VELOCITY SURVEY

SALT LAKE NO 1

REPORT

VELOCITY

FOR

PETROLEUM

ATTACHMENT TO WCR
FOR SALT LAKE-1 (W1583

18 pages

WELL VELOCITY SURVEY

of

SALT LAKE No.1

for

WOODSIDE OIL N. L.

by

UNITED GEOPHYSICAL CORPORATION

Party 141

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LOCATION MAP

VELOCITY SURVEY

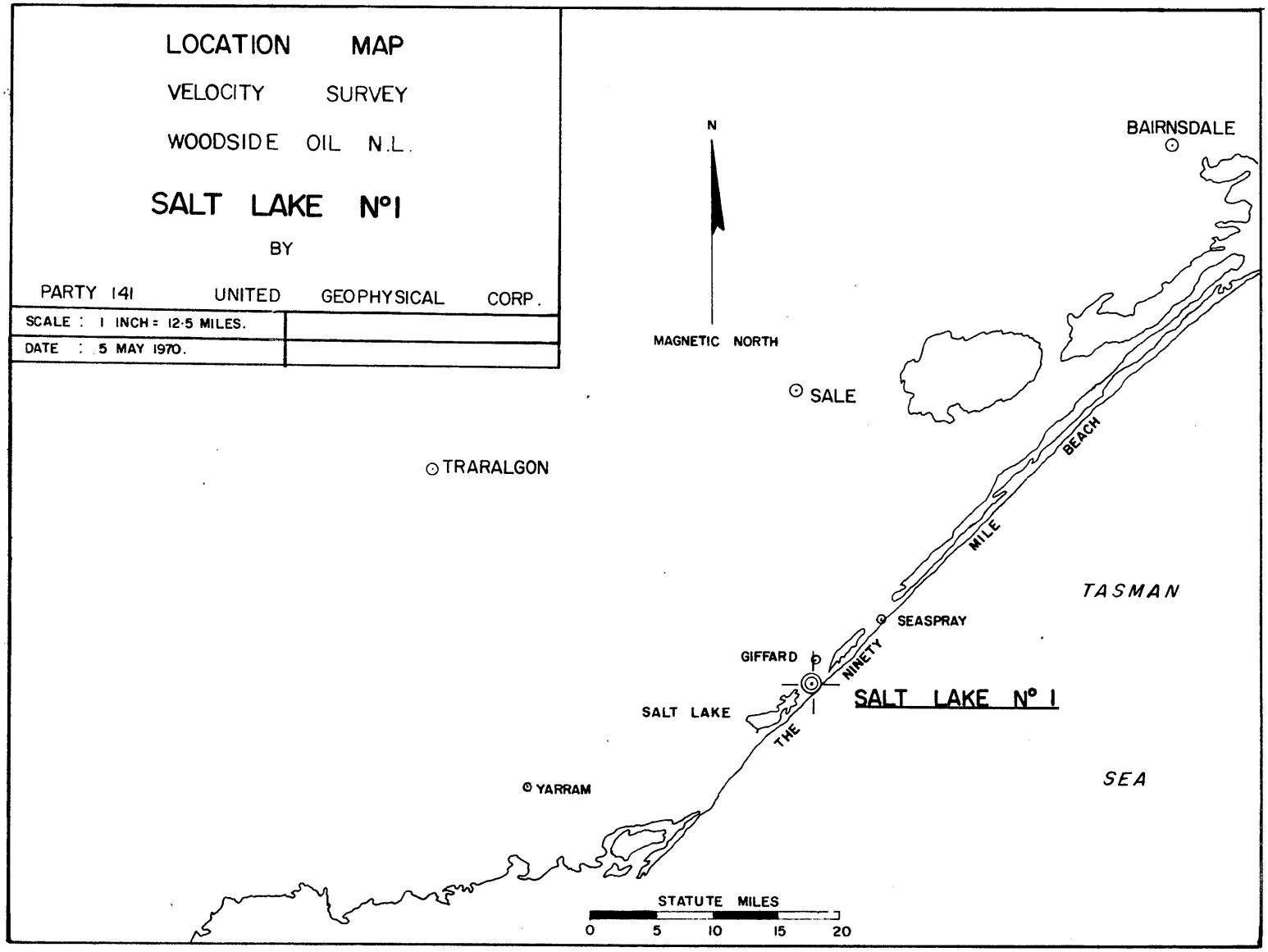
WOODSIDE OIL N.L.

SALT LAKE N°1

BY

PARTY 141 UNITED GEOPHYSICAL CORP.

SCALE : 1 INCH = 12·5 MILES.	
DATE : 5 MAY 1970.	



4

WELL INFORMATION

NAME OF WELL	Salt Lake No.1
DATE OF SURVEY	5th May, 1970
LOCATION	24 miles south of Sale, Victoria, in Petroleum Exploration Permit 72
CO-ORDINATES	Latitude 38° 26' 53" S. Longitude 147° 05' 12" E.
ELEVATION K.B.	+75.58 feet Mean Sea Level
ELEVATION G.L.	+62.81 feet Mean Sea Level
DATUM PLANE	0" Mean Sea Level
INTERVAL SURVEYED	1050' to 5285' below K.B.
CASING	316 feet below K.B. (Logger)
SEISMOGRAPH PROFILE	Shotpoint 27 Line 3 (Shotpoint 297 feet northwest of well)

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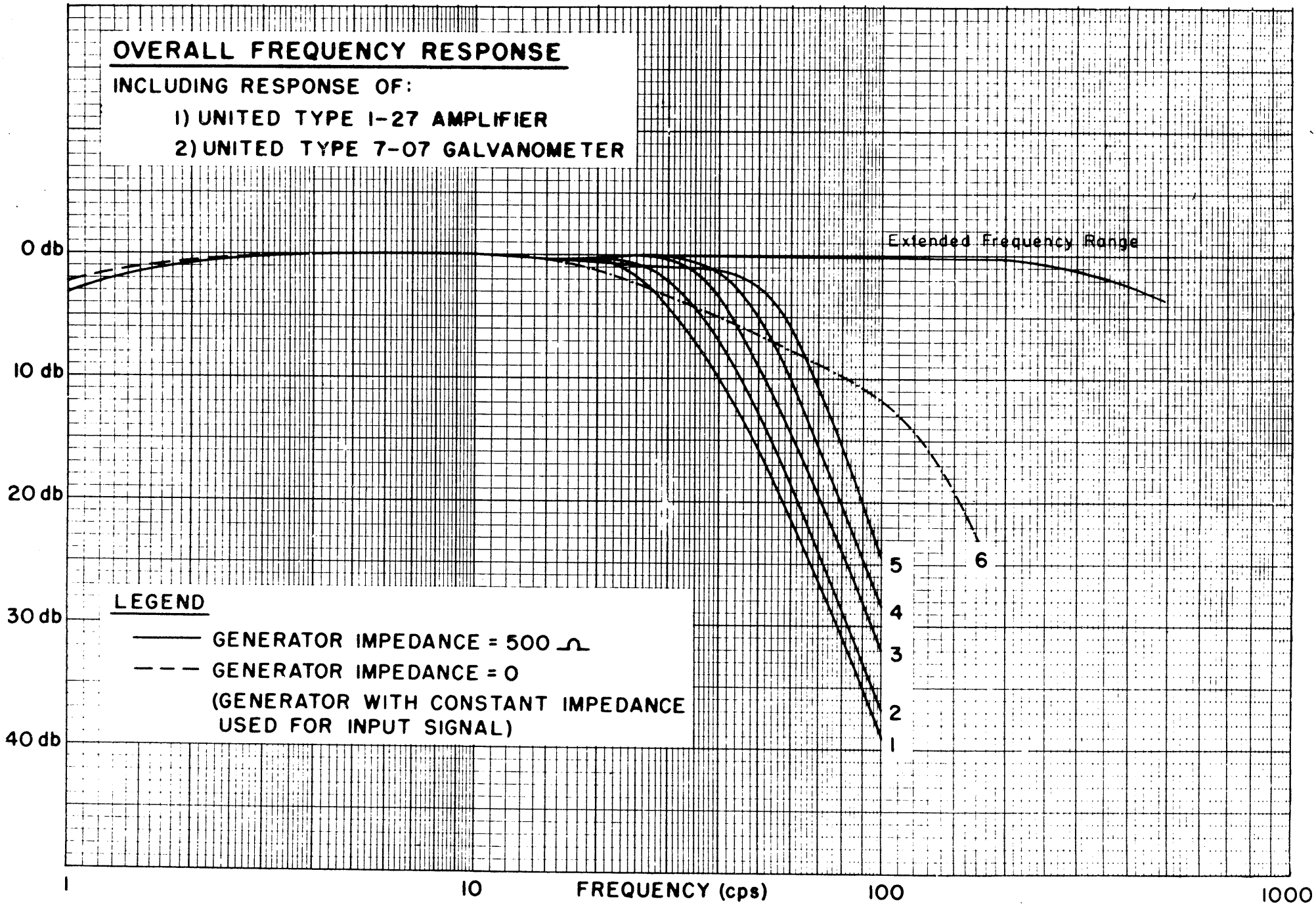

OVERALL FREQUENCY RESPONSE
INCLUDING RESPONSE OF:
1) UNITED TYPE 1-27 AMPLIFIER
2) UNITED TYPE 7-07 GALVANOMETER
0 db
10 db
20 db
30 db
40 db
Extended Frequency Range
6
5
4
3
2
1
LEGEND
GENERATOR IMPEDANCE = 500 Ω
GENERATOR IMPEDANCE = 0
(GENERATOR WITH CONSTANT IMPEDANCE USED FOR INPUT SIGNAL)
1
10
FREQUENCY (cps)
100
1000

OPERATIONS

1. Recording Equipment

Well geophone	S.S.C. GCE-600 pressure sensitive well geophone
Cable	Schlumberger cable and reel
Reference geophones	United Model 4-16 (20 Hertz) Electro Tech EVS-2 (20 Hertz)
Camera	Electro Tech Model ER-62 (galvanometers 125 Hz)
Amplifiers	United Model 1-27 (refraction amplifiers)

2. Amplifier Specifications

United Model 1-27

Frequency response	3db attenuation at 1 Hz. Phase characteristic linear ± 10° from 7 to 70 Hz
Filters	Six low pass filter selections with cut-off frequencies of 28, 34, 40, 47, 55 and 100 Hz An additional filter position for the high and medium sensitivity well geophone traces (amp No.1), extends the hi-cut range to 1KHz
Gain	Total of 100db gain from input to plate of final stage - 4 microvolts input produces 1 inch peak to peak galvo deflection
Input Impedance	6000 ohms

3. Recording Operations

Amplifier No. 1		Downhole geophone
	Output:	Divided output to traces No. 1 and No. 2 (fixed at the ratio of 3 to 1)
	Filters:	1KHz
Amplifier No. 2		Downhole geophone
	Output:	Divided output to traces 3 and 4 (fixed at the ratio of 6 to 1)
	Filters:	100 Hz
Amplifier No. 3		Reference geophone adjacent to well
	Output:	Single low output to trace No. 5
	Filters:	100 Hz
Amplifier No. 4		Uphole geophone (10 feet from hole)
	Output:	Single low output to trace No. 6
	Filters:	100 Hz

Time break to Trace No. 7 (not amplified).

4. Shotpoints

Because of the sharp drop in elevation to the east of the well, a northeast southwest shothole layout was the most suitable.

Permission to drill holes could not be obtained from the property owner on the northern side of the road, and a compromise had to be reached by drilling only the one group of shotholes to the southwest.

Shotpoint elevations and horizontal offsets from the well were later surveyed relative to kelly bushing by the recording crew.

5. Drilling

Shotholes were drilled by W.L. Sides & Sons of Melbourne using a FAILING rotary drilling rig.

Drilling progressed well through the first 40 feet of topsoil, sand and clay. From 40 to 50 feet gravel was encountered along with its associated drilling problems, and for this reason 40 feet was considered a practical shothole depth.

A total of six 40 feet shotholes and one 175 feet uphole were drilled.

COMMENTS:

Explosives from I.C.I. Melbourne were temporarily stored in a Sale magazine until required for the survey.

A lack of seismic energy was evident on all records, and large charges were required to obtain reliable data.

A plot of the uphole times from hole 7 showed that all shots were within the base of the weathering, and is most likely the reason for the lack of energy.

6. Operational Statistics

Surveyed interval	1050' to 5,285' below K.B.
Number of horizons surveyed	Nine
Number of shots per horizon	Two for Two horizons One for Seven horizons
Maximum offset	518 feet
Minimum offset	502 feet
Maximum Depth of Shot	41 feet (Bottom of Charge)
Minimum Depth of Shot	29 feet
Maximum Charge Size	70 lbs
Minimum Charge Size	10 lbs
Explosives	Geophex 2½×5 lb = 400 lbs 100 ft Detonators = 40 only Boosters = 50 only
Observer	W.J. Larsen
Shooter	L.D. Moore

COMPUTING

1. Uphole Survey

A plot of the uphole times from hole 7 shows weathering velocities of 1800 feet per second from surface to 15 feet, and of 2000 feet per second from 15 feet to 58 feet, and a velocity of 5900 feet per second from 58 feet to 175 feet.

2. Datum Plane

Well geophone arrival times were corrected to a sea level datum plane using a reduction velocity of 5900 feet per second.

Since well survey depths of shot range from 29 feet to 41 feet, weathering corrections were necessary on all records.

3. Horizon Arrival Times

Record quality is fair to good at most levels and arrival times are considered reliable.

The cumulative correction plot on plate 1 shows sonic log time $.003^5$ seconds longer than seismic time over the well interval from 1050 feet to 5285 feet below K.B.

Corrected arrival times to the principle horizons are as follows:

HORIZON TOPS	DEPTH BELOW DATUM (0' Mean Sea Level)	ARRIVAL TIMES (One Way Time)
GIPPSLAND LIMESTONE	384	$.069^5$ secs.
LAKES ENTRANCE FORMATION	2139	.291 "
LATROBE VALLEY FORMATION	2474	$.336^5$ "
BASALT	4634	$.590^5$ "
CHILDERS FORMATION (UPPER UNIT)	4769	$.601^5$ "
CHILDERS FORMATION (LOWER UNIT)	5089	.631 "
STRZELECKI GROUP	5144	.636 "

UNITED GEOPHYSICAL

4. Function Computation

Nash Miller's method of computation was employed to determine the velocity function. This function was determined by using the following expressions and information from the plot of vertical time against depth.

$$a = \frac{4.605}{t_1} \log 10 \left(\frac{Z_1 - Z_2}{Z_2} \right)$$

$$Vd = \frac{aZ_1}{e^{at_1} - 1}$$

where Z_1 & t_1 are corresponding depth and one way time at a deeper point in the section and Z_2 is the depth corresponding to one way time of $\frac{t_1}{2}$ secs. All functions were computed with respect to a sea level datum plane.

RESULTS

1. Velocity Function

The velocity function V = 6270 + 0.75 Ƶ was computed as a general function for the Salt Lake No. 1 well, and is a reasonable fit to the time depth curve from datum to total depth.

For greater accuracy the following combination of velocity functions is recommended.

Datum to 2000 feet	V = 5400 + 2.20 Ƶ
2000 feet to 3300 feet	V = 7400 feet per second (constant velocity)
3300 feet to 5200 feet	V = 5780 + 1.00 Ƶ

2. Function Plots

A plot of the velocity functions computed for the Salt Lake well is included in the appendix of this report for comparison purposes.

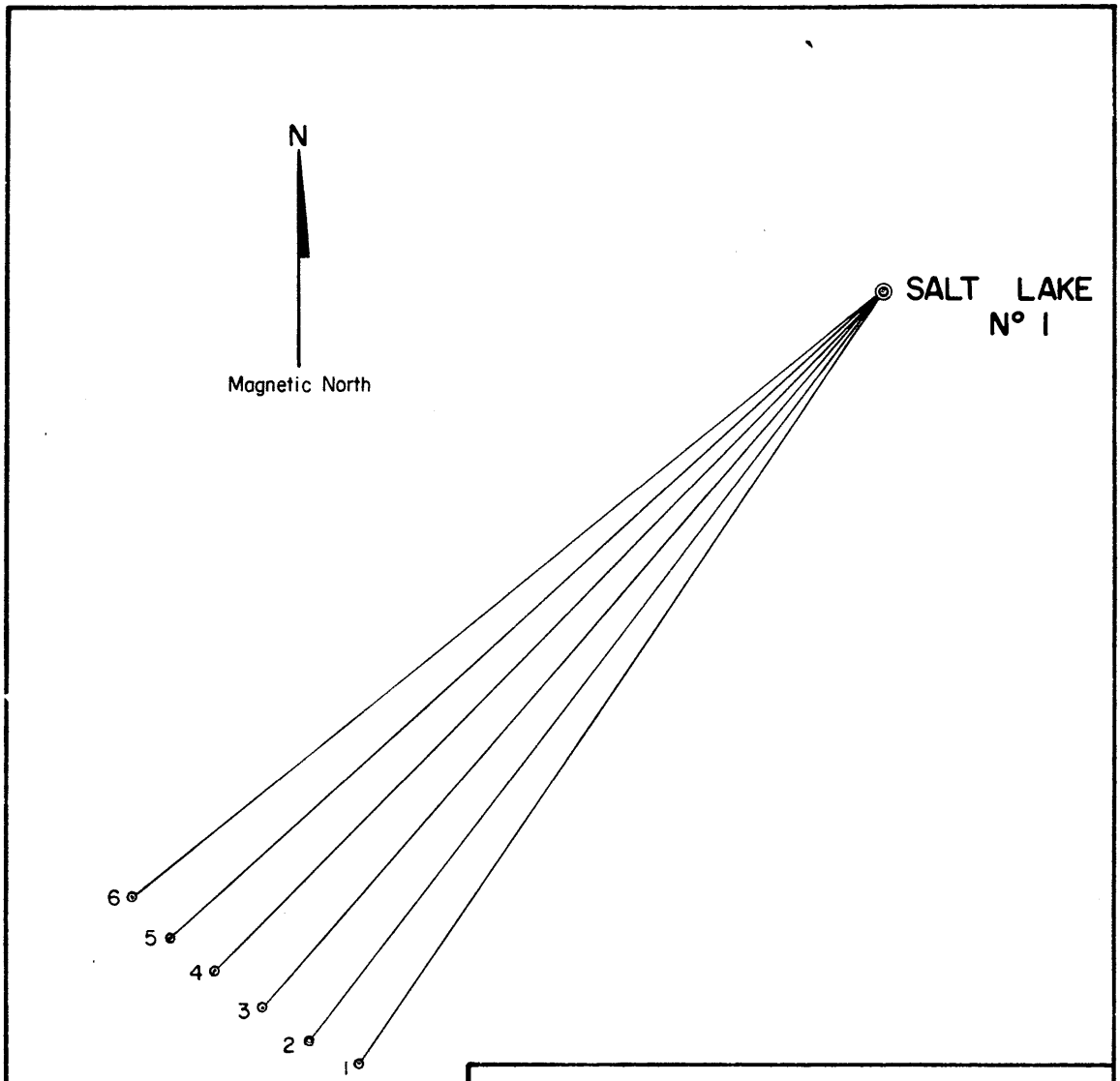
Respectfully submitted,

W J Larsen

United Geophysical Corporation
Party 141

Leo Fitzpatrick

Supervisor



1	S 34° 00' W	502'
2	S 37° 00' W	508'
3	S 41° 00' W	510'
4	S 44° 30' W	512'
5	S 48° 00' W	516'
6	S 51° 15' W	518'

SURVEY PLAT

VELOCITY SURVEY

WOODSIDE OIL N.L.

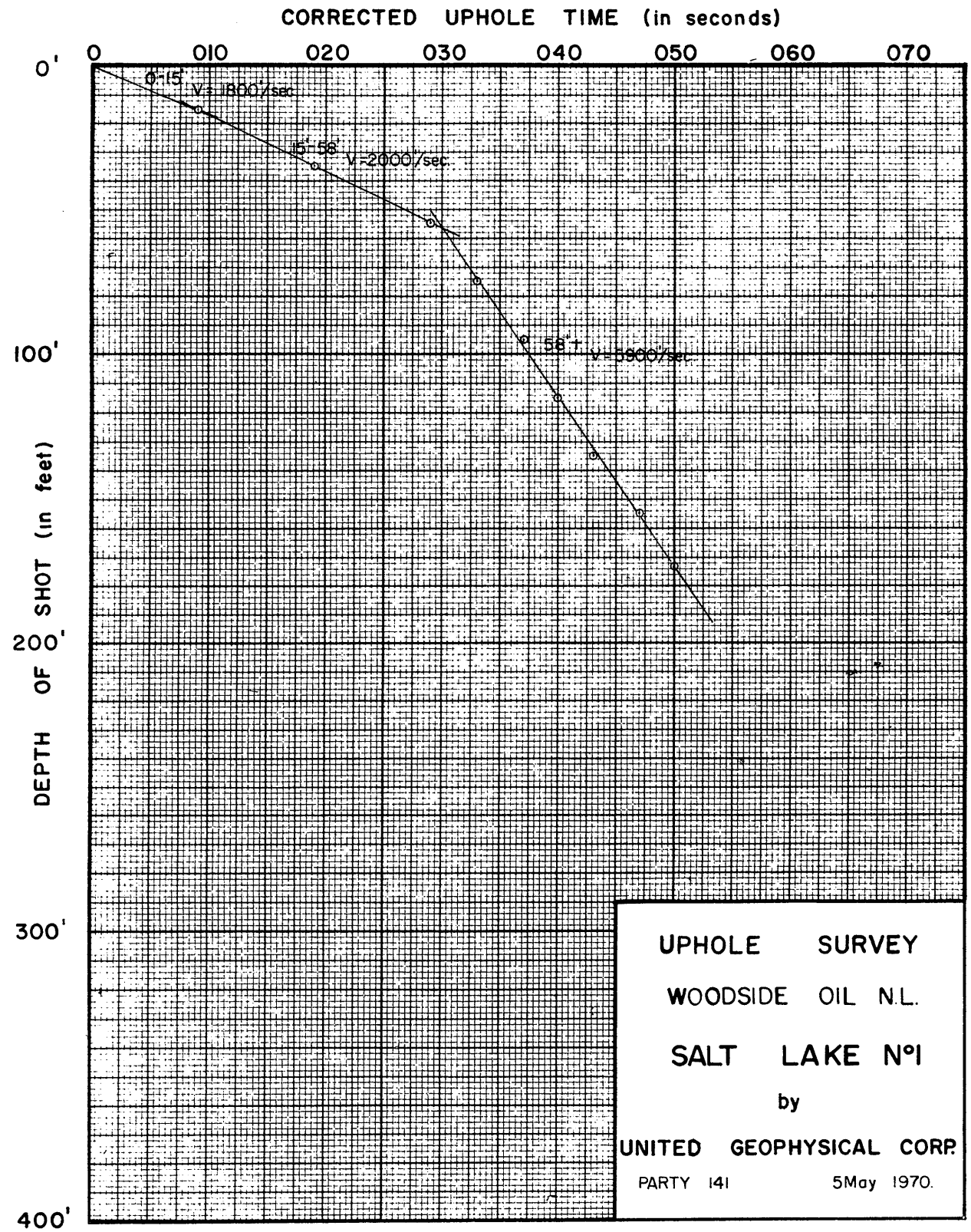
SALT LAKE N°1

BY

PARTY 141 UNITED GEOPHYSICAL CORP.

SCALE : 1 inch = 100 feet.

DATE : 5 May 1970


CORRECTED UPHOLE TIME (in seconds)
0
010
020
030
040
050
060
070
0'
100'
200'
300'
400'
DEPTH OF SHOT (in feet)
0-15' V = 1800'/sec
15-58' V=2000'/sec
58'+ V=5900'/sec
UPHOLE SURVEY
WOODSIDE OIL N.L.
SALT LAKE N°1
by
UNITED GEOPHYSICAL CORP.
PARTY 141
5May 1970.

PE906286

This is an enclosure indicator page.
The enclosure PE906286 is enclosed within the container PE906285 at this location in this document.

The enclosure PE906286 has the following characteristics:

ITEM_BARCODE	= PE906286
CONTAINER_BARCODE	= PE906285
NAME	= Well Velocity Table
BASIN	= GIPPSLAND
PERMIT	= PEP72
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Well Velocity Table of data for Salt Lake-1
REMARKS	=
DATE_CREATED	= 5/05/70
DATE_RECEIVED	=
W_NO	= W583
WELL_NAME	= SALT LAKE-1
CONTRACTOR	= UNITED GEOPHYSICAL CORPORATION
CLIENT_OP_CO	= WOODSIDE OIL COMPANY

(Inserted by DNRE - Vic Govt Mines Dept)

WELL VELOCITY DETERMINATION

WOODSIDE OIL N.L.

WELL SALT LAKE N°1

Record No L

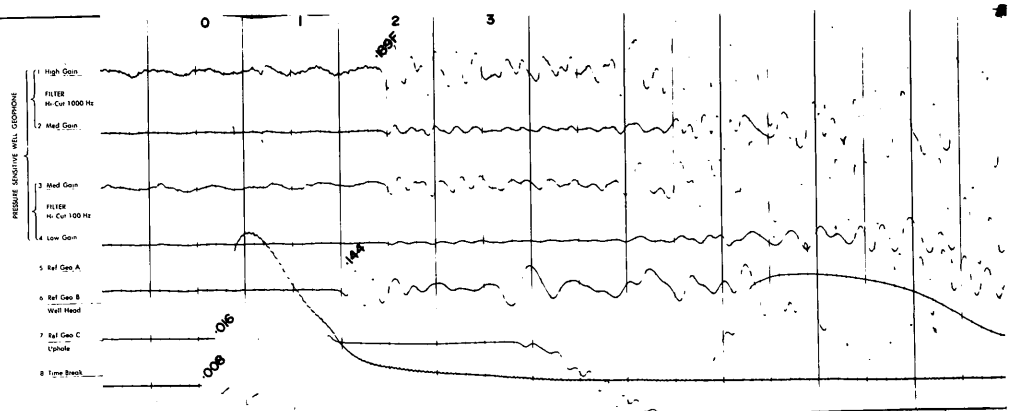
Shot Hole No / Offset & Bearing 5

Depth of Well Seismometer

Below Kelly Bushing 1050'

Below Datum 00ft (A.S.L.) 974'

Charge 10 lb Depth of Shot 26-29'



WELL VELOCITY DETERMINATION

WOODSIDE OIL N.L.

WELL SALT LAKE N°1

Record No K

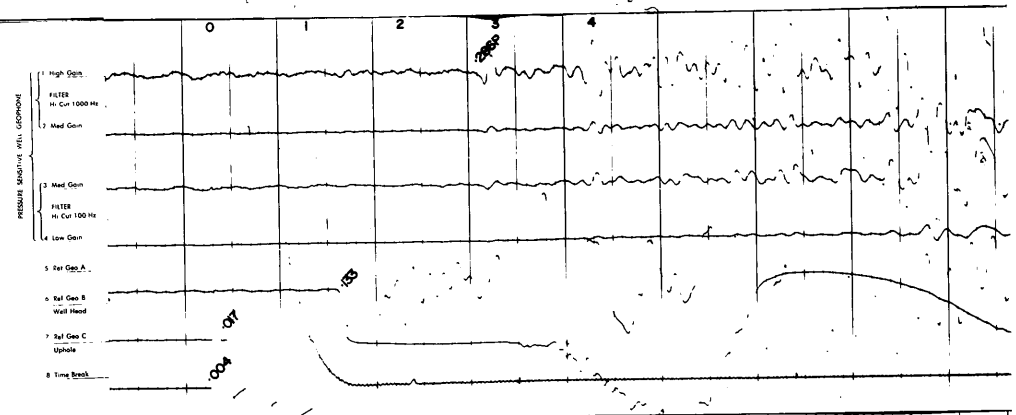
Shot Hole No / Offset & Bearing 4

Depth of Well Seismometer

Below Kelly Bushing 1992'

Below Datum 00ft (A.S.L.) 1916'

Charge 20 lb Depth of Shot 29-36'



WELL VELOCITY DETERMINATION

WOODSIDE OIL N.L.

WELL SALT LAKE N°1

Record No D

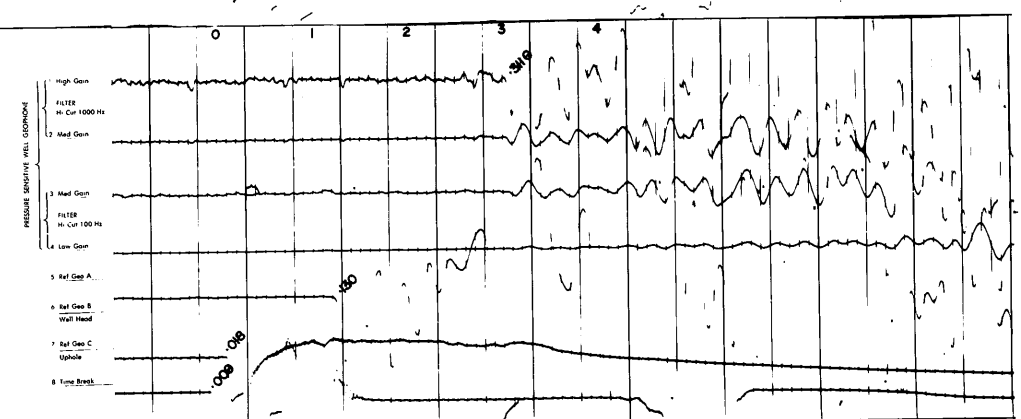
Shot Hole No / Offset & Bearing 1

Depth of Well Seismometer

Below Kelly Bushing 2215'

Below Datum 00ft (A.S.L.) 2139'

Charge 30 lb Depth of Shot 26-36



WELL VELOCITY DETERMINATION

WOODSIDE OIL N.L.

WELL SALT LAKE N°1

Record No E

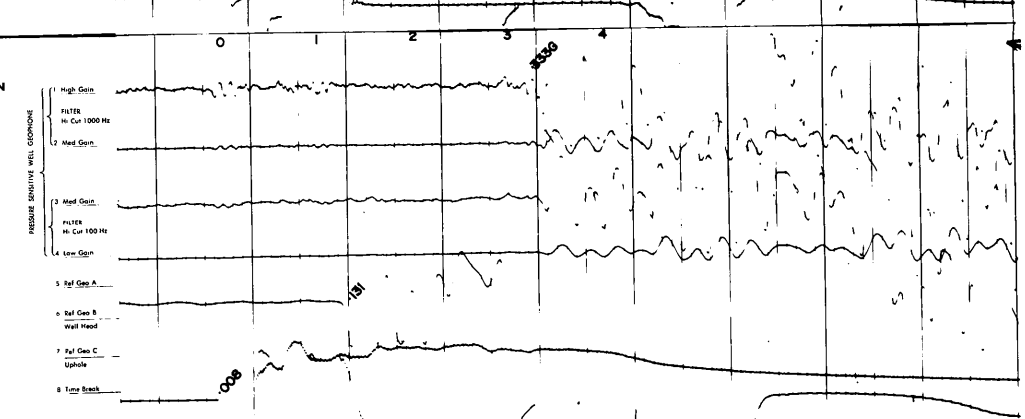
Shot Hole No / Offset & Bearing 2

Depth of Well Seismometer

Below Kelly Bushing 2386'

Below Datum 00ft (A.S.L.) 2310'

Charge 30 lb Depth of Shot 35-40'



WELL VELOCITY DETERMINATION

WOODSIDE OIL N.L.

WELL SALT LAKE N°1

Record No F

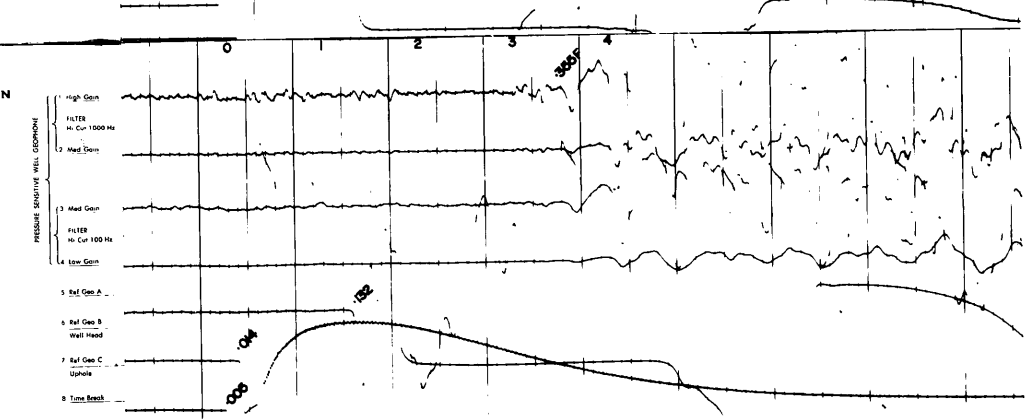
Shot Hole No / Offset & Bearing 3

Depth of Well Seismometer

Below Kelly Bushing 2550'

Below Datum 00ft (A.S.L.) 2474'

Charge 50 lb Depth of Shot 21-38'



WELL VELOCITY DETERMINATION

WOODSIDE OIL N.L.

WELL SALT LAKE N°1

Record No J

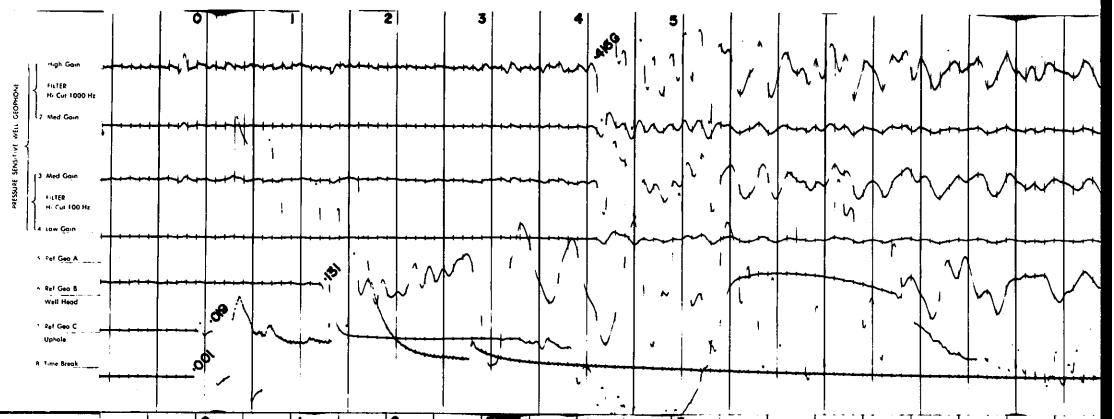
Shot Hole No 1
Offset & Bearing

Depth of Well Seismometer

Below Kelly Bushing 3000'

Below Datum 00ft (A.S.L.) 2924'

Charge 20lb Depth of Shot 32-39'



WELL VELOCITY DETERMINATION

WOODSIDE OIL N.L.

WELL SALT LAKE N°1

Record No I

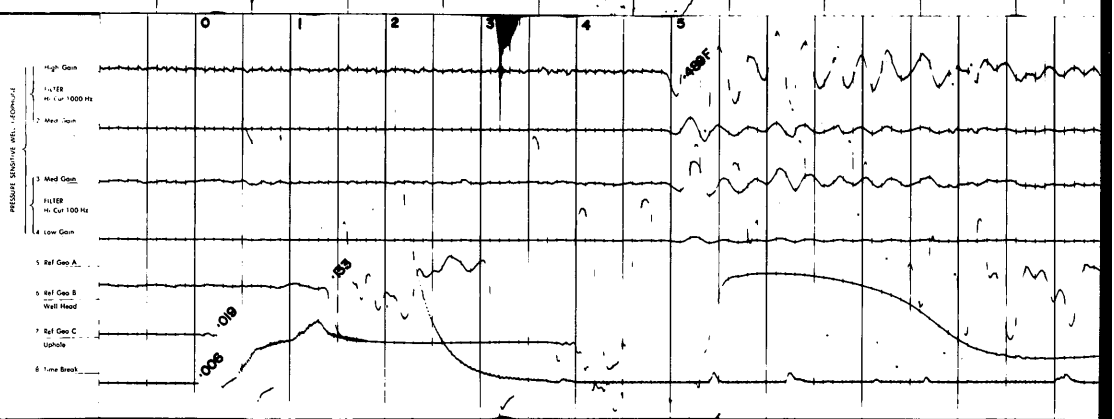
Shot Hole No 2
Offset & Bearing

Depth of Well Seismometer

Below Kelly Bushing 3600'

Below Datum 00ft (A.S.L.) 3524'

Charge 30lb Depth of Shot 30-40'



WELL VELOCITY DETERMINATION

WOODSIDE OIL N.L.

WELL SALT LAKE N°1

Record No G

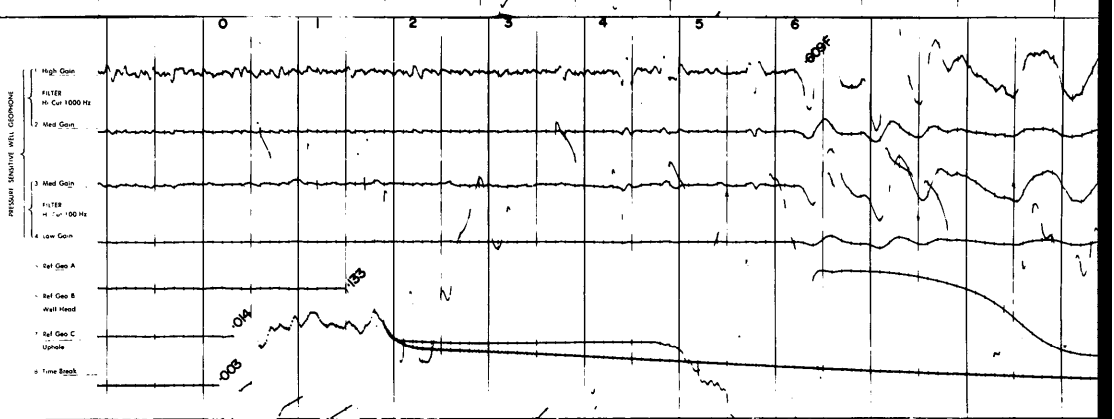
Shot Hole No 4
Offset & Bearing

Depth of Well Seismometer

Below Kelly Bushing 4720'

Below Datum 00ft (A.S.L.) 4644'

Charge 60lb Depth of Shot 20-30'



WELL VELOCITY DETERMINATION

WOODSIDE OIL N.L.

WELL SALT LAKE N°1

Record No B

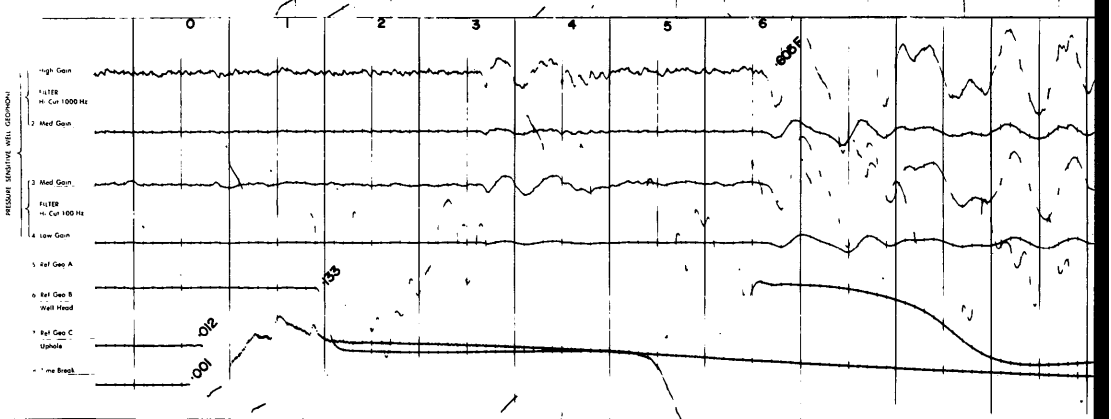
Shot Hole No 5
Offset & Bearing

Depth of Well Seismometer

Below Kelly Bushing 4720'

Below Datum 00ft (A.S.L.) 4644'

Charge 50 lb Depth of Shot 25-40'



WELL VELOCITY DETERMINATION

WOODSIDE OIL N.L.

WELL SALT LAKE N°1

Record No A

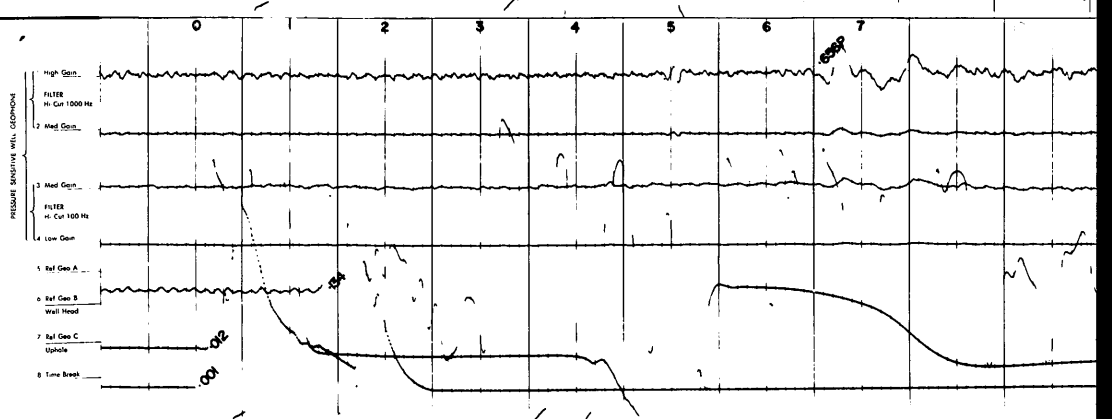
Shot Hole No 6
Offset & Bearing

Depth of Well Seismometer

Below Kelly Bushing 5285'

Below Datum 00ft (A.S.L.) 5209'

Charge 40 lb Depth of Shot 29-40'



WELL VELOCITY DETERMINATION

WOODSIDE OIL N.L.

WELL SALT LAKE N°1

Record No H

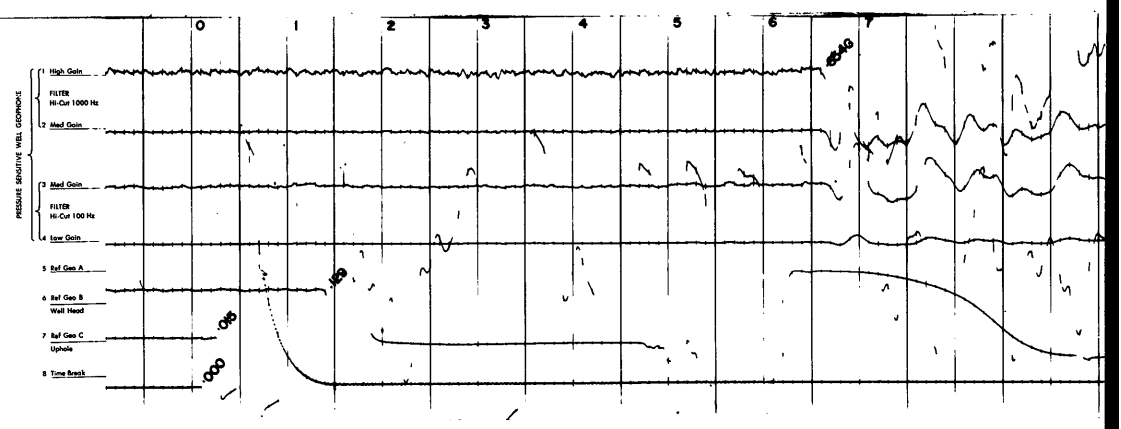
Shot Hole No 6
Offset & Bearing

Depth of Well Seismometer

Below Kelly Bushing 5285'

Below Datum 00ft (A.S.L.) 5209

Charge 70 lb. Depth of Shot 23-41'



PE906287

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The enclosure PE906287 has the following characteristics:

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CONTAINER_BARCODE	= PE906285
NAME	= Velocity Function
BASIN	= GIPPSLAND
PERMIT	= PEP72
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Well Velocity Function Curve for Salt Lake-1
REMARKS	=
DATE_CREATED	= 5/05/70
DATE_RECEIVED	=
W_NO	= W583
WELL_NAME	= SALT LAKE-1
CONTRACTOR	= UNITED GEOPHYSICAL CORPORATION
CLIENT_OP_CO	= WOODSIDE OIL COMPANY

(Inserted by DNRE - Vic Govt Mines Dept)

PE906288

This is an enclosure indicator page.
The enclosure PE906288 is enclosed within the container PE906285 at this location in this document.

The enclosure PE906288 has the following characteristics:

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CONTAINER_BARCODE	= PE906285
NAME	= Time-Depth Curve
BASIN	= GIPPSLAND
PERMIT	= PEP72
TYPE	= WELL
SUBTYPE	= VELOCITY_CHART
DESCRIPTION	= Time-Depth Curve (interpretative) and shot point data for Salt Lake-1
REMARKS	=
DATE_CREATED	= 5/05/70
DATE_RECEIVED	=
W_NO	= W583
WELL_NAME	= SALT LAKE-1
CONTRACTOR	= UNITED GEOPHYSICAL CORPORATION
CLIENT_OP_CO	= WOODSIDE OIL COMPANY

(Inserted by DNRE - Vic Govt Mines Dept)