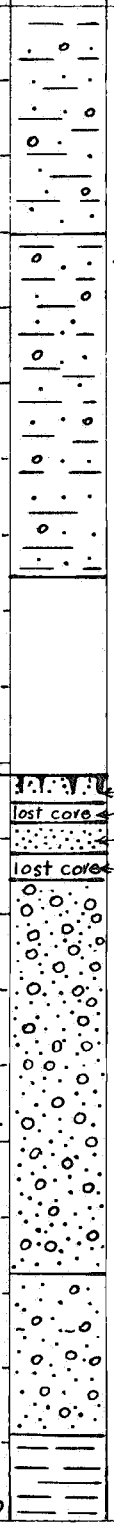
FOR LOCATION SEE PLAN 71–144

Date: 20·4·72.

Drg. No. S9792a. Bb

994·2+81

SHEET 1 OF 2. | HOLE Nº MCP1.



AGE	DEPTH m	DESCRIPTION
QUATERNARY		0 to 3.05m — BROWN SILTY SOIL with occasional silcrete pebbles. silcrete pebbles particularly abundant from 2.44m to 3.05m.
	5	3.05 to 7.62m — BROWN SOIL with abundant rounded pebbles up to 38mm. in diameter, consisting of white silcrete, brown jasper and mottled white and red jasper.
		7.62 to 10.21m — No sample
	10	(10.21 to 10.56) SILICIFIED SANDSTONE. Fine to medium grained sandstone with fine light brown clayey matrix and quartz grains up to 2mm in diameter. Quartz grains subrounded to angular. Irregular patchy silification decreases with depth.
JURASSIC (ALGEBUCKINA SST. FORMATION		10.21 to 10.56 m — lost core — 10.56 to 10.82 m
		10.82 to 11.27 m — lost core — 11.27 to 11.58 m
		(10.82 to 11.27) SANDSTONE. Fairly well indurated sandstone with subrounded to angular quartz grains up to 4mm diameter set in fine reddish-brown ferruginous silty matrix.
	15	11.58 to 16.76m — CONGLOMERATE SANDSTONE. Rounded to subangular quartz grains ranging in size up to 5mm in diameter set in fine brown ferruginous silty matrix.
		16.76 to 18.29m — CONGLOMERATE SANDSTONE. Subrounded to angular quartz grains 1mm to 5mms diameter set in fine pale brown silty matrix. Minor feldspar grains.
	20	18.29 to 22.25m — GREY SLIGHTLY SILTY CLAY with 5% subrounded to angular quartz grains ½ to 2mm in diameter.

MINERAL RESOURCES DIVISION

Compiled: T. Pain.

Drn D.W.W. Ckd.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

TARCOOLA – ALICE SPRINGS RAILWAY BALLAST SURVEY

LOG OF ROTARY - PERCUSSION HOLE

COOBER PEDY BASEMENT RIDGE

FOR LOCATION SEE PLAN 71-689

Date: 27.4.72.

Drg. No. S9804a.Bb

994·2+81

IM—2.70 A181

SHEET 2 OF 2 | HOLE Nº MC P1

AGE	DEPTH m	LOG	DESCRIPTION
JURASSIC (ALGEBUCKINA SST. FORMATION)			18·29 to 22·25m — as above
	25		22·25 to 25·60m — CONGLOMERATE SANDSTONE Subrounded to angular quartz grains up to 6mm in diameter, with occasional rounded to subangular feldspar grains up to 3mm in diameter in fine light brown silty clayey matrix.
			25·60 to 30·48 — BLUE GREY to PALE GREY SILTY CLAY with fine quartz grains and small fragments of weathered quartz feldspar rock. -
	30		30·48 to 31·69 — BLUE GREY to PALE GREY SILTY CLAY as above but with increase in content of quartz grains to 40% near base of interval.
PRECAMBRIAN BASEMENT			31·69 to 32·90 — WEATHERED FELDSPAR - QUARTZ - PYROXENE - HORNBLENDE HORNBLENDE ROCK. Medium grained to coarse-grained.
			32·90 to 34·29 — FELDSPAR - QUARTZ - PYROXENE - HORNBLENDE - ROCK DARK coarsely crystalline metamorphic rock of adamellite composition. AMDEL Report Nº MP/4219/71
	35		END OF HOLE 34·29m.

MINERAL RESOURCES DIVISION

Compiled: T. Pain.

Drn. D.W.W. Ckd.

DEPARTMENT OF MINES – SOUTH AUSTRALIA

TARCOOLA – ALICE SPRINGS RAILWAY BALLAST SURVEY

LOG OF ROTARY - PERCUSSION HOLE

COOBER PEDY BASEMENT RIDGE

FOR LOCATION SEE PLAN 71-689

Date: 24·4·72

Drg. No. S9804 6.Bb.

994·2+81

APPENDIX III

LOGS OF ROTARY AIR DRILL-HOLES

LONG CREEK SILCRETE DEPOSIT

LONG CREEK SILCRETE DEPOSIT

FOR LOCATION OF HOLES SEE PLAN 71-856

HOLE No. LC.1. - Depth 5.5 metres

Depth - (metres) From	To	Description
0.00	0.15	Brown, silty soil.
0.15	2.40	Pale white gypsiferous silt with occasional small silcrete fragments.
2.40	5.50	Pale brown to grey moist clay with 10% to 15% fine sub-rounded quartz grains.

HOLE No. LC.2. - Depth 3.65 metres

0.00	0.30	Brown soil with 60% silcrete fragments (10-15% ab 50 mm).
0.30	3.65	White gypsiferous silt.

HOLE No. LC.3. - Depth 5.20 metres

0.00	0.15	Brown soil with small amounts of silcrete boulders up to 0.1 m.
0.15	3.05	Soft, white gypsiferous silts.
3.05	4.27	Soft, white gypsiferous silts grading down to brittle porcellanite.
4.27	5.20	Hard, white, brittle conchoidally fractured porcellanite.

HOLE No. LC.4. - Depth 5.50 metres

0.00	0.15	Brown sandy soil with minor amounts of silcrete rubble up to 0.10 m diameter.
0.15	3.81	Fine, white, soft gypsiferous silt.
3.81	5.50	Hard, off-white, brittle, conchoidally fractured porcellanite.

	%
Biotite	Trace - 1
Fine Groundmass	45-55

This rock is very similar to P297/71. The texture and mineralogy are essentially the same, the chief difference being that this rock is a little less altered than P297/71. The plagioclase is strongly clouded whereas the sanidine is only lightly clouded and both feldspar and quartz show resorption.

The mafic minerals once again, are largely replaced by brown chlorite, although in some crystals only the core has been replaced and there are a few smaller mafic grains with no obvious chlorite alteration. Nearly all the mafic pseudomorphs have a poikilitic outer rim of green hornblende. In most cases, this outer rim appears to be the result of reaction, rather than a remnant of primary hornblende. One of the reasons for suggesting this is that chloritic pseudomorphs enclosed in feldspar phenocrysts (and hence protected from reaction with liquid) do not have the poikilitic green hornblende rims. The smaller hornblende grains, with no chlorite alteration, probably belong to the same stage of crystallization as the reaction rims.

Apatite and zircon are quite common, especially as inclusions in, or in close association with the mafic pseudomorphs. Biotite occurs in a similar manner to that described for P297/71. The opaque grains are of at least two, probably three kinds, namely, as seen in reflected light, a metallic grey mineral (magnetite?) a metallic grey mineral with white alteration (leucoxene after ilmenite?) and a bright yellow sulphide mineral (rare). The groundmass of this rock is similar to but less clouded than in P297/71.

This rock can be classified in the same way as P297/71, and is probably from the same rhyolite body.

Originally the rock contained phenocrysts, up to 1.5 mm, of hornblende and/or biotite, but these have been altered to chlorite. Some of the pseudomorphs have the shape typical of amphibole cross-sections and are rimmed by small granules of opaque matter, a feature common in volcanic rocks where the hornblende reacts with the liquid. Other chlorite pseudomorphs have shapes reminiscent of biotite flakes and show traces of a strong cleavage like the basal cleavage of mica. Some of the mafic pseudomorphs have rims of green hornblende and others have rims of green biotite, but it is not clear whether these are remnants of the primary crystals or later reaction products.

Biotite also occurs as small grains (0.05 - 0.3 mm) in the groundmass. Occasional apatite and rare zircon crystals are also present. The bulk of the groundmass is composed of a granular aggregate of quartz and slightly clouded alkali feldspar with cristobalite, chlorite and small opaque grains. The mineral identified as cristobalite occurs as polygonal grains, similar to the quartz grains, but has a pinkish colour, moderate relief, low refractive index and very low birefringence.

This rock could be described as a quartz-feldspar porphyry or as a rhyolite. However, the fineness of the groundmass grain size indicates that it must have cooled at or very near the surface, so that the name rhyolite seems more appropriate. A rock of this kind would be expected to have been extruded as a viscous dome rather than as a highly fluid lava. It could also have originated as a spine or neck in an acid volcano.

Sample: P298/71: TS 26778

Location:

Perfection Well, DDH3, 29'8" to 29'10" (9.04 m to 9.09 m).

Rock Name:

Rhyolite

Hand Specimen:

A highly porphyritic rock, with numerous phenocrysts of feldspar and quartz, in a fine slightly brownish-grey groundmass.

Sample: P299/71: TS 26779

Location:

Birthday Ballast Site, DDH1, 57'0" to 57'5" (17.37 m to 17.52 m)

Rock Name:

Rhyolite

Hand Specimen:

A moderately porphyritic rock, with phenocrysts of quartz and feldspar in a red groundmass.

Thin Section:

An optical estimate of the constituents gives the following:-

	%
Feldspar (altered)	15-20
Quartz	10-15
Mafics	Trace - 1
Opaques	Trace - 1
Apatite	Trace
Groundmass	65-75

This is a porphyritic acid rock like P297/71 and P298/71, but differs by being a little lower in its proportion of phenocrysts, and by being rather more altered. All the feldspar crystals are clouded and both they and the quartz crystals show resorption effects. Mafic phenocrysts are rather rare, but include some green biotite and some pseudomorphs, probably after hornblende.

The groundmass is composed of a granular aggregate of quartz and feldspar, with chlorite and opaques, as in the preceding rocks, but in this case there is a pervasive red cloudiness throughout the groundmass feldspar, like that in the phenocrysts. This cloudiness is probably the result of oxidation in the rock due to weathering. It is responsible for the red colour of the rock in hand specimen.

The rock is a porphyritic rhyolite, very similar to the preceding two, but possibly from a different rhyolite body.

Sample: P300/71: TS 26780

Location:

Birthday Ballast Site, DDH3, 26'6" to 26'10" (8.08 m to 8.18 m)

Rock Name:

Rhyolite

Hand Specimen:

A moderately porphyritic rock with phenocrysts of quartz and feldspar in a red groundmass.

Thin Section:

An optical estimate of the constituents gives the following:-

	%
Feldspar (altered)	15-20
Quartz	10-15
Groundmass	65-75

This rock is virtually identical to the last one. All of the feldspar, in phenocrysts and groundmass, is strongly clouded. Only traces of mafic minerals are recognizable, although opaques, including a number of grains of sulphide, are evident.

The rock is an oxidized (weathered) porphyritic rhyolite, probably from the same body as P299/71.

2. SUITABILITY FOR RAILWAY BALLAST

All four rocks are rhyolites with a compact texture resulting in a hard, cohesive rock. The chief effect of weathering on these rocks is the formation of a red colouration, as shown by P299/71 and P300/71 in comparison to P298/71. This weathering does not, however, affect the hardness or cohesiveness of the rock appreciably.

The chief requirements of railway ballast are hardness, macroscopic homogeneity and resistance to weathering. These rocks all qualify admirably in these regards and should prove very satisfactory as railway ballast.

It is not particularly uncommon to find a few sulphide grains in a rock such as this, but the presence of sulphide is worthy of note and should be kept in mind in future survey work. The proportion of sulphide material in these rocks, however, is too small to cause any problems with regard to spalling of the rock by oxidation of the sulphide.

APPENDIX IV

LOGS OF DIAMOND DRILL HOLES FROM BIRTHDAY AND PERFECTION WELL BALLAST SITES

BIRTHDAY BALLAST SITE DDH. 1

BORE SERIAL NO. 682/71

PLAN REFERENCE	72-6	DRILLER	K. KALMAR
COLLAR ANGLE	90°	COMMENCED	29/3/71
DRILL NO.	D.M. 16	COMPLETED	31/3/71
TYPE	MINDRILL E1000	LOGGED	A.M. PAIN

Depth - (metres) From	To	Description
0.00	0.46	Rubbly, broken quartz - feldspar porphyry. Quartz-feldspar porphyry. 3-4% Anhedral to subhedral feldspar phenocrysts up to 3 mm diameter. 2-3% anhedral quartz phenocrysts up to 3 mm diameter. 2% small mafic (biotitic) phenocrysts with associated pyrite specks. Also rare pyrite specks disseminated throughout the borwnish red fine grained siliceous matrix. Total sulphide greater than ½%. Joints dip 70°.
0.71	1.07	Lost Core.
1.07	1.78	Quartz-feldspar porphyry. Brownish-red as above but less broken with depth. Joints dip 70° spaced 5-7 cm.
1.78	2.1	Lost Core.
2.1	4.37	Quartz-feldspar porphyry as above, but with minor clay, haematite staining and rare pyrite smears on joint surfaces. Joints dip 65°-70°. Rare fractures dip 50°.
4.37	4.55	Alteration zone. Some of more closely spaced joints with pale limonitic alteration. Fine irregular fractures with mafics (hornblende and biotite) healing fractures. Fine grained hornblende blebs to 2 cm long constitute 5%-6% of total rock.
4.55	6.19	Quartz-feldspar porphyry. Description as for 0.46 m 0.71 m interval. Two sets of joints spaced ½ cm-7 cm dipping 55°-60°. Minor clay, sulphide smears and limonite on joint surfaces.
6.19	6.5	Fracture zone with hornblende filling irregular fractures.

Depth - (metres) From	To	Description
6.25	6.8	Quartz-feldspar porphyry - Core rubbly and broken.
6.8	9.4	Quartz-feldspar porphyry. Rare sulphide specks. Jointing:- 1. Prominent set. dip 65° spaced 5-10 cm. 2. Prominent set. dip 55° spaced 5-10 cm. 3. Occasional joints and fractures dipping at shallower than 30°.
9.4	9.75	Altered fracture zone. Quartz-feldspar porphyry with pale brown limonitic staining and 5-7% hornblende as irregular blebs and filling fine fractures.
9.75	9.97	Quartz-feldspar porphyry - rubbly and broken core.
9.97	10.36	Quartz-feldspar porphyry - hard, brownish, red rock with fine grained siliceous matrix and phenocrysts of quartz and feldspar. Jointing:- 1. Prominent set spaced 1-5 cm dipping 65°. 2. Prominent set spaced 10-20 cm dipping 70-75°. 3. Occasional irregular fractures dipping shallower than 30°.
10.36	10.82	Lost core.
10.82	16.15	Quartz-feldspar porphyry. Brownish-red to brick red. 3-4% subhedral potash feldspar phenocrysts to 3 mm diameter. 2% small mafic (biotite hornblende) phenocrysts with occasional pyrite specks. Pyrite smears on some joint surfaces. Joint surfaces generally slightly clayey with some limonite staining. Hornblende heals some fine irregular fractures. Jointing:- 1. Two sets striking approximately 90° apart and dipping 60° spaced 2-15 cm apart. (average spacing 10 cm). 2. One set spaced 6"-8" dipping 70°-75°. 3. Rare joints dipping 25°-30° and some irregular shallow fractures at approximately 10°.

Depth - (metres) From	To	Description
16.15	19.36	Quartz-feldspar porphyry as above. Sample submitted for L.A. testing. L.A. Loss = 19% on +¼"-1¼" crushed fraction. Sample P299/71 submitted for petrographic report.
19.36	19.81	Quartz-feldspar porphyry as above.
		End of Hole - 19.81 metres.

BIRTHDAY BALLAST SITE DDH. 2

BORE SERIAL NO. 681/71

PLAN REFERENCE	72-6	DRILLER	K. KALMAR
COLLAR ANGLE	90°	COMMENCED	24/3/71
DRILL NO.	D.M. 16	COMPLETED	27/3/71
TYPE	MINDRILL E1000	LOGGED	A.M. PAIN

Depth - (metres) From	To	Description
0.00	0.28	Lost Core.
0.28	0.71	Quartz-feldspar porphyry - core rubbly and broken.
0.71	3.6	Quartz-feldspar porphyry - brick red to brownish red rock with quartz and feldspar phenocrysts totalling 7-8% set in fine hard red siliceous matrix Jointing:- 1. 1 set vertical dip. 2. 1 set 65° dip average spacing 10 cm. 3. 1 set 60° dip average spacing 10 cm. Sets 2 and 3 strike 80° apart. 4. 1 set 75°-80° dip average spacing 10 - joint set strikes approximately 75° from strike of vertical set. 5. 1 set 45°-50° dip spacing 1 cm-20 cm (average 12 cm).
3.62	4.24	Lost Core.
4.24	5.79	Quartz-feldspar porphyry as above.
5.79	5.94	Lost Core.
5.94	6.34	Quartz-feldspar porphyry. Core rubbly and broken.
6.34	6.55	Lost Core.
6.55	20.12	Quartz-feldspar porphyry. Brick red to brownish red with quartz and feldspar phenocrysts totalling 7-8% set in fine hard red siliceous matrix. Core rubbly and broken between following depths:- 11.75 m - 11.90 m 13.34 m - 13.50 m 14.05 m - 14.25 m

Depth - (metres) From	To	Description
6.55	20.12	Jointing:- 1. 2 sets dipping 85°-90° striking 70° apart.
		2. 2 sets dipping 65°-70° spaced 2 cm - 15 (average 10 cm) striking 70° apart.
		3. 1 set dipping 25°-30° spaced 25-30 cm.
		4. 1 set dipping 45°-50°.
		5. Occasional shallow fractures at approx. 10° dip. Alteration zone around joint dipping 50°. Limonite staining and hornblende blebs to 4 cm long. Quartz feldspar porphyry. Hard, bric red to brownish red with broken, rubb patches from 16.46 m - 16.76 m and 16.07 m - 16.76 m and 16.07 m - 16.15
		End of hole: 20.12 metres.

BIRTHDAY BALLAST SITE DDH. 3

BORE SERIAL NO. 683/71

PLAN REFERENCE	72-6	DRILLER	K. KALMAR
COLLAR ANGLE	90°	COMMENCED	1/4/71
DRILL NO.	D.M. 16	COMPLETED	3/4/71
TYPE	MINDRILL E1000	LOGGED	A.M. PAIN

Depth - (metres) From	To	Description
0.00	0.846	Lost Core.
0.846	1.43	Quartz-feldspar porphyry. Brick red to brownish red with total of 7% quartz and feldspar phenocrysts in fine red siliceous matrix. ¼% disseminated pyrite specks.
1.43	6.25	Quartz-feldspar porphyry. As above. Joints commonly have limonitic staining and some minor clay. Jointing:- 1. Two prominent sets dipping 75° spaced 5 cm - 20 cm (average 12 cm) strike of two sets is 70° apart. 2. One set dipping 50° spaced 25 cm - 30 c 3. One set dipping 80° spaced 15 cm - 30 c (average 20 cm). 4. One set dipping 30° spaced 8 cm - 25 cı (least prominent set).
6.25	9.30	Quartz-feldspar porphyry. As above. Sample submitted for Los Angeles testing, sulphate soundness testing. L.A. Loss = 19% on +¼"-1¼" crushed rock fraction. Sulphate soundness loss = 0.9%. Sample P300/71 submitted for petrographic report.
9.30	19.81	Quartz-feldspar porphyry as above. Rubbly, broken patches at 10.06 m to 10.36 m; 16.87 m - 17.14 m; 10.35 m - 18.51 m.

Jointing:- 1. Two prominent sets dipping 65°.
Spaced 2 cm - 20 cm (average 10 cm).
Two sets strike 80° apart.

2. One set dipping 85° - vertical.

3. One set dipping 50° - spaced 25 cm - 30

4. Occasional fractures and joints
dipping shallower than 25°.

End of Hole 19.81 metres.

PERFECTION WELL BALLAST SITE DDH. 1

BORE SERIAL NO. 686/71

PLAN REFERENCE	72-5	DRILLER	K. KALMAR
COLLAR ANGLE	90°	COMMENCED	14/4/71
DRILL NO.	D.M. 16	COMPLETED	16/4/71
TYPE	MINDRILL E1000	LOGGED	A.M. PAIN

Depth - (metres) From	To	Description
0.00	0.06	Lost Core.
0.06	0.61	Feldspar porphyry - core rubbly and broken.
0.61	10.10	Feldspar porphyry - massive, hard, brownish grey rock 20 - 25% pink and pale grey potash feldspar subhedral to anhedral phenocrysts up to 7 mm. 3-4% biotite grains to 2 mm diameter. 6-7% white, irregular quartz-rich phenocrysts to 5 mm diameter, Phenocrysts set in very fine grained grey-brown hard siliceous matrix. Jointing:- One set dipping 85° to vertical with irregular joint planes marked by increase in biotite concentration. Occasional irregular shallow fractures dipping at approximately 15°.
10.0	13.11	Feldspar porphyry as above. Sample submitted for L.A. testing, L.A. loss = 25% on +¼"-¼" crushed rock fraction. Sample P297/71 submitted for petrographic report.
13.11	18.5	Feldspar porphyry as above - jointing irregular and poorly defined. 1. One joint set dipping 85° to vertical. 2. One joint set dipping 40-50°. Average spacing approximately 60 cm. 3. Occasional irregular fractures and joints dipping 10-15°.
18.5	19.23	Feldspar porphyry - as above but core rubbly and broken.
19.23	19.81	Feldspar porphyry - as above but with two sets of poorly defined joints visible.

Joints: 1. One set dipping 80°) Strike of two se
approximately 10
2. One set dipping 50°) apart and dips i
opposite directi

End of Hole 19.81 metres.

PERFECTION WELL BALLAST SITE DDH. 2

BORE SERIAL NO. 684/71

PLAN REFERENCE	72-5	DRILLER	K. KALMAR
COLLAR ANGLE	90°	COMMENCED	7/4/71
DRILL NO.	D.M. 16	COMPLETED	9/4/71
TYPE	MINDRILL E1000	LOGGED	A.M. PAIN

Depth - (metres)

From	To	Description
0.00	1.02	Lost Core.
1.02	1.52	Feldspar porphyry. Core rubbly and broken. Slightly weathered near surface but becoming less weathered with depth.
1.52	4.27	Feldspar porphyry. Hard, massive, dark grey-brown rock with:- 25% pale grey and pink potash feldspar phenocrysts. Phenocrysts are subhedral to euhedral and up to 6 mm diameter, 10% white irregular siliceous patches up to 5 mm diameter. 2-3% biotite grains up to 3 mm diameter. Phenocrysts set in hard, brownish-grey siliceous matrix. Jointing:- 1. One set dipping 85°. 2. One set dipping 65°-70° with average spacing approximately 60 c 3. One set dipping 20°-25° with average spacing approximately 60 c
4.27	7.01	Feldspar porphyry. As above but jointing slightly less prominent.
7.01	7.25	Feldspar porphyry as above but core rubbly and broken.
7.25	12.19	Feldspar porphyry as above but jointing as follows 1. 1 set 80° - vertical slightly irregular joint planes. 2. 1 set dip 60°-65° spaced more than one metre apart. 3. 1 set rare joints dipping approximately 10°.
12.19	19.81	Feldspar porphyry as above but joints slightly more closely spaced. End of Hole 19.81 metres.

PERFECTION WELL BALLAST SITE DDH. 3

BORE SERIAL NO. 685/71

PLAN REFERENCE	72-5	DRILLER	K. KALMAR
COLLAR ANGLE	90°	COMMENCED	12/4/71
DRILL NO.	D.M. 16	COMPLETED	14/4/71
TYPE	MINDRILL E1000	LOGGED	A.M. PAIN

Depth - (metres) From	To	Description
0.00	0.10	Lost Core.
0.10	0.71	Feldspar porphyry. Hard, massive, dark grey-brown rock with 25% pale grey and pink potash feldspar phenocrysts. Phenocrysts subhedral to euhedral and up to 6 mm diameter. 10% white irregular siliceous patches up to 5 mm diameter. 2-3% biotite grains up to 3 mm diameter. Phenocrysts set in fine hard greyish brown siliceous matrix. Core slightly broken.
0.71	2.31	Feldspar porphyry. As above with one joint set dipping 85°.
2.31	2.85	Feldspar porphyry. As above but core irregularl fractured and broken.
2.85	8.1	Feldspar porphyry. As above but jointing is rare - only occasional joints dipping at 5° or 10°.
8.1	11.21	Feldspar porphyry as above. Sample submitted for L.A. sulphate soundness tests. L.A. loss = 23% on +¼"-1¼" crushed rock fraction. Sulphate soundness loss = 0.1%. Sample P298/71 submitted for petrographic report
11.21	15.24	Feldspar porphyry. Hard, massive dark grey-brown rock with no obvious jointing.
15.24	16.56	Feldspar porphyry. As above but core broken by many irregular fractures.
16.56	19.6	Feldspar porphyry. Hard, massive dark grey-brown rock with no obvious jointing.
		End of Hole 19.6 metres.

APPENDIX V

PETROGRAPHIC DESCRIPTION OF A ROCK FROM COOBER PEDY BASEMENT RIDGE

by

Dr. R. Davy

Mineralogy & Petrology Section
Australian Mineral Development Laboratories

1. PETROGRAPHY - AMDEL REPORT MP 4219-71

Sample: P217/71 CPB7A: TS 26646

Location:

Coober Pedy 1:250 000 Sheet, grid ref. 236375. 25 miles S of Mabel Creek H.S. on Mabel Creek - Ingomar road, Bore Hole to 32.9 m (108'). Bore Number MCP1. Plan Location 71-689.

Rock Name:

Metamorphic rock of adamellite composition.

Hand Specimen:

A dark, coarsely crystalline rock.

Thin Section:

An optical estimate of the constituents gives the following:

	%
Quartz	10 - 15
Plagioclase	30
K-feldspar microperthite	45 - 50
Pyroxene	5
Hornblende	2 - 3
Opaques	2
Carbonate	2
Apatite	1

The rock consits of a mosaic of irregularly sized and shaped grains with weakly sutured margins. The grain size is quite variable ranging, for the felsic minerals, from 0.1 to 3 mm. The ferromagnesian minerals show a similar size range but the average size is rather below that of the felsic minerals.

The dominant minerals are a K-feldspar microperthite - untwinned except for the exsolution beads or stringlets, and albite twinned plagioclase. Both feldspars have been subjected to later effects, and, though little altered, have been cracked and the cracks infilled with red-brown ?micaceous clay.

The plagioclase, which is near An_{10} in composition, has also been subjected to strain with the development of curved twin planes.

Signs of some lack of equilibrium are present, with unidentified, very thin reaction rims present in places between the feldspars or between the feldspars and quartz. There are small patches of myrmekitic or graphic intergrowths of quartz with feldspar.

These appear to have been either the product of local remelting, or a result of recrystallisation of material previously granulated by stress. Both causes may have applied.

The ferromagnesian minerals are unusual in an acidic rock. The main ferromagnesian mineral has been a colourless clinopyroxene which is now highly altered and partly replaced by the same red-brown material (iddingsite or clay) noted earlier. Grains are anhedral but cleavage has been well developed. Alteration has taken place along the cleavage. Fo grains are also colourless non pleochroic, but have straight extinction. These may represent orthopyroxene. A pleochroic brown, unaltered amphibole (hornblende) appears to be primary to the rock but there are, also, small patches of green amphibole derived from the clinopyroxene.

Rounded grains of apatite are present.

Some opaques are interstitial between felsic minerals; others are related to the ferromagnesian minerals. The opaques appear to be iron oxides.

This is a somewhat unusual rock. It is almost certainly a metamorphic rock of upper amphibole facies, but the original rock remains uncertain. It is indeed likely that this rock is from the local basement complex.

APPENDIX VI

PETROGRAPHIC DESCRIPTIONS OF PORPHYRITIC RHYOLITES FROM DRILL CORES AT PERFECTION WELL AND BIRTHDAY BALLAST SITES

by

Dr. G. Lowder

Mineralogy & Petrology Section

Australian Mineral Development Laboratories

1. PETROGRAPHY - AMDEL REPORT MP 4816-71

Sample: P297/71: TS 26777

Location:

Perfection Well, DDH1, 33'2" to 33'6" (10.11 m to 10.21 m)

Rock Name:

Rhyolite

Hand Specimen:

A highly porphyritic rock with conspicuous phenocrysts of quartz and feldspar in a fine-grained brownish-grey groundmass.

Thin Section:

An optical estimate of the constituents gives the following:-

	%
Sanidine	15-20
Plagioclase	10-15
Quartz	10-15
Chloritic pseudomorphs	2-3
Opaques	2-3
Biotite + hornblende	1-2
Apatite, zircon	Trace
Fine groundmass	45-55

This rock is highly porphyritic, with phenocrysts up to 7 mm, set in a groundmass of mainly granular material averaging about 0.02 mm in size. Sanidine is the most common mineral and forms the largest crystals. The sanidine phenocrysts are partly clouded and many appear to be partially resolved. In spite of the resorption, most sanidine crystals have poikilitic, optically continuous overgrowths. The plagioclase crystals are strongly clouded but most clearly show albite twinning. In addition to the brownish cloudiness (probably minute crystals of epidote and other alteration products), there are patches and streaks of green chlorite which has replaced plagioclase. Slight resorption effects are also evident in the plagioclase. Resorption is much more apparent in the quartz phenocrysts, which show embayments and rounding of crystal outlines.

Thin Section:

An optical estimate of the constituents gives the following:-

	%
Sanidine	15-25
Plagioclase	10-15
Quartz	10-15
Chloritic pseudomorphs	3-5
Hornblende	1-2
Opaques	1-2
Apatite + zircon	Trace - 1

	%
Biotite	Trace - 1
Fine Groundmass	45-55

This rock is very similar to P297/71. The texture and mineralogy are essentially the same, the chief difference being that this rock is a little less altered than P297/71. The plagioclase is strongly clouded whereas the sanidine is only lightly clouded and both feldspar and quartz show resorption.

The mafic minerals once again, are largely replaced by brown chlorite, although in some crystals only the core has been replaced and there are a few smaller mafic grains with no obvious chlorite alteration. Nearly all the mafic pseudomorphs have a poikilitic outer rim of green hornblende. In most cases, this outer rim appears to be the result of reaction, rather than a remnant of primary hornblende. One of the reasons for suggesting this is that chloritic pseudomorphs enclosed in feldspar phenocrysts (and hence protected from reaction with liquid) do not have the poikilitic green hornblende rims. The smaller hornblende grains, with no chlorite alteration, probably belong to the same stage of crystallization as the reaction rims.

Apatite and zircon are quite common, especially as inclusions in, or in close association with the mafic pseudomorphs. Biotite occurs in a similar manner to that described for P297/71. The opaque grains are of at least two, probably three kinds, namely, as seen in reflected light, a metallic grey mineral (magnetite?) a metallic grey mineral with white alteration (leucoxene after ilmenite?) and a bright yellow sulphide mineral (rare). The groundmass of this rock is similar to but less clouded than in P297/71.

This rock can be classified in the same way as P297/71, and is probably from the same rhyolite body.

Originally the rock contained phenocrysts, up to 1.5 mm, of hornblende and/or biotite, but these have been altered to chlorite. Some of the pseudomorphs have the shape typical of amphibole cross-sections and are rimmed by small granules of opaque matter, a feature common in volcanic rocks where the hornblende reacts with the liquid. Other chlorite pseudomorphs have shapes reminiscent of biotite flakes and show traces of a strong cleavage like the basal cleavage of mica. Some of the mafic pseudomorphs have rims of green hornblende and others have rims of green biotite, but it is not clear whether these are remnants of the primary crystals or later reaction products.

Biotite also occurs as small grains (0.05 - 0.3 mm) in the groundmass. Occasional apatite and rare zircon crystals are also present. The bulk of the groundmass is composed of a granular aggregate of quartz and slightly clouded alkali feldspar with cristobalite, chlorite and small opaque grains. The mineral identified as cristobalite occurs as polygonal grains, similar to the quartz grains, but has a pinkish colour, moderate relief, low refractive index and very low birefringence.

This rock could be described as a quartz-feldspar porphyry or as a rhyolite. However, the fineness of the groundmass grain size indicates that it must have cooled at or very near the surface, so that the name rhyolite seems more appropriate. A rock of this kind would be expected to have been extruded as a viscous dome rather than as a highly fluid lava. It could also have originated as a spine or neck in an acid volcano.

Sample: P298/71: TS 26778

Location:

Perfection Well1, DDH3, 29'8" to 29'10" (9.04 m to 9.09 m).

Rock Name:

Rhyolite

Hand Specimen:

A highly porphyritic rock, with numerous phenocrysts of feldspar and quartz, in a fine slightly brownish-grey groundmass.

Sample: P299/71: TS 26779

Location:

Birthday Ballast Site, DDH1, 57'0" to 57'5" (17.37 m to 17.52 m)

Rock Name:

Rhyolite

Hand Specimen:

A moderately porphyritic rock, with phenocrysts of quartz and feldspar in a red groundmass.

Thin Section:

An optical estimate of the constituents gives the following:-

	%
Feldspar (altered)	15-20
Quartz	10-15
Mafics	Trace - 1
Opaques	Trace - 1
Apatite	Trace
Groundmass	65-75

This is a porphyritic acid rock like P297/71 and P298/71, but differs by being a little lower in its proportion of phenocrysts, and by being rather more altered. All the feldspar crystals are clouded and both they and the quartz crystals show resorption effects. Mafic phenocrysts are rather rare, but include some green biotite and some pseudomorphs, probably after hornblende.

The groundmass is composed of a granular aggregate of quartz and feldspar, with chlorite and opaques, as in the preceding rocks, but in this case there is a pervasive red cloudiness throughout the groundmass feldspar, like that in the phenocrysts. This cloudiness is probably the result of oxidation in the rock due to weathering. It is responsible for the red colour of the rock in hand specimen.

The rock is a porphyritic rhyolite, very similar to the preceding two, but possibly from a different rhyolite body.

Sample: P300/71: TS 26780

Location:

Birthday Ballast Site, DDH3, 26'6" to 26'10" (8.08 m to 8.18 m)

Rock Name:

Rhyolite

Hand Specimen:

A moderately porphyritic rock with phenocrysts of quartz and feldspar in a red groundmass.

Thin Section:

An optical estimate of the constituents gives the following:-

	%
Feldspar (altered)	15-20
Quartz	10-15
Groundmass	65-75

This rock is virtually identical to the last one. All of the feldspar, in phenocrysts and groundmass, is strongly clouded. Only traces of mafic minerals are recognizable, although opaques, including a number of grains of sulphide, are evident.

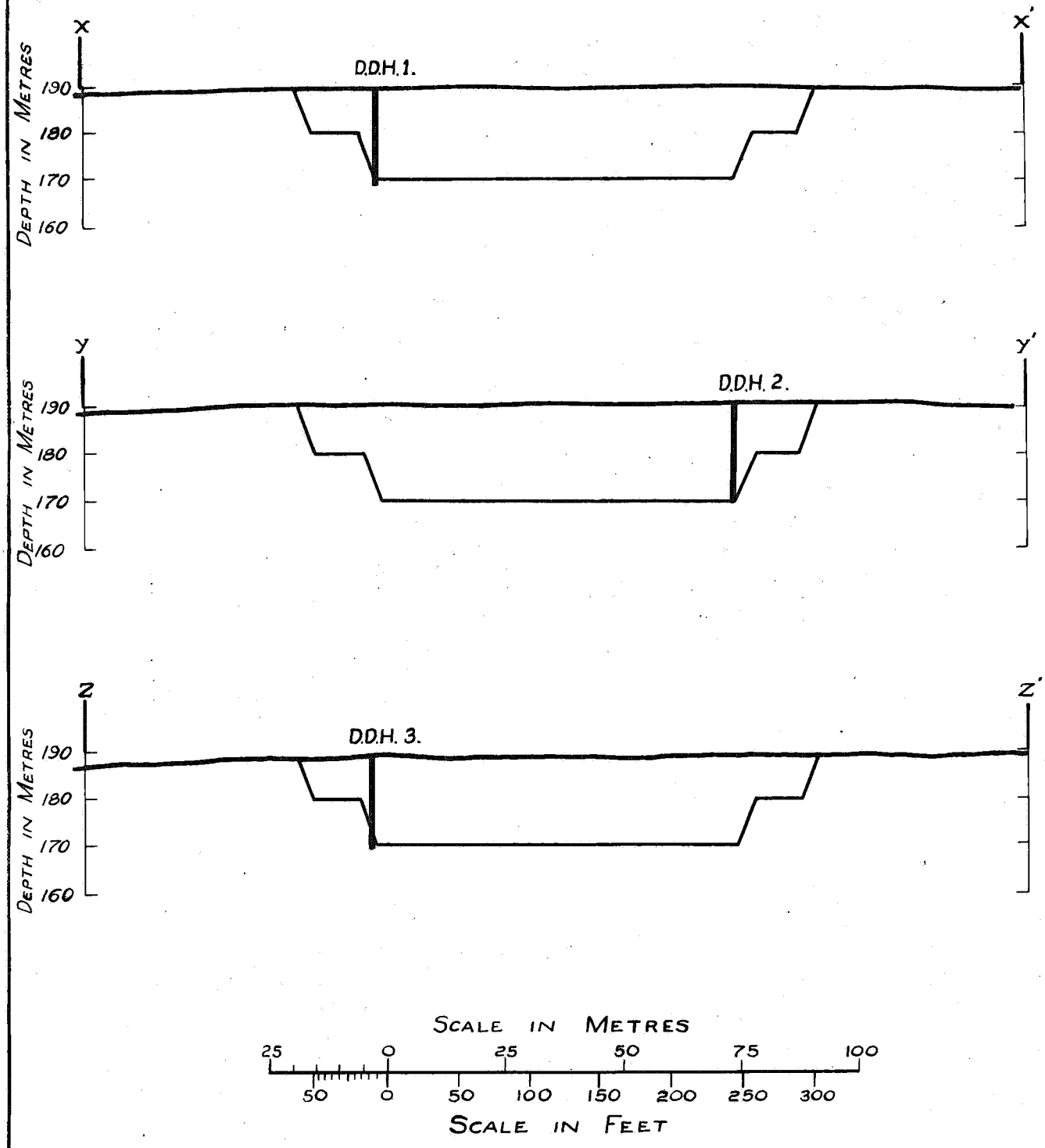
The rock is an oxidized (weathered) porphyritic rhyolite, probably from the same body as P299/71.

2. SUITABILITY FOR RAILWAY BALLAST

All four rocks are rhyolites with a compact texture resulting in a hard, cohesive rock. The chief effect of weathering on these rocks is the formation of a red colouration, as shown by P299/71 and P300/71 in comparison to P298/71. This weathering does not, however, affect the hardness or cohesiveness of the rock appreciably.

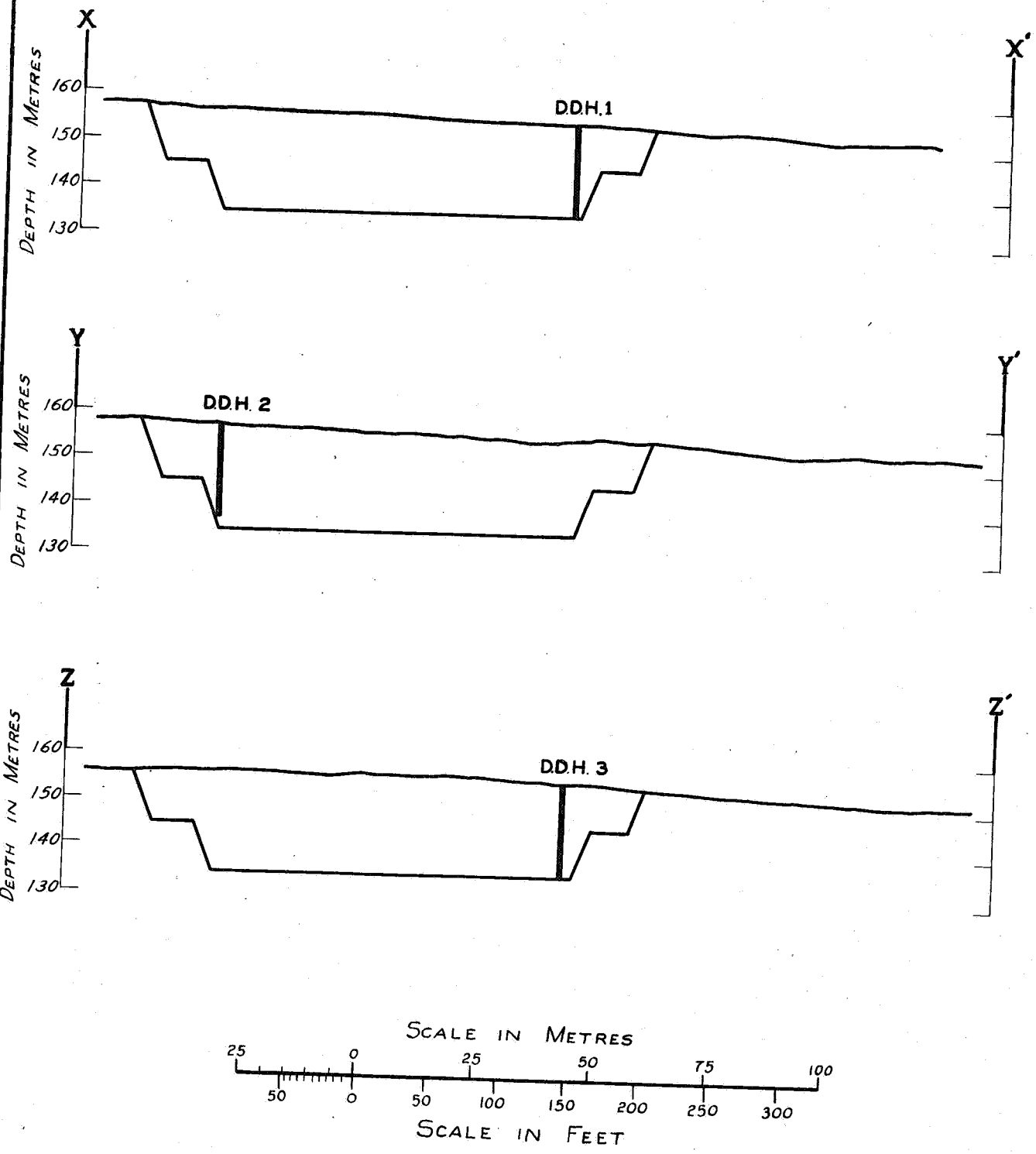
The chief requirements of railway ballast are hardness, macroscopic homogeneity and resistance to weathering. These rocks all qualify admirably in these regards and should prove very satisfactory as railway ballast.

It is not particularly uncommon to find a few sulphide grains in a rock such as this, but the presence of sulphide is worthy of note and should be kept in mind in future survey work. The proportion of sulphide material in these rocks, however, is too small to cause any problems with regard to spalling of the rock by oxidation of the sulphide.



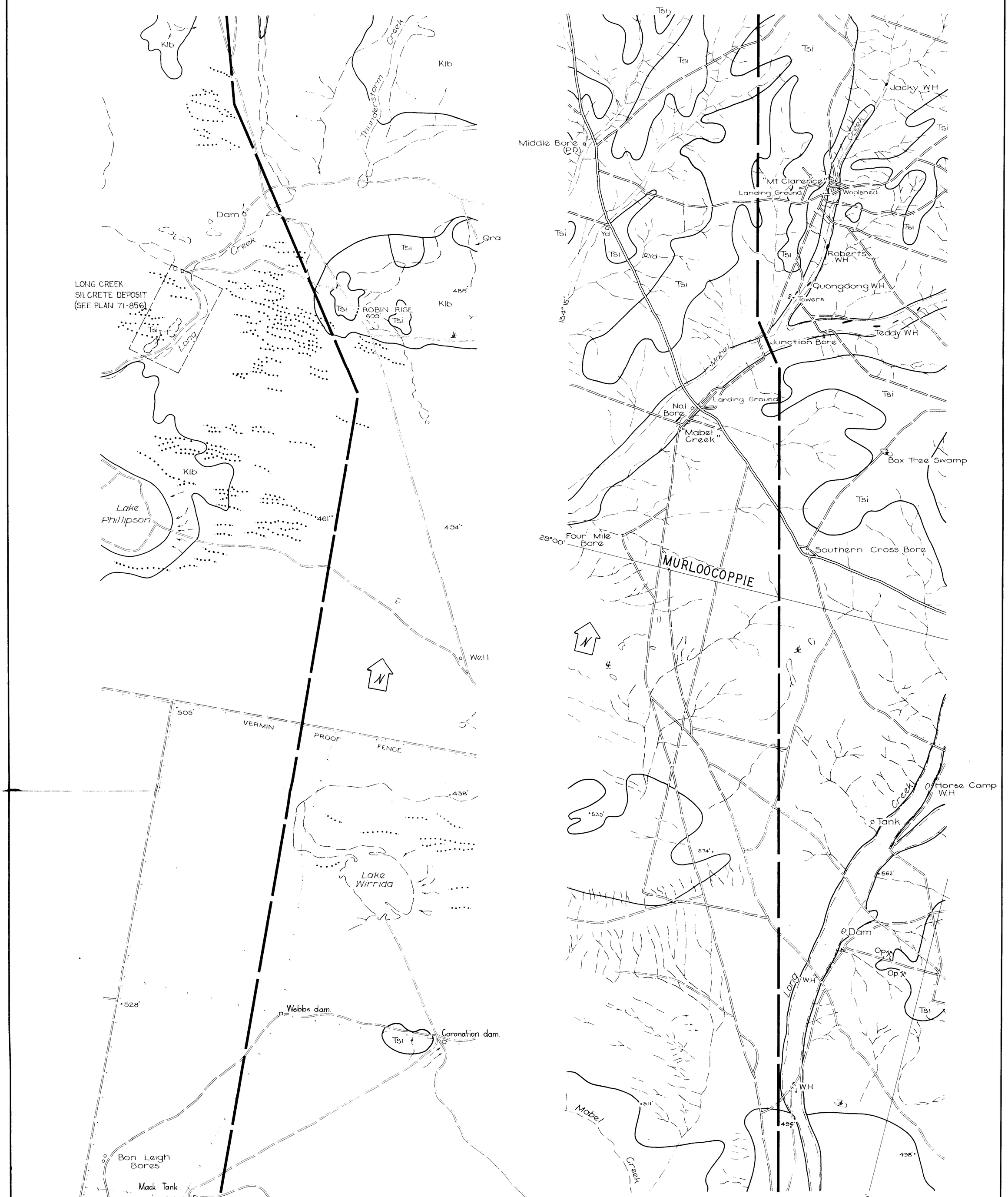
NON-METALLIC MINERALS SECTION	**DEPARTMENT OF MINES – SOUTH AUSTRALIA**	Scale: 1:1250
Compiled: A.M.P.	**TARCOOLA–ALICE SPRINGS RAILWAY**	Date: 3rd March 1972
Drn. M.A.S. Ckd. R.H.	**BIRTHDAY BALLAST SITE**	Drg. No. S9694 Bb.
	SECTIONS OF POSSIBLE QUARRY	

1M–2.70 A1810



NON-METALLIC MINERALS SECTION	**DEPARTMENT OF MINES – SOUTH AUSTRALIA**	Scale: 1:1250
Compiled: A.M.P.	**TARCOOLA–ALICE SPRINGS RAILWAY**	Date: 3rd March 1972
Drn. M.A.S. | Ckd. R.N.	PERFECTION WELL BALLAST SITE	Drg. No. S9693 Ba
	SECTIONS OF POSSIBLE QUARRY	

1M—2,70 A1810



DEPARTMENT OF MINES — SOUTH AUSTRALIA

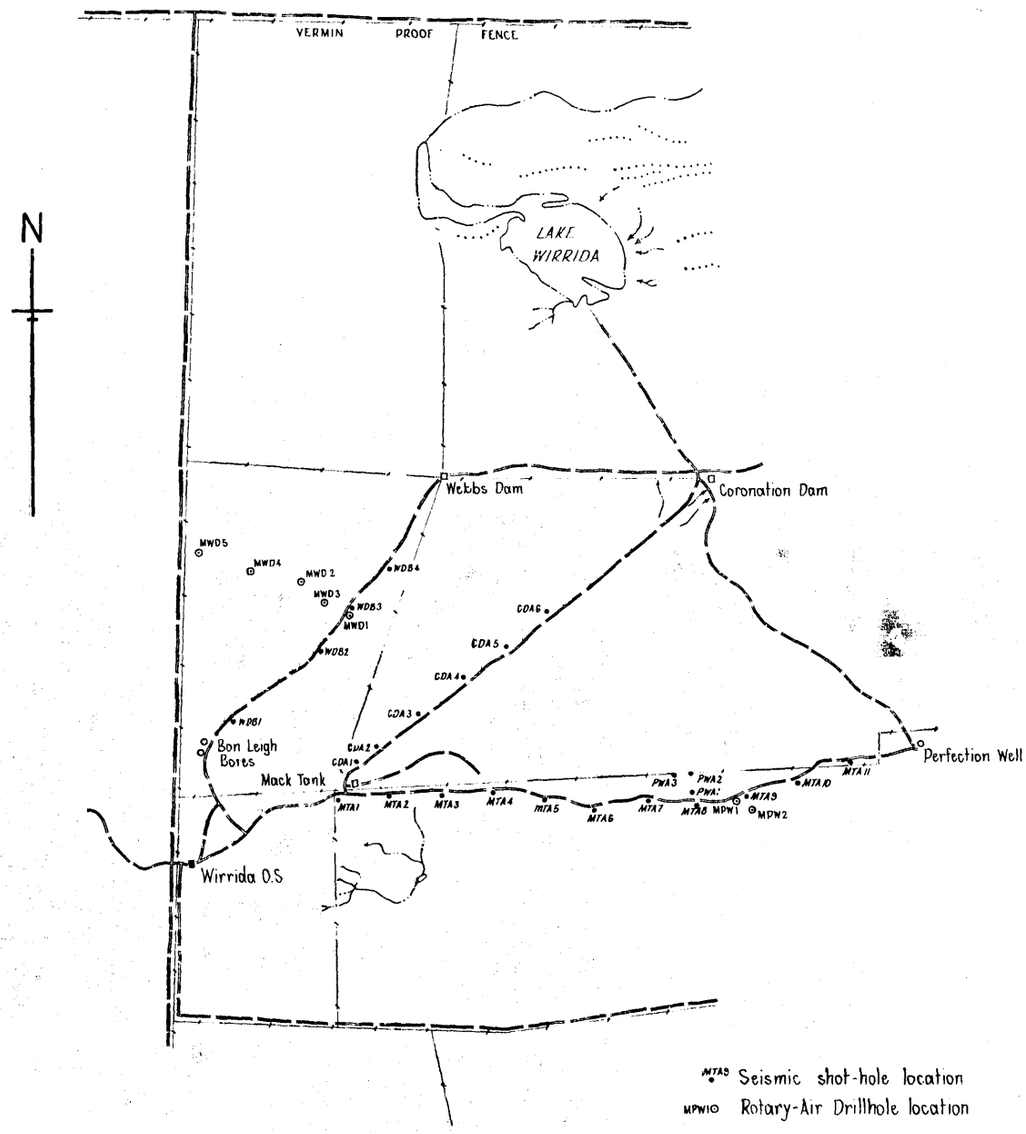
TARCOOLA — ALICE SPRINGS RAILWAY

GEOLOGICAL ROUTE MAP

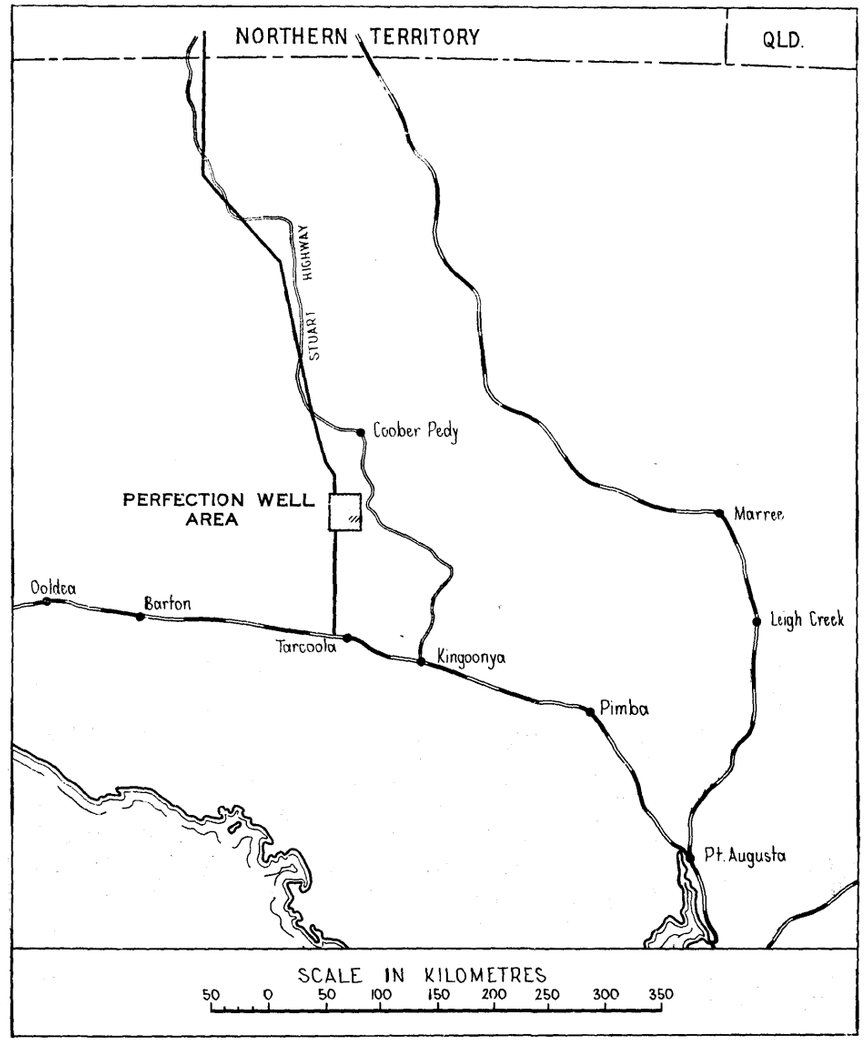
PERFECTION WELL TO MABEL CREEK

MINERAL RESOURCES DIVISION	GEOLOGIST	Compiled J.B. Firman	Scale As shown
			Date 25 June 1971
Director of Mines		Drn. A.G.R. Ckd.	Drg. No. 72-742 Bb

600 4.70 A2413



LOCALITY PLAN



DEPARTMENT OF MINES — SOUTH AUSTRALIA

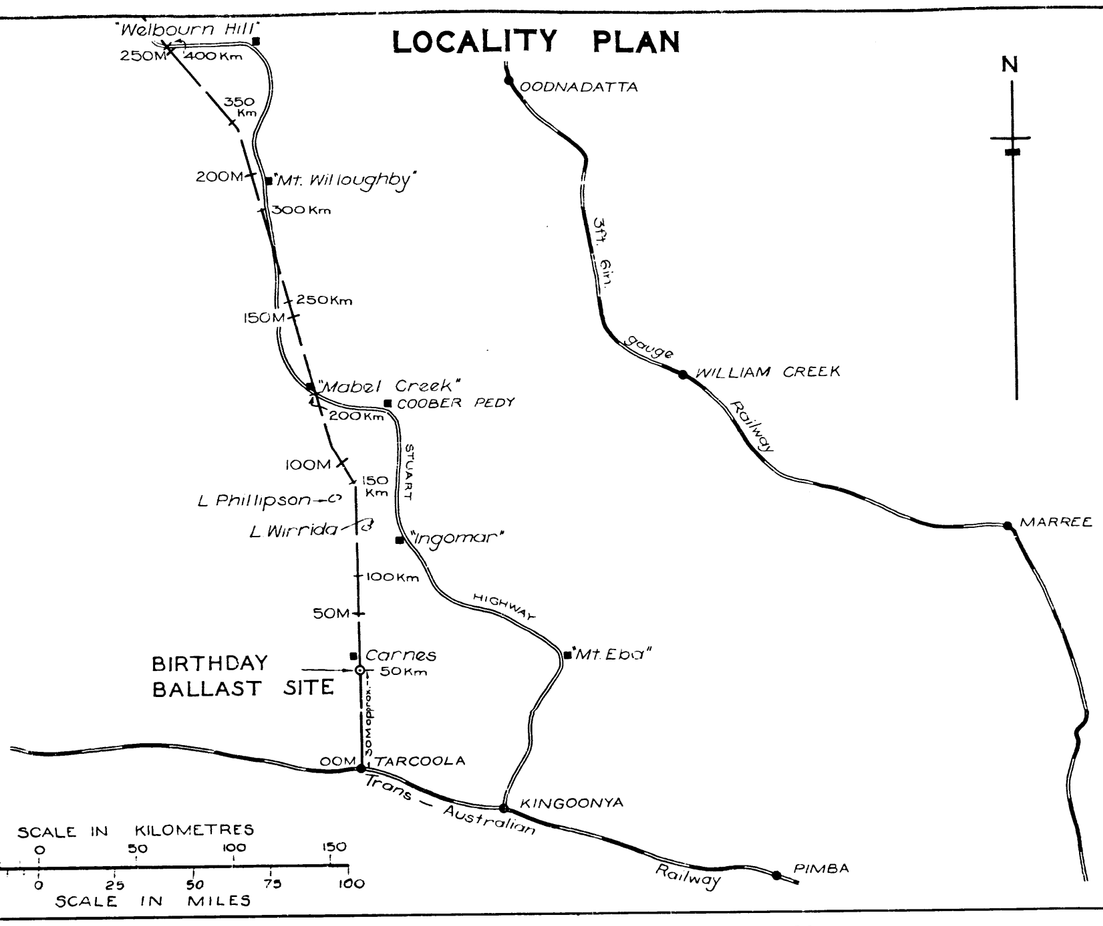
TARCOOLA — ALICE SPRINGS RAILWAY

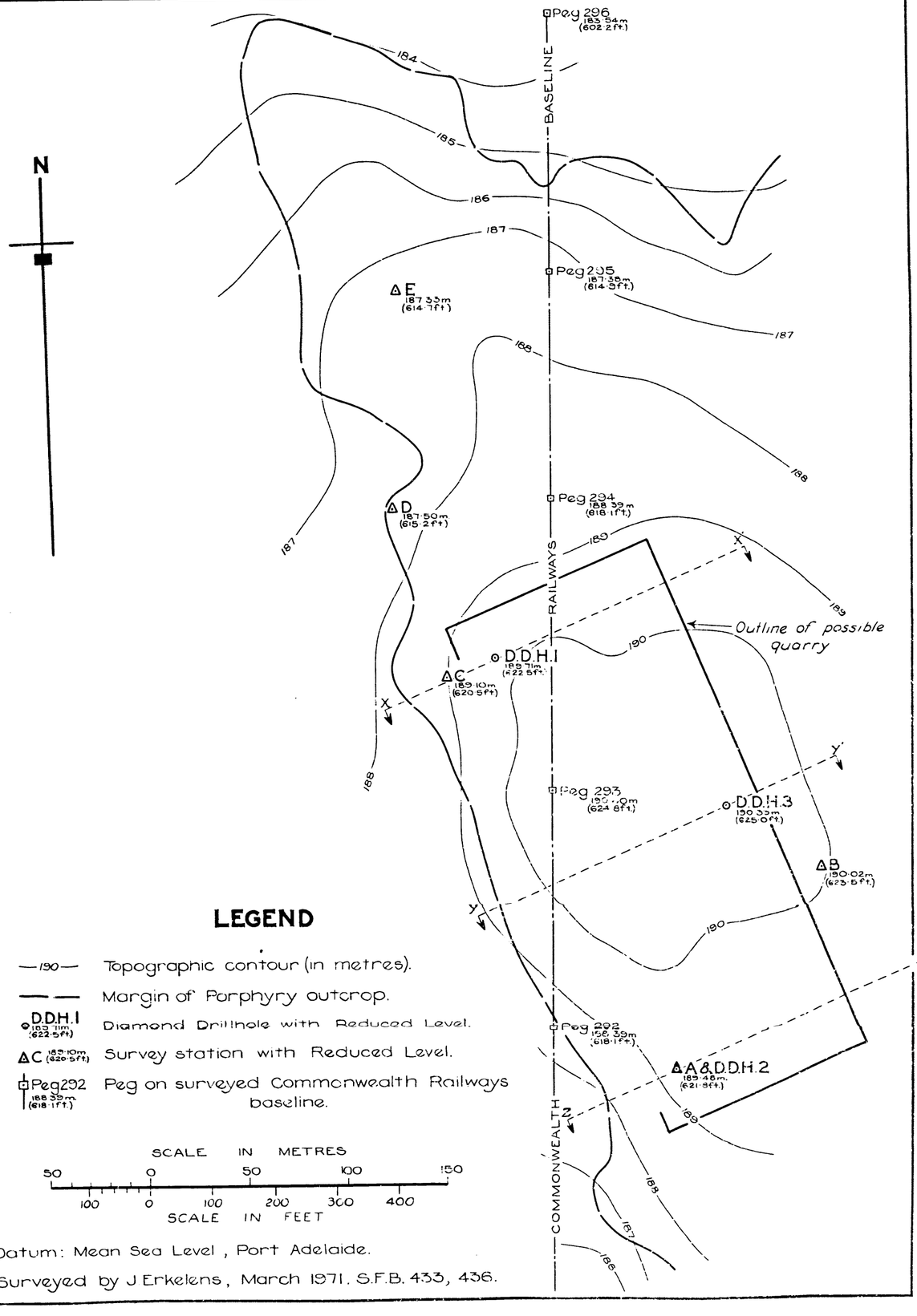
PERFECTION WELL AREA

LOCATION OF SEISMIC SHOT-HOLES AND ROTARY AIR DRILLHOLES

MINERAL RESOURCES DIVISION	A.M. Pain GEOLOGIST	Drn. A.M.P.	SCALE As shown
		Trd R.H.	72-144 Ba
Director of Mines	G.B. Forman SEN. GEOLOGIST	Chd.	
		Exd.	DATE 20 Dec 1971

LOCALITY PLAN





LEGEND

—190— Topographic contour (in metres).

Margin of Porphyry outcrop.

D.D.H.1 (189.71m (622.5ft)) Diamond Drillhole with Reduced Level.

ΔC (189.10m (620.5ft)) Survey station with Reduced Level.

Peg292 (188.39m (618.1ft.)) Peg on surveyed Commonwealth Railways baseline.

SCALE IN METRES

SCALE IN FEET

Datum: Mean Sea Level, Port Adelaide.

Surveyed by J Erkelens, March 1971. S.F.B. 433, 436.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

TARCOOLA — ALICE SPRINGS RAILWAY

BIRTHDAY BALLAST SITE

CONTOUR PLAN AND DRILLHOLE LOCATIONS

Compiled: A.M. Pain

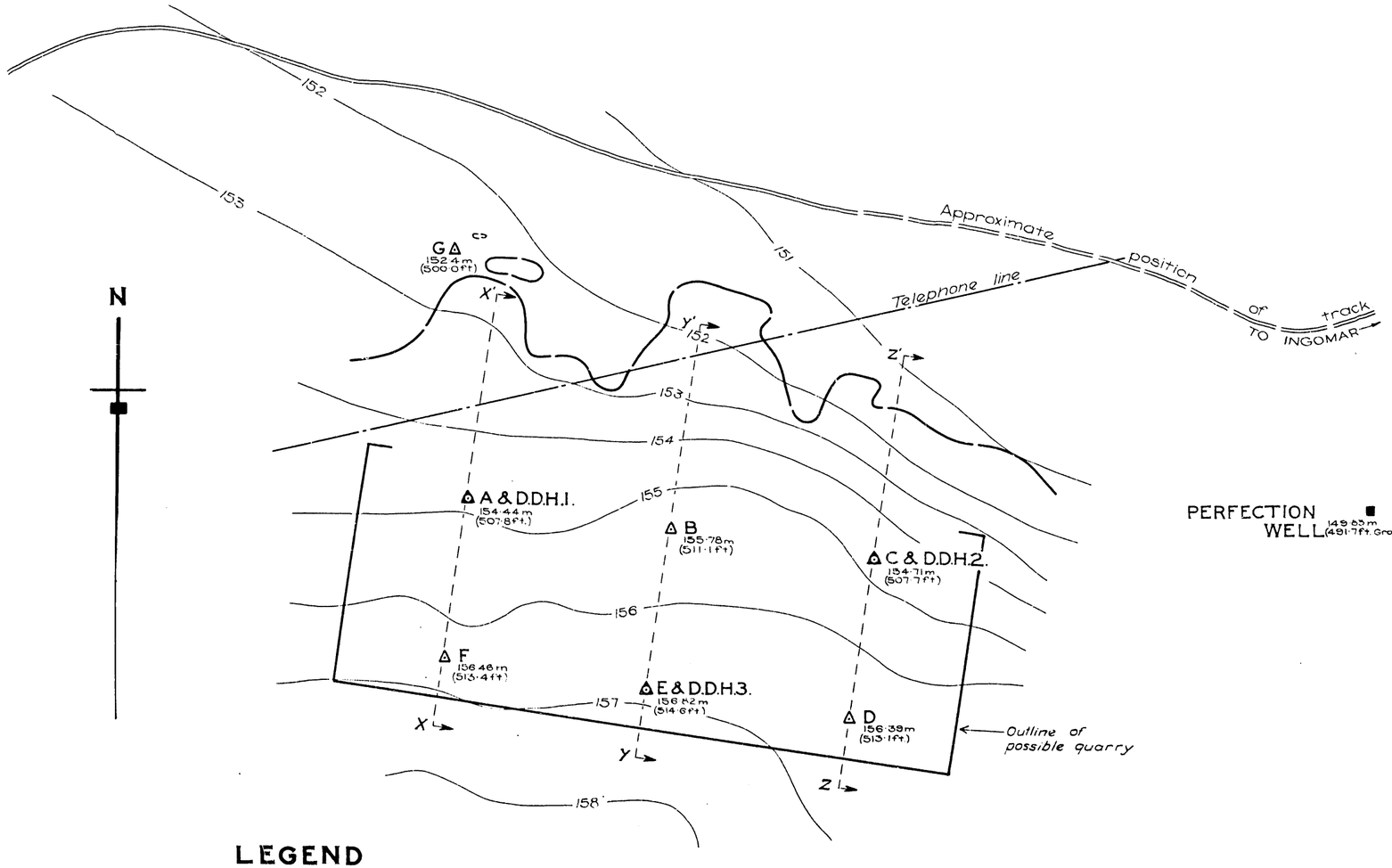
Drn. A.G.R. | Ckd.

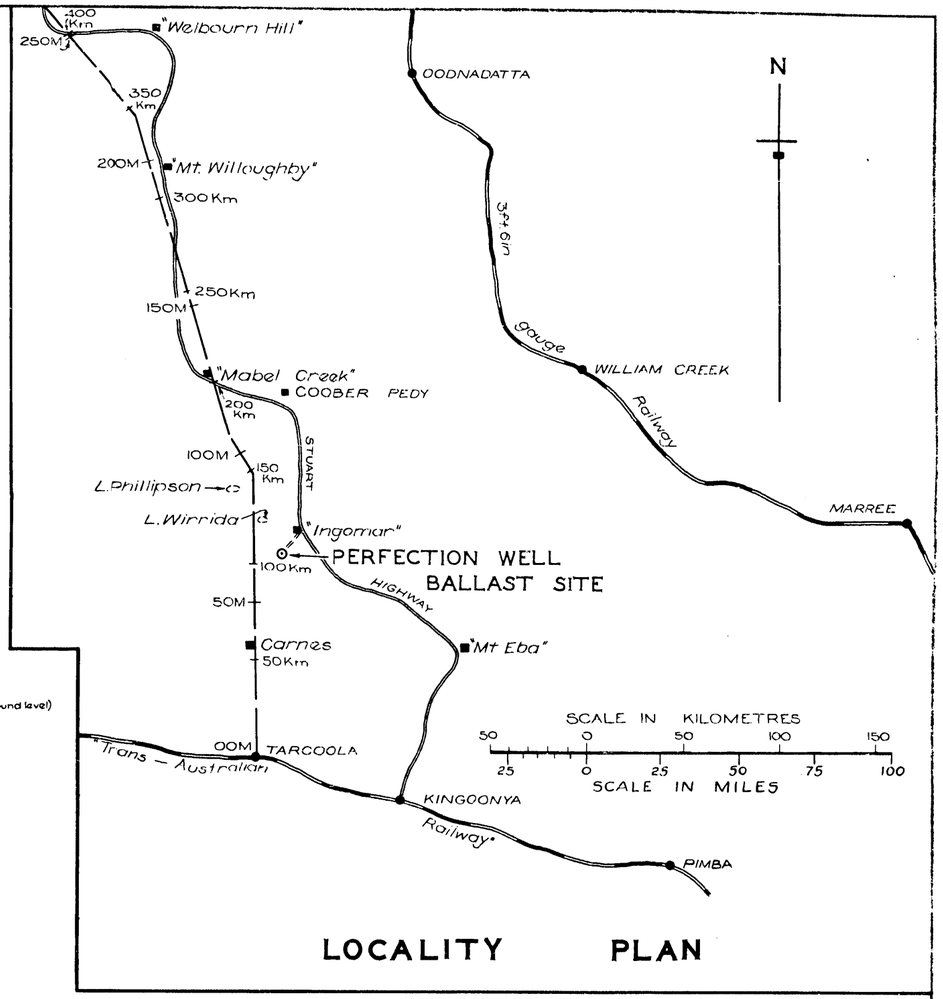
Scale: As shown

Date: 7th Jan. 1972

Drg. No. 72 - 6

Ba





PERFECTION WELL 149.63 m (491.7 ft. Ground level)

LOCALITY PLAN

LEGEND

—151— Topographic contour (in metres).

— — — Northern margin of porphyry outcrop.

⊙ D.D.H.I. 151.44 m (497.6 ft) Diamond Drillhole with Reduced Level.

△ F 156.46 m (513.4 ft) Survey station with Reduced Level.

═══ Track.

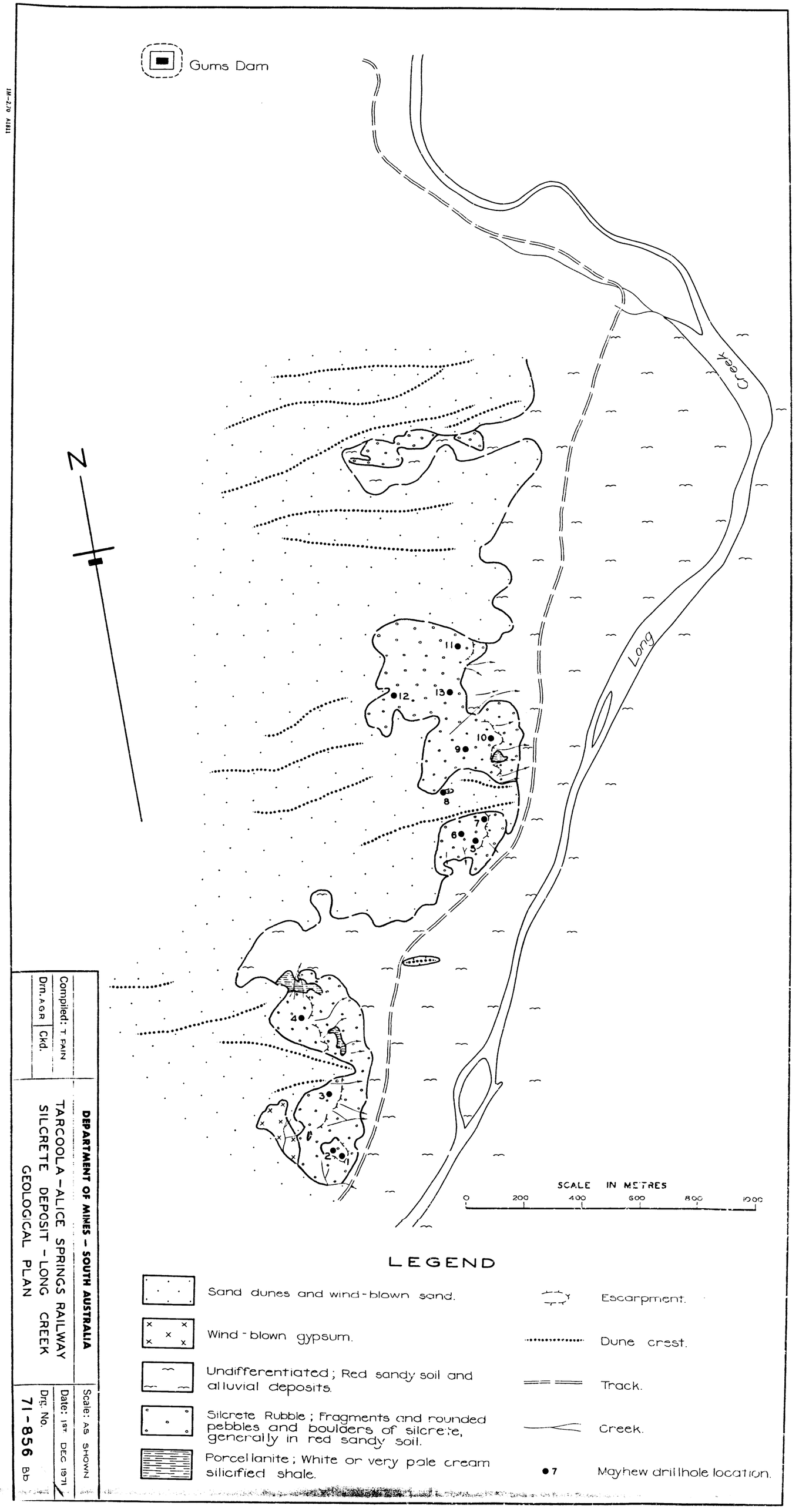
△ B 155.78 m (511.1 ft)

SCALE IN METRES
50 0 50 100 150
100 0 100 200 300 400
SCALE IN FEET

Datum: Arbitrary value taken on 152.40m (500ft) contour.
Surveyed by J. Erkelens, March 1971. S.F.B. 436 & 438.

	DEPARTMENT OF MINES — SOUTH AUSTRALIA	Scale: As shown
Compiled: A.M. Pain	TARCOOLA — ALICE SPRINGS RAILWAY	Date: 7TH Jan. 1972
Drn. A.G.R. Ckd.	PERFECTION WELL BALLAST SITE	Drg. No.
	CONTOUR PLAN AND DRILLHOLE LOCATIONS	**72-5** Ba

IM—2.0 A1811



IM-2.70 A1811

DEPARTMENT OF MINES — SOUTH AUSTRALIA

TARCOOLA–ALICE SPRINGS RAILWAY
SILCRETE DEPOSIT – LONG CREEK
GEOLOGICAL PLAN

Compiled: T FAIN
Drn. AGR | Ckd.

Scale: AS SHOWN
Date: 1ST DEC 1971
Drg. No. 71-856 Bb

134° 30'

APPROXIMATE ROUTE OF PROPOSED RAILWAY TRACK

Russel Bore

Broken Bit Bore

VERMIN PROOF FENCE

No. 5 Bore

DFW

MAGNETOMETER TRAVERSES

GG LINE

STUART

No. 2 Bore

WCW1

No. 1 Bore

RNA LINE

JHA LINE

Middle Bore

NOTE: SHOTHOLES DRILLED TO AVERAGE DEPTH OF 30 FT.

"Mount Clarence"

Yellow Bullock Bore

Shellpatch Bore

Ordnidgidinny Bore

VERMIN PROOF FENCE

Sputnik Bore

Stuart Range Bore No 2 (Drowned)

GPW

Junction Bore

LWA LINE

No 4 Bore

Honeymoon Bore

Cottonbush Bore

Rock Hill Bore

Alpha Swamp Bore

No 1 Willow Bore

No 2 Willow Bore

Patrina Bore

Dog Fence Bore

Stuart Range Bore No 1

Four Mile Bore

MBW

Mabel Creek

HIGHWAY

Southern Cross Bore

Salty Holes

MABEL CREEK

ALGEBULLCULLIA

29°00'

134° 30'

28°45'

LEGEND

Road
Track
Fence
Bore
Homestead

SCALE IN MILES

SCALE IN KILOMETRES

DEPARTMENT OF MINES — SOUTH AUSTRALIA

TARCOOLA – ALICE SPRINGS RAILWAY
BALLAST SEISMIC SURVEY

	GEOLOGIST	Drn RN	SCALE AS SHOWN
		Tcd SLT	71-690
Director of Mines	SENIOR GEOLOGIST	Chd	
		Eng	DATE: 6 JULY 1971

134°30'

29°00'

29°15'

30°30'

Ping Pong Bore

Harbour Bore (Disused)

Cleanskin Bore

Coronation Bore

VY

TWENTY MILE WATERHOLE

CPA1

GTA1/2

JAA1

RGA1

LKA1

CPB11

CPB1

CPC1

LCW1

LCW

CPD1

APPROXIMATE ROUTE OF PROPOSED RAILWAY TRACK

COOBER PEDY

Bore No 4

STUART HIGHWAY

Bore No 1

Bore No 2

RANKINS DAM

ROBIN RISE

GELIGNITE DAM

GEORGES HOLE DAM

MT PENRHYN DAM

Bore No 18

Bore No 15

Bore No 3

MAGNETOMETER TRAVERSE

RR1

MP1

MP2

MP3

NO 8 BORE

FITZGERALDS DAM

ARKEETA CLAYPANS

Lake P 100 Bore

ARKEETA DAM T.V.

PHILLIPSON

COOBER PEDY

LEGEND

Road

Track

Fence

Bore

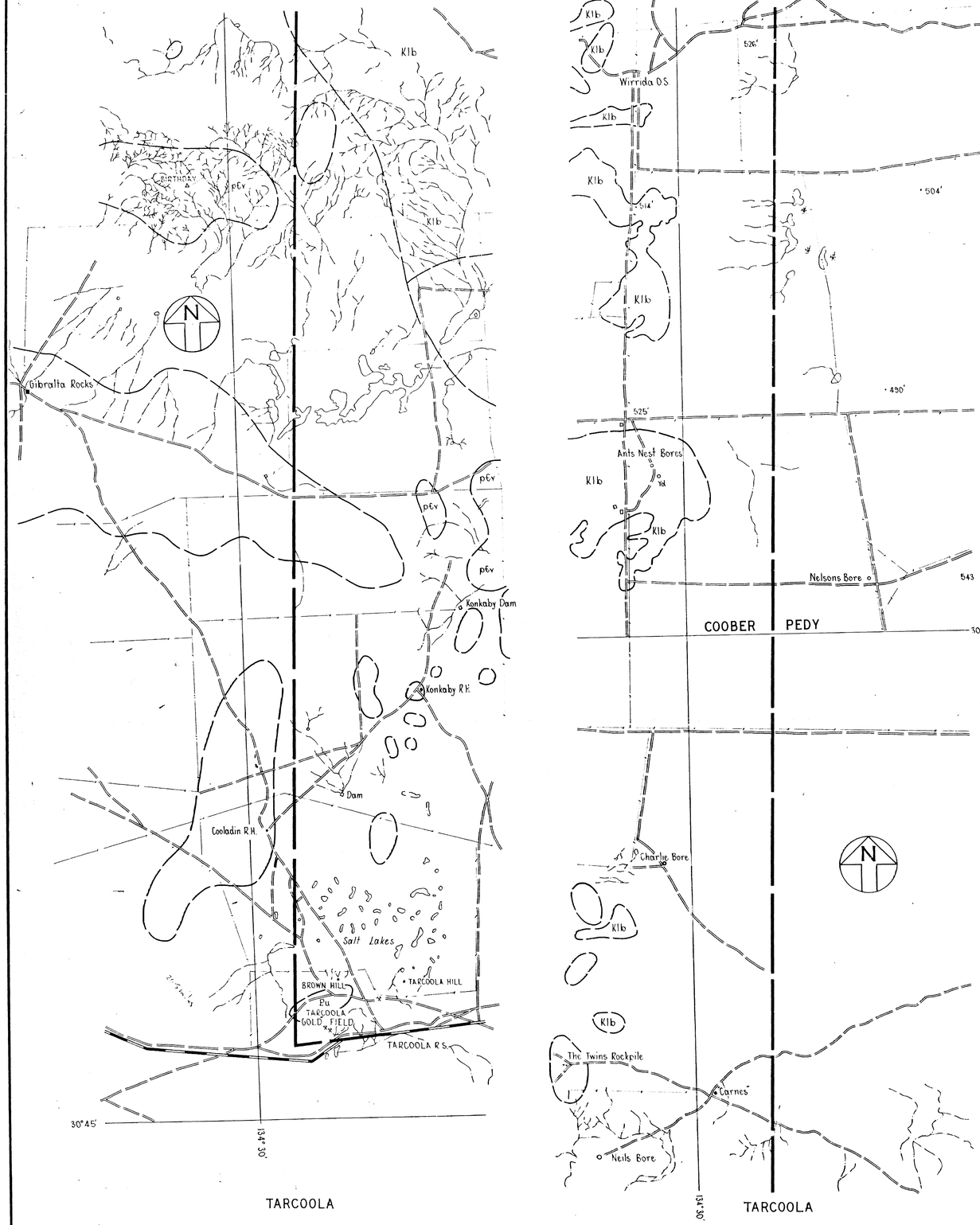
SCALE IN MILES

SCALE IN KILOMETRES

DEPARTMENT OF MINES — SOUTH AUSTRALIA

TARCOOLA - ALICE SPRINGS RAILWAY
BALLAST SEISMIC SURVEY

	GEOLOGIST	DRN RN	SCALE AS SHOWN
		SLT	71 - 689
Department of Mines	SENIOR GEOLOGIST		DATE 6 JULY 1971

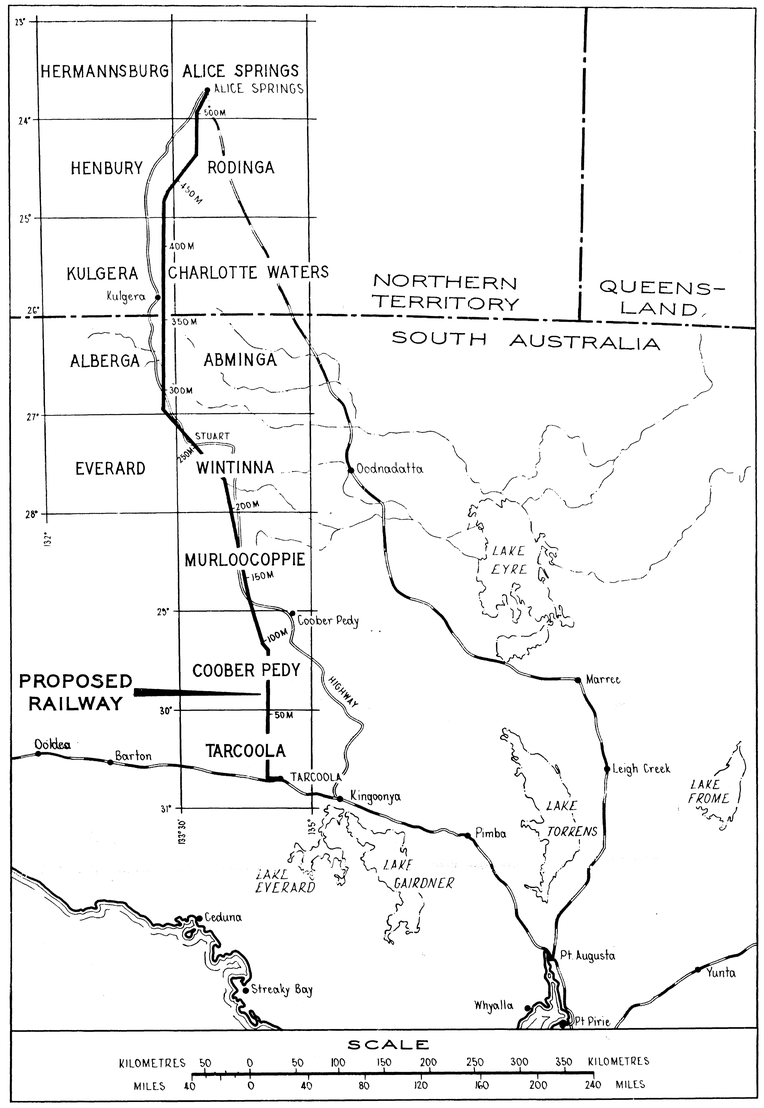


SCALE

MILES 2 1 0 2 4 6 8 MILES

KILOMETRES 2 0 2 4 6 8 10 12 KILOMETRES

LOCALITY MAP



SCALE

KILOMETRES 50 0 50 100 150 200 250 300 350 KILOMETRES

MILES 40 0 40 80 120 160 200 240 MILES

LEGEND

CAINOZOIC QUATERNARY RECENT	Qra	Alluvium of the stream courses, gibber gravel over pleistocene soils	Geological boundary (definite)
	Qrs	Sand of the recent dunes	Geological boundary (approximate)
	Qrt	Talus, including silcrete gravel in places	Route of proposed railway
CAINOZOIC TERTIARY PLEISTOCENE	Qpw	Limestone at Mt Willoughby and elsewhere	Existing railway
	Tsi	Silcrete	Stuart Highway
MESOZOIC LOWER CRETACEOUS	Klb	"Bulldog Shale"	Secondary road or track
PALAEOZOIC ORDOVICIAN	O	"Mt Chandler Sandstone"	Fence
PALAEOZOIC CAMBRIAN	€	Siltstone, dolomite and sandstone	Watercourse
PRECAMBRIAN STURTIAN UMBERATANAP	Pu	Shale, siltstone, tillite and limestone Vesicular basalt	Swamp
	P	Dawler Range Volcanics	Bore or Well
		Granitic rocks	Tank or Dam
	a	Aplite (Alberga area)	Stockyard
		Dolerite dykes	

10 CENTIMETRES ON ORIGINAL DRAWING

DEPARTMENT OF MINES — SOUTH AUSTRALIA

TARCOOLA—ALICE SPRINGS RAILWAY

GEOLOGICAL ROUTE MAP

TARCOOLA TO PERFECTION WELL

MINERAL RESOURCES DIVISION	GEOLOGIST	Compiled J.B.Firman	Scale As shown
		Drn. R.H.	Date 25 June 1971
Director of Mines		Chd.	Drg. No. 72-741

1137