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SML 183

PORT LINCOLN

PROGRESS AND FINAL REPORTS TO LICENCE SURRENDER FOR THE PERIOD 15/4/1968 TO 28/2/1970

Submitted by
Noranda Australia Ltd and Unimin Corp.
1970

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Government of South Australia
Primary Industries and Resources SA

Dm 392/1968
Noranda Australia Ltd

'FOR PURPOSE OF EXPLORATION FOR URANIUM BEARING MINERALS AND OTHER METALS.'

'EXCLUDES RIGHTS OVER CLAYS, GYPSUM, BAUXITE AND OTHER NON-METALLIC MINERALS.'

COORDINATES DETERMINED BY C.S.D. 9/7/68

SCALE 1 INCH = 2 MILES

NORANDA AUSTRALIA LTD.
D.M. 392/68

CONTENTS ENVELOPE 934 DM 392/68

TENEMENT: S.M.L. 183

TENEMENT HOLDER: NORANDA AUSTRALIA LTD.

REPORTS:

ENV 934

003

NORANDA AUSTRALIA LIMITED

SPECIAL MINING LEASE NO. 183 - PORT LINCOLN

REPORT FOR SIX MONTHS ENDED OCTOBER 1, 1968

Noranda Australia Limited was granted a Special Mining Lease over an area of 93 square miles for a term of one year commencing April 1, 1968. One of the conditions under which this Special Mining Lease was granted stipulated that Noranda Australia Limited would submit a progress report at the conclusion of each six months. This report is for the six months ended October 1, 1968.

Aerial photographs were purchased to provide stereoscopic coverage of this area. Geological maps have been purchased from the Department of Mines.

Five companies were invited to submit tenders for an airborne spectrometer survey over this Special Mining Lease. Three tenders were received and the contract was awarded to Geophoto Resources Consultants, who have arranged to fly an aircraft and equipment from North America later this year.

Geophoto Resources Consultants will use an Airborne Gamma-ray Spectrometer developed by Texas Instruments. The six large crystal configuration incorporated in this instrument provides a larger detector than that used by the other contractors.

Arrangements have been made to complete this flying prior to the end of 1968.

G. C. Battey,
Chief Geologist.

October 15, 1968.

GCB:GW

ENV 934.

004

SPECIAL MINING LEASE NO. 183
PORT LINCOLN, SOUTH AUSTRALIA

REPORT FOR 12 MONTHS ENDED MARCH 31, 1969

Report No. 114 June 1969

by

G. C. BATTEY

Melbourne, Australia

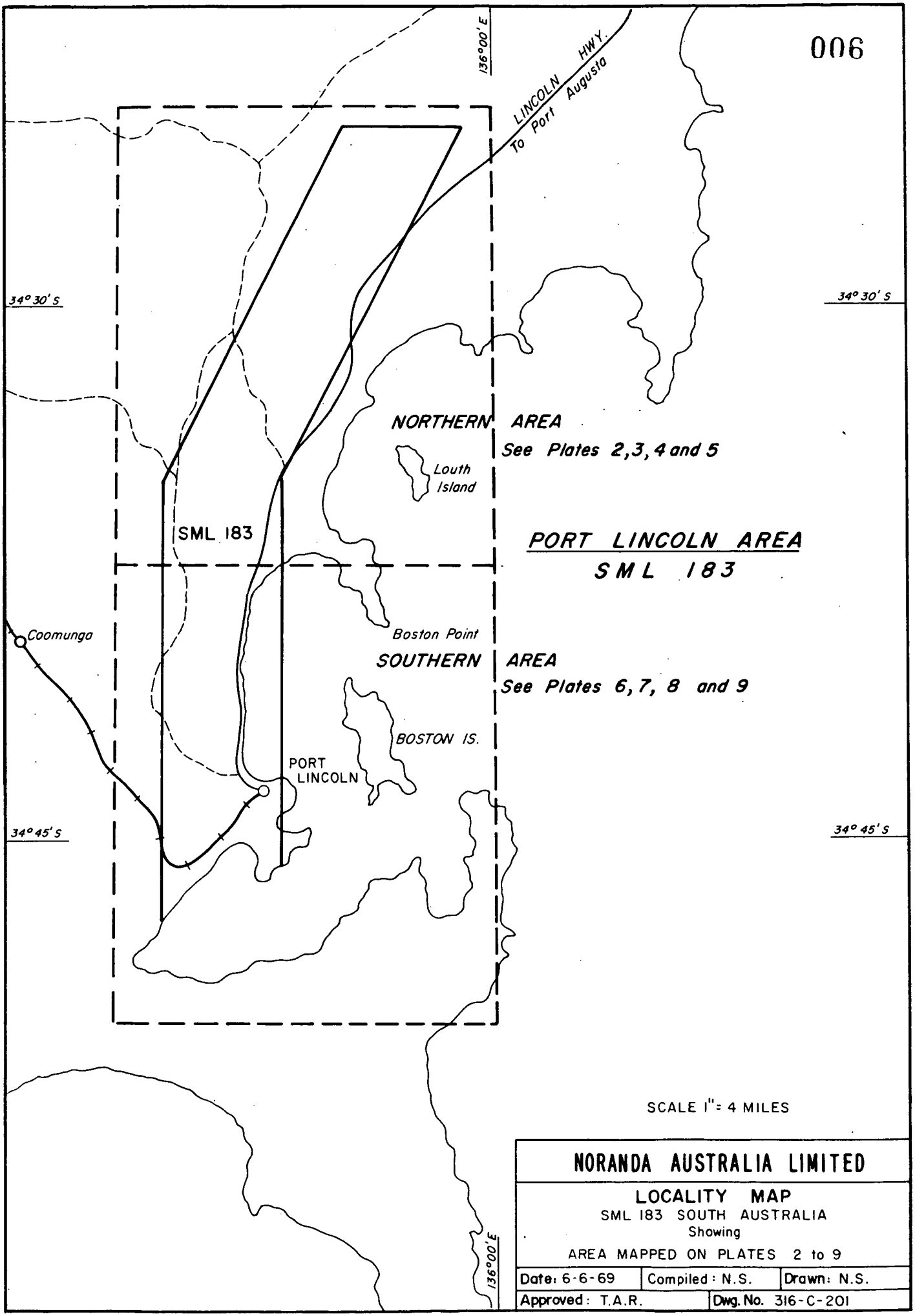
NORANDA AUSTRALIA LIMITED

S.M.L. NO. 183 - PORT LINCOLN, SOUTH AUSTRALIA

REPORT FOR 12 MONTHS ENDED MARCH 31, 1969

LIST OF PLATES

(All Plates in plastic pockets at back of report except where otherwise indicated)



NORANDA AUSTRALIA LIMITED

LOCALITY MAP

SML 183 SOUTH AUSTRALIA

Showing

AREA MAPPED ON PLATES 2 to 9

Date: 6-6-69	Compiled: N.S.	Drawn: N.S.
Approved: T.A.R.	Dwg. No. 316-C-201	

NORANDA AUSTRALIA LIMITED

SPECIAL MINING LEASE NO. 183

PORT LINCOLN, SOUTH AUSTRALIA

REPORT FOR 12 MONTHS ENDED MARCH 31, 1969

1. Introduction

Noranda Australia Limited was granted a Special Mining Lease over an area of 93 square miles for a term of one year commencing April 1, 1968. This term has now been extended for a period of one year, expiring on April 14, 1970.

One of the conditions under which this Special Mining Lease was granted stipulated that Noranda Australia Limited would submit a report at the conclusion of each six months. This report is for the 12 months ended March 31, 1969.

2. Literature Study

Mr. A. Thomas conducted a literature study of this area from the reports available at the South Australian Department of Mines.

An airborne scintillometer survey of the area was conducted during 1953-54, and this is reported in Review No. 101. The flight lines were east-west and many anomalies were recorded.

Radioactivity is recorded at several localities near Port Lincoln. These have been examined by officers of the Department of Mines and drilling has been done on several of these prospects. The best of these prospects is probably Gibson No. 1 or Hospital Prospect, where trenching indicated a width of eight feet over a length of 100 feet

with a grade of three to four pounds of U_3O_8 per ton. Seven holes totalling 866 feet failed to confirm continuity of the mineralisation with depth. The uranium minerals are fine-grained pitchblende decomposed to gummite and uranophane.

3. Present Investigation

Aerial photographs were purchased to provide stereoscopic coverage of the area. Geological maps were purchased from the Department of Mines.

Five companies were invited to submit tenders for an airborne spectrometer survey over this Special Mining Lease. The contract was awarded to Geophoto Resources Consultants.

The equipment used was an airborne gamma ray spectrometer developed by Texas Instruments and mounted in a DC3. This system is a multiple large crystal system and appears to be the most sensitive system in use in Australia. The data is recorded in digital form on magnetic tape. The results are processed in the U.S.A. and are presented as isoradioactivity contour maps for uranium. Isoradioactivity contour maps have been prepared to illustrate the U/Th and U/K ratios. Maps showing the position of the flight lines are also presented with this report.

A number of anomalies have been outlined as a result of this airborne spectrometer survey and these will be investigated by field parties.

PORT LINCOLN AREA

Bi^{214} ISORADIOACTIVITY CONTOUR MAP

from

Digital Airborne Gamma Ray Spectrometry

PREPARED FOR

NORANDA AUSTRALIA PTY. LIMITED
MELBOURNE, VICTORIA, AUSTRALIA

BY

GEOPHOTO SERVICES, INC.
SCIENCE SERVICES DIVISION
TEXAS INSTRUMENTS INCORPORATED
DENVER, COLORADO

SCALE

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DEPT. OF MINES
REGISTRY

N

PLATE 3

SCALE : 1.24,000 PORT LINCOLN SHEET 1 OF 2

ENV 934-6

PORT LINCOLN AREA
Bi^{214}/Tl^{208}
ISORADIOACTIVITY CONTOUR MAP
from
Digital Airborne Gamma Ray Spectrometry

PREPARED FOR
NORANDA AUSTRALIA PTY. LIMITED
MELBOURNE, VICTORIA, AUSTRALIA

BY
GEOPHOTO SERVICES, INC.
SCIENCE SERVICES DIVISION
TEXAS INSTRUMENTS INCORPORATED
DENVER, COLORADO

SCALE
1 / 24,000

Contour Interval 6 units

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12 JUN 1969
DEPT. OF MINES
REGISTRY

N

PLATE 4

SCALE : 1:24,000C PORT LINCOLN SHEET 1 OF 2

ENV 9326-7

PORT LINCOLN AREA
Bi^{214}/K^{40}
ISORADIOACTIVITY CONTOUR MAP
from
Digital Airborne Gamma Ray Spectrometry

PREPARED FOR
NORANDA AUSTRALIA PTY. LIMITED
MELBOURNE, VICTORIA, AUSTRALIA

BY
GEOPHOTO SERVICES, INC.
SCIENCE SERVICES DIVISION
TEXAS INSTRUMENTS INCORPORATED
DENVER, COLORADO

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1
24,000

Contour Interval 4 units

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12 JUN 1969
DEPT. OF MINES
REGISTRY

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SCALE : 1. 24,000 PORT LINCOLN SHEET 1 OF 2

PLATE 5

ENV 934-8

ENV 934 - 5

PORT LINCOLN AREA

Bi^{214} ISORADIOACTIVITY CONTOUR MAP

from

Digital Airborne Gamma Ray Spectrometry

PREPARED FOR

NORANDA AUSTRALIA PTY. LIMITED
MELBOURNE, VICTORIA, AUSTRALIA

BY

GEOPHOTO SERVICES, INC.
SCIENCE SERVICES DIVISION
TEXAS INSTRUMENTS INCORPORATED
DENVER, COLORADO

SCALE
1
24,000

Contour Interval 10 counts per 2 seconds

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12 JUN 1969
DEPT. OF MINES
REGISTRY

PLATE 7

BOSTON
Boston Point
BAY
HIGHWAY
LINCOLN
FLINDERS
Little Swamp
Creek
Valley
Happy
HIGHWAY
Duck
Creek
PORT LINCOLN
Porter
Bay
Duck
Creek
GRANTHAM
ISLAND
PORT
LINCOLN
PROPER
Lake
Pillie
BOSTON
ISLAND
Cape Donnington
Bicker Islets
Spalding
Cove

ENV 934-5

SCALE 1:24,000 PORT LINCOLN SHEET 2 OF 2

ENV 934-4

PORT LINCOLN AREA

Bi^{214}/Tl^{208} ISORADIOACTIVITY CONTOUR MAP

from

Digital Airborne Gamma Ray Spectrometry

PREPARED FOR

NORANDA AUSTRALIA PTY. LIMITED
MELBOURNE, VICTORIA, AUSTRALIA

BY

GEOPHOTO SERVICES, INC.
SCIENCE SERVICES DIVISION
TEXAS INSTRUMENTS INCORPORATED
DENVER, COLORADO

SCALE
1
24,000

Contour Interval 6 units

RECEIVED
12 JUN 1969
DEPT. OF MINES
REGISTRY

PLATE 8

378,000yds E
380,000yds E
135°50'
390,000yds E
135°55'
136°00'
724,000yds N
720,000yds N
710,000yds N
700,000yds N
698,000yds N
34°40'
34°45'
34°50'

BOSTON BAY
Boston Point
FLINDERS
Little Swamp
Creek
Duck
Creek
Duck
HIGHWAY
LINCOLN
Valley
Happy
PORT LINCOLN
Porter Bay
BOSTON ISLAND
Bicker Islets
Cape Donnington
Spalding Cove
GRANTHAM ISLAND
PORT LINCOLN PROPER
Lake Pillie

ENV 934-4

N

SCALE 1:24,000 PORT LINCOLN SHEET 2 OF 2

ENV 934-3

RECEIVED
12 JUN 1968
DEPT. OF MINES
REGISTRY

PORT LINCOLN AREA
Bi^{214}/K^{40}
ISORADIOACTIVITY CONTOUR MAP
from
Digital Airborne Gamma Ray Spectrometry

PREPARED FOR
NORANDA AUSTRALIA PTY. LIMITED
MELBOURNE, VICTORIA, AUSTRALIA

BY
GEOPHOTO SERVICES, INC.
SCIENCE SERVICES DIVISION
TEXAS INSTRUMENTS INCORPORATED
DENVER, COLORADO

SCALE
$\frac{1}{24,000}$

Contour Interval 4 units

PLATE 9

ENV 934-3

ENV 934

009

SPECIAL MINING LEASE NO. 183

PORT LINCOLN, SOUTH AUSTRALIA

REPORT FOR 6 MONTHS ENDED SEPTEMBER 30, 1969.

Report No. 130. November, 1969.

By

G. C. BATTEY

Melbourne, Victoria.

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NORANDA AUSTRALIA LIMITED

SPECIAL MINING LEASE NO. 183
PORT LINCOLN, SOUTH AUSTRALIA

REPORT FOR SIX MONTHS ENDED SEPTEMBER 30, 1969.

1. INTRODUCTION

Noranda Australia Limited was granted a Special Mining Lease over an area of 93 square miles for a term of one year commencing April 1, 1968. This term has now been extended for a period of one year, expiring on April 14, 1970.

One of the conditions under which this Special Mining Lease was granted stipulated that Noranda Australia Limited would submit a report at the conclusion of each six months. This report is for the six months ended September 30, 1969.

2. INVESTIGATION.

Aerial photographs were purchased to provide stereoscopic coverage of the area. Geological maps were purchased from the Department of Mines.

Five companies were invited to submit tenders for an airborne spectrometer survey over this Special Mining Lease. The contract was awarded to Geophoto Resources Consultants.

The field equipment used was an airborne gamma ray spectrometer developed by Texas Instruments and mounted in a DC3. The system is a multiple large crystal system and appears to be the most sensitive system in use in Australia. The data is recorded in digital form on magnetic tape. The results are processed in the U.S.A. and are presented as isoradioactivity contour maps for Uranium. Isoradioactivity contour maps were prepared to illustrate the U/Th and U/K ratios. Maps showing the position of the flight lines, the isoradioactivity contour maps for Uranium and the isoradioactivity contour maps illustrating the U/Th and U/K ratios were prepared and issued to the Department of Mines with the report for the 12 months ended March 31, 1969.

A number of anomalies have been outlined as a result of this airborne spectrometer survey and these will be investigated by field parties.

Work has commenced on the investigation of the anomalies on Special Mining Lease No. 182 but has been interrupted because of the shortage of qualified technical staff. The available technical staff have been operating in the Northern Territory during the winter and are scheduled to commence work on Special Mining Lease 183 during the summer months.

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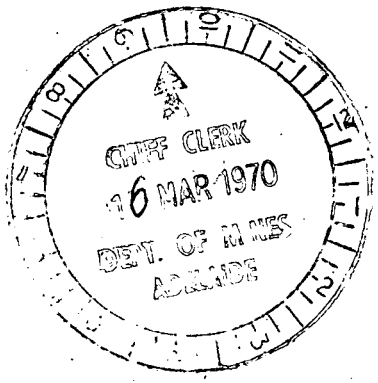


SPECIAL MINING LEASE NO. 183

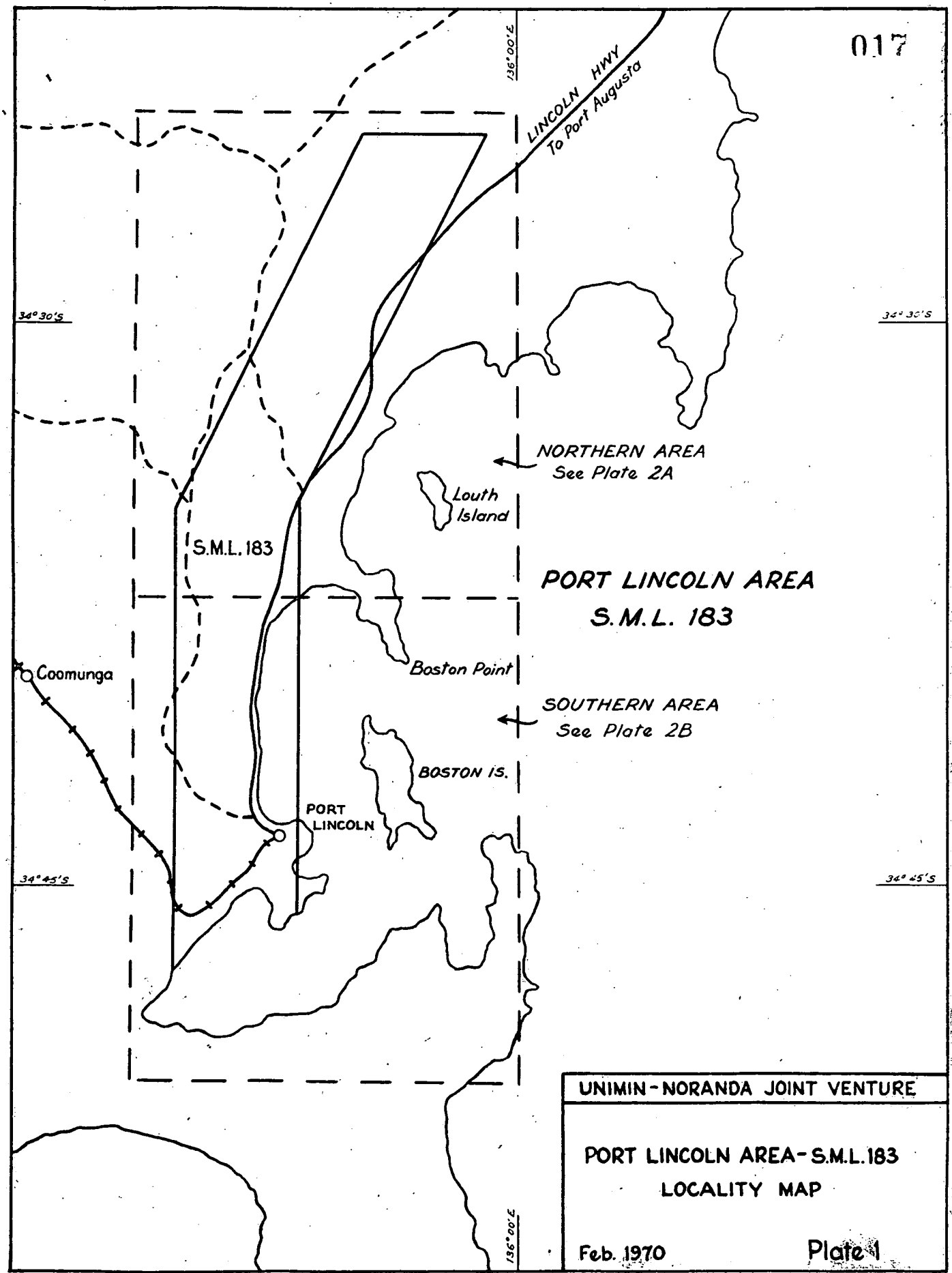
PORT LINCOLN AREA, SOUTH AUSTRALIA

UNIMIN REPORT

P.R. Boshier
&
P.L. Cremer

February, 1970

C O N T E N T S



UNIMIN - NORANDA JOINT VENTURE

PORT LINCOLN AREA - S.M.L. 183
LOCALITY MAP

Feb. 1970

Plate 1

1. INTRODUCTION

The township of Port Lincoln is situated towards the southeastern tip of Eyre Peninsula, about 400 miles by sealed road from Adelaide. S.M.L. 183 is about 22 miles long (stretching from just south of Port Lincoln to about six miles south of Tumby Bay), and about four miles wide, covering an area of approximately 93 square miles.

Several Archean inliers crop out within the lease. (?) Tertiary laterites and (?) Quarternary alluvium overlie the Archean rocks. Several uranium prospects found in close proximity to Port Lincoln have been the subject of detailed investigation by the Geological Survey of South Australia. No mining has ensued.

Company geologists undertook ground inspections in February, 1970, following a programme of airborne gamma ray spectroscopy carried out by Geophoto Services Inc., under the supervision of Noranda Australia Limited.

Data from the airborne survey was presented in two sheets, the majority of the anomalous zones occurring on the northern sheet.

2. GEOLOGY

Detailed mapping by the South Australian Geological Survey on the Sleaford, Lincoln and Cummins 1 mile geological sheets includes the geology of S.M.L. 183.

The Archean inliers have been separated into two distinct units, the lower Flinders Group and the overlying Hutchison Group. The Flinders Group is characterised by undifferentiated coarse grained augen gneisses, granitoid gneisses, charnokites, leucogneisses, amphibolites, mica schists and quartzites, with pegmatites and abundant chloritic dykes. The Hutchison Group contains undifferentiated metasediments, migmatites, banded gneisses, amphibolites, quartzites, schists, pegmatites, basic dykes and dolomite.

Palæozoic rocks do not crop out within the lease and the next youngest unit is (?)Tertiary. Vast areas of pisolitic, nodular and massive laterites overlie the Archean inliers, particularly towards the western margin of the lease. Fossil soil horizons, including clays and gravels, are developed on high level peneplained surfaces.

The flat areas at the base of the Archean hills are covered by (?)Quaternary sands, clays and gravels, and older calcareous aeolianites with a travertine crust.

The Archean inliers form a broadly folded sequence with major fold axes striking approximately northeast and plunging to the south.

The (?)Tertiary and (?)Quaternary sediments are virtually flat-lying.

3. AIRBORNE GAMMA RAY SPECTROSCOPY SURVEY & ITS INTERPRETATION

Digital recording and processing techniques were adopted in an airborne survey by Geophoto Services Inc., using a gamma ray spectrometer developed by Texas Instruments. Isoradioactivity contour maps were prepared for Bi 214 (U), Tl 208 (Th), K 40, Bi 214/Tl 208, Bi 214/K 40, and Tl 208/K 40. A 35 mm strip film photograph was taken at the centre of each counting period to aid in the surface location of any anomalous radioactive source. Lines were flown in an approximate north-south direction (parallel to strike) at 1000 feet intervals and a mean height of 400 feet. Only one area within the lease was not flown, that around and including Port Lincoln, presumably because of restrictions instituted by the Department of Civil Aviation.

The Bi 214 sheets were studied carefully, and areas with a reduced sum greater than 100 counts per two seconds were noted. By this method, 45 anomalous areas were delineated, and 39 of these have been subject to ground studies (section 5).

4 PREVIOUS WORK

With the promise of large Government cash rewards for significant uranium finds, uranium prospecting received a great deal of attention in the early ninteen fifties. Six separate prospects were discovered, all within three miles of the township if Port Lincoln. Three of these occurrences were detected by a local resident, Mr. P.J. Gibson, who also apparently prospected in the hills to the north of Port Lincoln.

Johns (1961) states that Gibson's discoveries were made in March 1954. The largest of these occurrences was the Hospital prospect, which qualified for a Government reward. Other prospects included Hargistrom (Gibson No.2) and Ainslee North and South (Gibson No.3). Later discoveries were the Lomax prospect (Mr. G. Lomax, July 1954), followed by those of Fraser and Davey-Wollaston.

Woodmansee (1955) states that the Archean crystalline metasediments have been intruded by highly sodic or granitic solutions or gases of magmatic origin. The original country rock, amphibolite, displays differential sodic metasomation in its alteration to highly sodic augen gneisses, sodic hornblende "granites" and gneisses. All the rocks are gneissic or schistose, strike roughly north-south and dip steeply to the west. The uranium mineralisation appears to be restricted to a relatively narrow zone of granitised metasediments which can be traced intermittently in a north-south direction through the middle of the Archean outcrops, and which are strongly fractured and deformed. Uraninite occurs as minute grains thinly disseminated through a granulated quartzo-felspathic groundmass in the foliated sodic hornblende "granite". The granitized areas have apparently provided a path for the uraniferous ore solutions, and were apparently the main ore control.

Seedsman and Harris (1956) carried out an airborne scintillometer study of the eastern Eyre Peninsula. A number of major anomalies (greater than four times background) were delineated. These occur chiefly to the north and northwest of Arno Bay, which lies about 70 miles to the northeast of Port Lincoln.

4.1 Hospital Prospect (Gibson No.1)

After completion of a programme of seven diamond drill holes (totalling 866 feet) King and Woodamansee (1956) carried out a detailed study of the Hospital Prospect. Pitchblende "occuring as evenly distributed minute grains and aggregates throughout a massive granodioritic hornblende gneiss", is the primary ore mineral. Uranophane and gummite form minute segregations, and also occur on joint and foliation planes. "The gneissic host rock of the uranium mineralisation resembles bordering gneisses in composition and general field appearance, but differs microscopically by the presence of interstitial granulated zones in which the uranium ore is localised". Also peculiar to the rock is the proportionately higher content of albite and titaniferous minerals (sphene and ilmenite) and the presence of augite. The diamond drilling established an approximate total of 5,700 tons of uranium averaging 2 to three lb U_3O_8 per ton, and persisting to a depth of 50 feet.

The drilling also revealed that the mineralisation occurs in a well defined tabular shaped body, and is restricted to a particular variety of the granitoid gneiss. The mineralisation is typically associated with titaniferous minerals, and occurs in finely disseminated grains in finely granulated zones of the host rock. Ore deposition was probably associated with the metasomatic process.

Several possibilities have arisen to the conditions which have favoured localisation of the ore -

(a) Mineralised fracture zone - incipient internal brecciation in the host rock distinguishes the host from the bordering gneisses. Support of structural control is provided by the fractured nature of the host rock in the boreholes, and the slightly oblique attitude of the ore zone in relation to the dip of the country rocks.

(b) Favourable bed - all the deposits around Port Lincoln are of the same type, and each bears a similar stratigraphic relationship to the bordering amphibolite.

(c) Sodic metasomation - petrographic studies have shown that the uranium mineralisation is associated with gneisses featuring abnormally advanced sodic metasomation.

It was concluded that the "exploratory diamond drilling .....indicates only limited depth to a small low grade pitchblende deposit, which in itself, would not justify consideration as an economic mining proposition".

4.2 Hargistrom Prospect (Gibson No.2)

This is a small area containing a few boulders of radioactive foliated "granite", striking 200°. No further surface studies were undertaken.

4.3 Lomax Prospect

Three diamond drill holes confirmed a small, concordant mineralised tabular body in granitic gneiss. A maximum of 400 tons of ore (only one intersection indicated ore grade material, 4.4 lb/ton U_3O_8) occurs in the deposit (Johns).

4.4 Fraser & Davey-Wollaston Prospects

These were only minor and were not investigated further.

4.5 Ainslee North and South Prospects (Gibson No.3)

The mineralised granitic gneisses are surrounded by broad areas of pink aplitic "granite" and augen gneiss. The amphibolite areas are only small, generally representing widely separated xenolithic inclusions (Woodmansee). The Ainslee North prospect was not investigated further.

At the Ainslee South prospect a small radioactive outcrop containing small amounts of disseminated uraninite yields spot assays ranging from 4 lb to 15 lb U_3O_8/ton (Johns). Two shallow diamond drill holes detected small discontinuous radioactive centres, none of which would constitute an orebody, in brecciated granitoid gneiss.

5. DETAILED INVESTIGATION OF THE ANOMALIES

5.01 General

Since the airborne survey did not include the township of Port Lincoln, four of the previously known prospects (Hospital, Fraser, Lomax and Hargistrom) were not included. However neither the Davey-Wollaston prospect nor the Ainslee Prospect was detected, presumably due to their small size. This is in accord with the survey undertaken by Seedsman and Harris, in which the area covered by S.M.L. 183 is represented by a collection of minor anomalies (less than four times background).

Of the 39 anomalous zones inspected, 17 occurred on laterite, 14 on Archean rocks, seven on both Archean rocks and laterite, and one on alluvium. Minor alterations have been made to the geology on the Mines Dept. maps. Generally these corrections are represented by areas of lateritised (?)Archean rocks, previously mapped as Archean outcrops.

No uranium minerals were observed throughout the inspections.

The maximum total count observed in most areas of Archean outcrop was generally found to occur along foliation surfaces and/or joint planes.

The anomalous zones are discussed in numerical order below. These numbers are directly referable to the accompanying plans. Anomalies 40 to 45, inclusive, were not inspected since they were thought to be too small and insignificant.

Ground prospecting was carried out with the use of a B.G.S.1 scintillometer.

5.02 Hospital Prospect (Gibson No.1)

Recently constructed buildings now cover the anomalous zone at the rear of the Port Lincoln District Hospital. Quartz-feldspar-amphibole gneisses crop out in an adjoining vacant block. Travertine blocks are scattered over the surface and, where they enclose fragments of gneiss and/or amphibolite, they give the appearance of a breccia.

No anomalous readings were encountered. The general background radioactivity gave readings of 15-20 cps, with minor fluctuations to 30 and 40 cps.

5.03 Hargistrom Prospect (Gibson No.2)

This prospect could not be located, as it appears to have been built-over in the last 10 years. Parkland areas behind this prospect display little outcrop, and no anomalous radioactivity.

5.04 Lomax Prospect

The site of this prospect, Marialta Crescent Port Lincoln, has also been built over. Adjoining vacant blocks display outcrops of gneiss and travertine, but no anomalous radioactivity.

5.05 Fraser Prospect

A small quarry, with a 15 feet high exposed face, stands on the site of this prospect. Boulders of unweathered quartz-feldspar-amphibole granitoid gneiss crop out in a soil profile, six feet deep. Segregations of (?) sodic feldspar form isolated clots similar to augen. Veins of pale green chloritic minerals and (?) biotite are irregularly distributed throughout the gneiss. Banding in these rocks, accentuated by segregations of mafic and felsic minerals, strikes approximately north-south and is near-vertical.

The maximum reading in this zone is 50 cps. The average reading is 65 cps, and this rises to a maximum of 150 cps at small isolated centres.

5.06 Davey-Wollaston Prospect

The actual prospect occurs in nodular laterites which crop out on the surface and in a three to four feet high quarry face. An area of approximately 1500 square yards shows general readings of 80 to 100 cps. Isolated maxima read 200 cps.

Augen gneisses, featuring large augen of (?)sodic feldspar and quartz in a matrix of quartz, feldspar, mica and (?) amphibole, crop out in sheets just to the north of the prospect. Irregular feldspathic dykes, one to two inches wide, transect the foliation which strikes 320^{o}. The general radiation reading over this outcrop is 68 cps.

5.07 Ainslee Prospects

The actual prospects were not irrefutably located. Granitoid gneiss predominates outcrop in the area, with augen gneisses minor. Dykes of amphibolite are generally concordant with layering in the gneisses. Average radioactivity readings over these rocks is 80 cps, rising to several isolated point maxima of 180 cps. The highest readings commonly occur along foliation and joint planes.

5.08 Anomaly 01

The anomalous zone occurs on the side of a hill and into the adjacent valley. Laterites crop out on the side of the hill and give readings averaging around 80 cps.

Large areas of granitoid gneiss crop out on the hill (Winter Hill) above the anomalous zone. Amphibolite appears as isolated pods and dykes concordant with the layering (which strikes 330°) of the gneiss. Large crystals of feldspar are concentrated around these amphibolite inclusions. Readings over the amphibolite range from 40 to 50 cps and from 70 to 80 cps over the gneisses. Local maxima of around 120 cps are concentrated along joint and foliation planes in the gneisses. Augen gneisses, which crop out prominently to the northeast of Winter Hill, display maximum readings of 140 cps.

5.09 Anomaly 02

Fragments of laterite up to 12 inches in diameter crop out on the side of the cleared hill. (?)Quaternary sediments occur in the valley below. The general background reading is 50 cps rising to several small isolated centres of 90 cps near the top of the hill.

5.10 Anomaly 03

Granitoid gneiss, minor augen gneiss, amphibolite, (?) aplite, quartzites and pelites (banded quartz-(?)feldspar-biotite rock) crop out near the confluence of two creeks in which (?)Quaternary sediments appear. Tight isoclinal folding is displayed by bands of felsic and mafic minerals. The regional strike of the foliation is 335°. Average readings over the indicated anomaly

range from 70 to 80 cps. Isolated maxima of 90 cps have only small areal extents.

5.11 Anomaly 04

The anomalous zone occurs on a cleared paddock which displays very little outcrop. Fragments of laterite are scattered on the surface. The average reading is 30 cps, rising to a small, local maximum of 52 cps.

5.12 Anomaly 05

Laterite predominates over the western threequarters of the anomaly, with Archean rocks cropping out on the eastern side. The Archean rocks are represented by scattered loose fragments of granitoid gneiss. The general background reading in the area is 30 cps with one relatively large area reading 50 to 60 cps. Isolated small centres indicate up to 92 cps on the scintillometer.

5.13 Anomaly 06

Augen gneiss, featuring (?) sodic feldspar augen up to two inches in diameter crops out prominently on the hills in the anomalous zone. Large tors of gneiss up to 14 feet in diameter display the maximum readings. Amphibolite (?)dyke fragments are ptygmatically folded in sympathy with the enclosing gneisses.

General background radiation readings are around 40 cps and rise to maxima of 130 cps generally along the joint and foliation planes of the large tors.

5.14 Anomaly 07

The anomalous zone occurs on a cleared hill adjacent to the road. Scattered loose boulders of lateritised Archean gneiss and heavily ironstained quartz gneiss appear on the surface.

Readings near the road are generally 50 cps. Two widely separated point maxima of 90 cps occur towards the top of the hill.

5.15 Anomaly 08

Lateritised Archean gneisses occur towards the top of a low ridge, with scattered heavily ironstained quartz fragments. Average readings around 60 cps rise to a point maxima of 72 cps near the top of the ridge.

5.16 Anomaly 09

The anomalous zone occurs in a large area of outcrop atop a group of small hills. Tors of augen and granitoid gneiss up to 12 feet in diameter dominate the outcrop. Amphibolite fragments are included in the gneisses. Irregular narrow feldspar and quartz veins cut across the tightly folded banding in the gneisses.

Radiation readings over the soil average around 50 cps and 70 to 80 cps over the outcrop. A single maximun of 150 cps occurs on a joint surface.

5.17 Anomaly 10

Scattered fragments of laterite and ironstained quartz occur in a cleared field near the top of a ridge. Average readings of 50 to 60 cps rise to several isolated maxima of 75 cps.

5.18 Anomaly 11

Lenticular bodies of amphibolite, concordant with the regional foliation, occur in sheet-like outcrops of granitoid gneiss. Foliation in the gneisses strikes approximately north-south and is transected by prominent joints which range from 30 to 90 degress to the foliation. Scintillometer readings over the soil average 50 cps, over the amphibolite 40 cps, and 65 to 70 cps over the gneiss. A single maximum of 90 cps was detected on a joint surface.

5.19 Anomaly 12

Sparsely scattered boulders and smaller fragments of laterite crop out on a low hill and beside the road. Radiation readings range between 55 and 85 cps with an average of 70 cps. Higher readings were encountered on the laterite surfaced road.

5.20 Anomaly 13

The anomalous zone occurs on the upper slopes and top of a cleared hill which is scattered with fragments of laterite and ironstained quartz. Readings range from 45 to 80 cps, with an average of 60 cps. The maxima are only small and isolated.

5.21 Anomaly 14

Laterites and alluvium crop out within the anomaly. The southern maximum indicated by the airborne survey appears to be caused by piles of lateritised gneiss fragments on the side of a hill. The average reading of 50 cps rises to a maximum of 95 cps over one of these rock piles.

The western maximum features large in-situ boulders of lateritised gneisses on the top of a hill whose sides are covered by loose laterite fragments to eight inches in diameter. These rocks give readings which range from 60 - 70 cps. Small areas atop the hill where ironstained quartz gneisses also crop out, give readings which range from 110 to 120 cps, and rise to a lone maximum of 140 cps.

5.22 Anomaly 15

Heavily ironstained granitoid gneiss exhibits sparse outcrops on the side of a low hill. The average reading of around 60 cps rise to 70 and 80 cps along joint surfaces.

5.23 Anomaly 16

The anomalous zone is represented by an alluvial flat near a small stream. Laterite fragments and ironstained quartzite are scattered in and around the creek. Readings range from 45 to 60 cps rising to a small, maximum of 72 cps.

5.24 Anomaly 17

Piles of lateritised gneisses and schists and ironstained quartz occur on the side and towards the top of a low hill. Average readings of around 60 cps range up to local isolated maxima of 70 cps.

5.25 Anomaly 18

Laterite fragments appear along the top of a series of low ridges. Readings range from 60 - 80 cps, generally 75 - 80 cps.

5.26 Anomaly 19

The anomalous zone is characterised by vast outcrops of granitoid gneiss which includes ptygmatically folded amphibolite inclusions. The amphibolite also occurs as (?)dykes striking 197° parallel to the foliation in the gneiss. Ironstained quartz veins are minor.

Readings over the amphibolite average 65 cps, and 100-120 cps over the gneiss. A lone maximum of 400 cps was detected in weathered granitoid gneiss. Readings of 200 - 400 cps were recorded in small outcrops of similar material.

5.27 Anomaly 20

The anomaly occurs on the sides of a series of low ridges which are flanked by rubbly outcrops of highly weathered quartz-felspar-amphibole schist, lateritised Archean rocks, and milky quartz. Readings of 70 to 80 cps are common over the schists. A small patch, about 10 yards in diameter gives readings between 90 and 100 cps and rising to a point maximum of 175 cps.

The general readings over the laterites range between 55 and 65 cps, rising to several, isolated point maxima of 80 cps.

5.28 Anomaly 21

Quartz-feldspar-(?)amphibole gneisses and schists, and fragments of laterite crop out on hillsides and adjoining creeks. The gneisses and schists give average readings of 80-100 cps rising to several maxima of 120 cps along joint surfaces.

The laterites average 80-90 cps and rise to a maximum of 130 cps on the eastern side of the small hill.

5.29 Anomaly 22

A cleared area near the top of a hill features outcrops of granitoid and augen gneisses within scattered fragments of laterite. The former give readings from 70-98 cps (average 75 cps). The laterite displays average readings of 50-60 cps, with a relatively large zone (100 square yards) of 80-96 cps.

5.30 Anomaly 23

Tors of granitoid gneiss, which contain ptygmatically folded and lenticular inclusions of amphibolite, crop out on the slopes and top of a low hill. The general readings average 60 cps but range from 70 to 96 cps over the tors.

5.31 Anomaly 24

Laterite fragments occur on a cleared slope near the confluence of two small creeks. Archean rocks crop out about 400 yards to the north.

The general reading is 70 to 80 cps rising to a local maximum of 110 cps.

5.32 Anomaly 25

Milky quartz fragments (representative of quartz (?)veins) are scattered over a large area along a ridge top. Readings range from 80 to 200 cps generally 120 to 140 cps, over an area of about 100 square yards.

5.33 Anomaly 26

Scattered rubble of heavily ironstained quartzites, which display an ironstained box-like structure representing alteration of original (?)silicates, occurs on the side of a hill. A small area gives readings which range from 75 to 90 cps and rise to a local maximum of 100 cps.

5.34 Anomaly 27

Outcrops of granitoid and augen gneisses with minor interlayered amphibolite and thin quartz veins, occur in and adjacent to a number of small creeks. Readings range from 55 to 75 cps the maximum occurring in the granitoid gneiss and along foliation planes in finer grained augen gneisses.

5.35 Anomaly 28

Fragments of lateritised Archean rocks up to six inches in diameter occur on the slopes and top of a small hill. Readings range from 50 to 100 cps with an average around 70 cps. The maximum reading represents a single point about 50 yards from the top of a hill.

5.36 Anomaly 29

The flanks of a low hill are covered by fragments of laterite. Readings range from 50-75 cps, but rarely above 60 cps.

5.37 Anomaly 30

This small anomalous zone contains small outcrops of augen and granitoid gneiss with included amphibolitic material. The general readings over the anomaly range from 50 to 60 cps rising to a small maximum of 75 to 80 cps.

5.38 Anomaly 31

Fragments of laterite and boulders of lateritised gneisses occur over a ridge of its flanks. The lateritised gneisses are more prominent on the slopes and appear to be in situ. Readings range from 80 to 95 cps and average 90 cps.

5.39 Anomaly 32

Augen and granitoid gneisses, striking north-south, crop out in a deeply incised steep sided valley. Lenticular inclusions and (?)dykes of amphibolite are common. Siliceous phyllites are minor. Readings range from 60 to 75 cps (average 70 cps) with a maximum of 100 cps on a joint surface in the granitoid gneiss.

5.40 Anomaly 33

Quartz-feldspar-amphibole schists and augen gneisses with interlayered amphibolite bands crop out in a small creek below a low hill covered with fragments of laterite. Readings over the schists and gneisses range from 45 to 85 cps and 30 to 60 cps over the laterites.

5.41 Anomaly 34

Fragments of laterite occurring towards the top of a small hill give readings which range from 40 to 60 cps (average 50 cps).

5.42 Anomaly 35

This small area occurs over an alluvial flat and no anomalous radioactivity could be detected on the ground.

5.43 Anomaly 36

Fragments of lateritised Archean rocks are scattered over alluvium. The readings over this zone reach only 50 cps.

5.44 Anomaly 37

The bed of a small creek and the slopes of a low hill contain fragments of laterite and banded quartzite which give readings that range from 50 to 85 cps.

5.45 Anomaly 38

Small rubbly outcrops of granitoid gneiss striking approximately north-south, occur on the sides of small hills and in a creek. Readings average 60 cps and rise to a local maximum of 100 cps.

5.46 Anomaly 39

Boulders of amphibolites (coarse and fine grained) occur on the side of a hill whose top is capped by laterite. Readings range from 40 to 65 cps.

6. CONCLUSIONS & RECOMMENDATIONS

No significant anomalies have been disclosed by the ground studies and hence these correlate with the airborne survey. No evidence of uranium minerals has been noted.

The majority of the anomalous zones which range up to approximately four times background, occur in laterite. It was noted that the maxima over areas of laterite occur below the tops of hills, and hence probably represent lower horizons in the lateritic cover. In all probability the uranium has been transported along with iron into the laterite horizons.

The most significant readings over Archean rocks occur along joint and foliation planes, and in small isolated pods of the granitoid gneiss. These minor concentrations of radioactive minerals have probably occurred during leaching of primary uranium from the host rocks.

It is recommended that no further work be undertaken on S.M.L. 183.

LIST OF REFERENCES

King D and Woodmansee W.C. (1956)
Diamond drilling at the Hospital Prospect. Mining Review 101, 32-41.

Johns, R.K. (1961)
Geology and mineral resources of southern Eyre Peninsula. Geol. Survey S. Aust. Bulletin 37, 79-82.

Seedsman K.R. and Harris J.L. (1956)
Airborne scintillometer survey of eastern Eyre Peninsula. Mining Review 101, 72 pp.

Woodmansee W.C. (1955)
Port Lincoln uranium prospects. Aerial Geology and considerations for further surface exploration. (unpub. report S.A. Dept. Mines).

750,000 yds N
390,000 yds E
34°25'
135°50'
136°00'
740,000 yds N
34°30'
730,000 yds N
34°35'
724,000 yds N
380,000 yds E

Anomaly 39 65-50
Anomaly 38 100-60
Anomaly 37 85-60
Anomaly 45
Anomaly 36 50-50
Anomaly 35
Anomaly 34 60-50
Anomaly 44
Anomaly 33 85-50
Anomaly 32 100-70
Anomaly 31 95-90
Anomaly 30 80-55
Anomaly 26 100-75
Anomaly 28 100-70
Anomaly 29 75-55
Anomaly 27 75-60
Anomaly 25 200-120
Anomaly 24 110-75
Anomaly 23 96-60
Anomaly 21 130-80
Anomaly 22 96-55
Anomaly 43
Anomaly 42
80-60
175-75
Anomaly 20
Anomaly 19 400-100
Anomaly 18 80-75
Anomaly 17 70-60
Anomaly 16 72-50
Anomaly 15 80-60
Anomaly 41
140-90
Anomaly 14 95-50
Anomaly 40
Anomaly 13 60-60
Anomaly 12 85-70
Anomaly 11 90-70
Anomaly 10 75-55

Creek
Valley
Millolee
Noorabidna
Washpool
Pernalla
Rock
Dillonville
Bailo
RIVER
Tod River Reservoir
TOD
WHITE
HIGHWAY
LINCOLN
Meadow
Boundary of S.M.L. 183
Aerodrome

LEGEND

QUATERNARY

- Alluvium, sands, clays & gravels; includes resorted Tertiary laterites. Mantles (?) Tertiary lacustrine sediments in Wanilla-Cummins Basin
- Calcareous aeolinite with travertine crust

TERTIARY

- Pisolitic, nodular & massive laterites, fossil soil developed on high level peneplained surfaces, with clays & gravels

ARCHEAN

- Hutchison Group — Undifferentiated metasediments & migmatites, banded augen gneisses, amphibolites, schists & quartzites; quartz mica schists, mica schists, graphite schists, dolomites
- Hutchison Group — Hematite quartzite, ferruginous quartzites & charts with interbedded schists
- Laterised Archean - generally Hutchison Group
- Flinders Group — Undifferentiated coarse grained augen gneisses, granitoid gneisses, charnockites, leucogneisses, amphibolites, mica schists, sericite schists. Basic dykes abundant.

Road — Railway

Bi^{214} Isoradioactivity Contours by Geophoto Services Inc.

A Greater than 140 counts per 2sec.
B 120-140 counts per 2sec.
C 100-120 counts per 2sec.

180-110 Maximum total count for anomaly - 180 c.p.s. Average total count for anomaly - 110 c.p.s. } Scintrex B.G.S.1

N

UNIMIN — NORANDA JOINT VENTURE

PORT LINCOLN AREA, S.A. — S.M.L. 183
GEOLOGICAL PLAN
F.A.G.S.

2000 0 2000 4000
Scale in feet
1:24,000

ENV 934-2

Union Miniere Development & Mining Corp. Ltd.
To accompany Report by P. Cremer & P. Boshier
Feb. 1970

Plate 2A

Plate 2B

UNIMIN – NORANDA JOINT VENTURE

PORT LINCOLN AREA, S.A. – S.M.L. 183
GEOLOGICAL PLAN

F. A. G. S.

2000 0 2000 4000
Scale in feet
1:24,000

Union Miniere Development & Mining Corp. Ltd.
To accompany Report by P. Cremer & P. Boshier
Feb. 1970

For Legend, see Plate 2A

724,000yds N
380,000yds E
390,000yds E
135°50'
135°55'
136°00'
720,000yds N
34°40'
710,000yds N
34°45'
700,000yds N
34°50'
698,000yds N

Anomaly 09 160-75
Anomaly 08 72-60
Anomaly 07 90-50
Anomaly 06 130-40
Anomaly 05 92-55
Anomaly 04 52-30
Anomaly 03 90-75
Anomaly 02 90-50
Anomaly 01 100-80

Ainslee Prospects
Lomax Prospect
Hospital Prospect
Hargistrom Prospect
Davey-Wollaston Prospect
Fraser Prospect

× Known uranium prospects not detected by airborne survey

BOSTON BAY
Boundary of S.M.L. 183
FLINDERS HIGHWAY
LINCOLN HIGHWAY
Happy valley
HIGHWAY
PORT LINCOLN
Porter Bay
GRANTHAM ISLAND
PORT LINCOLN PROPER
Lake Pillie

Boston Point
BOSTON ISLAND
Bicker Islets
Cape Donnington
Spalding Cove

N

ENV 934-1