DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
ENVIRONMENT AND RESOURCES DIVISION

CONSTRUCTION MATERIALS RESOURCES - REDCLIFF PROJECT
GENERAL APPRAISAL & RECOMMENDATIONS FOR FURTHER INVESTIGATION

(County Frome)

by

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SUPERVISING GEOLOGIST

Rept.Bk.No.74/108
G.S. No. 5426
DM. No. 525/74

10th May, 1974

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CONSTRUCTION MATERIALS RESOURCES - REDCLIFF PROJECT GENERAL APPRAISAL & RECOMMENDATIONS FOR FURTHER INVESTIGATION

INTRODUCTION

This report summarises the distribution of the various materials likely to be required for construction of the petrochemical plant and appurtenant works at Redcliff, 23 km S.S.E. of Pt. Augusta.

The data have been obtained from various sources including the PT. AUGUSTA and ORROROO regional geological maps, departmental investigations for the solar salt fields formerly proposed at Pt. Paterson, 15 km to the north and discussion with private company personnel currently searching for materials in the area. An inspection of the area was carried out on 5th and 6th February, 1974 with officers from Highways, Marine and Harbours and Environment and Conservation Departments.

The accompanying plans are extracts from published standard geological and topographic maps. The reader is referred to the originals for full details.

MATERIALS REQUIREMENTS

Final quantities and types of materials are not known at the time of writing because decisions have yet to be made on major appurtenant works such as the deep water access and the adjacent salt fields.

However in general terms the following materials may be required:

- Coarse aggregate for concrete and railway ballast.
- rock materials for road sub-base, base and bitumen surfacing.
- gravel for a causeway and salt field sea walls.
- armouring rock in blocks up to 1 tonne for causeway and salt field walls.
- concrete sand.
- filling sand.
- impervious material for salt field embankments. This has been previously investigated by consultants to a private company group and will not be further discussed in this report.

MINERAL TENURE

Under the Mining Act 1971-1972, all materials required are classed as extractive minerals.

Most of the area comprises freehold and leasehold land with minerals reserved to the Crown. The right to acquire title for extractive minerals on freehold land is restricted to the owner.

In some sections, minerals were formerly alienated from the Crown and the provisions for a private mine apply until July, 1975.

Most of the area considered in this report lies in Exploration Licence 60. Although the licence does not apply to extractive minerals, Section 80 of the Act requires the agreement of the licence holder for another party to peg for extractive minerals.

Land between low and high water and extending for 800 m inland from high water is reserved from the operation of the Mining Act.

The Hundreds of Baroota, Davenport, Winninowie and Woolundunga were reserved from the operation of the Mining Act on 17th January, 1974 and only private mines on the appropriate class of land can now be acquired.

This reservation was proclaimed to restrain private company activity until such time as materials requirements and environmental constraints could be evaluated. It is considered that the reservation should remain in force for an indefinite period but that applications for the release of specific sections be granted where no constraint applies.

Mineral claims 390, 391, 392, 394 are held by R.M.C. Minerals in Section 55 Hd. Winninowie.

Interim Development Control, administered by the State Planning Authority under the Planning and Development Act, was proclaimed on 31/1/74 and operates until 30/6/78. By this provision the existing use of land cannot be changed without the approval of the Authority.

GEOLOGICAL SETTING

A Precambrian sequence of hard rocks underlies the southern Flinders Ranges. South of Nectar Brook H.S. quartzites and sandstone predominate while to the north the beds consist mainly of siltstones with some flaggy and sandy limestones. The sequence is folded and disrupted by meridional faults, particularly along the western escarpment.

The Baroota Plain is underlain by horizontal, generally unconsolidated, Tertiary sediments to a depth of approximately 200 m. Quaternary sediments blanketing the Tertiary beds comprise fine red dune sand, sands and gravels in both the modern and older buried stream channels, brown loamy soils with a nodular limestone horizon, a freshwater fragmented limestone and an aeolean accummulation of seed gypsum.

Flat lying Precambrian quartzites and associated talus deposits occupy Mt. Grainger and Mt. Gullett, two small coastal monadnocks lying south of Redcliff Point.

The distribution of the rocks is shown on Plan S 10818 and on the published PORT AUGUSTA and ORROROO map sheets.

ENVIRONMENTAL CONSTRAINTS

A detailed report from the Department of Environment and Conservation on this subject is awaited.

A small colony of Yellow Footed Wallaby inhabits the quartzite ranges east of the Winninowie Tanks on the Morgan-Whyalla pipeline. The colony is claimed by Department of Environment and Conservation officers to be one of the last remaining in the southern Flinders Range and the Department would resist any intrusion into the habitat by quarrying operations.

However, it has been reported by the Ready Mix Group that the Curator of Mammals at the South Australian Museum considers these animals to be much more widespread.

This diversity of opinion should be resolved at an early stage.

No other significant ecological associations were noted during the inspection. The presence of aboriginal sites was to be investigated with the South Australian Museum.

The face of the southern Flinders Range is unbroken by quarry workings and this situation should be maintained.

As discussed in a later section, Mt. Grainger is an important potential source of aggregates. Quarry openings could be sited on the northern side out of site of the main road and it is considered that rehabilitated workings would be insignificant when viewed from the west and northwest against the background of a large industrial complex.

No major environmental damage is envisaged from gravel winning operations provided that they are screened from the main roads and adequately rehabilitated.

RESOURCES

Quartzite and sandstone

The A.B.C. Range Quartzite which underlies the range south of Nectar Brook H.S. and the coastal monadnocks, comprises hard flaggy quartzite interbedded with cemented to semi friable sandstone. The quartzite and harder sandstone would provide suitable aggregate for concrete and railway ballast. Crushing costs would be higher if quartzite was worked.

One tonne blocks for causeway protection might be available from the quartzite beds depending on the spacing of bedding plane partings and joint sets below the surface exposures. Excavation of trial quarries will be necessary to evaluate the quartzites for this use.

Limestone

A site in Brighton Limestone equivalents in Section 272 Hd. Woolundunga has been core drilled by the Highways Department to establish a central source of aggregates for district roadworks. The unit is thinly bedded with frequent incipient bedding plane partings but is considered suitable for road materials. This rock type would also provide concrete aggregate but not causeway armouring.

A nearby outcrop of pink gritty limestone, possibly an equivalent of the Nuccaleena Dolomite, is more massive and has potential for providing armour rock as well as concrete and road aggregates (see plan S 10819).

Over 3 million cubic yards of Quaternary fragmental limestone were proved by core drilling in Sections 671, 672 Hd. Davenport. This is a potential source of road sub-base and base material and overburden would be suitable for general filling purposes (see plan S 10820).

Gravel

The composition of creek gravels ranges from flat well rounded siltstone pebbles and cobbles in stream channels north of Nectar Brook H.S. to more cuboidal quartzite material in streams to the south. These deposits are mainly restricted to the eastern side of the main road.

Both types of gravel are suitable for the core section of the proposed causeway.

Some older buried channels containing both gravel and sand are known west of the main road. Further search and appraisal of these is required, particularly as they offer the main potential source of concrete sand in the area.

Concrete Industries (Monier) Ltd. propose to work gravels in Mambray Creek, 25 road km to the south, as a source of fine and coarse aggregate for their concrete railway sleeper plant being erected in the area.

The slopes of Mt. Grainger comprise angular quartzite scree with some calcrete limestone, both of which would be suitable for causeway construction.

Sand

Red dune sands blanket portions of Mt. Grainger and are well developed around Winninowie Railway Siding, 18 km by road to the north. Generally the dune sand is too fine for high quality concrete aggregate although acceptable gradings can be achieved by adding coarser material.

Concrete Industries (Monier) Ltd. claim that creek sands of acceptable grading exist in Mambray Creek, west of the main road.

Earlier drilling of the samphire flats east of Redcliff Point disclosed sand in portion of a buried stream channel. This will extend to the east towards Nectar Brook, possibly under the access corridor portion of the Development Area.

It is likely that sand deposits of acceptable grading will be restricted to a few localities in the area.

FURTHER INVESTIGATION

None of the deposits discussed above have been evaluated to the stage where quantities are known or quality can be assured. The following general programme of exploration is recommended.

Coarse aggregate

Mt. Grainger is the nearest potential source of concrete aggregate and causeway gravels. It should be the first deposit to be evaluated.

A grid of backhoe trenches is required to define quantities of quartzite gravel and some limited diamond drilling or trial quarrying should be undertaken to investigate the availability of one tonne armouring blocks in the bedrock quartzite.

If the Mt. Grainger site proves inadequate or unacceptable from an environmental view point, gravel deposits associated with stream channels to the east and quartzite deposits in the main range should be investigated.

Access to the limestone deposits in Section 272 Hd. Woolundunga will be difficult and these beds should be mapped southwards to the vicinity of the gas pipeline route across the ranges so that the pipeline track can be utilised. Diamond drilling and some trial quarrying will be necessary for detailed site evaluation.

Trial quarrying was recommended on the fragmental limestone deposit in Sections 671, 672, Hd. Davenport and this should be carried out if the Highways Department elect to use this deposit for roadworks.

Sand

Auger drilling should be undertaken to further investigate the sand deposit east of Redcliff and to search for other sources if this proves unsuitable.

MNH:FdeA
10/5/74

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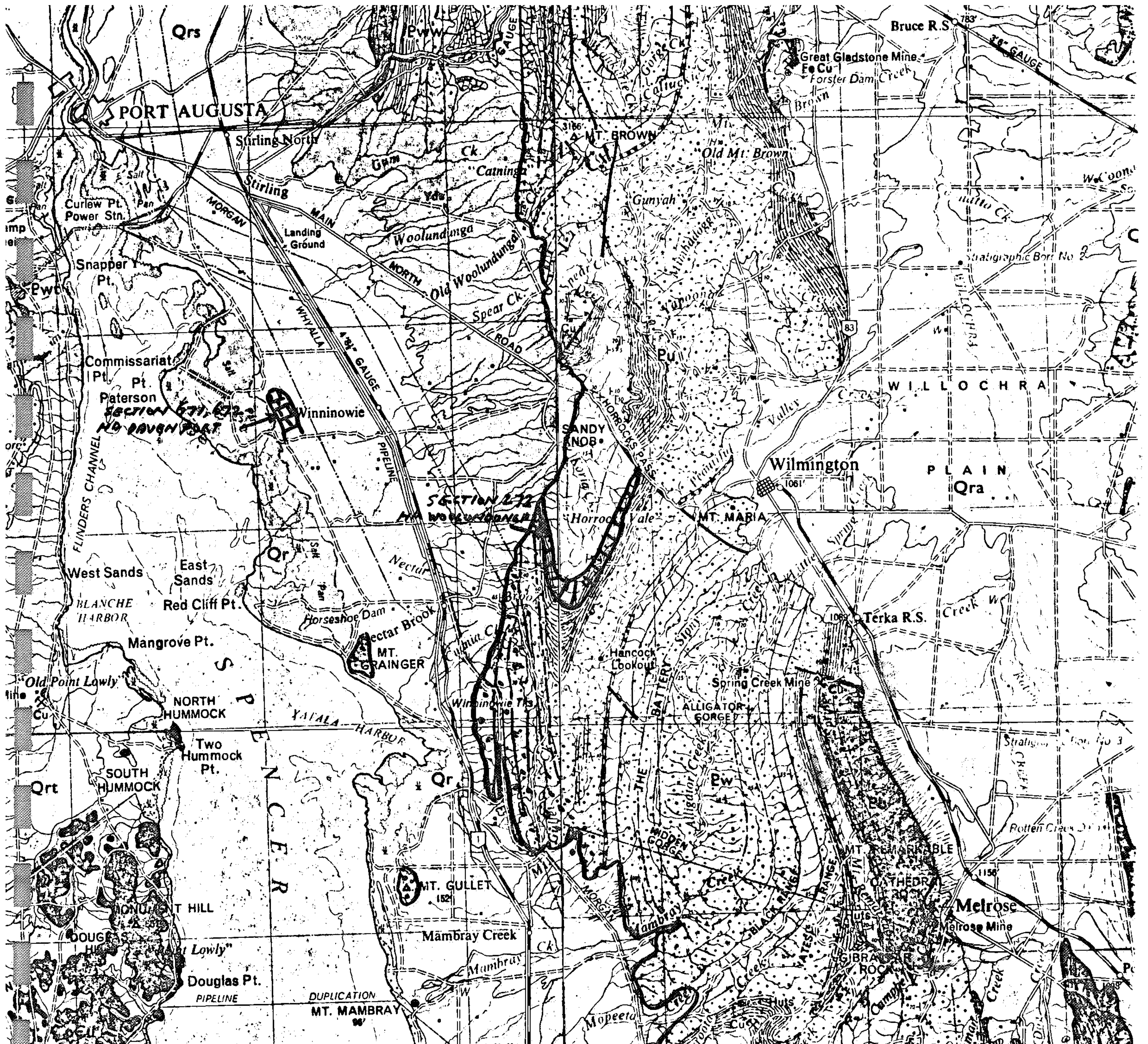

CONSTRUCTION MATERIALS – REDCLIFF PROJECT.

REGIONAL GEOLOGICAL MAP.

For detailed legend see PT AUGUSTA and ORROROO 1:250,000 SHEETS.

Sandstone and quartzite [legend box] Limestone [legend symbol]

Scale 1:250,000.

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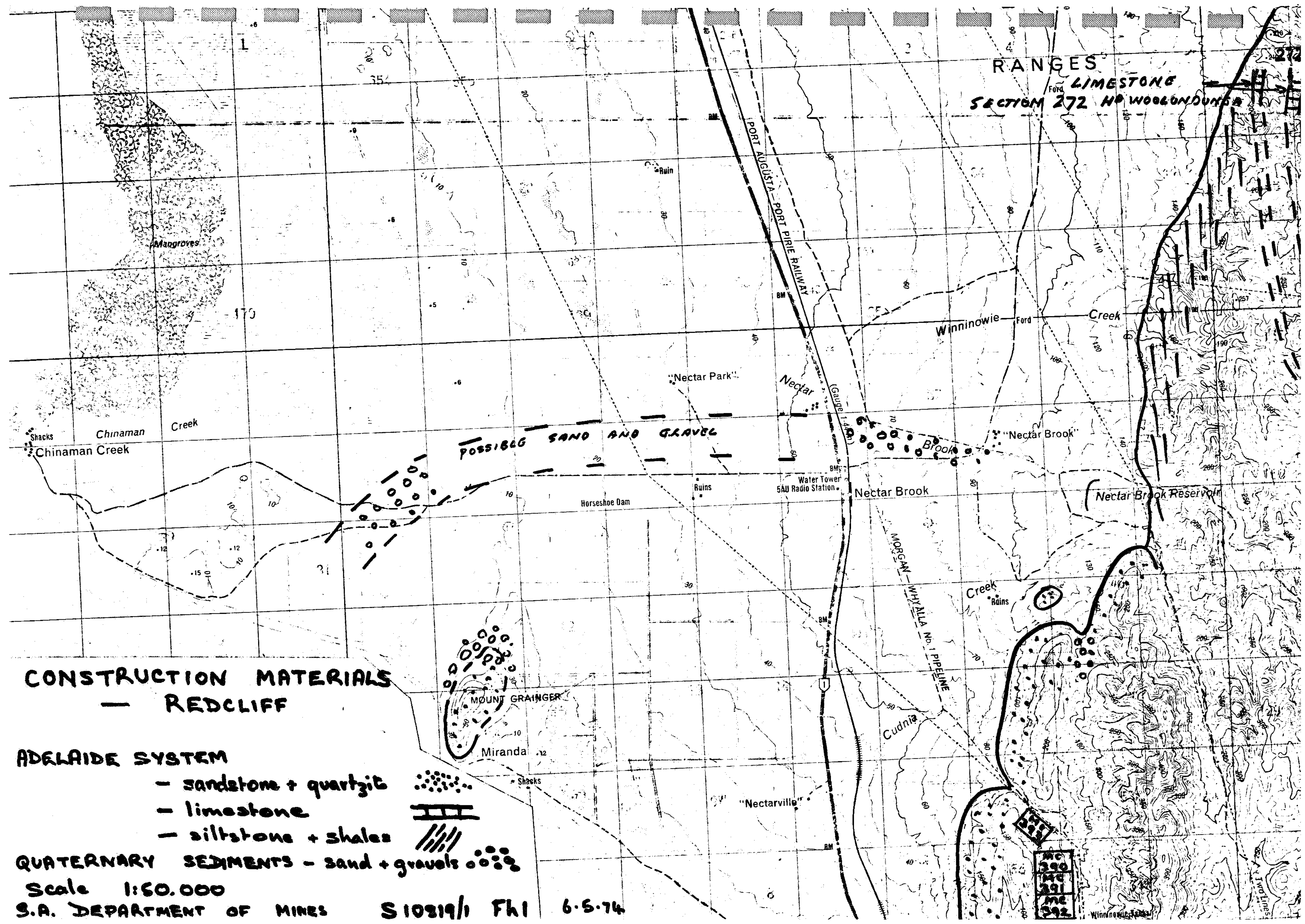
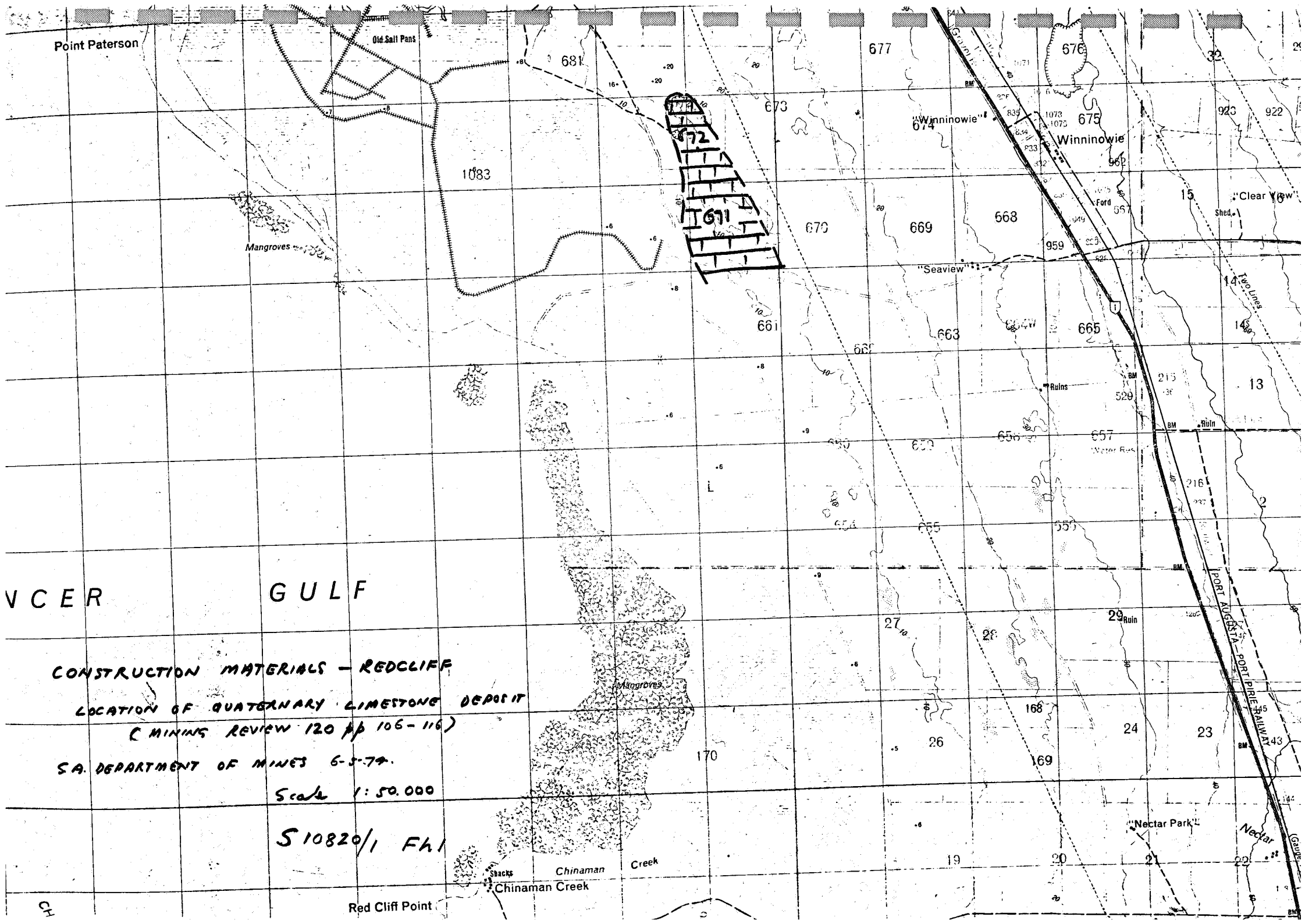

RANGES
LIMESTONE
SECTION 272 Hd WOOLUNDUNGA
PORT AUGUSTA–PORT PIRIE RAILWAY
Ruin
Mangroves
Winninowie
Ford
Creek
"Nectar Park"
Nectar
(Gauge 1.4...)
Brook
"Nectar Brook"
Shacks
Chinaman
Creek
Chinaman Creek
POSSIBLE SAND AND GRAVEL
Water Tower
5AU Radio Station
Ruins
Horseshoe Dam
Nectar Brook
Nectar Brook Reservoir
MORGAN–WHYALLA No 1 PIPELINE
Creek
Ruins
MOUNT GRAINGER
Miranda
Shacks
"Nectarville"
Cudnia
MC 393
MC 390
MC 391
MC 392
Winninowie
CONSTRUCTION MATERIALS — REDCLIFF
ADELAIDE SYSTEM
– sandstone + quartzite
– limestone
– siltstone + shales
QUATERNARY SEDIMENTS – sand + gravels
Scale 1:50.000
S.A. DEPARTMENT OF MINES S10819/1 Fh1 6.5.74



CONSTRUCTION MATERIALS — REDCLIFF

LOCATION OF QUATERNARY LIMESTONE DEPOSIT

(MINING REVIEW 120 pp 106-116)

S.A. DEPARTMENT OF MINES 6-5-74.

Scale 1:50.000

S10820/1 FH1