

BARITE OCCURRENCES IN THE  
NORTHERN TERRITORY

by

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## 1. INTRODUCTION

This report summarizes most of the known barite occurrences in the Northern Territory and where available gives details of the location, size, quality and geological setting of each occurrence. However, information on some occurrences such as those at Anthony's Lagoon and in the Rock Candy Range on the Daly River Road is sketchy and subject to confirmation. Brief details of general occurrences, mineralogy and the economics of barite deposits are also given.

## 2. MINERALOGY

The name barite, the correct mineralogic name, is derived from the Greek work "barys" meaning heavy. The mineral of commerce is commonly referred to as barytes. The mineral barite, (barium sulphate,  $\text{BaSO}_4$ ), contains 65.7%  $\text{BaO}$  and 34.3%  $\text{SO}_3$  by weight, when pure. It is colourless, white or grey and transparent to opaque. In some deposits barite is black, yellow, brown, red, green or blue because of included impurities. The most common impurities are silica, iron oxide, calcium and magnesium carbonate, alumina, pyrite and galena. Strontium may substitute for some of the barium in the crystal lattice.

Barite crystallizes in the orthorhombic system; well-formed crystals are generally tabular and have three cleavages. The barite of many deposits, however, has an uneven fracture and an apparent cleavage caused by separation along planes between successively deposited layers.

Barite is a heavy mineral having a specific gravity, when pure, of 4.5. It has a hardness of 2.5 to 3.5 on Moh's Scale; is infusible, changing to  $\text{BaO}$  at high temperatures and is insoluble in water but soluble in concentrated sulphuric acid.

The only other barium mineral of commercial importance is witherite (barium carbonate,  $\text{BaCO}_3$ ) which contains 77.7%  $\text{BaO}$  and 22.3%  $\text{CO}_2$  by weight when pure. There are no known commercial deposits of witherite in Australia.

## 3. USES AND SPECIFICATIONS

Approximately 75% of the world's production of barite is used in the oil and natural gas drilling industry as a weighting agent in well drilling muds. Barite is also used as a fluxing agent in the glass making industry where it also acts as an oxidiser and decolouriser, making the glass more workable and increasing its brilliance. Further uses are as a filler or extender in paint, inks, oilcloth, linoleum, rubber and other materials and to make a high density concrete to shield radiation from nuclear reactors and X-ray equipment. Barite is the raw material used in manufacturing barium carbonate, barium chloride and other barium chemicals. The once extensive use of barite for the manufacture of lithophone has largely ceased in the last decade due to the replacement of lithophone by titanium oxide.

Specifications for barite depend upon the application to which it is to be put. In oil well drilling, barite must be fine ground (at least 90% less than 44 micron), heavy (minimum specific gravity of 4.25) and chemically inert. The glass manufacturing industry requires a minimum content of 98%  $\text{BaSO}_4$ , and a maximum, 1.5%  $\text{SiO}_2$ , 0.15%  $\text{Fe}_2\text{O}_3$  and 0.15%  $\text{Al}_2\text{O}_3$  and a particle size of 590 - 74 microns. For use as a filler, barite should have high light reflectance and contain at least 94%  $\text{BaSO}_4$ . Manufacturers of barium chemicals insist on a "hard" lump barite (this refers to ease of crushing) with a minimum content of 94 - 95%  $\text{BaSO}_4$  and no more than 1%  $\text{Fe}_2\text{O}_3$  and 1%  $\text{SrSO}_4$ .

#### 4. DOMESTIC PRODUCTION AND PRICES

Barite is a relatively low price commodity and transportation cost is an important factor in determining the economic viability of most barite deposits. Variations in domestic production and particularly exports are dependent on demand from neighbouring countries in the South Pacific region, as transport costs beyond this region are prohibitive in relation to barite prices. Generally deposits need to be near existing cheap transport systems and seaports to become viable operations.

Total recorded domestic production of barite in Australia between 1906 - 1973 was 495 326 tonnes and total exports between 1939-1973 were 167 743 tonnes. Total recorded production in the Northern Territory was 35 257 tonnes. (1970-1971). With the upsurge of oil exploration activity in Australia and South - East Asia in the 1960's domestic production rose markedly and some 65% of the total recorded domestic production has taken place since 1960. The five year period 1968-1972 saw peak domestic production with 40% of total recorded production and 60% of total recorded exports. In 1971, the peak year 53 811 tonnes of barite were produced in Australia. Of this 29 705 tonnes were exported to Brunei, Indonesia, Japan and other S.E. Asian countries.

Reduced oil exploration activity in Australia and its offshore areas and alternative supplies of barite to S.E. Asia from Thailand have seen a dramatic slump in Australian domestic barite production to pre 1960 levels. Total domestic production in the period Jan.-June 1974 was 3 030 tonnes with exports of 868 tonnes.

Prices of industrial grades of barite are subject to negotiation, as a very general figure the value per tonne of the 868 tonnes of barite exported between Jan. - June, 1974 was \$67. Drilling grade barite is usually a little cheaper than most other industrial grades of barite.

## 5. OCCURRENCE AND ORIGIN

Workable deposits of barite are widely distributed in many geological environments in sedimentary, igneous and metamorphic rocks. Most barite deposits are formed by precipitation of the barium sulphate from circulating solutions. The barium may be of magmatic origin, or may have been dissolved from pre-existing rocks by circulating groundwater.

Generally deposits can be classified into three main types; vein and cavity filling deposits; replacement deposits and residual deposits.

Vein and cavity filling deposits are those in which barite and associated minerals occur along faults, gashes, joints and bedding planes, and in breccia zones and solution channels. Sharp contacts of the veins and cavity fillings with wall rocks are common.

Replacement deposits are those where either partial or total replacement of sedimentary beds by barite has taken place. These may be restricted to a certain bed or a sequence of beds.

Residual deposits are those which formed by the weathering of pre-existing deposits.

Australian deposits are of at least two types: fissure veins and replacement bodies, the majority belonging to the fissure vein class.

## 6. AUSTRALIAN SOURCES

### South Australia

South Australia has been the source of more than three-quarters of the barite produced in Australia. About 50 deposits are known, mostly in the Flinders Ranges or Mount Lofty Ranges. The principal producer is the Oraparinna Mine.

### New South Wales

Barite has been mined at many places in New South Wales, but most of the production has come from Kempfield in the Trunkey District.

### Western Australia

Numerous barite deposits occur throughout Western Australia but the majority of the production has come from the Cranbrook locality near Albany.

### Northern Territory

The Inverway barite deposit is the only deposit to have been mined. Some 35 000 tonnes were produced between 1970 and 1972. Production at the Inverway mine has now ceased.

The Dorisvale and Mathison Creek occurrences are being evaluated at present and may be economic propositions in the future.

7. BARITE OCCURRENCES IN THE NORTHERN TERRITORY

Locations are plotted on plate 1.

7.1 Mount Shoobridge

Location: Pine Creek 1:250 000 Geological Sheet SD 52-8.

Within the Golden Dyke Formation in the vicinity of the Old Company Tin Mine barite occurs with sporadic lead mineralization in a quartz blow. This quartz blow lies on a major structural feature, the Mt. Shoobridge Fault and it is possibly that further minor barite mineralization may be associated with quartz material along this structure. The patchy nature of the barite mineralization limits any economic potential.

7.2 Mary River Homestead (Battey Pers. Comm)

Location: Pine Creek 1:250 000 Geological Sheet SD 52-8.

Several narrow veins of barite are known to be present within limestone of the Golden Dyke Formation 5 kilometres west-south-west of Mary River Homestead or 27 kilometres east-south-east of Mt. Wells.

7.3 Cullen Siding Area

Location: Pine Creek 1:250 000 Geological Sheet SD 52-8.

The occurrence is 100 metres east of the highway at a point 2.6 kilometres north of Cullen Siding.

The barite occurs as lenses up to 65 metres long in two quartz veins in granite. The quartz veins are each 0.3 metres to 1 metre wide, trend about  $340^{\circ}$  and crop out sporadically for 275 metres. They merge in two places near the south end of the outcrop giving a total width of 2 metres.

Two barite lenses in the veins could have economic potential. The largest of these is at the south end of the outcrop where the two quartz veins merge; it is about 65 metres long and attains a maximum width of 1.2 metres. The smaller lens, about 200 metres north of the larger one, is only about 25 metres long and up to 0.6 metres wide.

The barite is massive and coarsely crystalline. It is pure white to cream in colour, with only rare traces of ferruginous staining. Galena and malachite occur in trace amounts. Assays of two samples gave the following results: -

1.	B a S O <sub>4</sub>	66.5%
2.	B a S O <sub>4</sub>	81.0%

The length of the barite lens at the main outcrop is about 65 metres. Though a maximum width of 1.2 metres is reached, the average mineable width is probably not more than 1 metre. Assuming a mineable depth of 3 metres (probable depth to solid granite) the reserves of barite at the main outcrop would be of the order of 190 cubic metres or roughly 900 tonnes. Another 100 tonnes could be mined from a smaller lens 200 metres north of the main outcrop.

7.4 Collia Waterhole

Location: Fergusson River 1:250 000 Geological Sheet SD 52-12.

A barite reef occurs within the Soldiers Creek Granite about 8 kilometres north-west of Collia Waterhole on a tributary of the Fish River.

The reef was sampled by Hossfeld (1937) during a survey of the Collia tinfield. The analytical results were as follows:

Soluble in HCl		Insoluble in HCl	
	%		%
Ca O	2.24	Ba O	58.16
Sr O	4.19	S O <sub>3</sub>	28.86
S O <sub>3</sub>	3.43	Si O <sub>2</sub>	00 07
C O <sub>2</sub> est.	3.25		
Fe <sub>2</sub> O <sub>3</sub>	Trace		

- S.G. (a) Picked samples of orthorhombic crystals 4.05.  
 (b) Bulk samples 3.85 - 3.96.

7.5 Dorisvale Area

Location: Fergusson River 1:250 000 Geological Sheet SD 52-12.

Dorisvale Homestead is situated in the centre of the area covered by the Fergusson River 1:250 000 sheet. The barite deposits are about 16 kilometres south-west of the homestead.

Access to the area is via the Stuart Highway to a point about 275 kilometres by road south of Darwin, where a well-used road turns off to Claravale Homestead near the Daly River. Across the river, an unsurfaced track leads to Dorisvale and the barite deposits. The distance by road from the highway to the deposit is about 120 kilometres.

"The barite deposits occur in the flat-lying Antrim Plateau Volcanics and the Bynoe Formation. The barite emplacement appears to be at least in part, associated with the Dorisvale Fault. There is no high degree of deformation in the area and the emplacement appears to represent low temperature hydrothermal mineralization. Little alteration exists along the contact of the barite with the country rock.

The barite outcrops in the area have strikes ranging between 300° and 345° magnetic. The dip of the barite outcrops is near vertical."  
 (Johnson, 1970)

Mineral Deposits Ltd. under an agreement with the leaseholders, Messrs. D. Drake, T. Mour and W.E. Casey have carried out an extensive drilling programme and feasibility study on the deposits and at last report the estimated barite reserves were approximately 1,435,000 tonnes.

7.6 Mathison Creek Area

Location: Ferguson River 1:250 000 Geological Sheet SD 52-12.

The barite deposits lie on the western side of Mathison Creek approximately 16 kilometres south of its junction with the Flora River. The geographical co-ordinates of the field are latitude 14° 58' S, Longitude 131° 34' E.

"The barite veins are restricted to an andesite dominant member of the Antrim Plateau Volcanics, and do not penetrate the overlying sedimentary member. The barite has been emplaced in the lodes, most probably by circulating groundwater solutions reacting to precipitate barium sulphate, but possibly through hydrothermal emplacement." (Shannon, 1971)

The veins have a north-west strike, vertical dip, and an average width of between 1.2 and 1.5 metres. The lode outcrop is poor and discontinuous because of soil cover. Exposures stand up to 0.3 metres out from the ground surface.

Eight major lodes have been recognised to date referred to as lodes A to H. (See Plate 3.) Detailed work has only been undertaken on lodes A, B and C, details of which are given below.

<u>Lode</u>	<u>Length</u> (metres)	<u>Average Width</u> (metres)	<u>Metric Tonnage to 12 metres.</u>
A	600	1.5	50 000
B	900	1.2	60 000
C	600	1.2	40 000

7.7 Coolibah Homestead

Location: Delamere 1:250 000 Geological Sheet SD 52-12.

Small aggregates of barite are found in the Bynoe Formation about 6 kilometres west of Coolibah Homestead.

7.8 Saddle Creek Area

Location: Auvergne 1:250 000 Geological Sheet SD 52-12.

The Saddle Creek barite deposits are located at the headwaters of Saddle Creek 9.5 kilometres north of the Victoria Highway.

Pontifex et al (1968) noted that "small pods and veins of barytes were found in the Angalarri Siltstone. A lens up to 6 metres long and 2 metres wide was found 1.5 kilometres north-west of Saddle Creek Dam."

Further veins have since been located near the headwaters of Saddle Creek. A preliminary testing of the deposits by South Australian Barytes Pty. Ltd. showed that the veins attained a maximum width of 1.5 metres and dip at between 10° to 30° to the east. Details of strike length were not available.

The following chemical analyses were obtained from two samples submitted to the East Point Laboratory of the Department of Northern Australia, Darwin.

Sample 1.	Specific gravity	4.11
	Barium as BaO	60.0%
	Strontium as SrO	2.1%
	Iron as Fe <sub>2</sub> O <sub>3</sub>	0.7%
	Calcium as CaO	0.8%
	Silicon as SiO <sub>2</sub>	4.7%
	Magnesium as MgO	0.2%
	Sulphur as SO <sub>3</sub>	31.8%
Sample 2.	Specific gravity	3.98
	Barium as BaO	59.7%
	Strontium as SrO	1.6%
	Iron as Fe <sub>2</sub> O <sub>3</sub>	0.4%
	Calcium as CaO	0.3%
	Silicon as SiO <sub>2</sub>	5.8%
	Magnesium as MgO	0.2%
	Sulphur as SO <sub>3</sub>	31.3%

#### 7.9 Newry Homestead

Location: Waterloo 1:250 000 Geological Sheet SE 52-3.

A vein of barite up to 1.5 metres wide and 100 metres long occupies a vertical fault zone in Fargoo Tillite, 12 kilometres east-southeast of Newry Homestead at grid reference 540222.

#### 7.10 Inverway Barite Deposits

Location: Limbunya 1:250 000 Geological Sheet SE 52-7.

The Inverway barite deposits are located 32 kilometres north-west of Inverway Homestead on the Mistake Creek - Inverway Road.

The deposits are currently held by South Australian Barytes Limited. Mining commenced in 1970 and ceased in 1972 due to marketing problems following a slump in the oil drilling industry. Between 1970 and 1972 35 000 tonnes of barite was mined and marketed. The material was first put through jigs at the mine to remove extraneous material and then sent by truck 390 kilometres to the company's mill in Wyndham. Here the material was crushed to the required mesh size and then bagged ready for marketing.

The barite deposits occur within basalts of the Antrim Plateau Volcanics. Six lodes have been located to date called Bellchambers Lode, Western Lode, Main Lode, Gregg Lode, Coates Lode, and Bowering Lode. Of these only the Western Lode and the Main Lode have been worked and very little information is known about the unworked lodes.

The main lode has a strike length of approximately 3 300 metres and minimum outcropping width of 1.5 metres, and the strike is north-west. A bulk sample taken from this vein gave the following results:-



Specific Gravity	4.28
BaSO <sub>4</sub>	97.3%
SrSO <sub>4</sub>	2.05%
SiO <sub>2</sub>	0.33%

The western lode strikes west-north-west, has a minimum width of 1.5 metres and a strike length of 600 metres. A bulk sample taken from this vein gave the following results:-

Specific Gravity	4.54
BaSO <sub>4</sub>	96.9%
SrSO <sub>4</sub>	2.40%
SiO <sub>2</sub>	0.33%

Plate 5 is a detailed plan of the deposits.

#### 7.11 Kirkimbie Homestead

Location: Limbunya 1:250 000 Geological Sheet SE 52-7.

Small veins and pods of barite, commonly with associated quartz and calcite cut the volcanics west and north-west of Kirkimbie Homestead. A relatively large north-west trending (310°) vein, crops out approximately 26 kilometres west-south-west of Kirkimbie Homestead. On air photographs the vertical vein shows up as a white, linear feature and can be traced for approximately 8 kilometres. At its northern extremity the vein, 1.5 metres in width, projects up to 1.5 metres above the enclosing basalt, and consists of quartz and minor barite.

#### 7.12 White Point Area

Location: Mount Doreen 1:250 000 Geological Sheet SF 52-12.

Minor copper and lead mineralization occurs in the Cambrian Walbiri Dolomite in the Walbiri Ranges on the northern margin of the Ngalia Basin. Secondary copper minerals are present in intraformational breccia and irregular veins of barite contain galena.

The Walbiri Ranges lie two miles south of the Yuendumu Settlement and extend to the east and west over a total length of 32 kilometres.

Two diamond drill holes were put down by Mines Branch, Department of Northern Australia approximately 1.2 kilometres north-west of White Point, 10.5 kilometres south-west of Yuendumu. Veinlets and small irregular masses of barite are present in dolomite from both drill holes (72 to 76 metres in DDH 1 and 59 to 67 metres in DDH 2) and contain minor amounts of galena. A few specks of pyrite were observed in barite from DDH 2.

The barite mineralization appears to be stratigraphically controlled. No mineralization has been observed, or has been reported, along the fault zone itself (White Point Fault), but it may have provided access for hydrothermal solutions which deposited the barite - galena veins present in the dolomite outcrops. Alternatively the barite could be the product of redistribution of material originally present in disseminated form elsewhere in the sequence.

7.13 Ngalia Basin, Northern Margin (Fruzzetti, Pers. Com)

Location: Mount Doreen 1:250 000 Geological Sheet SF 52-12.

Barite is associated with fluorite in quartz dykes intruding basement rocks, mainly granite, on the northern margin of the Ngalia Basin, 300 air kilometres north-west of Alice Springs, approximately 50 kilometres west of the Yuendumu Settlement.

7.14 Georgina Range Area (Fruzzetti, Pers. Com.)

Location: Alice Springs 1:250 000 Geological Sheet SF 53-14.

Barite has been reported by C.R.A. geologists in carbonate veins (possibly carbonatite) associated with potassium - rich melanocratic syenite and ultrabasic rocks in the Georgina Range area, 100 kilometres east-north-east of Alice Springs (160 kilometres by road).

7.15 Parana Hill-Anticline

Location: Lake Amadeus 1:250 000 Geological Sheet SG 52-4.

"Veins of barite up to about 0.15 metres thick, occur in the Bitter Springs Formation in the core of the Parana Hill Anticline" (Wells et al, 1970.)

7.16 Redbank - Wologorang Area

Location: Calvert Hills 1:250 000 Geological Sheet SE 53-8.

Barite crystals have been identified in samples taken from the "Azurite" mine, crystals were found in hollows within crystal aggregates of malachite in layers of trachyte. Remnants of volcanic necks and pipes of trachytic rocks in an area between 3.2 and 6.4 kilometres north and north-east of Wologorang Homestead, are very rich in barite (aggregates of large rhombic prisms) as well as containing significant amounts of copper carbonates and silicates. Also galena, sphalerite and barite have been reported to occur in some of the breccia features in the vicinity of the "China" workings.

Barite occurrences noted in the Redbank - Wologorang Area appear to have no economic potential but rather serve as a guide to the location of subsurface copper mineralization.

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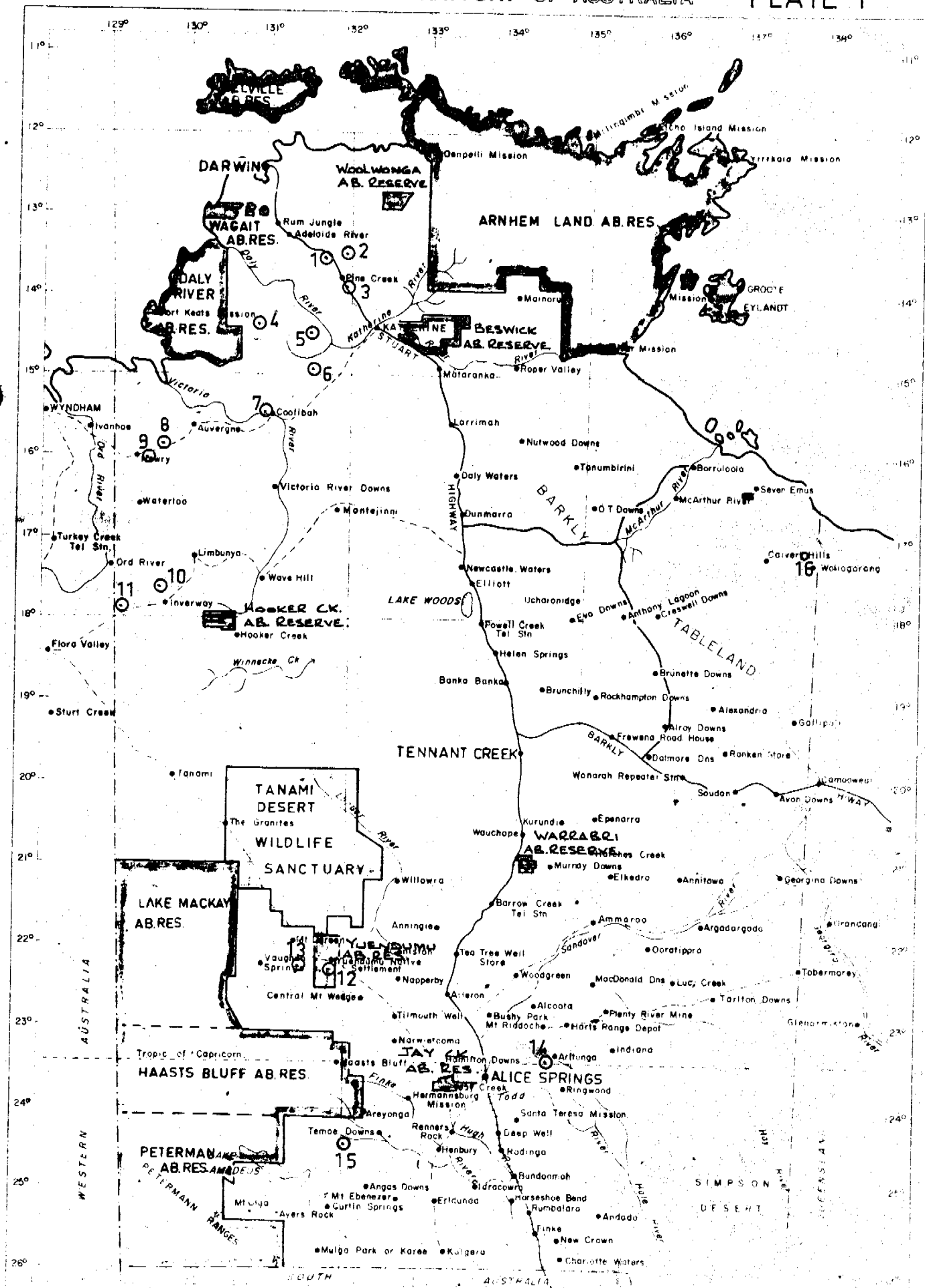
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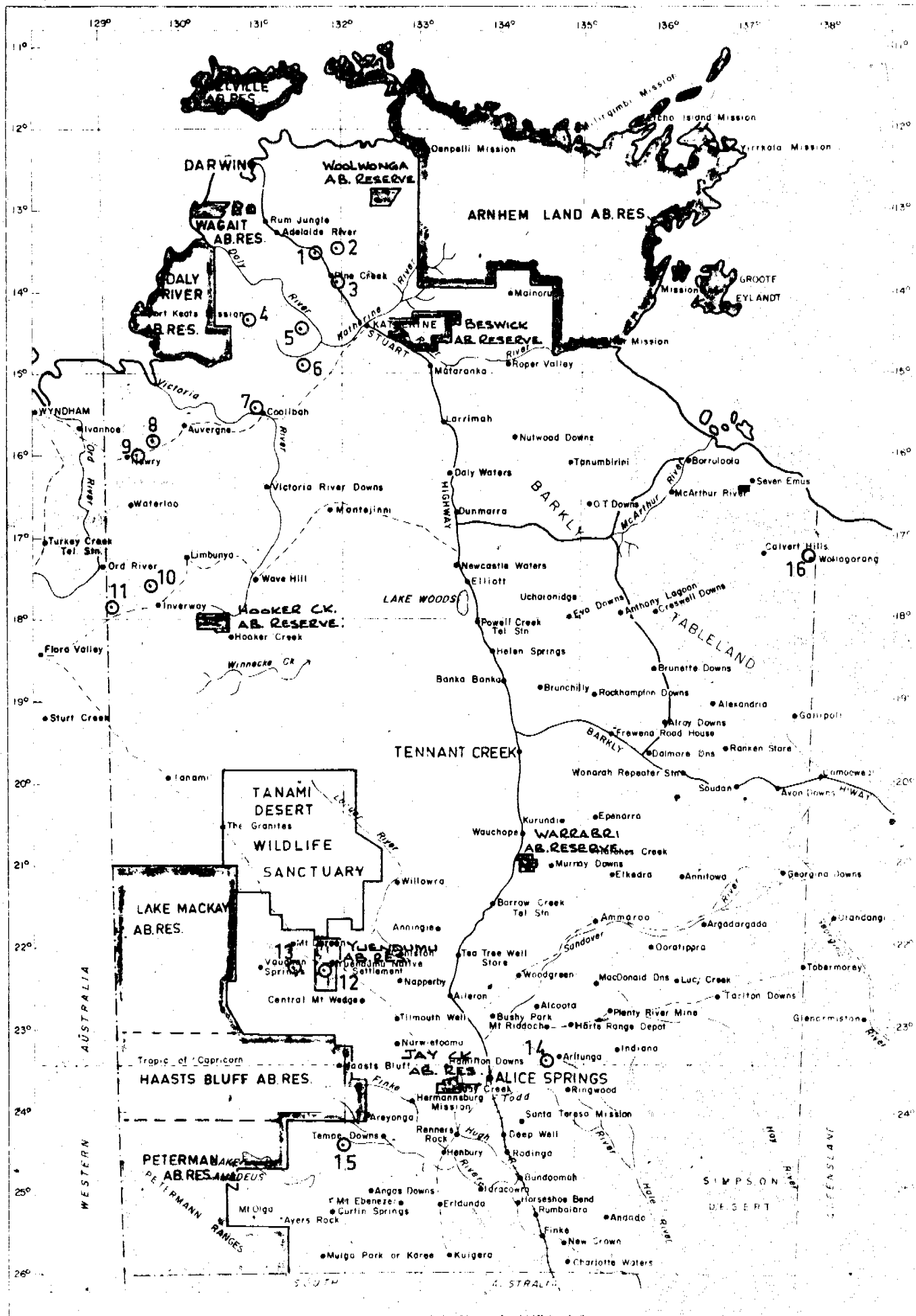
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BARITE OCCURRENCES IN THE  
NORTHERN TERRITORY

- (1) Mount Shoobridge
- (2) Mary River Homestead
- (3) Cullen Siding Area
- (4) Collia Waterhole
- (5) Dorisvale
- (6) Mathison Creek
- (7) Coolibah Homestead
- (8) Saddle Creek
- (9) Newry Homestead
- (10) Inverway
- (11) Kirkimbie Homestead
- (12) White Point
- (13) Ngalia Basin
- (14) Georgina Range
- (15) Parana Hill Anticline
- (16) Redbank - Wollogorang Area





14°30'

Dorisvale H.S.

14°45'

Wombungi

131°00'

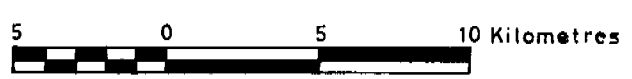
131°15'

— Barite occurrences

DORISVALE N.T.

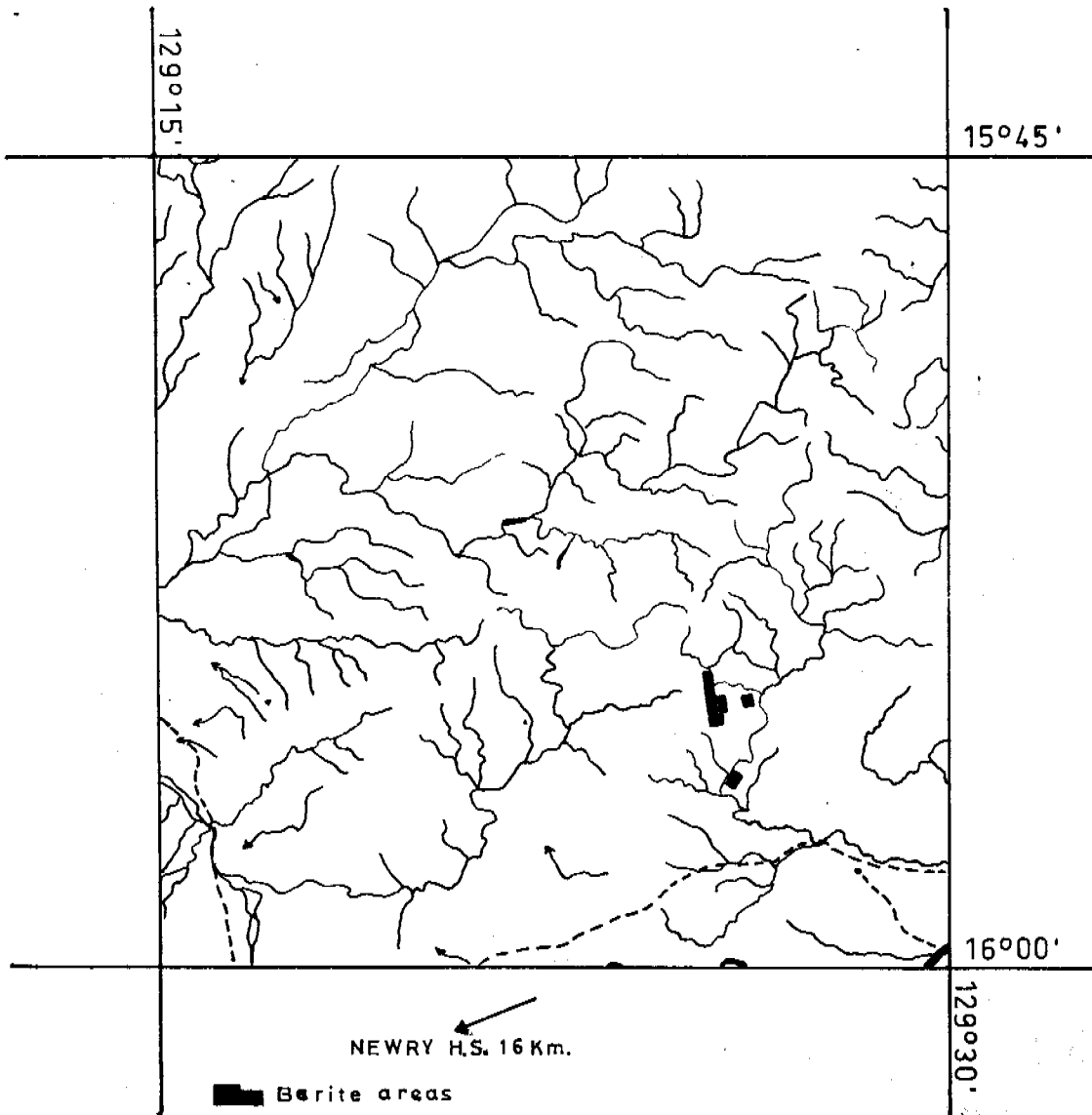
BARITE OCCURRENCES

SCALE 1:250,000



G80/048E

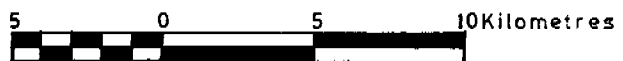




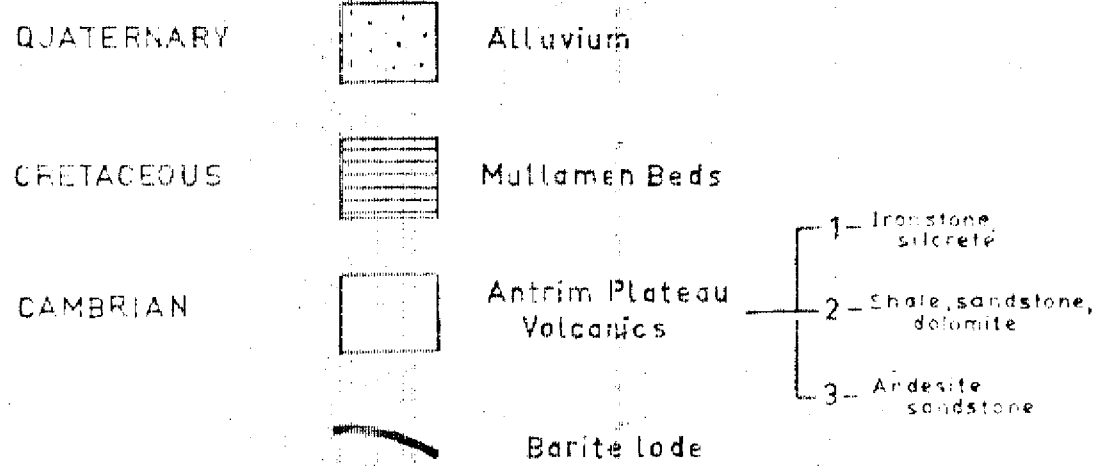
SADDLE CREEK N.T.

BARITE OCCURRENCES

SCALE 1:250,000

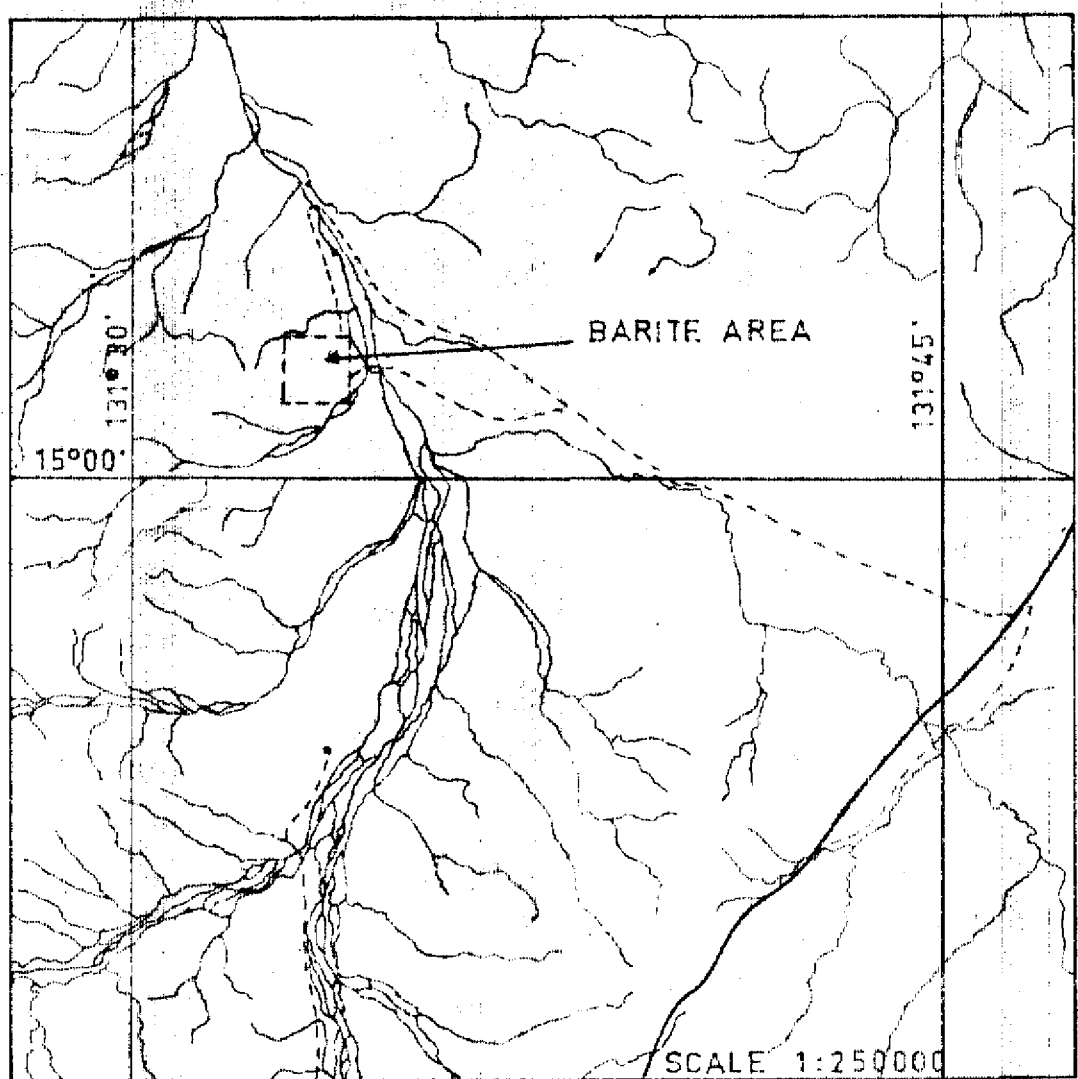
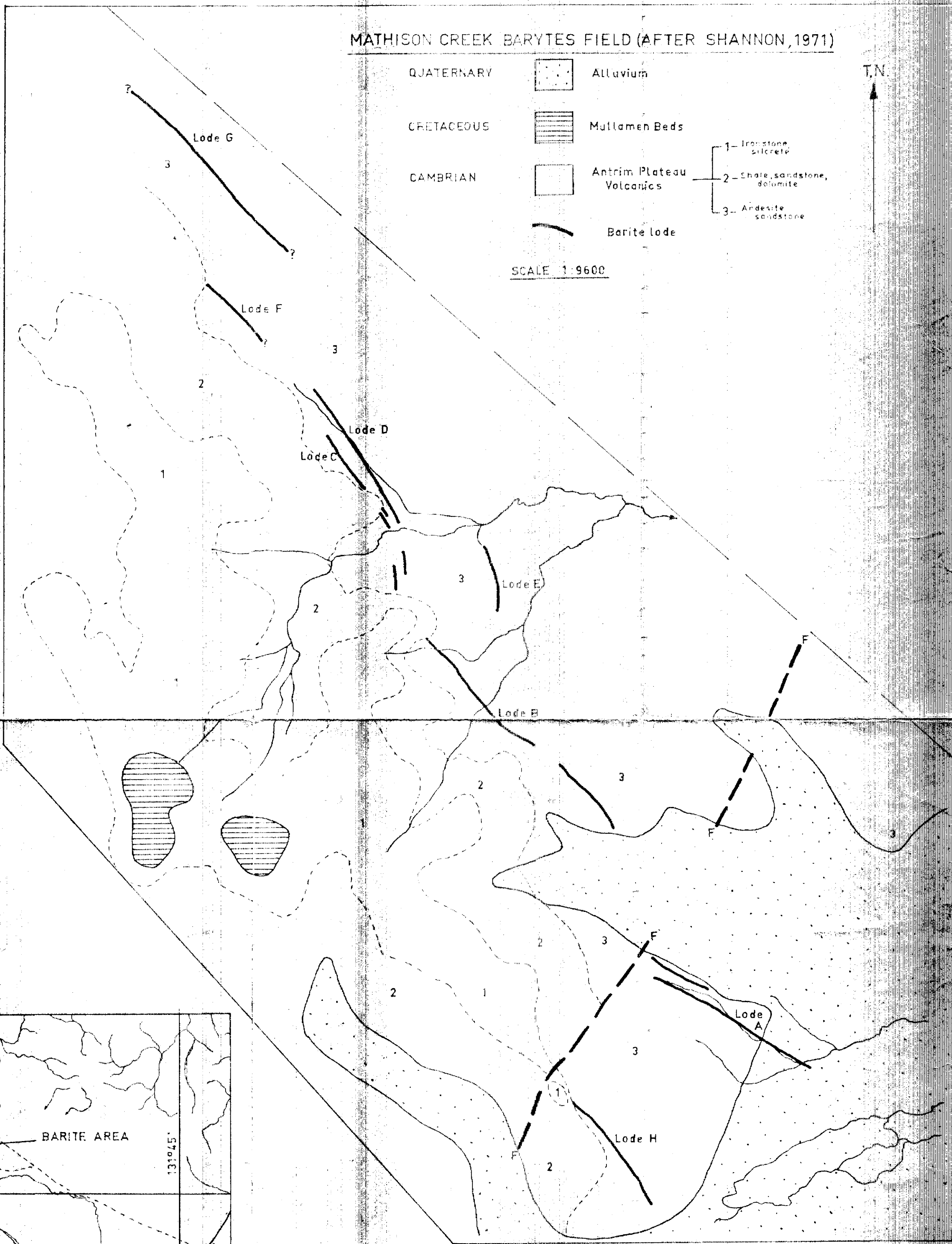


MATHISON CREEK BARYTES FIELD (AFTER SHANNON, 1971)



SCALE 1:9600

T.N.



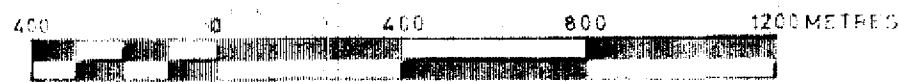
MATHISON CREEK N.T.

BARITE OCCURRENCES

INVERWAY N.T.

BARITE DEPOSITS

SCALE 1:15840



T.N.

TO MISTAKE CREEK

KIRKIMBIE CREEK

BORR

KIRKIMBIE  
YARD

COATES  
LODE

BOWERING  
LODE

BELLCHAMBERS  
LODE

DWELLINGS

WORKSHOP

BORR

BORR

AIRSTRIP

WESTERN  
LODE

PLANT

MAIN LODE

GREGG  
LODE

TO INVERWAY  
30Km.

REFERENCE

BARITE OUTCROP (Continuous)

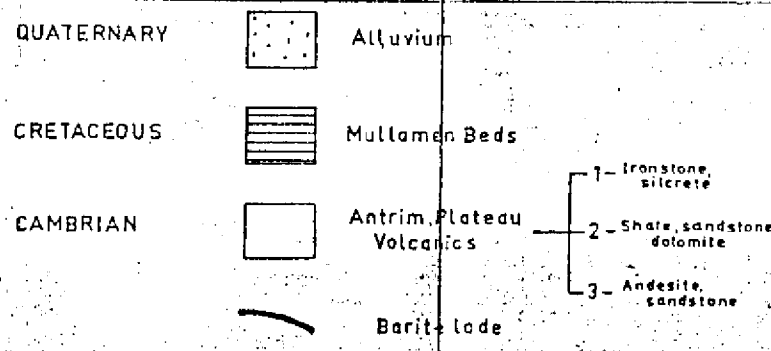
BARITE OUTCROP (Discontinuous)

MAIN ROAD

TRACK

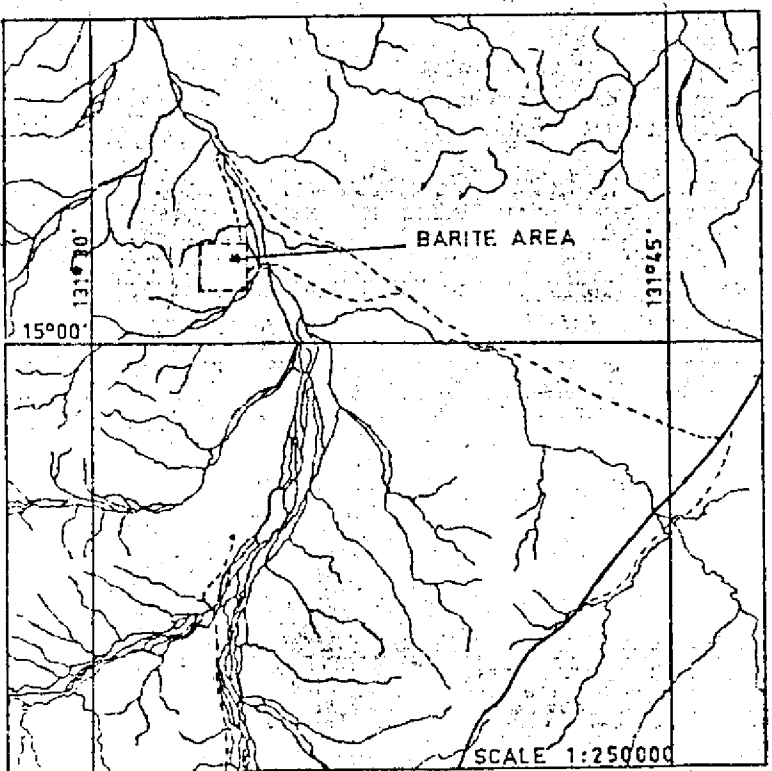
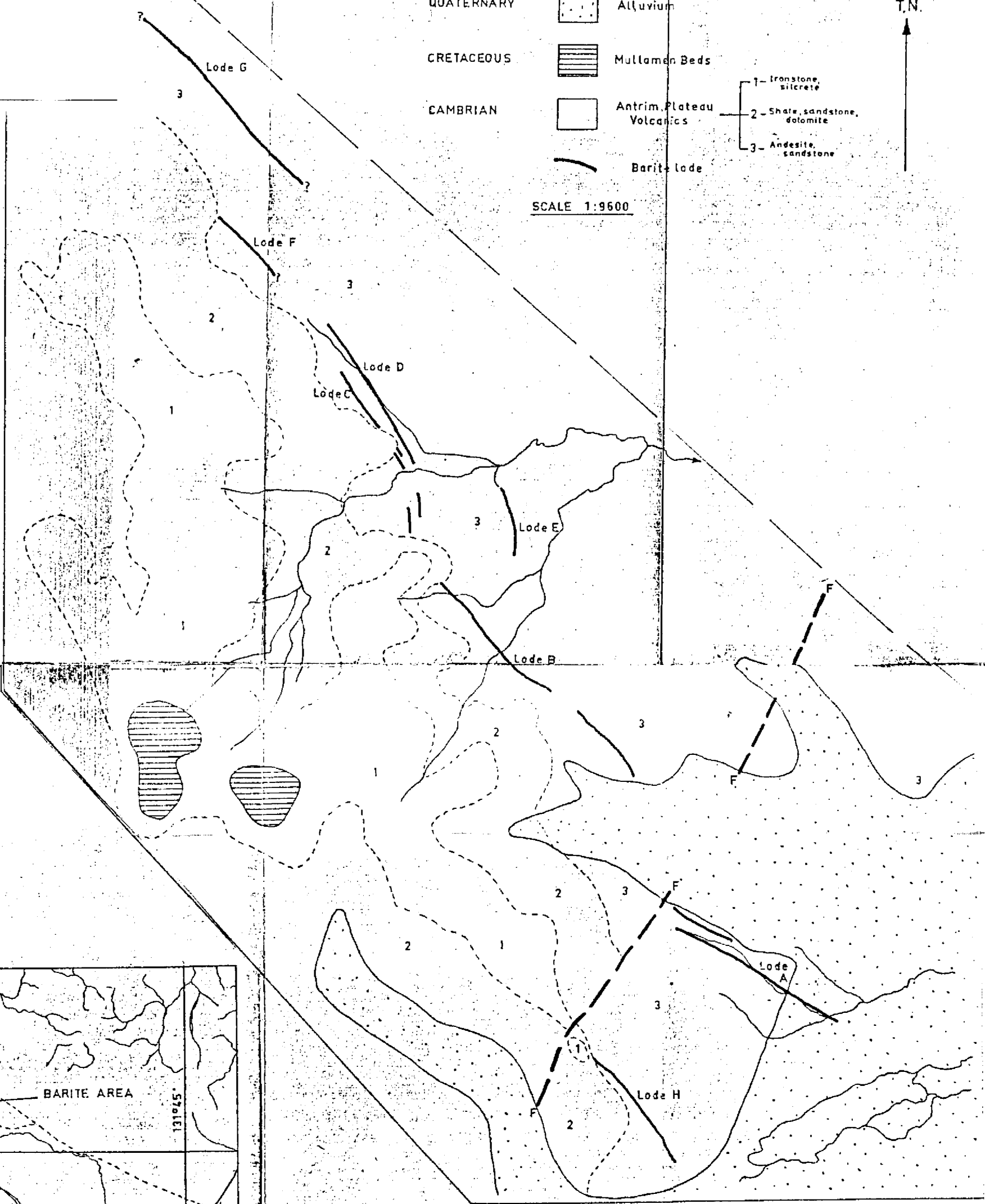
CREEK

MATHISON CREEK BARYTES FIELD (AFTER SHANNON, 1971)



SCALE 1:9600

GS 75/21



MATHISON CREEK N.T.  
BARITE OCCURRENCES