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The text of this report refers to seismic lines for Undandita; Glen Edith; Johnstone; Tempe Vale; Gosses Bluff

ONSHORE

DATA COLLECTION
FINAL REPORT OP 178
FOR PANCONTINENTAL PETROLEUM LIMITED
BY GEOPHYSICAL SERVICE INC
MAY, 1982

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INTRODUCTION

A reflection seismic survey utilising vibrator technology was conducted in the Amadeus Basin for PANCONTINENTAL PETROLEUM LIMITED by Geophysical Service Inc. during the period November, 1980 to April, 1982. This survey was conducted in order to enhance definition of previously known structures and to reconnoitre other areas of little or no previous knowledge.

The concessions lie in the Northern Territory of Australia, south and west of Alice Springs and consist of two leases, OP178 and OP175, which may be found between latitudes 23 degrees 30' and 24 degrees 45' south of the Equator and longitudes 129 degrees 45' and 134 degrees 15' east of Greenwich. This area was divided into several sub areas, namely:" Alice, Dingo, Highway, and Walker Creek", for OP175, "Undandita, Glen Edith, Johnstone, Tempe Vale and Gosses Bluff" for OP178.

The Data Collection report will entail two sections:

1) This report which will cover OP178; Undandita, Glen Edith, Johnstone, Tempe Vale and Gosses Bluff which were surveyed during April, 1981 to April, 1982.

2) Another report covering OP175 is under separate cover.

DISCUSSION

Weathering control in this area was considered to be a major problem so dynamite shots (anzite) were taken into the main spread every 600 metres. Operationally, this necessitates the drilling of shot holes well in advance of the main crew. In general, this system worked well. The shot interval was reduced to 400 metres in places to assist interpretation of the refraction breaks.

Extensive parameter analysis was done at the beginning of the Undandita Prospect to ensure the vibrator and geophone spacings were optimum for the area's surface conditions and structural dip.

These tests were done initially on the first line (U4) in Undandita. Vibrator sweep frequencies were set at 12-80Hz. However good reflection quality was illusive and subsequent processing showed no usable data above 60 cycles. Hence the sweep frequency range was decreased to 12-60Hz over the same 16 seconds to place more energy into the lower frequency band.

Further tests were run on GE4 in July but no major change was made to the parameters (see Appendix 1).

Two days were spent in early January on U16 where it was decided to try 25 metre group intervals and 24 fold shooting on "bad" areas of line. Six fold was shot in the known "good" data areas.

To avoid any delays while waiting for Central Lands Council (CLC) approval, PANCONTINENTAL engaged a group of surveyors who worked well ahead of the main crew. This meant that all line traverses and air strips could be scouted by the CLC anthropologist and his team before the dozers began clearing line.

The Johnstone Prospect provided several logistic problems due to: distance from town; large sand dunes; lack of good air strips; lack of a good water supply, and unseasonal weather. Production was kept high by "fly camping" the main crew when drive times became too high.

Rain in December, January and February affected production badly. Roads were impassable and airstrips unserviceable. Fuel, explosives, food and water provided severe logistic problems. February's 17 inches of rain stopped production for 20 days.

KILOMETER SUMMARY

Month/Year	Kms/Month	Undandita	Glen Edith	Johnstone	Tempevale	Gosses Bluff
Apr/81	67.7	67.7				
May/81	237.5	161.9	75.6			
June/81	218.2		218.2			
July/81	193.2		193.2			
Aug/81	174.4		126.2	48.2		
Sep/81	217.2			217.2		
Oct/81	199.8			199.8		
Nov/81	204.6		141.1	54.1	9.4	
Dec/81	163.5		129.5		34.0	
Jan/82	80.0	72.6	7.4			
Feb/82	31.5	6.9	24.6			
Mar/82	158.1		88.7	69.4		
Apr/82	180.4		126.6	21.5		32.3
TOTALS	2126.1	309.1	1131.1	610.2	43.4	32.3

EQUIPMENT LIST

Survey

2	Wilde T-2 Theodolite and accessories
1	Auto Ranger II EDM
1	100m chain and 1 x 50m chain
2	SR 59 Programmable Calculators with printer
1	770 Survey Terminal
2	4 x 4 Model H.J. Toyota Survey Trucks
	Drafting equipment as required
2	VHF Radios and 1 Stingray
1	Set Field Glasses
1	Photocopier

Vibrators

4	TR-3 Vibrators
4	Vibrator Control Units
1	4 x 4 Model C-70 Chevrolet Line Maintenance Truck
1	4 x 4 H.J. 45 Personnel Carrier

Recording

1	Texas Instruments DFSV 48 trace Digital Field System, complete with electrostatic camera and all necessary equipment and spares.
1	96 Input, 48 Output CDP Switch
1	Field Timap System (FT-1)
170	Geophone Strings, GSC 20D 10 Hz, 6/string 5m interval
16	CDP Cable Sections, 50m intervals, each cable of 8 x 100m sections

2	50m and 2 x 440m Jumper Cables
1	Geospace Model GS 940 Geophone Analyzer
1	Oscilliscope
1	Blaster for detonating dynamite charges
10	FM Radios
1	SSD HF Radio, 100 watt output
1	4 x 4 Model C-70 Chevrolet Truck complete with recording cab, 24 Kw Generator, 770 Intelligent Terminal, RCU Unit, a Plotter and Airconditioning
5	4 x 4 Model H.J. 45 Toyota Line Trucks
2	4 x 4 Model H.J. 45 Toyota Personnel Trucks

Camp

1	Fully equipped Kitchen Trailer 12m x 3m
1	Fully equipped Mess and Rec. Trailer 12m x 3m
1	Fully equipped Office Trailer 12m x 3m
1	Fully equipped Ablution Trailer 12m x 3m
1	Mechanics Workshop 12m x 3m
5	Accommodation Trailers (55 bunks)
2	4 x 4 C-70 Chevrolet 1000 gallon Water Trucks
1	Generator Trailer with 1 70kva main and 1 45kva standby Generator plus a 1000 gallon Fuel Tank and a 1000 gallon Water Tank
1	1000 gallon Fuel Truck
1	4 x 4 Model H.J. 45 toyota Personnel Truck

MONTHLY SUMMARIES

From April, 1981 until April, 1982

April, 1981

In the first half of this month two dozers and a grader started setting of lines and preparing the way for an advance survey crew that was sent in on the 13th April, 1981. The main crew followed on the 16th April, 1981 and set up camp near P81-U5 and the access road. The drillers commenced drilling on the 18th April, 1981 and recording started the same day. Line clearance was hampered by rough terrain, line extensions and sacred sites. Recording was slow due to terrain and the large number of line moves required to shoot the Prospect and its extensions. Time was also lost due to noise analysis and noise on the line from the drilling rig. While in this new area we had several visitors; J Corleis, D Kelly and K Bushnell from the Pancontinental Film Crew as well as D White also from Pancontinental Petroleum. Geoff Stead from the C.L.C., Helmet from the Hermannsburg Mission, Bob Liddle from Magellan and three representatives from the Northern Territory Cattle Board.

May 1981

An unusually high turnover of personnel this month combined with line clearance problems (C.L.C.) did not stop recording from making good progress. Parameters were changed twice to avoid attenuation of high frequency signal and although some animal damage occurred to cables and geophones the time lost was minimal compared to picking up and relaying the line every day. Line clearance and drilling could have done better and steps were taken to improve their production. Survey lost time extricating a bogged Mobil fuel truck, as well as closing field survey loops using the PPL Satellite stations as control. Visitors for the month were Dave Moressy (C.L.C.), Brian Giles (Manager Haasts Bluff), Mike Purcel, Dick Thompson and Peter Garland all from the Department of Mines and Energy as well as Jimmy Malta, a lease holder from the Browns Bore Area.

June 1981

Production was good again this month and the work day has been reduced from 11 to 10 hours. Some recording input parameters were changed but data quality remained poor except on GE5. Cold weather (-5 degrees celcius) created some minor delays due to fuel problems as did C.L.C. approval of a new campsite thus creating excessive travel times. Line clearance with three dozers and two graders, at one stage, built up a 60 kilometre lead but then dropped off to 28 kilometres by the end of the month due to mechanical problems etc. Gorey & Cole acquired a new rig (Mayhew 1000) which proved superior and could comfortably stay with the chainmen but mechanical problems and C.L.C. clearance hindered production. Survey computing was hindered by the loss of 770 parts to the dog box and unreliable vertical control from the Doppler Sattelite control points. Visitors were Malcolm Holt from Gorey and Cole; Bob Liddle and Mike Stone from Magellan; Joe Eagan, David Moressy, Brian Giles, Barney Malta and Limpy all C.L.C. or aboriginal related people; and Ian Lewis from Department of Mines and Energy.

July 1981

The recording had several problems this month and despite the efforts of Richard Schroder and John Wardell, no significant improvement in data quality was seen. Personnel problems coupled with transportation strikes left us short handed on the line and long travel times with instrument down days all contributed to lower production. Line clearance had a very bad month with long breakdowns as did the drillers. Visitors were Andrew Svalbe, John Gorter and Richard Schroder of Pancontinental Petroleum; John Wardell, Bill Pailthorpe and Doug Chapman from GSI.

August 1981

Recording did poorly this month as a result of problems with cables/geophones, poor terrain and camp moves. The crew worked additional hours to compensate for these problems. Line clearance continued to be a problem but improved with the appointment of a Dussin's Supervisor. The Mayhew was down for 12 days and holes were drilled with a hand auger.

The survey department held its own and had only minor problems with the EDM unit.

September 1981

Recording production went well this month with only one day lost to replacement of an A.G. card. Data quality also improved and continued to do so until shooting was discontinued west of J-13. Line clearance also did well and we saw a dozing lead of 96 kilometres by the end of the month, with room for improvement next month where the country is quite open. The drillers produced a good month and only experienced difficilty on the 30th September, 1981 when they hit some large sand hills on J-13 where the detours put in were too steep. Survey once again encountered problems with the PPL's but this was not a major difficulty. The crew was visited this month by Amanda Webb and Bill Pailthorpe both from GSI.

October 1981

Control of the line cutting and drilling rig was extremely hard due to their distance from the recording crew. Radio contact was virtually impossible and a visit to these machines was an eight hour round trip. The dozer lead by the end of the month was 180 kilometres. Drilling did well for the month with the exception of a few days where high sand dunes necessitated the rig to be towed on line J-1.

November 1981

Rain once again played a part in loss of production as did several camp moves. Drinking water, as was the case in the majority of camp locations, was difficult of acquire and became even more so after several aboriginals had a bath in Yeatman's Bore and the soap scum made it unfit to drink. We encountered problems with the Department of Mines and Energy over explosives; communication with line clearance crews remained a problem, (due to distance) and delays due to C.L.C. line approvals complicated planning. Drilling was hindered by weather (no tents in the fly camp) and spent several days on standby or down to repairs.

Recording had its problems with the dog box generator and servo valves on the vibrators but did manage to set a new production record on the 27th November, 1981 with a 13.4 kilometre day.

December 1981

This period was a short one as the crew had been working extra hours to enable a well deserved crew shut down for ten days over the Christmas season. Rain caused some loss of production but more importantly, shut down our supply lines (airstrips and roads) leaving us in short supply of explosives and fuel. Crew changes and food orders supplied by helicopter were also hindered by interference from the P.D.S.A. Rig. Line clearance was slow due to long shifts and then fuel became a problem. Drilling was also affected by rain and a shortage of detonators.

January 1982

Some more heavy rain this month bogged the chaining crew and the four other vehicles that went out, got bogged trying to unbog the one before. Dussins (D7 and Cat 12) cleaned up some lines on Glen Edith then walked their camp to Johnstone where they began work on J-6 and a new air strip. Drillers worked in both Undandita and Glen Edith Prospects and lost time to wet weather and breakdowns. Recording slowed due to a short VP interval and shooting 24 fold. This months we were visited by Dolan McDaniel (GSI President), Jim Kerr (Far East Land Manager) and Bill Pailthorpe plus Richard Schroder and Bruce Phillips of Pancontinental.

February 1982

This month was a disaster, over 17 inches of rain brought everything to a stand still and very little if anything was accomplished after the 9th February, 1982. A skeleton crew was left in charge and the main crew did not return until the 28th February, 1982.

March 1982

Although the rain had stopped there were still low lying areas that needed to be detoured and roads that needed cleaning up. Dussins arrived back on the 13th March, 1982 and proceeded to cut lines in the Johnstone Area and it wasn't until the same day that the drillers were able to push through to Johnstone and begin work. The main crew followed on the 18th March, 1982 and although no production was obtained that day, the spread was laid out for an early start on the 19th March, 1982. We encountered rain again on the 26th and 27th March, 1982 (4.5 inches) which put the recording crew out of action again and made the road to Mt Winter impassable for heavy equipment. We were lucky in that Dussins finished up Johnstone and moved to Glen Edith again before the roads became impassable again and so had lines ready for us when we were able to move.

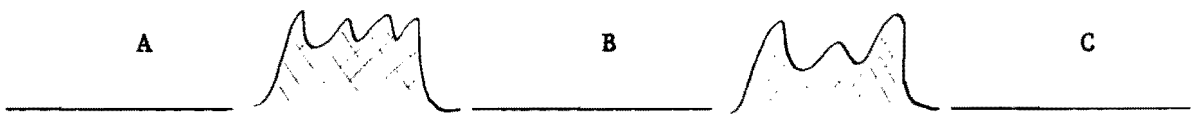
April 1982

The Johnstone area was completed on the 4th April, 1982 with the reshooting of lines J11 and J12. For line J12 the parameters were left unchanged except that the sweep length was increased from 16 seconds to 26 seconds and four vibrators were put on line. This increased energy input to the ground did produce better records and a better final section. Line J11 was reshot the same as J12 except that in addition the geophone spacing was reduced from 4 to 2 metres.

The camp was then moved 150 kilometres to the Glen Edith Area on 5th April, 1982 production began on the 6th April, 1982 and this area was completed on the 22nd April, 1982

Camp was moved on the 23rd April, 1982 to Gosses Bluff, a move of 140 kilometres. Production in the Gosses Bluff Area was completed on the 30th April, 1982 and all GSI equipment was moved to Alice Springs on the 1st May, 1982. The Terex dozer was mobilized on the 14th April, 1982 to cut Gosses Bluff while Dussins were completing the Glen Edith Area. The Terex completed the Gosses Bluff Area on the 26th April, 1982 and spent the next two days walking to Glen Helen and demobilization.

Dussins completed the Glen Edith Area on the 17th April, 1982 and the D7 dozer was demobilized while the grader went to Gosses Bluff to clean up the lines. The grader finished on the 27th April, 1982 and was demobilized on the 28th April, 1982. Richard Schroder was on hand due to the operational complexity of the Gosse's Bluff Project which required undershooting of the Bluff outcrops. This was done by shooting normally up to the outcrop along A then leaving the cable laid out on A, two vibrators moved inside to shoot along B then the cable was moved to B and the two vibrators left outside shot along A. This way reflection coverage was gained under the two kilometre obstacle. This approach was repeated for both lines.



2 KM

RECORDING PARAMETERS

Source Array

	Undandita	Glen Edith	Johnstone	Tempevale	Gosses Bluff
No of Vibs in Line	3	3/4	3/4	3	2/3
Spacing of Vibs	12m	12/16	16m	16m	16 m
Move Up	4/6	6/8	8	8	8
	(52m/66m)	(52m/88m)	(88m)		
No of Sweeps/Pattern	8	8	8	8	8
		24	24 26		
Sweep Length	16s	16s	16s	16s	16 s
Listening Time	5s	5s	5s	4s	4 s
Taper	.7s	.7s	.7s	.7s	.7
Recording	4ms	4ms	4ms	4ms	4ms
	12-50 Hz	12-50 Hz	12-50 Hz		
Sweep Frequency	12-80 Hz	12-80/12-60	12-60 Hz	12-60 Hz	12-60 Hz
Filters	8-90 Hz	8-90 Hz	8-90 Hz	8-90 Hz	8-90 Hz
Fold	6/12/24	12	12	12	6/12

RECORDING PARAMETERS

Receiver Array

	Undandita	Glen Edith	Johnstone	Tempevale	Gosses Bluff
Phones in Line	24	24	24	24	24
Spacing	2/3/4m	2/4m	4m	4m	4m
Group Interval	25/50m	50m	50m	50m	50/25m
Station Gap	6	6	6	6	6

KEY PERSONNEL

	April, 1981	April, 1982
Supervisor	Bill Pailthorpe	Bill Pailthorpe
Party Manager	John Derickx	Bob Stephenson
Assistant party Manager	Terry Atkins	John Owen
Administration	Len haack	Dick Butt
Seismology	Ross McCartney	Iain Palmer
Observers	Terry Quayle	John Pritchett
	John Pritchett	Paul Roberts
Junior Observers	Ray Bracewell	Keith Durkee
	Barry Powell	Phil Lloyd
	Mike Heuson	Calvin Ledbetter
Surveyors	Andy Strachan	Mike Sokil
	Mel Ridge	Oscar Curth
vibrator Mechanics	Ken Swenson	Ken Swenson
	Niel Scott	Bruce Barsby
Client Representatives	Andre Bainbridge	Bruce Beer
		Terry Grocke
Line Cutting	Dussin Construction	Dussin Construction
	Tassie Goodluck	Tassie Goodluck
	United Earthmoving	
Drilling	Gorey & Cole	Gorey & Cole

Appendix 1.

REPORT ON VIBRATOR SWEEP AND PATTERN TESTS OF 2ND JULY 1981, ON LINE 4, GLEN EDITH AREA OF PERMIT OP 178, NORTHERN TERRITORY, FOR PANCONTINENTAL PETROLEUM

These tests were carried out to determine whether or not the generally poor data quality in this area could be improved by a change of array or sweep parameters. A variety of sweeps, from two adjacent VP's, were recorded into the production spread. The spread parameters and sweeps used are listed in Table 1.

The three narrow band sweeps, of 10-30Hz, 15-45Hz, and 20-60Hz, were intended to concentrate the same total energy as a production VP (8x16 second sweeps) into a narrower frequency range. These tests thus served as both a frequency analysis, and a test of higher energy input in the selected bands. Two records were made (15-45Hz and 20-60Hz sweeps) with the vibrators stationary to test, by comparison, the effectiveness of the vibrator array.

The regular production sweep of 12-60Hz was tried with double the normal number of sweeps, but half the normal sweep length and half the vibrator moveup, to test an array with a smaller spacing, but the same total effort. (These are the records with 16x8 second sweeps and 4 metre move-ups).

The production 12-60Hz, 16 second sweep was also tried with double the usual 8 sweeps, by sweeping twice at each location. This doubles the total effort without altering the vibrator array response.

RESULTS

The field monitor records showed no significant differences from one another. There was no evidence of in-line surface noise, but no definitely identifiable signal on which to judge the quality of the various sweeps.

The records were displayed later in variable area format; firstly with the same gain recovery function (TAR) to enable absolute amplitude comparisons, and secondly with a medium digital AGC (TVS) to enable better comparison of signal-to-noise ratios.

On the first displays (TAR only) the higher amplitudes on the records with no vibrator move-ups indicate that the vibrator array is being effective in reducing noise. The noise is not simple in-line surface noise however, but is more like fragments of scattered broadside noise. There is still no definite signal, the most likely being at 2.5-2.6 sec., dipping slightly to the left on the displays. This is best seen on the display with TVS. If it is signal, it appears best on the records with the production 12-60Hz sweep. On the narrower band sweeps, it is only really visible on the 15-45Hz.

CONCLUSIONS

The poor record quality in this area is not due to simple surface noise problems, and there is no evidence from these tests to warrant changing the current arrays or vibrator sweep.

There is some indication that there may be scattered, fragmented surface noise, and this would require areal (2 dimensional) arrays for best attenuation. Processed sections in this area show that bad data zones are often associated with structural highs, so that if the seismic energy is being absorbed or scattered in the near surface, those near surface conditions are probably the result of some deeper features.

Several other possible tests were discussed with R. Schroder (Pancontinental) and B. Beer (Consultant). Potentially the most useful of these were:

1. At one of the locations where the sections show a very sudden change from good to bad data, run deep uphole surveys in both the good and bad areas to determine the shallow section differences, if any.

2. In a bad data area, repeat a few VP's with reasonably deep dynamite shots. This would show if the very near surface is causing loss of energy from the surface source.

3. Shoot one of the shorter lines in a bad data area such as Glen Edith, with a smaller group interval and possibly also at higher fold. For example, use a 25m. group interval split spread with 24 fold coverage.

The aim of this is two-fold: first to provide more "statistics" for automatic statics to work on if the reflection energy consists mainly of short fragments; and secondly to give more visual continuity for the interpreter by means of the smaller group interval.

John Wardell

JOHN WARDELL
AREA GEOPHYSICIST
GEOPHYSICAL SERVICE INTERNATIONAL

TABLE 1

Spread: 48 trace split, 50m. group interval, 175m. near trace offset.

Geophone array: 24 in-line, 4m. spacing.

Vibrators: 3 in-line, 16m. spacing. (Move-up details below)

VP 'A' below = VP 400/401, Line 4, Glen Edith

VP 'B' below = VP 402/403, Line 4, Glen Edith

Record Number	VP	Sweep: Hz	Sweep: Length	Sweep: Number	Move-Up
5210	A	10-30	16 sec.	8	8m.
5211	B	10-30	16 sec.	8	8m.
5213	A	15-45	16 sec.	8	8m.
5214	B	15-45	16 sec.	8	8m.
5215	A	15-45	16 sec.	8	0
5216	A	20-60	16 sec.	8	8m.
5217	B	20-60	16 sec.	8	8m.
5218	A	20-60	16 sec.	8	0
5219	A	12-60	8 sec.	16	4m.
5220	B	12-60	8 sec.	16	4m.
5223	A	12-60	16 sec.	16	8m.*
5224	B	12-60	16 sec.	16	8m.*

* 2 sweeps per location