

ANNUAL REPORT.  
FOR PERIOD ENDING 27/6/1987  
on  
EXPLORATION LICENCE 4968  
ALEXANDRIA STATION  
N.T.

by  
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L.G.B.Nixon & Associates.

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NORTHERN TERRITORY  
GEOLOGICAL SURVEY

CR 88 / 18

## SUMMARY.

Gypsum is widespread in the region and large clusters of coarsely crystalline gypsum can be found on the spoil heaps of most of the "turkey nest" dams which have been dug in the black soil plains in the area.

A rapid reconnaissance of the region resulted in the discovery of significant deposits of gypsum at and around the No.6 Waterhole on the Playford River west of Alexandria Station Homestead, at the NO.18 Waterhole and in the black soil plain about 1 mile to the ENE of No.6 Waterhole.

The gypsum at No.6 Waterhole is estimated to be about 3 metres thick and to extend at least 1 kilometre along the southern bank of the Playford River in this area. Samples from this location have shown that the gypsum is of commercial grade and possibly of sufficient size to warrant development for exploitation.

Exploratory drilling is warranted to test the thickness, aerial extent and grade of the deposits in this area.

## INTRODUCTION.

Mr. J.Sickert, General Manager of Northern Cement commissioned the present writer to locate gypsum in the Northern Territory. The gypsum was to be used by Northern Cement at their cement plant in Darwin.

Following a literature search, the area along the Playford River near Alexandria Station was selected as having the potential to develop gypsum at shallow depth and of economic grade and size to warrant exploitation. Consequently an exploration licence was applied for covering the areas of interest to the company.

The initial search was on the ground using a Iovota 4WD Land Cruiser. This search resulted in the discovery of gypsum at the No.6 Waterhole on the Playford River and a second discovery beneath shallow black soil at a location approximately 1 kilometre to the east of the discovery at NO.6 Waterhole.

## REGIONAL GEOLOGY.

sediments in the region range from Upper Proterozoic to Recent. Outcrop is poor and large areas are covered with black soil and sand with sub-outcrops of dolomite, limestone and extensive areas of chert pebbles and pisolitic gravel.

### **Upper Proterozoic. Mittiebah Sandstone.**

A medium grained quartz sandstone forming a low rubble covered ridge south of Alexandria homestead, elongated along Buchanan Creek. This outcrop is regarded as the axis of an anticline with low flanking dips.

### **Middle Cambrian. Rankin Sandstone.**

Burton Beds. This unit outcrops between Buchanan Creek and the Playford River. The sediments are mainly limestone, chert and siltstones. Fossils including trilobites of Cambrian are common in the shales and siltstones.

### **Cainozoic.**

Brunette Limestone. This is a limestone of tertiary age. It occurs as scattered boulders in the black soils and is exposed in the bed of the Playford River where it occurs as a rubbly, white to brown, fine to coarsely grained, cherty limestone. The environment of deposition is thought to be brackish water. Gypsum is associated with these tertiary limestones but this may be fortuitous although some writers think the gypsum may be formed as a result of replacement of the limestone.

Recent. Widespread dark grey and black pedocalcic soils which produce the rolling grass covered downs of the Barkly Tableland. These soils are weakly leached and contain carbonate and gypsum horizons.

## LOCAL GEOLOGY.

The oldest sediments in the licence consist of sub-outcropping brown Middle Cambrian Burton Beds in the Rankin Limestone formation. These limestones may be overlain by Brunette Limestone of tertiary age which outcrop sporadically in the region and are exposed in the bed of the Playford River or they may be covered by black soils of more recent origin.

Gypsum occurs as large crystals or clusters of crystals in the black soil or as a rock layer up to 3 metres thick immediately beneath the black soil which can vary from less than a centimetre to over two metres.

### ECONOMIC GEOLOGY.

For the purposes of this investigation, only gypsum was considered to be of economic importance to Northern Cement.

Gypsum was discovered in significant volume at the No.6 Waterhole and at a location approximately 1 kilometre ENE of the waterhole.

The gypsum at the No.6 waterhole is exposed in the southern bank of the Playford River where it is estimated to be about 3 metres thick. It persists to the east and west of the waterhole for a total length of approximately 1 kilometre and to the south for several tens of metres before it is covered by black soil.

A second and possibly separate deposit is exposed in a low rise about 1 kilometre to the ENE of the deposit at the No.6 Waterhole. This occurrence is estimated to be at least 2 metres thick in its thickest section and is exposed in a roughly oval shape, measuring about 150m x 250m. It too disappears beneath black soil to the south, east and west, but coarse clusters of gypsum float extend for many hundreds of metres beyond the outcrop limits.

### CONCLUSIONS.

Gypsum of recent has formed at the NO.6 Waterhole in the Playford River and a nearby area.

Overburden is negligible and an open pit could easily be established to mine the gypsum.

Analyses of samples collected from these areas indicate that the gypsum is of commercial grade.

Reserves are thought to be sufficient to warrant exploitation.

Systematic drilling would be necessary to establish the thickness, grade and extent of the deposits.

### RECOMMENDATIONS.

Carry out a systematic drilling programme at both the deposits described in this report. Drill the intervening area to establish whether the gypsum forms a continuous layer from the NO.6 Waterhole to the deposit 1km to the ENE.

ESTIMATED EXPENDITURES. 1986/87.

Consultants field charges	\$4900.00
Consultants office charges	\$2888.00
Casual wages	\$600.00
Air fares	\$940.00
Vehicle hire, insurance, fuel etc.	\$2543.00
Accommodation & meals (casual)	\$264.00
Field living allowance	\$1230.00
Plans, prints, photos, report	\$120.00
Communications	\$57.00
Chemical analyses	\$600.00
Management & overheads 20%	\$2828.40
	-----
TOTAL	\$16,970.40

PROPOSED PROGRAMME & ESTIMATED EXPENDITURES for 1987/88.

The proposed exploration programme for the 1987/88 period is a pattern of drill holes to systematically explore the gypsum deposits discovered at the NO.6 Waterhole and the area 1 km to the ENE of it.

The estimated expenditures for this programme will be of the order of \$10,000.00

*L. G. Nixon*

Signed,  
L. G. Nixon  
9/8/1987

EL 4968

APPENDIX 1.

ADELAIDE BRIGHTON CEMENT LTD.

BIRKENHEAD LABORATORY.

LABORATORY No BSP 101

IO: John Sickert Darwin

<u>Sample No</u>		<u>SO3</u>	<u>CaSO<sub>4</sub> · 2H<sub>2</sub>O</u>
Playford 1		0.9	1.8
Playford 2	0-2m	44.6	99.1
Playford 3	2-4m	43.4	93.4
Playford 4	0-3m	36.6	78.8
Alexandria	surface	44.8	96.3

## APPENDIX II.

### MEGASCOPIC SAMPLE DESCRIPTIONS.

#### **Alexandria 1.**

Pale pink, brown and off white, laminated, coarsely crystalline gypsum rock. The gypsum crystals are clear to translucent, twinned with a pearly lustre and some iron staining. Impurities include silica sand grains, clay and organic matter.

#### **Playford Ck. 1.**

Pale grey to off white earthy clay. The material reacts vigorously with HCl indicating a significant carbonate content. Gypsum content was very low.

#### **Playford 2. 0-2m**

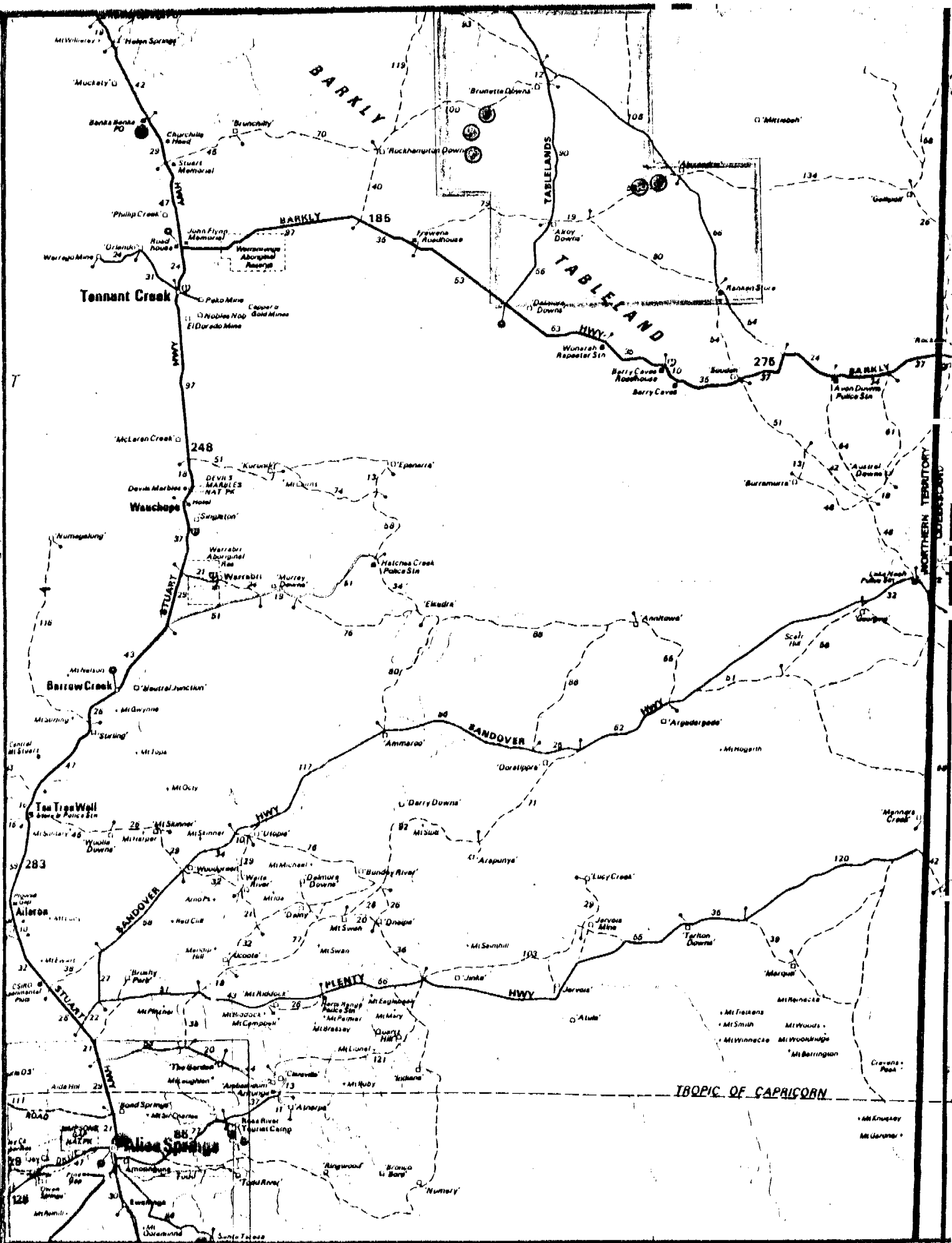
Coarsely crystalline gypsum outcrop earthy in parts. Colour pale grey to off white. The grey colour is attributed to black carbonaceous matter and grey clay. Gypsum content is 99.1%.

#### **Playford 3. 2-4m.**

Off white to pale grey, coarsely crystalline gypsum rock. The crystals are platy, twinned and have a pearly lustre. Impurities include clay, organic matter and carbonate. Gypsum content is 93.4%.

#### **Playford 4. 0-3m**

White, coarsely crystalline gypsum rock. Lustre pearly, translucent to clear crystals. Carbonate matrix which reacts vigorously with HCl. Major impurities are clay, earthy limestone and organic matter. Gypsum content 78.8%.



SURVEYED AREA	NORTHERN CEMENT PTY. LTD.	
	Drawn L.G.N.	PLACE FIX MAP
GYPSUM DISCOVERIES	Traced	GYPSUM EXPLORATION BARKLY TABLELAND NORTHERN TERRITORY
	Checked	
Revised	FIG 1	
Scale 1:2,500,000	L.G.B. NIXON & ASSOCIATES	
Date 10/9/1986		



SECOND SCHEDULE

(Plan of Area)

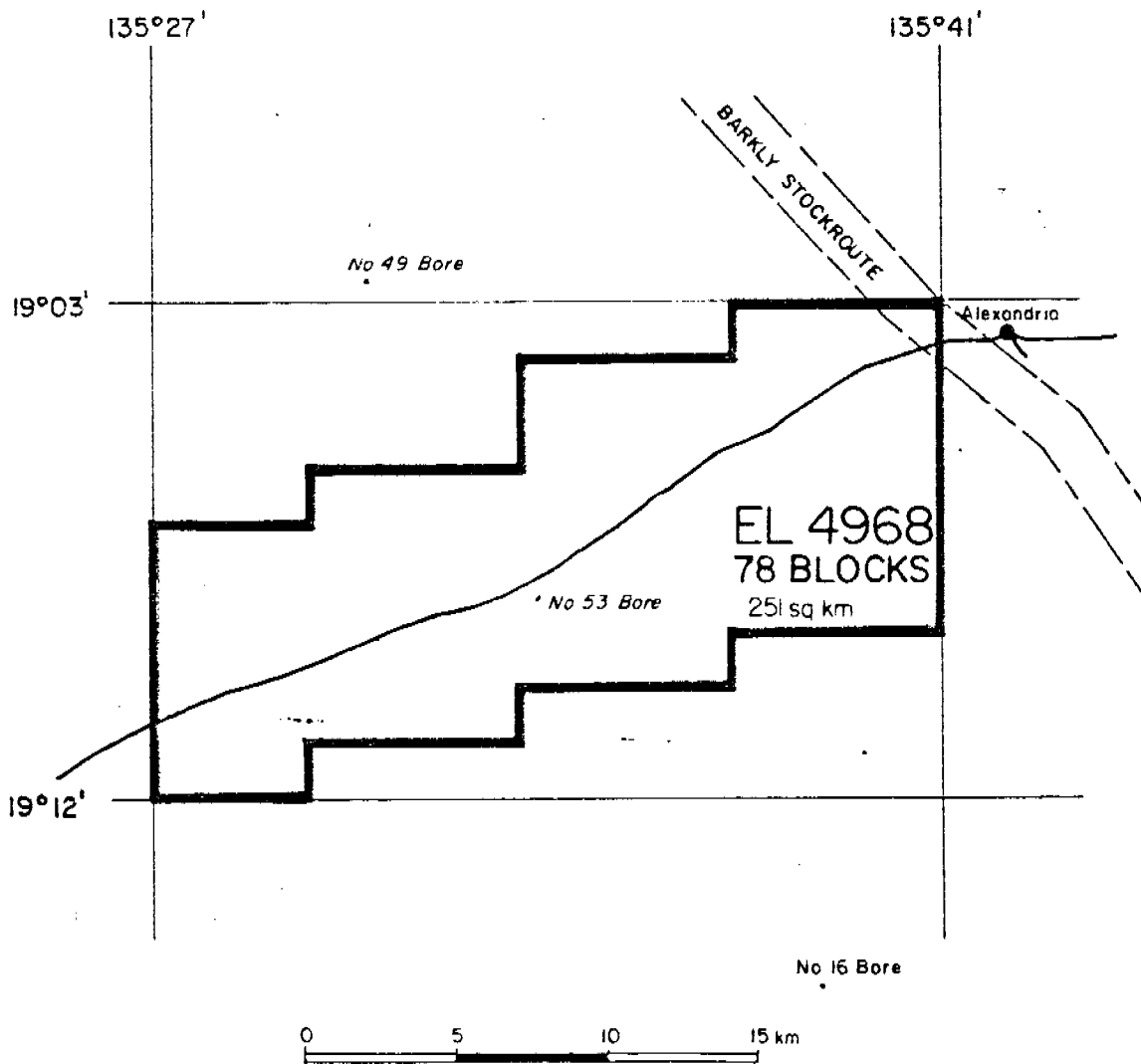
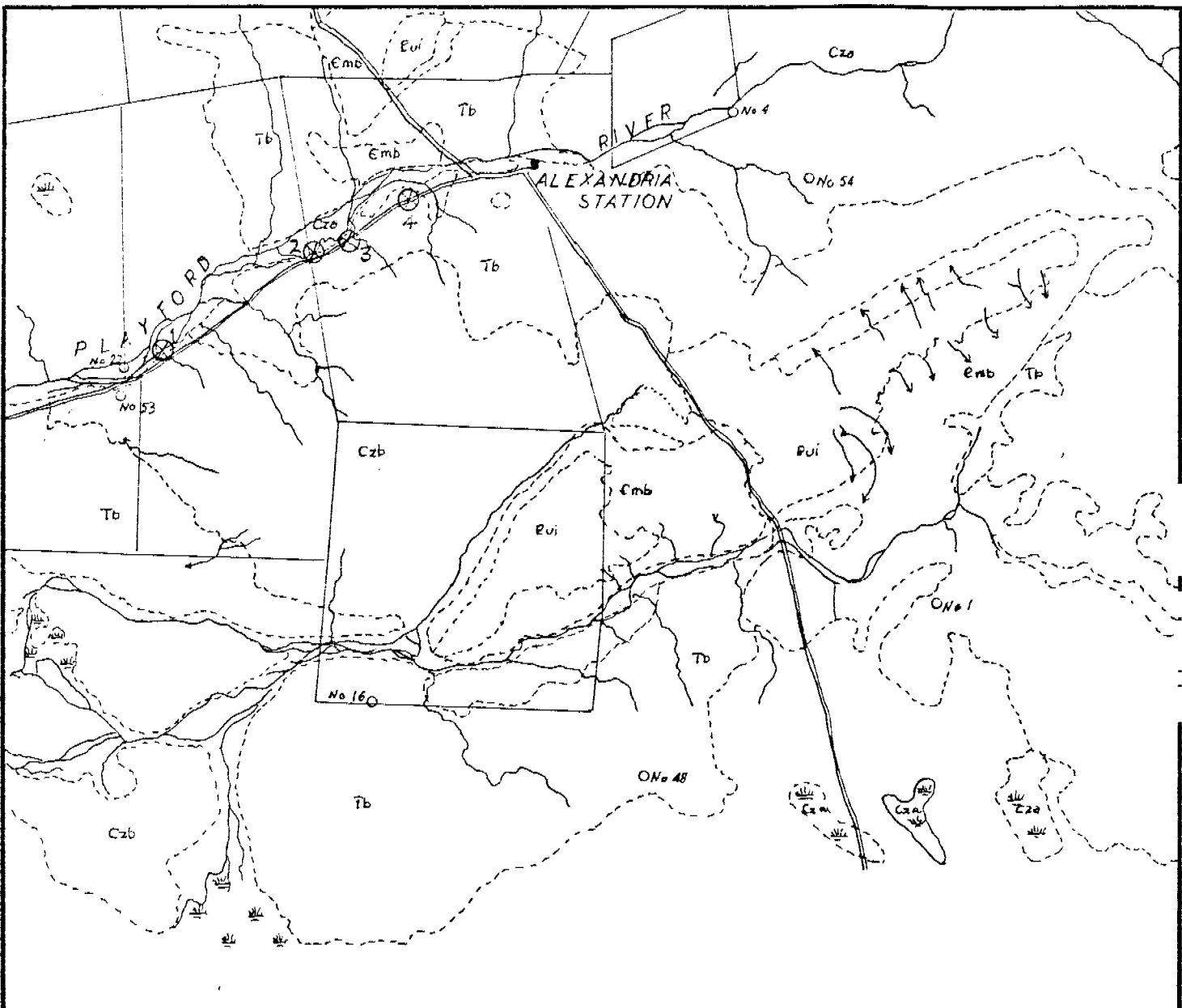


FIG.2.



SCALE



Geology after Randal et al.

QUATERNARY  
 TERTIARY  
 CAMBRIAN  
 PROTEROZOIC  
 WATER HOLE  
 SAMPLE SITE  
 FENCE  
 ROAD

Czo
Tb
Emb
Eui
ONo 27
⊗ 1
—
==

NORTHERN CEMENT PTY. LTD.

Drawn	
Traced	
Checked	
Revised	
Scale	1:250,000
Date	24/10/1987

GEOLOGICAL MAP  
 and  
 GYPSUM SAMPLE LOCATIONS  
 No 6 WATERHOLE PLAYFORD RIVER  
 ALEXANDRIA STATION  
 S. E. NORTHERN TERRITORY  
 L. G. B. NIXON & ASSOCIATES

FIG. 3