Appendix A.

Bendix

BONAPARTE GULF SEISMIC SURVEY

BONAPARTE GULF BASIN

NORTHERN TERRITORY

for

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

by

AUSTRAL UNITED GEOPHYSICAL PTY. LTD.

July to August, 1980

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1. INTRODUCTION

Austral United Geophysical were contracted to conduct the Bonaparte Gulf Seismic Survey in O.P. 186 in the Bonaparte Gulf Basin, Northern Territory for Australian Aquitaine Petroleum Pty. Ltd.

Seismic Party 296 was mobilised from its previous commitments in the Bonaparte Gulf Basin of Western Australia and arrived in the field on July 31. Experimental recording began on July 31.

2. LOGISTICS AND WEATHER

The area of operations lies approximately 80 km north-west of Kununurra, Western Australia.

The program consisted of 7 lines, totalling 141.20 km.

One campsite was used, and was located on the banks of the Keep River. Supplies were obtained from Kununurra, and Perth, and specialised parts were imported from the United States.

The weather was generally fine and hot throughout. No rain occurred during the program.

3. FIELD OPERATIONS

3.1 LINE CLEARING

Line clearing commenced on July 15, 1980 with one D8 and one D7 bulldozer subcontracted from General Bulldozing of Perth, Western Australia, under the direction of one Austral United surveyor.

Both bulldozers had considerable downtime for various mechanical failures but the lead of bulldozing over recording was never threatened.

Line clearing was completed on August 20.

A Cat 12 Grader, subcontracted from Kununurra arrived on the prospect on July 15 and graded lines until August 20.

Seismic lines were started by setting star pickets on the assigned bearing. Where lines crossed fences, detours were constructed to the nearest gateway, or fences were cut and a temporary gate constructed.

3.2 SURVEYING

Lines were located mainly in timbered country and scrub with some extensive grassland areas.

Pegging was carried out using wooden pegs at 80 metre intervals, with even numbered pegs being vibrator points. Ranging of lines was done either by tubular compass, attached to the Wild Theodolites used, or by determining azimuth from a series of sun observations. Distances were measured using a wire chain and checked by stadia measurements.

Elevations and co-ordinates were determined by conventional stadia methods, tying to state bench marks available in the area and also old seismic lines. No adjustments were carried out as all line loops closed within the required limits. All lines were either looped or double run. The loop closure maps provided show the allowable errors.

Permanent markers, being steel fence posts set in concrete, were placed at line intersections with tags showing nearest vibrator point and a distance to it, on both lines.

Survey information, in the form of survey notes, shot point location maps, A.M.G. co-ordinates, and loop closure maps, have been presented to Aquitaine separately.

3.3 DRILLING AND LOW VELOCITY SURVEY

One Jacro 200 Drilling Rig, mounted on a Toyota FJ-45 4 x 4 and equipped with an auxiliary air compressor was contracted from Sparkes Drilling of Brisbane.

Holes were drilled to 10 feet and loaded with 3 lbs Anzite Blue for the refraction survey.

Good first breaks were recorded and it was possible to understand the complex near surface lithology of the area.

3.4 RECORDING

The noise study conducted on July 31 determined the recording parameters for the survey which were specified by Aquitaine as follows:

Number of Vibrators (four on the crew)	3
Vibrator Interval	16 m
Sweep Frequency	16 - 70 Hz up sweep
Sweep Time	15 sec
Listen Time/Record Length	4 sec
Number of sweeps per V.P.	8
Move Up	10 m
Length of Source Pattern	102 m
Spread Distance	2160-320-0-320-2160 m
Station Interval	80 m
Geophone Array	10 in line X 3 Wide Weighted Total array length 86.7 m Weighting 11223333332211 Centre hook up at station peg
Filters	12 Hz Lo Cut 128 Hz Hi Cut
Notch Filter	50 Hz
Sample Rate	2 milliseconds
Subsurface Coverage	1200 %

Composited records were put on tape in SEG "B" format with a TI DFS V and DCX II 48 trace system.

Geophones were 10 Hz Digital grade GSC 20 D.

PRODUCTION HISTORY

July 31

Recorded noise analysis on line 204.

July 31 - August 2

Recorded line 204 from V.P.'s 100 - 290.
Delays were due to a river crossing and long detours.

August 3 - August 4

Recorded line 203 from V.P.'s 330 - 92.

August 5 - August 8

Recorded line 205 from V.P.'s 106 - 500.
Some swampy ground was encountered on this line.

August 9 - August 10

Recorded line 201 from V.P.'s 280 - 100.

August 12 - August 15

Recorded line 202 from V.P.'s 104 - 395.

August 15 - August 17

Recorded line 207 from V.P.'s 330 - 106.

August 18

The instruments were down due to failure in the alternator.

August 19 - August 21

Recorded line 200 from V.P.'s 100 - 346.

END OF SURVEY

Note that in several locations recording was conducted at 2400% subsurface coverage.

4. COMPUTATIONS AND FIELD OFFICE PROCEDURE

A 12 trace RS-4 refraction system was used to record first energy arrivals from a maximum 3 lb dynamite charge loaded and tamped at a maximum depth of 10 feet. These times were plotted on a time/distance graph to calculate refractor velocities, the direct (shot to near geophones) velocity, and the time delay associated with the travel path of energy to and from the refractors. From these data the weathering depth and thickness of subweathered layers was calculated to the nearest metre. Weathering corrections were computed as a sum of vertical travel times through separate layers and subsequently a geophone correction (or static correction) was computed as the sum of the weathering correction plus the base-of-weathering to datum travel time with respect to direction. These computations were made using a program with the "K" coefficient formula on a Hewlett Packard 29C Calculator. The datum to which times were corrected was sea level and the replacement velocity used was 3000 m/sec. Stacking charts, correlated field records, observers reports, magnetic tapes, and survey data for all lines was sent to G.S.I. (Sydney) for processing.

Statistical reports, together with a summary of production and list of consumables, was sent to Aquitaine's Sydney Office bi-monthly.

5. CONCLUSIONS

1. The improvement in near surface velocity control rendered by the addition of the drill auxiliary compressor was significant.

2. The flexibility of the "Vibroseis" procedure was demonstrated in terms of quality and quantity.

3. Austral United Party 296 appreciates the assistance of Aquitaine's Client Representatives Messrs. Pelerin, Magnien, Harrison, and Greaves, and also the considerable help of Mr. Peter Burrell of Aquitaine Minerals.

4. The prospect area is dangerous for bushfires.

Respectfully

J.L. DOUGLASS
Supervisor P. 296

APPENDIX A

EQUIPMENT

Field Office Equipment

One (1) complete set of field office, administrative and interpretational equipment and supplies including calculator, typewriter, Rotalite Printer, drafting tools, forms and supplies.

Field Management Equipment

One (1) Toyota Land Cruiser, 4 x 4.

Surveying Equipment

Two (2) Theodolites.
Two (2) sets of survey equipment, including chains, rods, poles, flagging, stakes, notebooks, computing and mapping equipment.
Two (2) Toyota Land Cruisers, 4 x 4.

Energy Source Equipment

Four (4) Zeligson 6 x 6 trucks, two (2) equipped with Wabco Y-900 Vibrators and two (2) equipped with Wabco Y-1100 Vibrators. ETL SHV 310A Vibrator Electronics.
One Vibrator service truck, International D1630, 4 x 4.
One (1) Toyota Land Cruiser, 4 x 4.

Recording Equipment

One (1) recording system mounted in a recording cabin on a Ford F-600 4 x 4 truck.
Recording system consists of 48 channel TI-DFS 5 Amplifiers, GUS-CDX 2 Compositor, Geosource EC 2400 Correlator, SIE-ERC-10C Electrostatic Camera, roll along switch, module kits, test equipment and spare parts.
Fifty-two (52) 52 pair cable sections, each cable section with 2 traces at 105 metre intervals.
Two (2) 52 pair jumper cables of 300 metre lengths.
Three hundred (300) strings of digital grade geophones, 10 phones per string, 10 metre interval and 10 Hz.
Four (4) Toyota Land Cruisers, 4 x 4 with radios.

Camp and Supply

Complete camp to accommodate up to thirty-five (35) men.
Camp includes kitchen, ablution, diner, office and shop trailers, 65 KVA Generator Trailer, mess and personnel tents.
One (1) supply vehicle Toyota Land Cruiser, 4 x 4.
One (1) camp water/supply truck, International D1630, 4 x 4.
One (1) mechanic vehicle equipped with welder, compressor, tools, and supplies, Toyota Land Cruiser, 4 x 4.

Velocity Equipment

One (1) SIE RS-4 12 Channel Seismic Refraction Recording Amplifiers plus camera.
Two (2) 12 trace refraction cables with 30 metre group intervals.
Twenty-four (24) Mark L-1, 4 Hz Refraction Geophones.
One (1) Toyota Land Cruiser, 4 x 4.
Three (3) 100 W SSB radios (Perth , Camp, Mobile).
Five (5) 40 W SSB radios (Camp-Field).
One (1) set fly camping equipment for up to twelve (12) men.

Expediting Equipment

One (1) Utility Truck.
One (1) office/store.

APPENDIX C.1

LINE CLEARING

	July	August	Total
Line Cut (kms)	85.7	143.7	229.4
D8 Operational Hours	72.00	110.00	182.00
D8 Down Hours	88.00	15.00	103.00
D7 Operational Hours	158.00	205.00	363.00
D7 Down Hours	16.50	7.00	23.50
Grader Operational Hours	98.50	187.00	285.50
Grader Down Hours	51.50	23.00	74.50
Line cleared km/operational hour (not including grading)	0.373	0.456	0.421

APPENDIX C.2

DRILLING AND L.V.L.

	July	August	Total
Drill Production Hours	33.5	51.0	84.5
Standby Hours	25.5	90.0	115.5
Total Footage	1000	1419	2419
Production Feet/Hour	29.9	27.8	28.6
Spreads Laid	14	84	98
Shots	28	168	196
Uphole Surveys	0	0	0

APPENDIX C.3

RECORDING

	July	August	Total
Total kms Recorded	0.80	140.40	141.20
Operational Hours	3.25	166.69	169.94
Travel Hours	0	36.66	36.66
Moving Hours	0	0	0
Allowable Down Hours (0.35 Vibrators) (14.41 Instruments)	0	14.76	14.76
Allowable Standby Hours	0	0	0
Holiday Hours	0	0	0
Total Chargeable Hours	3.25	218.11	221.36

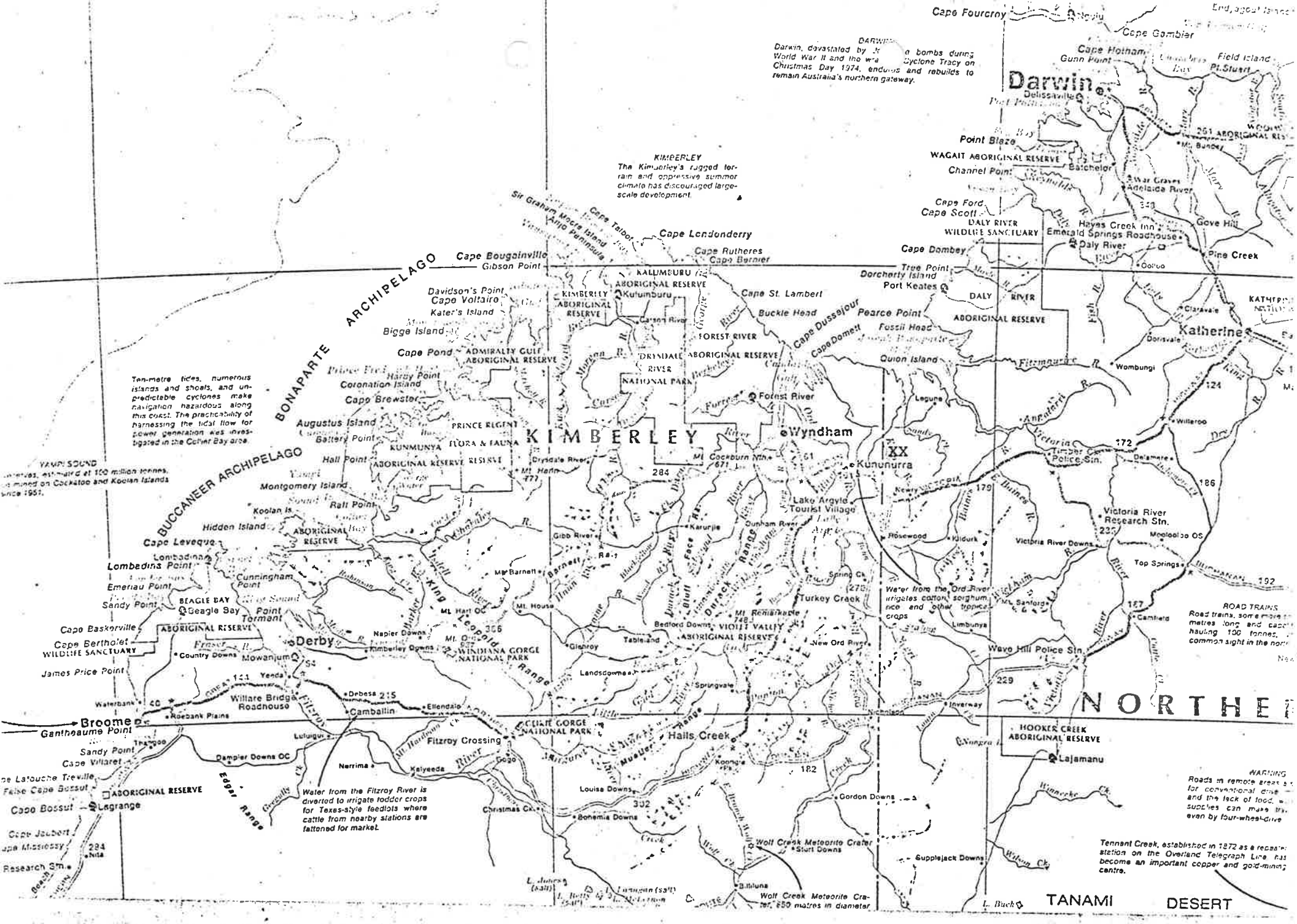


FIGURE 1 LOCATION SKETCH

XX DENOTES WORK AREA

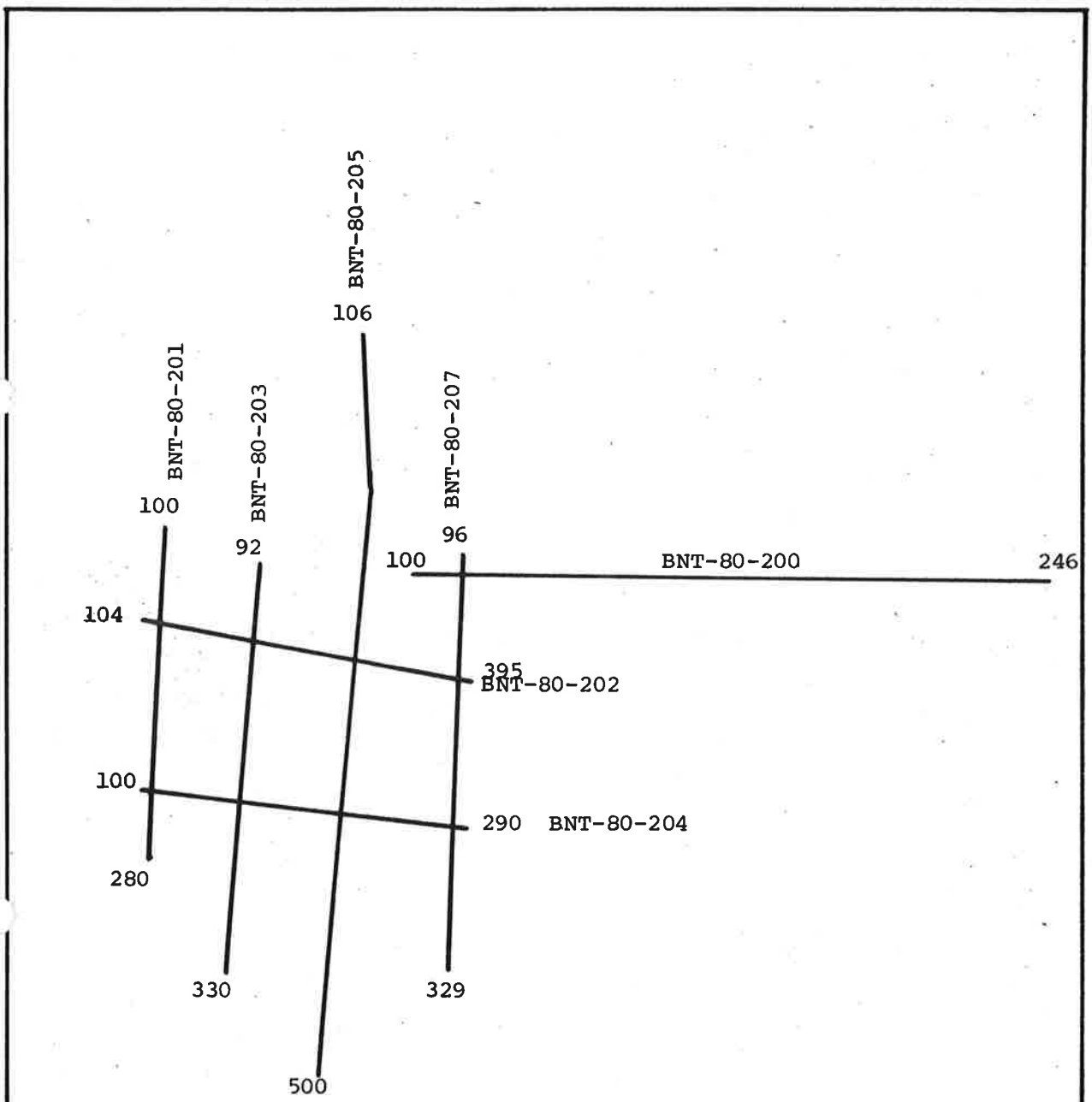
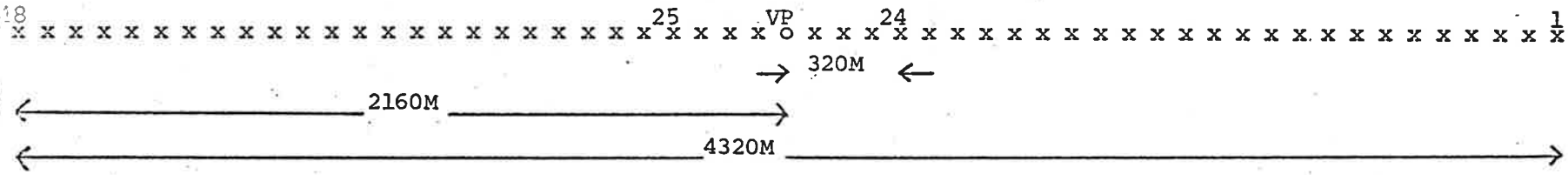


FIGURE 2 LINE MAP BONAPARTE GULF BASIN N.T.

SPREAD CONFIGURATION

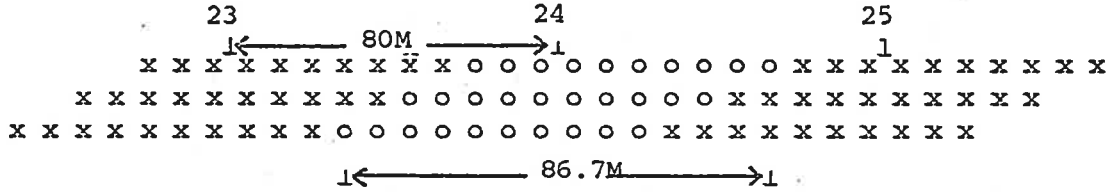


TRACE INTERVAL = 80M

V.P.INTERVAL = 160M

TRACE 1 TO NORTH OR EAST

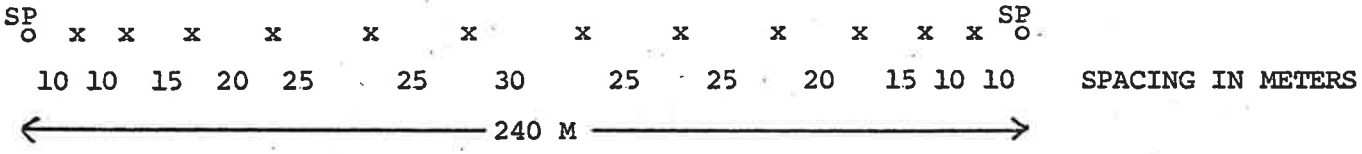
GEOPHONE ARRAY



10 GEOPHONES IN LINE BY THREE WIDE WEIGHTED
LENGTH OF ARRAY 86.7M
WEIGHTING 1122333333221l

FIGURE 3 SPREAD CONFIGURATION AND GEOPHONE ARRAY

WEATHERING SPREAD



2 GEOPHONES PER TRACE

FIGURE 4 WEATHERING SPREAD

APPENDIX B

PERSONNEL

Party Manager	C. Smith
Seismologist	D. Dally
Computer	M. Miralles
Surveyors (2)	K. Taylor C. Chandler
Chainman	One (1)
Rodman	One (1)
Senior Observer	T. Doherty
Observer	J. Peters
Junior Observer	D. Gillespie
Recording Helpers	Twelve (12)
Vibrator Mechanics (2)	R. Evans D. Sweeney
Vibrator Operators (3)	A. Monroe E. Harrower K. Thomas
L.V.L. Observer	O. Grose
L.V.L. Helper	One (1)
Utility/Driver	One (1)
Cook	J. Fossey
Camp Attendant	One (1)
Camp Mechanic	P. Gratte
Field Engineer	D. Whitford
Expeditor	M. Gannon