

WEABER FIELD

NORTHERN TERRITORY: R1

GAS-IN-PLACE REPORT

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## 1. INTRODUCTION

### A. FIELD LOCATION

The Weaber gas field is located in the onshore part of the Bonaparte Basin of northwestern Northern Territory (see Figure 1) approximately 60 kilometres north of Kununurra. The Weaber gas reservoirs occur at depths of 1200-1400 metres (SSea).

The Weaber Field lies in retention lease NT/R1. Dry wells Spirit Hill #1 and Skull #1 are respectively located 20 kilometres to the south and west of the Weaber Field.

### B. GENERAL FIELD DESCRIPTION

The regional tectonic setting of the Bonaparte Basin is shown in Figure 2, and Figure 3 provides the chronostratigraphic table.

The Weaber structure is a domal feature encompassing 6,500 acres of areal closure and 70 metres of vertical closure at the Enga Sandstone level (see Figure 4).

Gas-bearing sandstones have been tested in the Keep River Group in Weaber #1 through a ½" choke. Analysis of the test data indicates that considerable skin damage may have occurred. The well was subsequently re-plugged and abandoned due to poor hole conditions.

#### Weaber #2

A second well, Weaber #2, was proposed in 1988 to appraise the possible OGIP. Weaber #2 was located 2.3 km west of Weaber #1. The well was abandoned at a depth of 446 m following significant caving, lost circulation and stuck pipe problems.

#### Weaber #2A

Weaber #2A was spudded 125 m north of the Weaber #2 location. The Keep River Group sandstone reservoirs were intersected updip from Weaber #1 but 13-0 sand was thinner than in Weaber #1 and the 14-0 sand had shaled out. Consequently, the well was plugged and abandoned without testing the interval.

C. DRILLING RESULTSWeaber #1

Weaber #1 was drilled in 1982 by Elf Aquitaine near what was then interpreted as a carbonate bank anomaly of the Ningbing limestone. Four way dip closure was interpreted in the Keep River Group which lies unconformably above the Ningbing limestone.

The well encountered minor gas shows in the sands of the Keep River Group but no DST's were run and the well was plugged and abandoned. Subsequently, the well was found to be leaking gas.

An analysis of the log data indicated two potential gas sands within the Keep River Group. As a result, the well was re-entered in 1985 and the sands were tested. Two valid DST's were run, as follows:-

DST #1: Tested the upper (13-0) sandstone (1281-1313m KB). The test resulted in GTS @ 2.0 MMCFD through a  $\frac{1}{2}$  choke. No fluid recovery was report.

DST #4: Tested the upper (13-0) and lower (14-0) sandstone beds. Gas flowed during two flow periods. The first flow period @ 3.6 MMCFD through a  $\frac{1}{2}$ " choke and the second flow period @ 4.5 MMCFD.

2. SUMMARYA. SUMMARY OF GAS-IN-PLACE

	---THIS REVIEW---			--PREVIOUS REVIEW--			-----CHANGE-----		
	HIP:90/140			WEABER GAS FIELD-SANTOS					
				REPORT: MAY 1989					
SAND	PROV & PROB (BCF)	POSS (BCF)	3P OGIP (BCF)	PROV & PROB (BCF)	POSS (BCF)	3P OGIP (BCF)	PROV & PROB (BCF)	POSS (BCF)	3P OGIP (BCF)
<u>Keep River Group</u>									
13-0	3.7	3.4	7.1	0.6	4.6	5.2	+3.1	-1.2	+1.9
14-0	<u>15.7</u>	<u>20.1</u>	<u>35.8</u>	<u>11.0</u>	<u>48.3</u>	<u>59.3</u>	<u>+4.7</u>	<u>-28.2</u>	<u>-23.5</u>
TOTAL	<u>19.4</u>	<u>23.5</u>	<u>42.9</u>	<u>11.6</u>	<u>52.9</u>	<u>64.5</u>	<u>7.8</u>	<u>-29.4</u>	<u>-21.6</u>

B. REASONS FOR REVIEW

A geological review of the Weaber Field was carried out (late 1990) which resulted in a recorrelation between Weaber #1 and Weaber #2A.

Consequently, a petrophysical review of the sands in Weaber #2A was carried out.

### 3. DETAILED DISCUSSIONS

#### A. GEOPHYSICS

A 1 km by 1 km seismic grid was recorded across the Weaber structure in 1987. The resultant structural interpretation indicated four way dip closure at the Enga (14-0) sandstone level. The crest of the closure was located 2.3 km west of Weaber #1 which was chosen as the location of the Weaber #2 appraisal well.

The post Weaber #2A sand correlation interpreted the Enga Sandstone (14-0) to be intersected 108m low to prognosis, the recorrelation indicates that the sandstone was intersected 12m low to prognosis. Consequently, only minor adjustments to the original depth mapping was required.

#### B. GEOLOGY

Detailed discussion of the tectonic history, stratigraphy, source and reservoir rocks have been presented in Elf Aquitaine's 1983 Weaber #1 Well Completion Report.

#### C. PETROPHYSICS

##### Treatment of Data

The following suites of logs were used in the petrophysical evaluation for Weaber #1 and #2.

Gamma Ray, Caliper, Dual Laterolog (DLL), Micro-Spherically Focussed (MSFL), Sonic, Compensated Neutron formation density (Weaber #1) and lithodensity (Weaber #2A) logs.

These logs were environmentally corrected using Scientific Software Intercomp's (SSI) model ENVIRON. The following parameters were used for the environmental correction process:

	WEABER #1	WEABER #2A
Resistivity of mud	1.42 at 72°F	0.34 at 84.2°F
Resistivity of mud filtrate	2.1 at 72°F	0.289 at 76.1°F
Resistivity of mud cake	1.45 at 72°F	0.290 at 80.6°F
Mud weight	9.5 lbs/gal	9.43 lbs/gal
Bottom hole temperature	204°F	197°F
Total Depth	1950.0 m	1656.0 m
Bit Size	8.5"	8.5"

#### Petrophysical Parameters

Table 1 shows the various petrophysical parameters used for Weaber #1 and #2A. Industry standard cementation (m) and water saturation (n) exponents were used in this review. An  $R_w$  of 0.23 and 0.55 ohm-m at 75°F were used for the 13-0 and 14-0 sands respectively.

#### Calculation Method

Porosities were determined using the neutron density cross-plot method. In zones where hole conditions are poor, the Raymer-Hunt-Gardner sonic porosity algorithm was used. Shale volumes were derived from the gamma ray and density neutron logs. The lowest shale volume was used in the determination of effective porosity. Water saturations were calculated using the Indonesian equation.

TABLE 1

WELL NAME	WEABER #1		WEABER #2A	
	1280 to 1612	1390m to 1612m	1200 to 1373	1373m to 1450m
a	0.81	0.81	0.81	0.81
m	2	2	2	2
n	2	2	2	2
$R_w$	0.23	0.55	0.23	0.55
Rsh	6.6	10.0	4.0	4.0
GRma	28	28	45	45
GRsh	160	160	180	170
Dtma	55.5	55.5	55.5	55.5
Dtf	189	189	189	189
Dtsh	86	85	92	95
Rhoma	2.68	2.68	2.68	2.68
Rhobsh	2.70	2.7	2.69	2.72
Phinsh	30.0	35.0	35.5	28

NET PAY CUT OFFS

Porosity: 9%  
 Water saturation: 50%  
 Shale Volume: 50%

Using these parameters, the following net pay is indicated:

WEABER #1

SAND	INTERVAL (m)	NET PAY (m)	AVE POROSITY (%)	AVE SW (%)
13-0	1300.6-1303.6	1.52	10.0	47.3
14-0	1395.9-1419	14.9	11.8	42.3

WEABER #2A

13-0	1231.5-1233.7	1	10.9	30.2
14-0	ABSENT			



D. FIELD DATA SHEET

Field: Weaber (post-Weaber 2A)  
 Category: Proved and Probable - To LKG  
 Individual Sand Data:

Formation	Sand	Porosity (%)	Sh (%)	Ave h (ft)	Field Limit (metres)	Rw @** 75°F	1/Bg*	Reservoir Area (ac)	BRV Vol (ac/ft)	OGIP (Bcf)
Keep River	13-0	10.3	66.6	3.3	-1284 (LKG #1)	0.18	121.5	3080	10,148	3.7
	14-0	10.3	76.4	23.5	-1397 (LKG #1)	0.08	121.5	1607	37,730	<u>15.7</u>
										19.4

Category: Proved, Probable and Possible - To LCC  
 Individual Sand Data:

Formation	Sand	Porosity (%)	Sh (%)	Ave h (ft)	Field Limit (metres)	Rw @** 75°F	1/Bg*	Reservoir Area (ac)	BRV Vol (ac/ft)	OGIP (Bcf)
Keep River	13-0	10.3	66.6	3.0	-1310	0.18	121.5	6466	19,483	7.1
	14-0	10.3	76.4	24.2	-1430	0.08	121.5	3548	86,023	<u>35.8</u>
										42.9

\* 1/Bg Ref: Re-Evaluation of Weaber #1 (SANTOS REPORT); Weaber #1 DST 4.

\*\*Rw Ref: Re-Evaluation of Weaber #1 (SANTOS REPORT); From SP log.

#### 4. CONCLUSIONS AND RECOMMENDATIONS

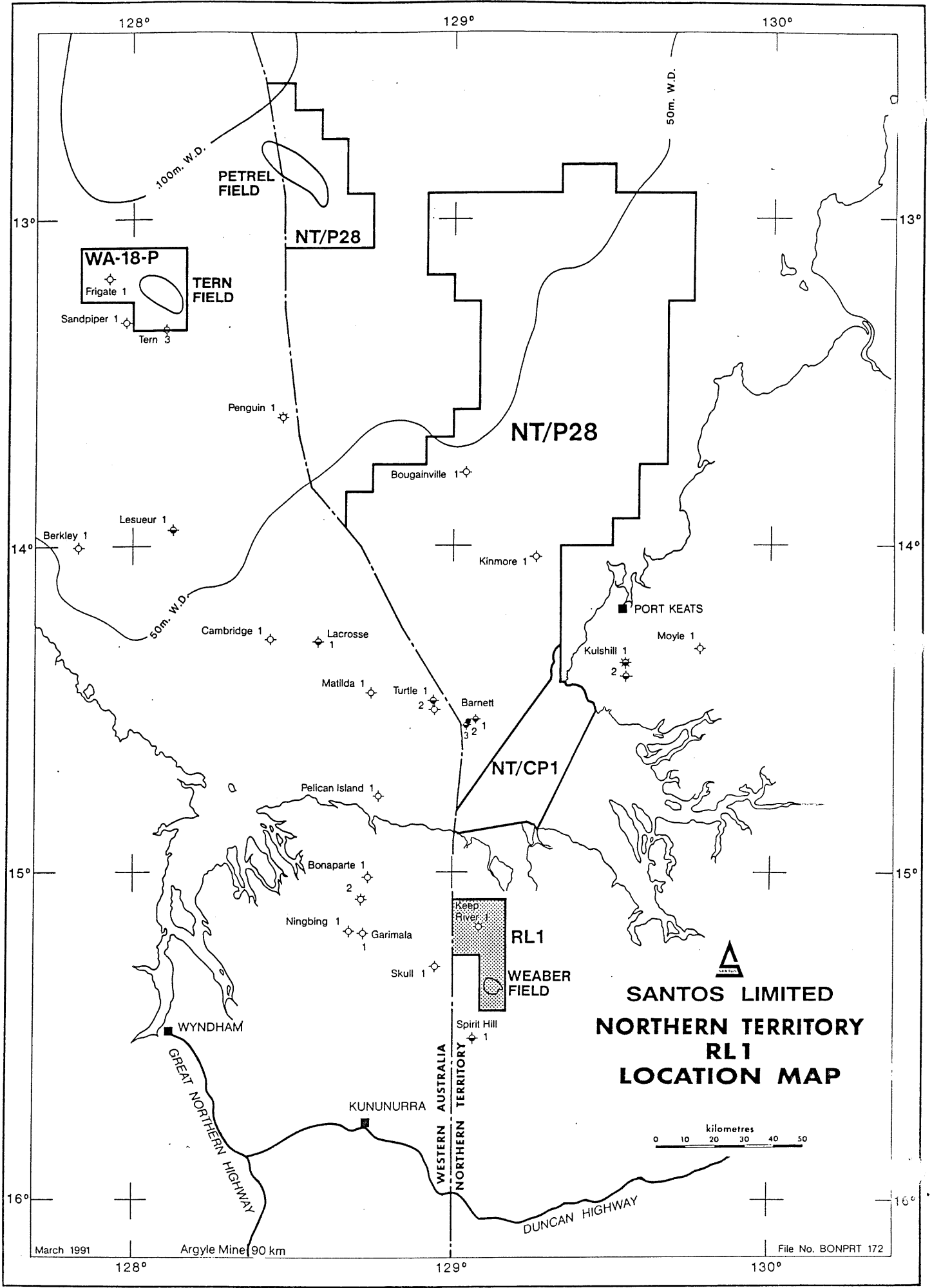
The poor result of Weaber #2A can be directly attributed to the Enga Sandstone shaling out between Weaber #1 and Weaber #2A. To investigate the continuity of the Enga Sandstone in NT/R1, a cross-section was generated between Weaber #2A, Weaber #1 and Keep River #1. The correlation of the Keep River Group between Weaber #1 and Keep River #1 is very good. There is good reservoir development of the Enga Sandstone in both wells.

An appraisal well would be required to confirm the continuity of the Enga Sandstone reservoir and the Weaber Field structural mapping. A location 3 km north of Weaber #1 is the most favoured location because it lies between Weaber #1 and Keep River #1 and is mapped as a structural high. This location would address the full 29 BCF of possible OGIP as well as providing a good drainage point for future development of the field.

To optimunly locate the appraisal well will require reprocessing seismic lines S84-15 and BN 80-207 which tie between Weaber #1 and the approximate proposed location.

The regional continuity of the Enga Sandstone to the north of Weaber #1 combined with the pinchout of the sand to the south and east provide the opportunity for gas being stratigraphically trapped.

The Enga Sandstone was not tested in Keep River #1 but the presence of a gas show and high resistivities indicate possible gas saturation in this location. This confirms the gas potential of the Enga Sandstone in NT/R1.



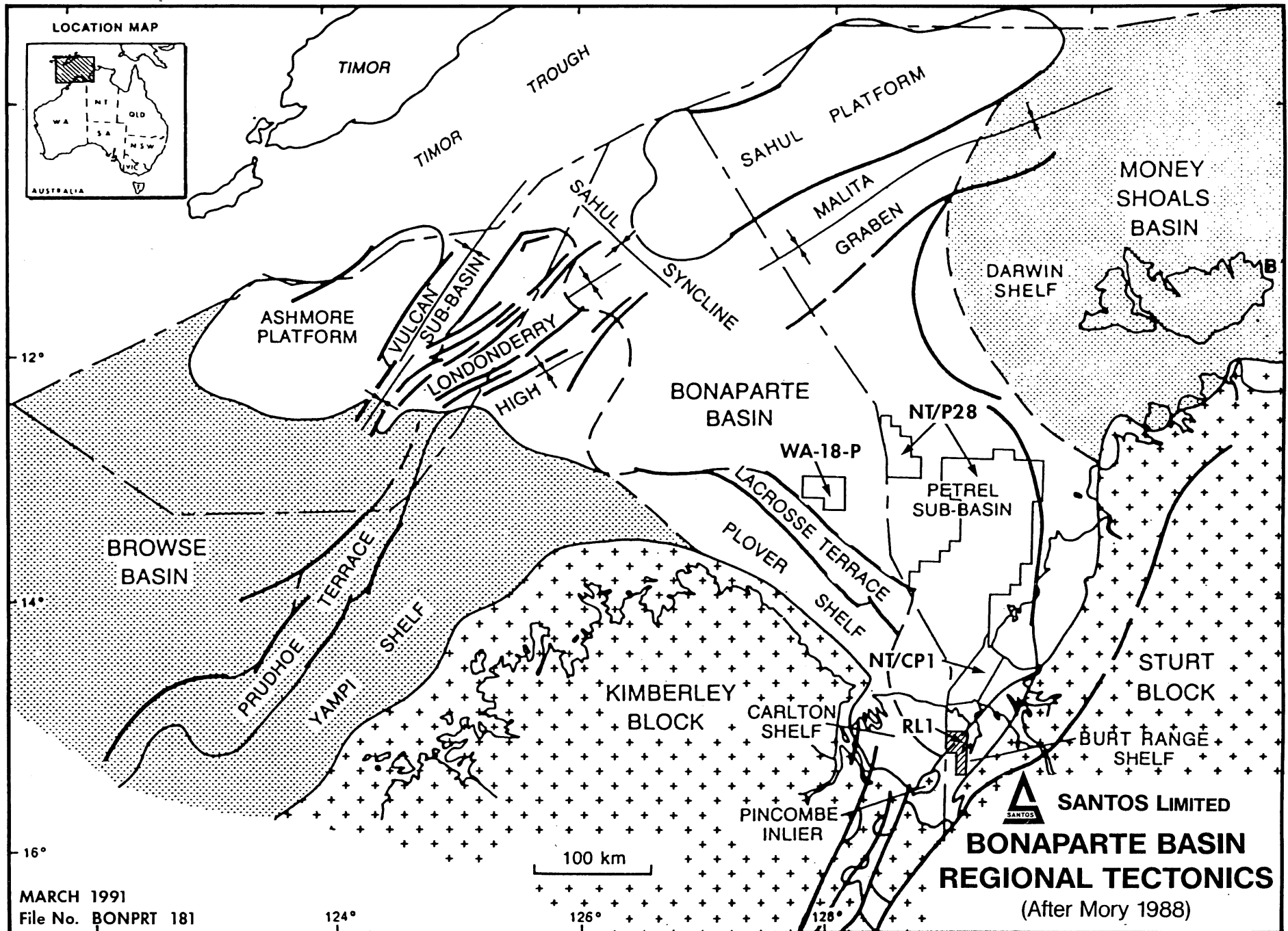


FIGURE 2

AGE	STRATIGRAPHY		LITHOLOGY	DEPOSITIONAL ENVIRONMENT	HYDROCARBON POTENTIAL					
	ONSHORE	OFFSHORE			SOURCE	RES.	SEALS	SHOWS		
JUR. CRET.		Bathurst Island Fm								
	Late	Petrol Formation	A Mbr B Mbr C Mbr							
	Middle				F	G				
Early										
TRIASSIC	M-Lt	Un-named								
	Early	Mount Goodwin Formation								
PERMIAN	Late	PORT KEATS GROUP	Hyland Bay Fm	1 2 3 4 5	H4 H5	Marine-Deltaic				
			Fossil Head Formation							
	Early									
CARBONIFEROUS	Late	Border Creek Formation	Kulshill Formation							
	Early	Pointspring Sst								
		Tanmurra Formation								
		Milligans Beds								
DEVONIAN	Late	Buttons Bed	Bonaparte Beds							
		Ningbing Lst								
	Early	Cockatoo Fm								
ORDOVICIAN	Early	Un-named Evaporite Sequence								
CAMBRIAN	Early	CARLTON GROUP								
		Tarrara Fm								
PRE-CAMBRIAN		Antrim Plateau								
		Metamorphics								

- 1 Tern Member
- 2 H4 Member
- 3 Hay Member
- 4 H5 Member
- 5 Shale Member



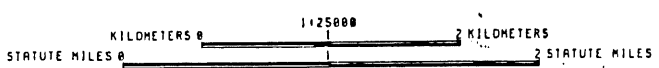
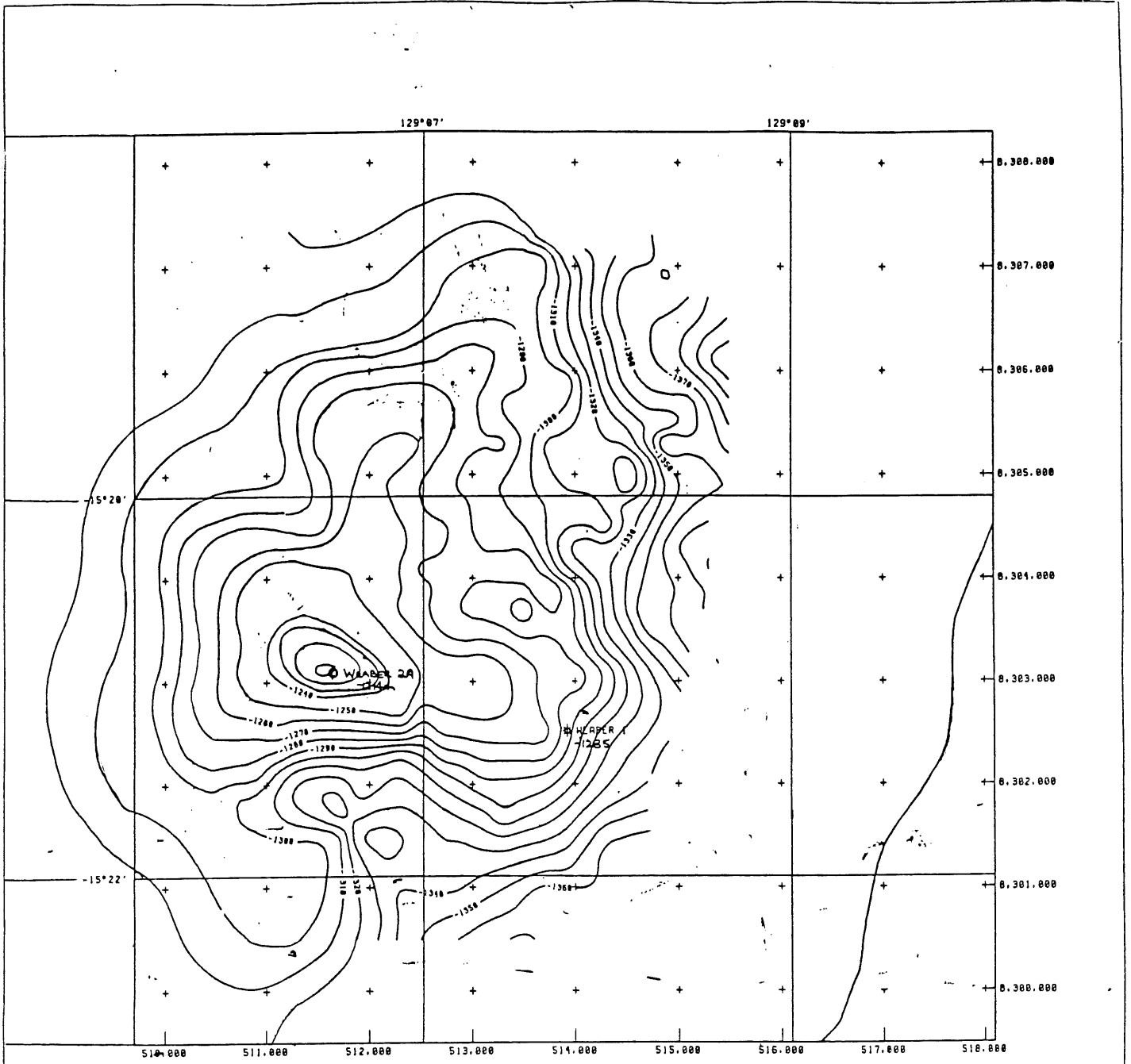
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BONAPARTE BASIN - STRATIGRAPHIC TABLE

(Modified from Robertson Research, 1988)

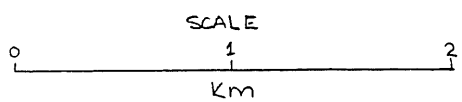
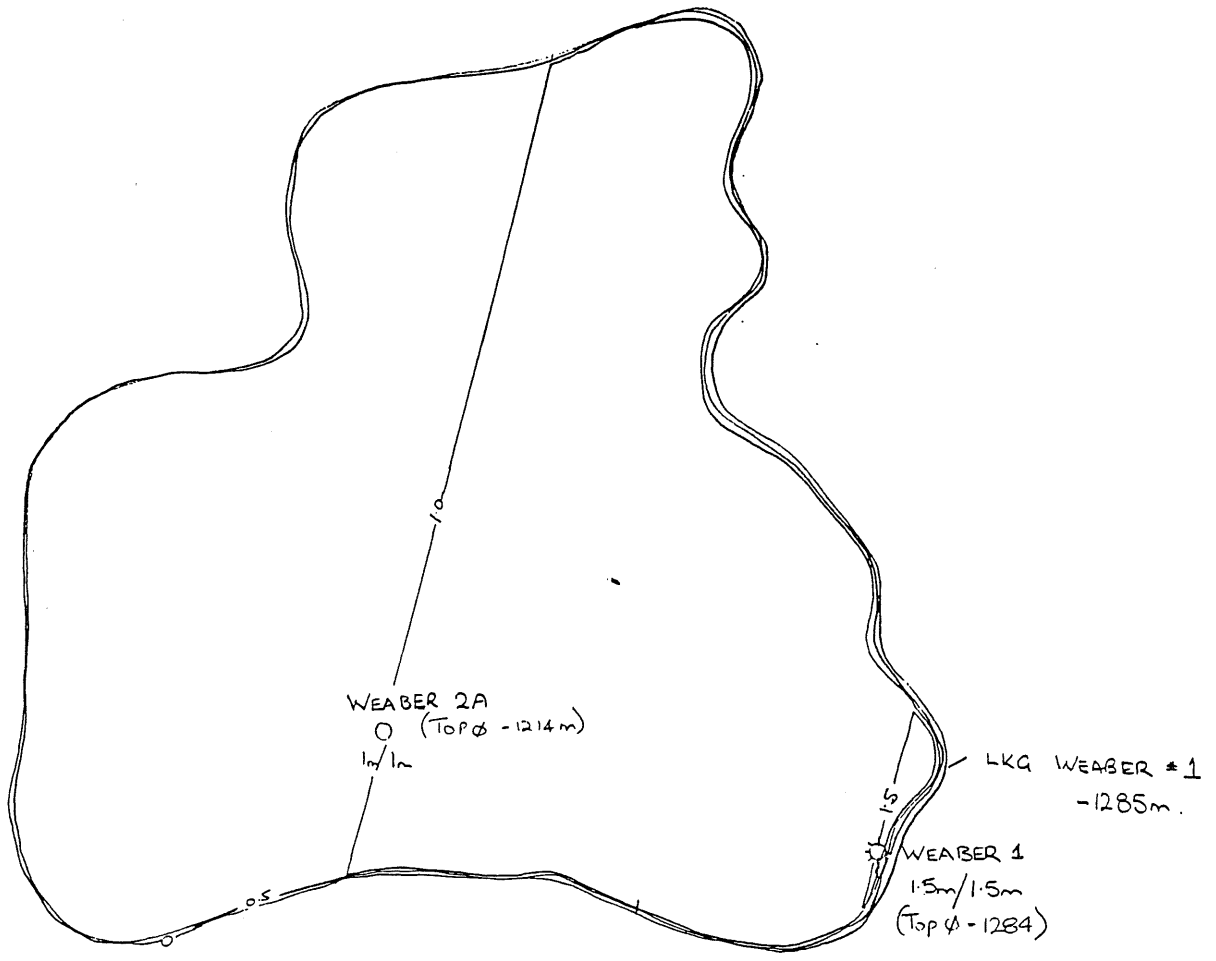
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FIGURE 3



	
OP 186, NORTHERN TERRITORY WEAVER FIELD 13-0 SAND DEPTH STRUCTURE	
1:25000	9-85-98

GRID = 13-0 DEPTH GRID



WEABER FIELD  
 13-Ø SAND  
 PROVED & PROBABLE OGIP  
 CI 0.5m

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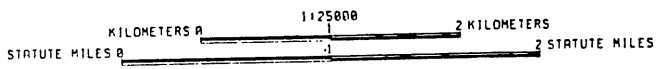
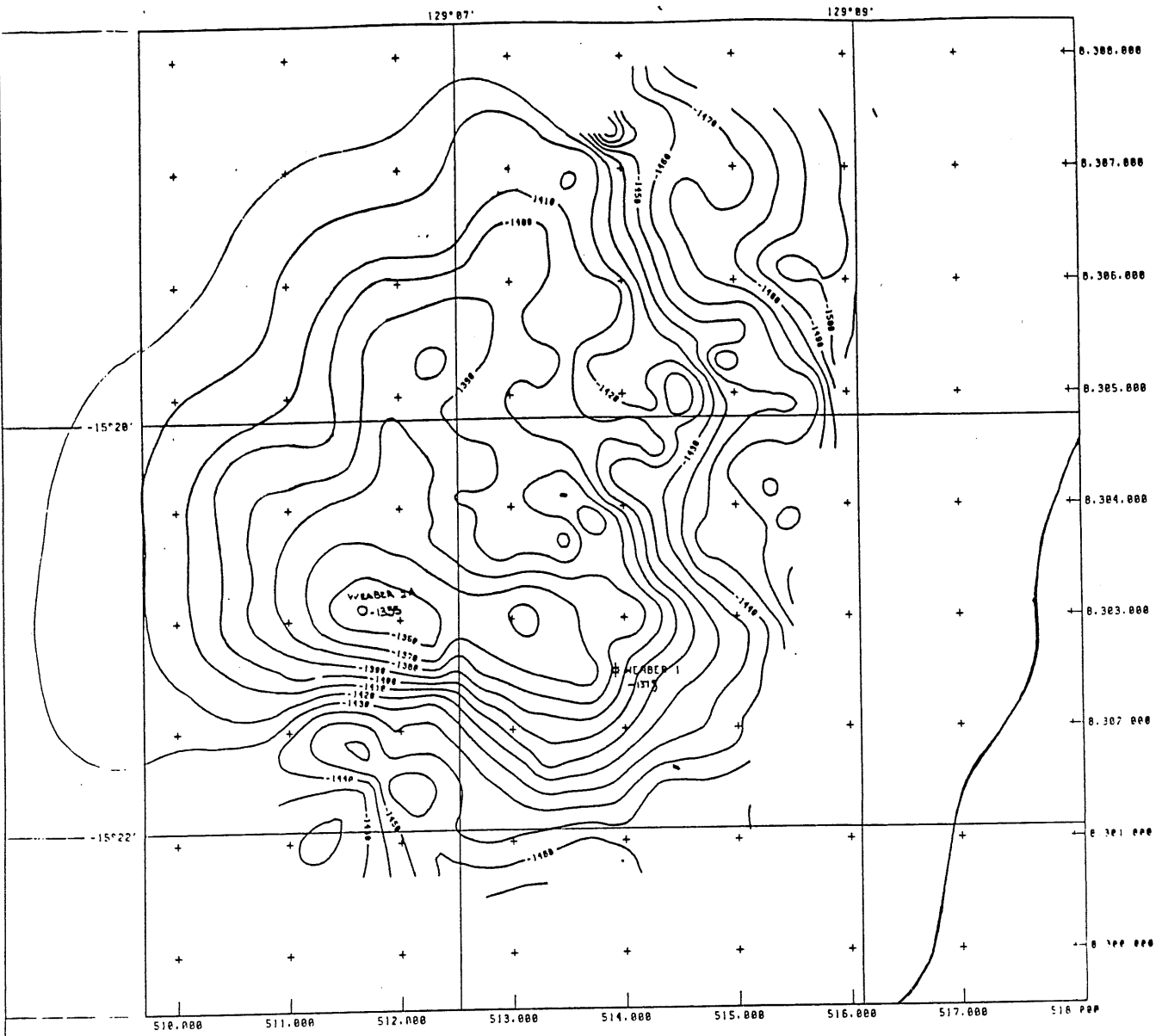



WEABER FIELD  
13-Ø SAND  
PROVED, PROBABLE & POSSIBLE  
CI 0.5m



AUTHOR: S.W. JONES 1/91



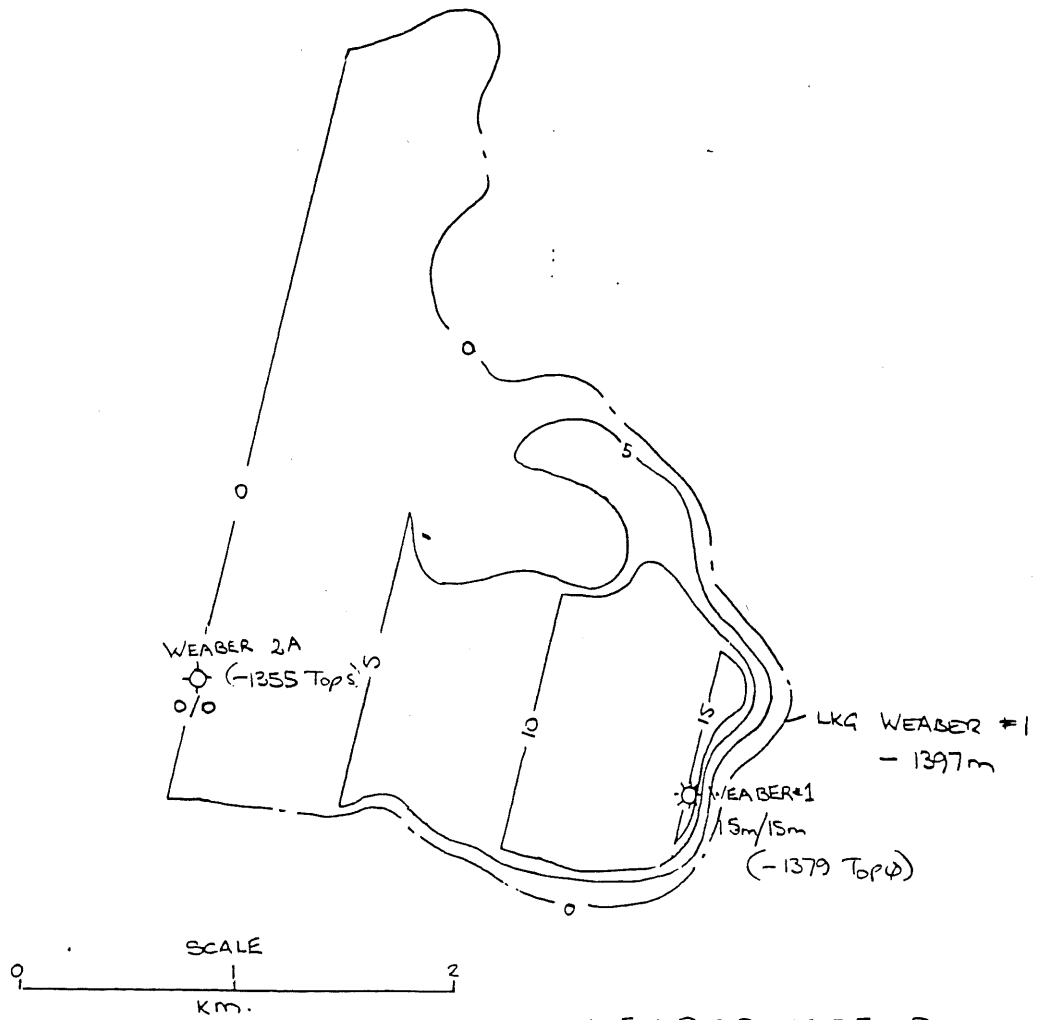




OP 186, NORTHERN TERRITORY  
WEABER FIELD  
14-Ø SAND  
DEPTH STRUCTURE

1:125000      9-86-98

GRID = 14-Ø DEPTH

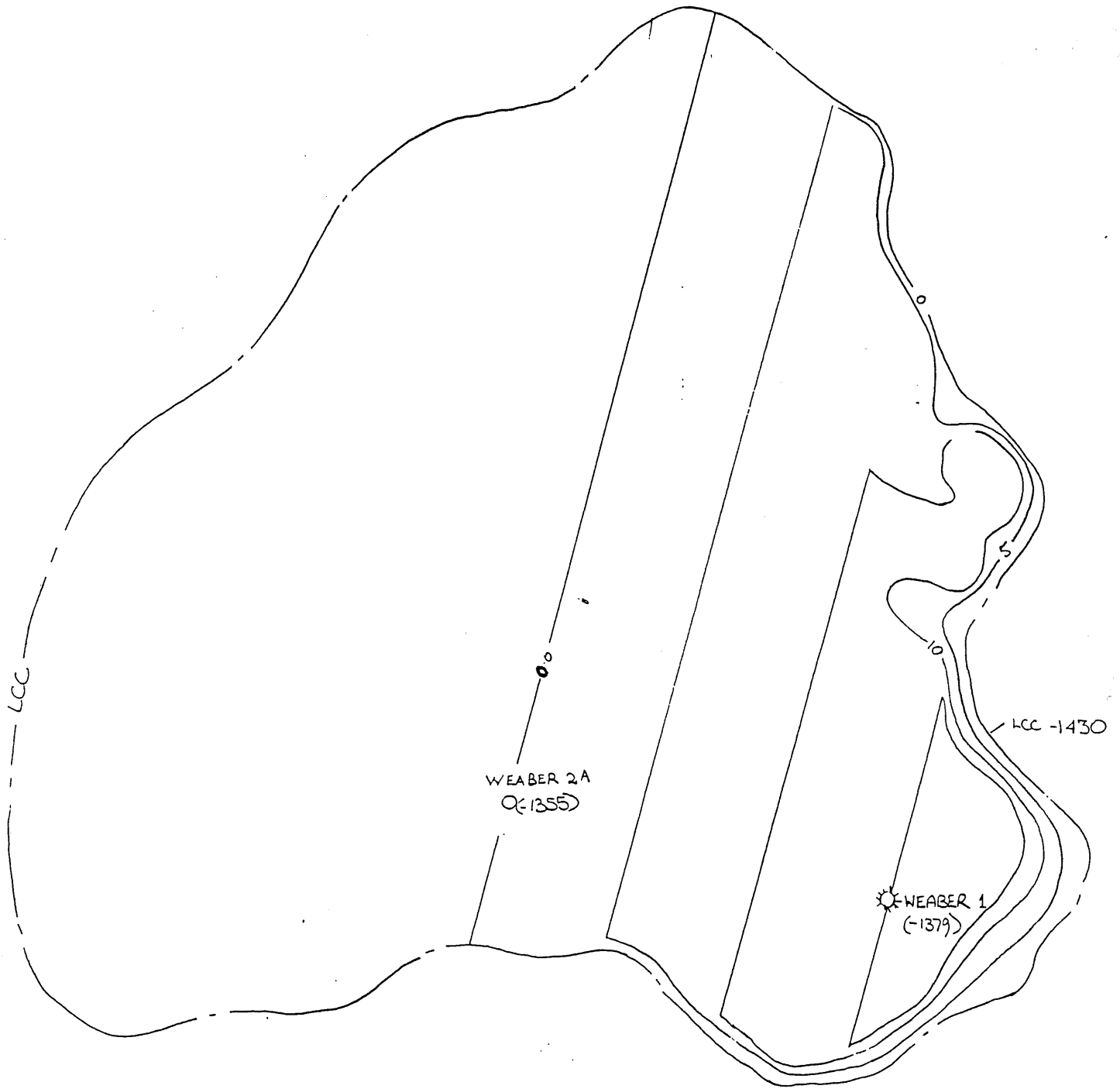


WEABER FIELD  
14-0 SAND

PROVED & PROBABLE

CI 5 m.

AUTHOR: S.W. JONES 1/91



0 1 2  
SCALE km

WEABER FIELD  
14-0 SAND  
PROVED, PROBABLE & POSSIBLE  
CI Sm.  
AUTHOR: S.W. JONES 1/91