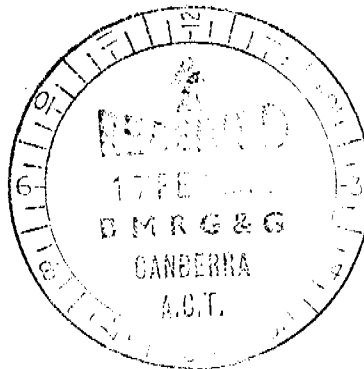


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MAGELLAN PETROLEUM (N.T.) PTY. LTD.

WEST WATERHOUSE NO. 1

NORTHERN TERRITORY

FINAL WELL REPORT

by

R.A. Magee & L.G.G. Pearce

Magellan Petroleum (N.T.) Pty. Ltd.

February 9th, 1970.

NORTHERN TERRITORY
GEOLOGICAL SURVEY

PR70/013B

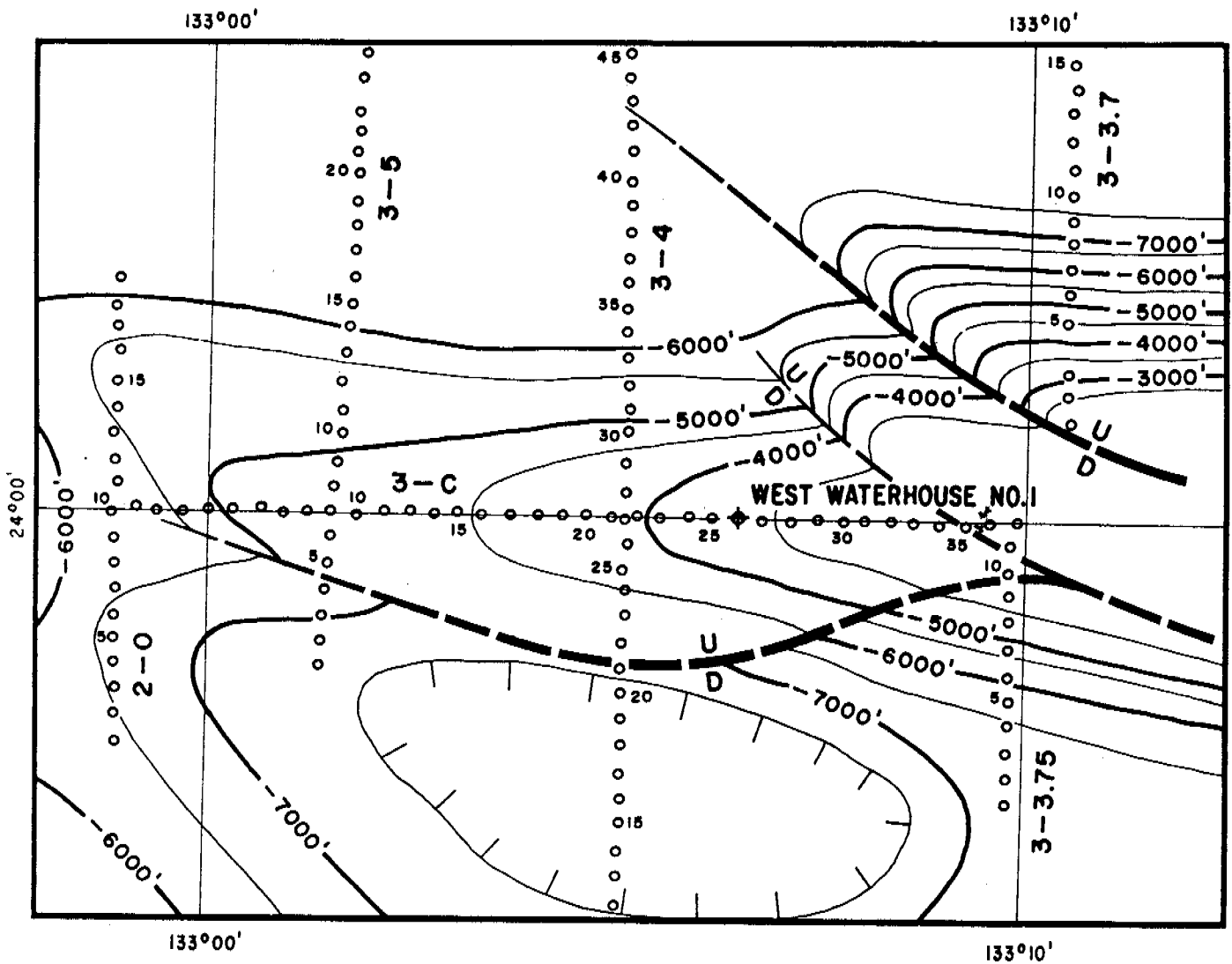


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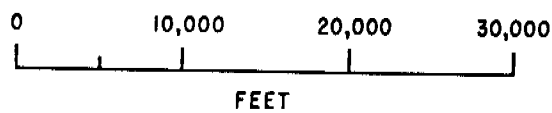
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WEST WATERHOUSE NO.1 - STRUCTURE MAP

AMADEUS BASIN, NORTHERN TERRITORY

CONTOURS ON TOP OF PACOOTA SANDSTONE
 (AFTER E. A. KRIEG SEISMIC INTERPRETATION)



CONTOUR INTERVAL : 500'

ENCLOSURE I

SUMMARYDRILLING

West Waterhouse No. 1 located 52 miles southwest of Alice Springs, Northern Territory, was spudded on August 30, 1969. The hole was drilled to a total depth of 6,528 feet with a National 100 rig. Air, mist and aerated water were used as drilling fluid.

Hole and casing sizes are as follows:

<u>Hole Size</u>	<u>Depth</u>	<u>Casing Size</u>	<u>Depth</u>
26"	41'	20" (Conductor)	41'
17-1/2"	470'	13-3/8" (Casing)	466'
12-1/4"	4,479'	9-5/8" (Casing)	4,479'
8-1/2"	6,520'	---	---
8-15/32"	6,520.25'	---	---
7-13/16"	6,528'	---	---

There were no fishing jobs. Drilling, reaming and coring required 23 bits. Three diamond cores, having a total footage of 25 feet, were cut. Recovery was 24.91 feet or 99.66 percent. The hole was surveyed on Run No. 1 with Induction-Electric, Acoustic Velocity-Gamma Ray-Caliper and on Run No. 2 with Acoustic Velocity-Gamma Ray, Guard and FoRxo-Caliper. The only drillstem test attempted was unsuccessful because of mechanical difficulties.

West Waterhouse No. 1 was completed as a shut-in water well through perforations in the 9-5/8 inch casing in the Mereenie formation.

The rig was released on October 9, 1969.

GEOLOGICAL

The formations encountered at West Waterhouse No. 1 conformed generally to expectations, although the tops were slightly lower than predicted. The minor gas show encountered in the lower part of the hole suggests that the seismically interpreted fault to the east has sealed the West Waterhouse structure from the Waterhouse anticline, a breached surface feature.

Lithologic units penetrated at West Waterhouse No. 1 are: the Brewer conglomerate (surface) and Hermannsburg sandstone (2,200') of the Pertnjara Group (Devonian); the Mereenie sandstone (3,353') (Silurian?-Devonian); Stokes siltstone (4,358'), Stairway sandstone (4,887'), Horn Valley siltstone (5,627') and Pacoota sandstone (5,873') of the Larapinta Group (Cambrian-Ordovician).

The Pertnjara section at West Waterhouse No. 1 consists of a dirty sandstone with included pebbles, which is considered to be the Brewer conglomerate equivalent, overlying the Hermannsburg sandstone which has some interbedded shale and siltstone.

The Mereenie sandstone which is more quartzone than the overlying dirty sandstone, also has minor interbeds of shale and siltstone. Wireline logs indicate scattered fair porosity in the upper two hundred feet overlying approximately four hundred feet of slightly cleaner sandstone with generally good intergranular porosity throughout. The basal section of the Mereenie sandstone has scattered poor porosity with the bottom fifty feet being very hard and tight.

The Stokes formation at West Waterhouse No. 1 is 529 feet thick, consisting of interbedded shale and siltstone in the upper part and shale with some thin

limestone and dolomite beds in the lower part.

The Stairway has interbedded sandstone, siltstone and minor shale. The better sandstones of the lower Stairway are generally tight.

The Horn Valley has interbedded shale, siltstone and very minor sandstone in the upper section overlying black shale and interbedded limestone with interbedded shale and dolomite in the basal fifty feet.

The upper Pacoota consists of a sandstone and minor interbedded shale and siltstone section overlying interbedded shale and siltstone with a glauconitic sandstone at the base. The lower Pacoota of which only 58 feet was penetrated, is mainly sandstone with minor shale. Intergranular porosity appears to be negligible, however all cores cut in the Pacoota showed some fracture porosity.

One minor gas zone was encountered. Unfortunately it was not detected while mist drilling and cannot be located with any degree of accuracy. It was obviously drilled during Bit Run 17 (5,562' to 5,912') which penetrated 65 feet of basal Stairway, 246 feet of Horn Valley and 39 feet of upper Pacoota.

INTRODUCTION

West Waterhouse No. 1 was drilled by Magellan Petroleum (N.T.) Pty. Ltd. to test an interpreted dip and fault closure on the western end of the Waterhouse Anticline.

The well was programmed to 6,100 feet. Objectives of the test were firstly, to determine the fluid content of the Pacoota, Stairway and Mereenie sandstone. Secondly, to determine the reservoir characteristics and thicknesses of Pacoota and Stairway sandstones in an area where these characteristics cannot be determined from surface geologic observations and thirdly, to obtain control for the integration of seismic and geologic data in the north-central part of the Amadeus Basin.

Operations were conducted by Mr. L.G.G. Pearce, wellsite Geologist, and Mr. L.Z. Anderson, Drilling Superintendent, under the supervision of Mr. R.A. Magee, Division Manager.

WELL HISTORY

GENERAL DATA:

Name - West Waterhouse No. 1

Operator - Magellan Petroleum (N.T.) Pty. Ltd., Seventh Floor, Alexandra Chambers, 201 Wickham Terrace, Brisbane, Queensland.

Tenement Holder - Magellan Petroleum (N.T.) Pty. Ltd., Seventh Floor, Alexandra Chambers, 201 Wickham Terrace, Brisbane, Queensland.

Petroleum Tenement - Oil Permit No. 43.

District - Hermannsburg and Henbury,
Northern Territory.

Location - Latitude 24° 00' 00" South
 Longitude 133° 06' 30" East.

Elevation - Ground - 2,197' above sea level.
Kelly Bushing Datum - 2,214' above sea level.

Total Depth - 6,528 feet.

Drilling Commenced - August 30, 1969.

Total Depth Reached - October 6, 1969.

Rig Released - October 9, 1969.

Drilling Time to Total Depth - 38 days.

Status - Shut-in water well. 9-5/8" casing perforated with four groups of twenty shots per group at one foot spacing over the following intervals in the Mereenie Sandstone:- 3,825' to 3,845', 3,760' to 3,780', 3,700' to 3,720', and 3,600' to 3,620'. Two cement plugs with tops at 5,394' and 4,319'. Bolted and spot welded steel plate onto 13-3/8" casing bowl and erected permanent marker.

Total Cost - To be submitted when all invoices are available.

DRILLING DATA:

Drilling Contractor - Oil Drilling & Exploration (N.T.) Pty. Ltd., 37 York Street, Sydney, New South Wales.

Drilling Plant - National Ideal Type 100, rated capacity 1,400 feet with 4-1/2 inch drillpipe. Motors - 3 Paxman, Model 12, Series 1, 500 H.P.

Mast - Ideco FM 136-450 Full View, 700,000 lbs. capacity.

Pumps and Compressors -

Mud Pumps	-	Two
Make	-	Gardner Denver
Type	-	GR-GXP
Size	-	7-3/4" x 16"
Motors	-	Draw Works Compound
Air Compressors	-	Three
Make	-	Ingersol Rand
Type	-	H.H.E.
Size	-	Two 1500 cfm primaries and one 1500 psi booster.
Motors	-	Waukesha, 400 H.P.

Blowout Preventors - Schaffer Rotating B.O.P. (3,000 psi), Shaffer "GB" (5,000 psi) and Hydril "GK" (5,000 psi).

Hole Sizes and Depths -

<u>Diameter</u>	<u>Depth</u>
26"	41'
17-1/2"	470'
12-1/4"	4,479'
8-1/2"	6,520'
8-15/32"	6,520.25'
7-13/16"	6,528'

Casing, Liner and Cementing Details -

	<u>Conductor</u>	<u>Surface</u>	<u>Intermediate</u>
Size (inches)	20	13-3/8	9-5/8
Weight (lbs/ft)	-	48	Mixed*
Grade	-	H40	J55
Range	-	2	2
Setting Depth (ft)	41	466	4,479
Shoe Type	None	Guide	Guide
Shoe Depth	-	465	4,478
Collar Type	None	Float	Float
Collar Depth	-	431	4,447
Stage Tool Type	None	None	None
Stage Tool Depth (ft)	-	-	-
Centralizer Depths (ft)	None	182,278, 401 & 455	4,468, 4,422, & 4,325
Scratchers	None	None	None
Cement Used (sacks)	37	374	360
Top of Shoe Cement (ft)	Surface	Surface	Approx. 3,400
Top of Stage Cement (ft)	-	-	-
Cementing Method	No Plugs	Top and Bottom Plugs	Top and Bottom Plugs

* 36 lb. J55 LTC to 3,569'; 40 lb. J55 LTC to 4,478'.

Drilling Fluid -

<u>Depth</u>	<u>Fluid</u>	<u>Remarks</u>
0 - 698'	Air	Water at 698'.
698 - 3,724'	Mist	Substantial influx of water at 3,550'.
3,724 - 4,479'	Aerated Water	Set 9-5/8" Casing at 4,479'.
4,479 - 5,078'	Air	Hole became damp at 5,064'.
5,078 - 6,528'	Mist	-

While mist and aerated water drilling, foaming agents, corrosion inhibitors and conditioning chemicals

were injected. Total amounts used were: Adafoam 1,590 gals., Sodium Bichromate 2,586 lbs. and Caustic Soda 5,195 lbs.

Fluid in the hole during wireline logging operations was as follows: Run 1, fresh water with known contaminants being Adafoam, Sodium Bichromate and Caustic Soda. Run 2, salt water with known contaminants being Adafoam, Sodium Bichromate, Caustic Soda, Micalox and sawdust.

Water Supply - Water for drilling purposes was hauled by truck from spring fed pools at Ellery Creek located approximately 17 miles by road to the west. All camp water for cooking and drinking purposes was hauled from the Hermannsburg Mission water well approximately 27.5 miles by road to the west.

Perforation and Shooting Record - Casing perforations (9-5/8" 40 lb/ft casing).

<u>Depth Interval</u>
3,825' to 3,845'
3,760' to 3,780'
3,700' to 3,720'
3,600' to 3,620'

The above casing intervals were perforated with one jet per foot using Welex 2-1/8" Link-Jets each having 22.0 grams explosive charge. These jets result in a hole size diameter of 0.50 of an inch and a penetration of 7.96 inches.

Plugging Back and Abandoning - After reaching total depth of 6,528' two plugs were run as follows:

Plug No. 1 - Displaced 250 sacks Class 'A' cement with water through open end drillpipe at 6,000'. Waited on cement 7-1/2 hours and checked with 15,000 lbs. drill string weight. Top of plug at 5,394' - held satisfactorily.

Plug No. 2 - Displaced 150 sacks Class 'A' cement with water through open end drillpipe at 4,580'. Waited on cement 6-1/2 hours. Plug tagged at 4,169' with 20,000 lbs. drill string weight. Plug drilled down to 4,319' with an 8-1/2 inch bit leaving 261 feet of cement across the 9-5/8 inch casing shoe.

The 9-5/8 inch casing was then perforated in the Mereenie formation.

A steel plate was bolted onto the 13-3/8 inch casing bowl and spot welded in four places. A well marker was erected. The cellar will be left unfilled and a fence erected around same.

Fishing Operations - None.

Side Tracked Hole - None.

Drilling Observations - The estimated versus actual time required to drill West Waterhouse No. 1 correlated closely. A total of 505 hours or fifty-two percent of the total time was actual drilling and coring for an average penetration rate of 4.6 minutes per foot. Drilling, reaming and coring required 23 bits.

The Mereenie sandstone, which is a prolific aquifer in the Amadeus Basin, contains fresh water as anticipated and necessitated drilling with aerated water from 3,724' to 4,479' (121 feet into the Stokes) at which depth 9-5/8 inch casing was run. The basal 50 feet of the Mereenie is a very hard, tight orthoquartzite as shown by wireline logs and decreased penetration rate. The hole remained dry through the Stokes, however it became slightly damp in the upper Stairway, necessitating a change to mist drilling on down to

total depth. No radical increase in water was noticed for the remainder of the Stairway formation, however salt water was encountered in the lower Horn Valley and Pacoota.

Core No. 2 (6,520' - 6,520.25'), which was cut with a 8-15/32 inch core bit, was to be the terminal core but the footage cut was too low. An attempt was made to follow up with an 8-1/2 inch core bit, however several hundred feet of undergauge hole were encountered, and the bit was worn out attempting to ream to bottom. Wireline logs were run at this depth (6,520.25'). Core No. 3 (6,520.25' - 6,528') was then cut with a 7-13/16 inch core bit.

FORMATION SAMPLING:

Ditch Cuttings - While air, mist and aerated water drilling, a specially designed trap in the blooie line was used to catch cuttings. Samples were lagged when there was significant delay in circulating cuttings to the surface.

An attempt was made to sample each ten feet of hole except when coring. Samples were not obtained over the following intervals usually because of the cuttings being too dusty or because of dampness in the hole while drilling with air; 0' to 26' (KB to bottom of the cellar), 720' to 730', 830' to 840', 3,750' to 3,760', 4,480' to 4,500' and 5,160' to 5,170'.

One set of samples has been sent to the Bureau of Mineral Resources Laboratory at Fyshwick, A.C.T., one set has been delivered to the Resident Geologist in Alice Springs, Northern Territory and four sets are stored in the Operator's Alice Springs warehouse.

Coring - Three cores were cut in West Waterhouse No. 1. Total footage cored was 25 feet with 24.91 feet of core (99.66%) being recovered. Cores No. 1 and 2 have a 4 inch diameter and were cut with an 8-15/32 inch diamond core bit. The bottom hole core (Core No. 3) has a diameter of 3-1/2 inches and was cut with a 7-13/16 inch diamond core bit.

<u>Core Number</u>	<u>Interval Cored</u>	<u>Feet Cut</u>	<u>Recovery (feet)</u>	<u>Recovery (%)</u>
1	5,912' - 5,929'	17.00	17.00	100.00
2	6,520' - 6,520.25'	0.25	0.25	100.00
3	6,520.25' - 6,528'	7.75	7.66	98.84
		<u>25.00</u>	<u>24.91</u>	<u>99.66</u>

At least four inches of the first foot of Cores No. 1 and 3 and four inches of each two succeeding feet of core were sampled. That plus the 0.25 feet of recovery for Core No. 2 were sent to the Bureau of Mineral Resources Laboratory in Fyshwick, A.C.T. The remaining portions are stored in the Operator's Alice Springs warehouse.

Side-wall Sampling - No side-wall sampling was attempted.

Fluid Sampling - Water was collected on six occasions as noted below:

<u>Depth</u>	<u>Remarks</u>
	(Collection point, formation, type of water, etc.)
1,870'	From blooie line during drilling operations. Brewer conglomerate. Brackish water.
4,226'	From blooie line during drilling operations. Mereenie sandstone. Fresh water.
5,068'	From sample trap in blooie line during drilling operations. Stairway sandstone. Salty water. Note: only a small volume however sufficient to make it necessary to change drilling fluid from air to mist at 5,078 feet.

5,865' From blooie line during drilling operations. Lower Horn Valley siltstone. Salt water.

5,895' From sample trap in blooie line during drilling operations. Probably from upper Pacoota sandstone. Salt water.

3,600' - Collected at surface while attempting
3,845' to evaluate flow from Mereenie sandstone through perforations over the following intervals: 3,600' - 3,620', 3,700' - 3,720', 3,760' - 3,780', and 3,825' - 3,845'. Fresh water.

Four cylinders of gas were collected under low pressure while blowing the hole at a depth of 6,448'. The gas is from a small zone somewhere in the interval 5,562' to 5,912'.

Representative samples of all water and gas collected have been sent to the Bureau of Mineral Resources Laboratory in Fyshwick, A.C.T. Where there has been an excess of water samples a representative sample has been given to the N.T.A. Water Resources Branch, Alice Springs and the balance is stored in the Operator's Alice Springs warehouse.

LOGGING AND SURVEYS:

Wireline Logging - Welex wireline logs were run on two occasions at West Waterhouse No. 1. Log types and total intervals covered are as follows:-

	<u>Run 1</u>	<u>Run 2</u>
Induction - Electric	466 - 4,474'	
Acoustic Velocity-Gamma Ray-Caliper	Surface - 4,474'	
Acoustic Velocity-Gamma Ray		4,480 - 6,515'
Guard		4,480 - 6,500'
FORxo - Caliper		4,480 - 6,500'

Log Scales: 2" = 100' and 5" = 100'

Penetration Rate and Gas Logs - Rates of penetration, as recorded by Geolograph, are presented on the Composite Log (Enclosure 2) that accompanies this report.

Data on gas detection is given in Appendix 1.

Deviation Surveys - Periodic surveys of hole deviation were made while drilling as follows:-

<u>Depth</u> (feet)	<u>Deviation</u> (degrees)	<u>Depth</u> (feet)	<u>Deviation</u> (degrees)
147	1/2-	2,951	1-1/4
347	1/4-	3,251	1-1/2
470	3/4	3,555	1-1/2
603	0	4,031	3
705	1/4+	4,092	3-
1,088	3/4	4,227	3
1,296	1	4,335	3
1,476	1+	4,460	3
1,737	1	4,868	3
1,927	1-1/2	5,254	3
2,140	1-1/2	5,520	3+
2,554	Misrun	5,900	3
2,651	1-3/4	6,332	2

Temperature Surveys - Hole temperatures as recorded while wireline logging are as follows:

<u>Depth</u>	<u>Temperature</u>
4,450'	117° F
6,500'	165° F

TESTING:

Formation Testing - One drillstem test was attempted over the interval 5,680' to total depth (6,528') for the purpose of isolating the small gas zone, which is thought to be in the lower Stairway sandstone, Horn Valley siltstone or possibly upper

Pacoota sandstone. However, the packer seat failed, and the test is recorded as a misrun.

After perforating the 9-5/8-inch casing in the Mereenie sandstone, an attempt was made to evaluate the water producing potential by using the two primary air compressors (total of 3,000 cfm) and blowing the water into the sump. Unfortunately one primary broke down and the other was not adequate to keep up with the water flow into the bore. It is anticipated that a test will eventually be run using a draw down method of evaluation to ascertain the water potential of West Waterhouse No. 1.

GEOLOGYOBJECTIVES:

West Waterhouse No. 1 was drilled to test an interpreted dip and fault closure on the western nose of the Waterhouse Anticline. The main target zones were the stairway and Pacoota sandstones of Ordovician age.

Programmed depth of the well was 6,100 feet. Although evidence suggests that salt water is present as high as 5,863' in the lower Horn Valley siltstone and is undoubtedly present in the upper Pacoota sandstone, the well was still deepened to 6,528' for stratigraphic information.

The one small gas zone which is somewhere in the interval 5,562' to 5,912' appeared to be negligible from drilling observations and log evaluation. However, a drillstem test (DST No. 1, 5,680' - 6,528') was attempted which was a misrun. Further expenditure was not warranted.

CORRELATIONS:

The closest correlating well to West Waterhouse No. 1 is Palm Valley No. 1, a shut-in gas well, located 21 miles to the west.

STRATIGRAPHIC TABLES

The following table shows the formations, ages, depths, and thicknesses of units penetrated in West Waterhouse No. 1 relative to KB and sea level.

<u>Age</u>	<u>Formation</u>	<u>Depth</u>	<u>Subsea Depth</u>	<u>Thickness</u>
	<u>Pertnjara Group</u>			
Devonian	Brewer	Surface	+2,197'	2,220'+
	Hermannsburg	2,200'	+ 14'	1,153'
Silurian? - Devonian	Mereenie	3,353'	-1,139'	1,005'
	<u>Larapinta Group</u>			
Ordovician	Stokes	4,358'	-2,144'	529'
Ordovician	Stairway	4,887'	-2,673'	740'
Ordovician	Horn Valley	5,627'	-3,413'	246'
Cambrian- Ordovician	Pacoota	5,873'	-3,659'	655'+
	T.D.	6,528'	-4,314'	

The section penetrated by West Waterhouse No. 1 is compared with Palm Valley No. 1 and the variations in thickness between the two wells are indicated. The following table shows the correlation of units in the two wells:-

	<u>P.V. #1</u>	<u>% Thinning</u>	<u>W.W. #1</u>	
		-	2,200'+	Brewer
Pertnjara	1,016+	-		
		-	1,153'	Hermannsburg
Mereenie	2,192'	54	1,005'	Mereenie
Stokes	1,112'	52	529'	Stokes
Stairway	976'	24	740'	Stairway
Horn Valley	338'	27	246'	Horn Valley
Pacoota (upper)	766'	22	597'	Pacoota (upper)
Pacoota (lower)	258'+	-	58'+	Pacoota (lower)

STRATIGRAPHY:PERTNJARA GROUPBrewer Conglomerate (Surface to 2,200')Age: Devonian

The unit equivalent to the Brewer conglomerate consists of sandstone with included pebbles. The sandstone is brown, orange-brown and reddish-brown, predominantly medium, coarse and very coarse grained with a very fine and fine grained matrix, becoming mainly medium grained below 730'. Sorting is poor but improves in some beds in the lower 800 feet of the formation. The sandstone generally is very silty and argillaceous with some calcareous bonding down to 1,370' and becoming dolomitic below. Grains are sub-angular to sub-rounded with larger grains being rounded. The quartz grains have some secondary quartz overgrowths and a few scattered secondary quartz crystal faces. Although most of the grains are quartz, the porportion of non-quartz grains is high consisting of feldspar, mica, carbonate, dark and green coloured grains of indefinite composition, lithic grains and flat shaly pellets. Pebbles are mostly quartz, quartzite and other siliceous varieties, carbonates and shale. Very minor interbedded brown and green shaly bands and partings, and siltstone are present through most of the section. Traces of porosity were observed below 1,750' but a small volume of water encountered at 698' indicates some porosity at this point.

Hermannsburg Sandstone (2,200' to 3,353')Age: Devonian

The contact between the Brewer and Hermannsburg formations is selected at a change to a predominantly finer grain size, lack of included pebbles and increased

quartz content in the latter unit.

The formation, comprised essentially of sandstone, is orange-brown, dark brown and brown with minor grey-green interbeds, mostly very fine and fine grained with some medium grained beds, medium sorted, sub-angular to sub-rounded, silty and well consolidated by siliceous and dolomitic cement. Quartz grains have some secondary quartz overgrowths and crystal faces. Non-quartz components consist of feldspar, mica and grey and green grains of indefinite composition, with scattered brown and red-brown, micaceous shaly pellets and partings. From cuttings shale and siltstone amounting to twenty percent from 2,440' to 2,450' and five percent from 2,450' to 2,460', 2,890' to 2,900' and 2,970' to 2,980' are interbedded with the sandstone.

The interval 3,080' to 3,120' contains up to fifty percent brown, silty, micaceous, dolomitic shale. Below 3,120' the sandstone is cleaner, firmly bonded by secondary silica, dolomitic and calcareous and resembles the underlying Mereenie sandstone.

Traces of porosity only were observed in places and the Hermannsburg produced only a small volume of water.

Except for about 30 feet of interbedded shale and sandstone between 3,080' and 3,110' there is no indication of Parke siltstone in the section. This 30 feet interval may be a tongue of Parke siltstone interbedded in the lower Hermannsburg.

Mereenie Sandstone (3,353' to 4,358')

Age: Silurian? - Devonian

The top of the Mereenie is picked at a change to very quartzose sandstone with about five percent or

less non-quartz components, and a slight colour change from browns to orange and orange-red. As in many localities in the eastern Amadeus, the base of the Hermannsburg is similar to the Mereenie.

The sandstone is mostly orange, orange-red and minor white, very fine, fine and medium grained, some coarse grains in the basal 130 feet, medium to poorly sorted, occasionally well sorted, grains are sub-angular to sub-rounded, and larger grains are rounded. The rock is siliceous with abundant secondary quartz overgrowths and crystal faces, slightly calcareous and dolomitic in parts, slightly kaolinitic and silty in parts, with traces of black grains. Although the beds are mostly consolidated some zones are loosely bonded, mainly between 3,500' and 4,000'. Below 4,000' a changeable drilling rate suggests very hard, tight interbeds. These very hard, abrasive beds constitute all of the lower 50 feet of the formation and proved destructive on drilling bits. Very minor dark red-brown shale and siltstone interbeds were observed in a few places in the upper 300 feet.

Significant intergranular porosity was observed in samples between 3,430' and 4,050'. A substantial increase in water flow was encountered at 3,550' at the top of the first zone to show good porosity and the flow increased rapidly thereafter.

LARAPINTA GROUP

Stokes Siltstone (4,358' to 4,887')

Age: Ordovician

The Stokes upper contact is well defined in samples with a sharp change from sandstone to shale

and siltstone. Logs confirm this sharp contact.

The upper Stokes from 4,358' to 4,650' consists mostly of interbedded shale and siltstone. The shale is dark and medium red-brown, dark brown with minor green patches, spots and laminae, fissile to platy, micromicaceous, very slightly dolomitic, silty in parts grading into siltstone. Slickensides were observed in places throughout the section. Siltstone is red-brown, dark brown with minor grey-green patches and laminae, blocky to platy, micaceous, dolomitic in parts, argillaceous and sandy in parts. Minor light grey to white, siliceous siltstone grades into very fine grained sandstone in a few places, particularly between 4,380' and 4,400'. Limestone up to twenty percent occurs from 4,550' to 4,650' and is light grey, light orange, cryptocrystalline to very fine crystalline, argillaceous and silty.

The lower Stokes from 4,650' to 4,887' consists of shale and some limestone. The shale is dark grey, grey-green with minor red-brown, fissile to platy, calcareous, and silty in parts grading into siltstone. Limestone, which forms up to sixty percent of the section between 4,650' and 4,690' and minor amounts lower down, is similar to that in the upper Stokes and grades into argillaceous limestone. Minor white, light grey, cryptocrystalline to very fine crystalline, silty and sandy dolomite occurs at the base of the unit.

Stairway Sandstone (4,887' to 5,627')

Age: Ordovician

The top of the Stairway is picked at the top of the first sandstone beneath the lower Stokes shale and siltstone. The unit consists of interbedded sandstone, siltstone and minor shale.

The sandstone of the upper Stokes is white, light grey, orange-brown, brown and rusty-brown, very fine to fine and minor medium grained with numerous floating medium and coarse grains set in a fine grained sandstone matrix between 4,930' and 4,950', silty, well to medium sorted, grains angular to sub-rounded, dolomitic in part, micaceous, siliceous with secondary quartz overgrowths and occasional traces of pyrite and black grains. Between 4,950' and 4,970' and 5,180' and 5,280' are numerous black and dark coloured grains and fragments of probable organic origin (phosphate?). Smaller amounts occur elsewhere. Siltstone is dark to light grey, micaceous, dolomitic, sandy in parts and argillaceous. Shale is dark grey, micaceous, platy, silty grading into siltstone. The section shows no visible porosity.

The lower Stairway lies between 5,500' and 5,627'. This unit shows a marked increase in grain size, and is composed of fine, medium and coarse grained sandstone with minor siltstone and shale interbeds and partings. The sandstone is rusty-brown, light brown, becoming white below 5,550', poorly sorted, with abundant medium and coarse grains floating in a fine grained sandstone matrix, trending bimodal near the top, sub-angular to rounded, orthoquartzitic, mostly tightly bonded by secondary silica, slightly dolomitic in parts, silty in the top 70 feet, traces of mica and black grains of indefinite composition, and abundant rounded pyrite modules below 5,590'. The section is generally tight with no visible porosity observed in samples.

Horn Valley Siltstone (5,627' to 5,873')Age: Ordovician

The top of the Horn Valley is selected at the change from basal Stairway sandstone to a predominantly shale and siltstone section.

The interval down to 5,740' consists of interbedded shale, siltstone and very minor sandstone. The shale is black, micromicaceous, fissile to platy, dolomitic and silty. The siltstone is dark grey to light grey, micromicaceous, dolomitic, blocky, sandy in part grading into very fine grained white sandstone.

The interval from 5,740' to 5,830' is black shale and interbedded limestone. The shale contains traces of pyrite. The limestone is light grey to dark grey, argillaceous, silty and sandy in parts, and microcrystalline.

Dolomite is interbedded with black shale from 5,820' to 5,870'. The dolomite is grey-brown, light brown, calcareous in parts, microcrystalline to fine and medium crystalline, silty and sandy in parts with scattered large, floating quartz grains, scattered fossil impressions and fragments, and pyrite. Traces of glauconite indicate the marker bed at the base of the Horn Valley.

Pacoota Sandstone (5,873' to 6,528')Age: Cambrian-Ordovician

The top of the Pacoota formation is selected at the top of the first sandstone bed which underlies the Horn Valley basal, glauconitic dolomite marker bed.

The upper Pacoota comprises the section from 5,873' to 6,470'. The interval from 5,873' to 6,340' consists of sandstone and minor interbedded shale and

siltstone. The sandstone is white to light grey, very fine and fine grained with medium grained stringers and floating medium and coarse grains, well to poorly sorted, sub-angular to sub-rounded, larger grains rounded, orthoquartzitic, silty in parts, firmly consolidated, tightly welded in many places by secondary silica and secondary quartz overgrowths, slightly dolomitic in small part, traces of dark and black grains and pyrite in a few places. Black shaly appearing flecks and thin black shaly bands, laminae and partings are interbedded with the sandstone. Many black flecks are of probable organic origin. Light to dark brown, rusty-brown, ferruginous sandstone is present in the interval from 6,080' to 6,250'. Scattered fragments of small pebbles occur in a few places from 6,180' to 6,290'.

Although the Pacoota sandstone is generally tight, there is a suggestion of intergranular porosity in samples over the interval 6,250' to 6,290' and thin porous streaks elsewhere. Core No. 1 (5,912' - 5,929') showed the rock to be highly fractured. The fractures are healed with secondary anhydrite, but appear to have some useful remaining porosity.

The interval from 6,340' to 6,470' is interbedded shale, siltstone and glauconitic sandstone. This sandstone forms a marker bed at the base of the upper Pacoota. The shale is black, dark grey, micaceous, blocky to platy, silty grading into siltstone, sandy in parts. Sandstone is white, light grey and grey, very fine to fine grained with a few medium grained stringers becoming coarse grained at the base, silty, well to medium sorted, poorly sorted in the bottom 20 feet, sub-angular to sub-rounded, siliceous

and dolomitic in parts. Glauconite occurs throughout the section, but becomes abundant at the base, while mica and traces of pyrite are also present.

The top of lower Pacoota is beneath the glauconitic sandstone marker at 6,470'. Only 58 feet of this unit was penetrated, which consists mainly of sandstone and minor black shaly bands, laminae, partings and flecks. The sandstone is light grey to grey, very fine to coarse grained, with floating medium and coarse grains in places set in a fine grained matrix and a few medium grained stringers, well to poorly sorted, grains sub-angular to rounded, orthoquartzitic, firmly consolidated to tightly welded by secondary silica, slightly dolomitic, clean in parts, with traces of pyrite and glauconite at the top. Numerous black grains, dark flecks of probable organic origin, and fossil impressions and fragments were observed. The bottom hole cores (Cores No. 2 & 3) from 6,520' to 6,528', contain numerous dark coloured quartz grains and reveal numerous vertical and horizontal hairline fractures which provide some porosity in an otherwise tight rock. A trace of intergranular porosity is indicated over a 6 inch interval from 6,526'.

Dip determinations were difficult to measure from Cores No. 2 & 3 because of cross bedding in the sandstone, unevenly bedded shaly bands and partings, slumping and organic reworking of beds, however bedding is approximately horizontal.

POROSITY & PERMEABILITY OF SEDIMENTS PENETRATED

Visual estimations of porosity were made microscopically from cuttings and cores.

A few thin, scattered intervals of poor porosity in the Brewer conglomerate are indicated by samples and logs. The first sign of porosity was a small influx of brackish water at 698' in the Brewer necessitating a change to mist drilling. The top of the Hermannsburg sandstone at 2,200' is shown on the Acoustic log by intervals of improved porosity, which extend down through the upper 300 feet of the formation. Scattered intervals of poor porosity were observed also in samples over this section. The Hermannsburg is generally tight from 2,500' to 3,100'. From 3,100' to the top of the Mereenie at 3,353' the lower Hermannsburg is characterised by cleaner sands and some low porosity. The overall water flow from the whole Pertnjara section was small.

Intervals of fair to good porosity in the Mereenie sandstone are indicated from samples and logs down to 4,000'. A large influx of fresh water was encountered upon striking the first zone of good porosity at 3,550', which necessitated changing to aerated water drilling. Hereafter the flow increased steadily through the upper part of the Mereenie. The best zones of porosity are from 3,540' to 3,575', 3,599' to 3,660', 3,683' to 3,880' and 3,915' to 3,960'. From 4,000' to the base of the Mereenie there are streaks of poor porosity interbedded with some tight sections. Preliminary testing has indicated that West Waterhouse No. 1 would be an excellent water well with a standing water level of approximately 600 feet from the surface.

The Stokes siltstone provides an impermeable barrier separating the fresh water sandstones in the Mereenie from the underlying Stairway sandstone. This was shown by successfully air drilling from below the 9-5/8 inch casing through the Stokes and into the upper Stairway. The Stairway sandstone is generally tight in samples but occasional streaks of porosity are indicated on the logs. Dampness in the hole was noted at 5,064' in the upper Stairway and the very small amount of water, which was collected at surface, was analysed at 9400 ppm NaCl.

Although samples in the Horn Valley shale and siltstone appear unlikely to have porosity, an odour of natural gas was noted near the rig while drilling in the basal Stairway and Horn Valley. The gas could have originated from a thin porous stringer in the lower Stairway, or fractures in the Horn Valley as at Palm Valley No. 1.

The Pacoota sandstone is generally tight, as indicated from samples, cores and logs. However, Core No. 1 (5,912' to 5,929') contains zones of extensive fracturing healed with secondary anhydrite, which probably have some fracture porosity. A small influx of salt water which occurred at 5,863' and increased steadily as drilling continued into the Pacoota, most likely was produced from fractures in the Pacoota and basal Horn Valley. Rough drilling, lost circulation and cave problems through parts of the Pacoota indicate that fracturing is probably fairly extensive through the section.

A small gas show, which first burned at the end of the blooie line for thirty-five minutes while blowing the hole at a depth of 5,912', probably

originated above the salt water level from a thin stringer in the Stairway or fractures in the Horn Valley. The gas did not appear at the surface in sufficient quantities to burn until allowed to accumulate for several hours in the hole during times when drilling was not in progress.

Cores No. 2 & 3 (6,520' - 6,528') cut in the lower Pacoota generally lack intergranular porosity except for a trace in a thin 6 inch band from 6,526'. Fracture porosity is present.

STRUCTURE

West Waterhouse No. 1 was drilled on a buried seismically defined anticlinal nose, which plunges westward over a distance of about 9 miles. At first appraisal, this anomaly appears to be a western extension of the Waterhouse surface anticline. No dip separation from Waterhouse Anticline can be shown on the upper horizons, but seismic evidence indicates that West Waterhouse is a structure separated from Waterhouse by a north-east dipping thrust fault. A gravity minimum centered along the fault trace has been interpreted as a possible salt mass rising along the fault zone. The higher sodium chloride content of the water (minimum value of 210,000 ppm NaCl) found in the Pacoota sandstone as compared with Palm Valley No. 1 (185,000 ppm NaCl) could be evidence for the presence of such a salt intrusion. The fault system and/or the salt mass could seal the eastern end of the West Waterhouse structure, thereby providing closure. The presence of hydrocarbons at West Waterhouse, although minor in magnitude, suggests that closure has indeed been effected. Approximately horizontal bedding in cores indicates that the well is close to the crest of the structure.

From seismic evidence the West Waterhouse structure has a complex history of growth and is probably a growth structure. Subsurface information from this well does not disprove this conclusion, since the units in the Larapinta Group at West Waterhouse No. 1 are much thinner than those at Palm Valley No. 1, as shown in the correlation table under Stratigraphic Tables.

This could result from regional thinning in an easterly direction, but it could also reflect local stratigraphic thinning over the crest of West Waterhouse structure. Greatly increased thinning in the Stokes and Mereenie formations at West Waterhouse relative to Palm Valley is probably due to growth during deposition.

REFERENCES

Geophysical Assoc. Int.
Ltd., 1965.

Missionary Plain Seismic
and Gravity Survey, Oil
Permits 43 and 56, N.T.,
for Magellan Petroleum
(N.T.) Pty. Ltd.
(unpubl.)

Geophysical Assoc. Int.
Ltd., 1966.

Missionary Plain Seismic
and Gravity Survey, Oil
Permits 43 and 56, N.T.,
for Magellan Petroleum
(N.T.) Pty. Ltd.
(unpubl.)

Krieg, E.A., and Froelich,
A.J., 1967.

A Report on the Missionary
Plain and Mt. Rennie -
Ooraminna Seismic and
Gravity Surveys O.P. 43
and O.P. 56, North Amadeus
Basin, Northern Territory,
Australia, (unpubl.)

Magellan Petroleum (N.T.)
Pty. Ltd., 1965.

Well Completion Report,
Palm Valley No. 1 Well.
(unpubl.)

Wells, A.T., Ranford, L.C.,
Cook, P.J. and Forman, D.J.,
1967.

The Geology of the Amadeus
Basin, Central Australia.
Bur. Min. Resources Aust.,
Rec. 92.

APPENDIX 1

FLUID ANALYSES

and

GAS DETECTION OPERATIONS

GAS, OIL AND WATER ANALYSES

West Waterhouse No. 1 encountered one small low pressure gas zone which appears to have been drilled during Bit Run 17. There was no indication of gas before this bit run; however, while blowing the hole prior to coring from 5,912' the blooie line flared for thirty-five minutes and flared on subsequent occasions under the same circumstances. Wireline log analysis is rather indefinite although an $S_w = 60\%$ can be calculated for the interval 5,900' to 5,910' in the Pacoota sandstone. Enclosed are two laboratory analyses of this gas which was collected while blowing the hole at 6,448' prior to drilling ahead. Results indicate air contamination.

No shows of oil were found.

Water was encountered in the Brewer formation at 698', the Mereenie sandstone at 3,550', the Stairway sandstone at 5,064' and at 5,863' in the Horn Valley siltstone. Water samples were collected from all these water zones and analyses are enclosed in this report. Samples were also taken while attempting to evaluate the Mereenie sandstone through perforations and these analyses are also enclosed.

The following chart summarizes the analyses results obtained by the Bureau of Mineral Resources, Canberra.

<u>Remarks</u>	<u>Resistivity (ohm-meters at 20°C)</u>	<u>Salinity (ppm NaCl)</u>	<u>pH</u>
Collected from end of blooie while drilling at 1,870' (Brewer: sandstone)	2.42	900	9.5
Collected from end of blooie line while drilling at 4,226' (Mereenie sandstone)	6.98	580	6.5
Collected from sample trap while drilling at 5,068' (Stairway sandstone)	0.93	9,400	6.5
Collected from sample trap while drilling at 5,865' (Horn Valley siltstone)	0.056	228,000	6.0
Collected from sample trap while drilling at 5,895' (Pacoota sandstone)	0.058	210,000	6.0
<hr/>			
Collected at surface while attempting to test water flow through perforations from Mereenie sand- stone over interval 3,600' - 3,845' *	7.14	700	6.5

* Also enclosed are four analyses by the Northern Territory Administration with their "Specimen Advice Note No. 4480".

GAS DETECTION OPERATIONS

From surface to TD (6,528') while drilling with air, mist or aerated water a flare was maintained at the end of the blooie line as the primary means of hydrocarbon detection.

One gas show was noted as described under "Oil, Gas and Water Analyses", Appendix 1.

WATER ANALYSIS

Origin of water Magellan Petroleum West Reference Sn 70 / 215
Waterhouse No.1 Specimen Advice Note No. 4480
 Date sampled 9.10.69 Date received 21.10.69

* Results in milligrams per litre of filtered sample.

Recommended Maximums (see over page).

	Sample	Domestic	Stock	Agriculture
HARDNESS (calculated as CaCO ₃)—				
“ Total	346	500	—	—
“ Carbonate	214	—	—	—
“ Non-Carbonate	132	—	—	—
ALKALINITY IN EXCESS OF				
TOTAL HARDNESS	Nil	—	—	—
CHLORIDE	215	500	—	—
SULPHATE	147	250	2,000	—
BICARBONATE	262	—	—	—
		Child 20	—	—
NITRATE	4	Adult 120	—	—
FLUORIDE	0.2	1.5	5.0	—
CARBONATE	Not Determined	—	—	—
SODIUM	140	—	—	—
POTASSIUM	13	—	—	—
CALCIUM	66	100	—	—
MAGNESIUM	44	100	300	—
TOTAL DISSOLVED SALTS				
	891	3,000	8,000	1,000
RESIDUE ON EVAPORATION				
	--	3,000	8,000	1,000
pH <u>8.6</u>				

General remarks of Analysing Officer with particular reference to suitability of the water for the purpose for which it is stated to be required.

The above results are forwarded for your information.

Signature *Dean M. R. Newman*

Date 13-11-69

* 14.3 milligrams per litre equals 1 grain per gallon. 437.5 grains eqn 1.102

NORTHERN TERRITORY ADMINISTRATION—ANIMAL INDUSTRY BRANCH

WATER ANALYSIS

Origin of water Magellan Petroleum Reference Sn 70 / 215
West Waterhouse No.1 Specimen Advice Note No. 4480
 Date sampled 9.10.69 Date received 21.10.69

* Results in milligrams per litre of filtered sample.

Recommended Maximums (see over page).

	Sample	Domestic	Stock	Agriculture
HARDNESS (calculated as CaCO ₃)—				
“ Total	346	500	—	—
“ Carbonate	211	—	—	—
“ Non-Carbonate	135	—	—	—
ALKALINITY IN EXCESS OF TOTAL HARDNESS	Nil	—	—	—
CHLORIDE	220	500	—	—
SULPHATE	138	250	2,000	—
BICARBONATE	258	—	—	—
		Child 20	—	—
NITRATE	4	Adult 120	—	—
FLUORIDE	0.4	1.5	5.0	—
CARBONATE	Not Determined	—	—	—
SODIUM	138	—	—	—
POTASSIUM	13	—	—	—
CALCIUM	66	100	—	—
MAGNESIUM	44	100	300	—
TOTAL DISSOLVED SALTS	881	3,000	8,000	1,000
RESIDUE ON EVAPORATION	—	3,000	8,000	1,000
pH <u>8.7</u>				

General remarks of Analysing Officer with particular reference to suitability of the water for the purpose for which it is stated to be required.

The above results are forwarded for your information.

Signature *Alan W. R. Newman*

Date 13-11-69

* 14.3 milligrams per litre equals 1 grain per gallon. 437.5 grains equals 1 lb.

WATER ANALYSIS

Origin of water Magellan Petroleum Reference Sn. 70 / 215
West Waterhouse No.1 Specimen Advice Note No. 4480
 Date sampled 9.10.69 Date received 21.10.69

* Results in milligrams per litre of filtered sample.

Recommended Maximums (see over page).

	Sample	Recommended Maximums		
		Domestic	Stock	Agriculture
HARDNESS (calculated as CaCO ₃)—				
“ Total	354	500	—	—
“ Carbonate	222	—	—	—
“ Non-Carbonate	132	—	—	—
ALKALINITY IN EXCESS OF				
TOTAL HARDNESS	Nil	—	—	—
CHLORIDE	215	500	—	—
SULPHATE	142	250	2,000	—
BICARBONATE	271	—	—	—
		Child 20	—	—
NITRATE	7	Adult 120	—	—
FLUORIDE	0.2	1.5	5.0	—
CARBONATE	Not Determined	—	—	—
SODIUM	138	—	—	—
POTASSIUM	13	—	—	—
CALCIUM	70	100	—	—
MAGNESIUM	44	100	300	—
<hr/>				
TOTAL DISSOLVED SALTS	900	3,000	8,000	1,000
RESIDUE ON EVAPORATION	—	3,000	8,000	1,000
pH <u>8.7</u>				

General remarks of Analysing Officer with particular reference to suitability of the water for the purpose for which it is stated to be required.

The above results are forwarded for your information.

Signature Alan W. R. Newman

Date 13-11-69

* 14.3 milligrams per litre equals 1 grain per gallon. 437.5 grains equals 1oz.

WATER ANALYSIS

Origin of water Magellan Petroleum West Reference Sn 70 / 215
Waterhouse No.1
 Date sampled 9.10.69 Specimen Advice Note No. 4480
 Date received 21.10.69

* Results in milligrams per litre of filtered sample.

Recommended Maximums (see over page).

	Sample	Recommended Maximums		
		Domestic	Stock	Agriculture
HARDNESS (calculated as CaCO ₃)—				
“ Total	342	500	—	—
“ Carbonate	213	—	—	—
“ Non-Carbonate	129	—	—	—
ALKALINITY IN EXCESS OF TOTAL HARDNESS	Nil	—	—	—
CHLORIDE	210	500	—	—
SULPHATE	149	250	2,000	—
BICARBONATE	260	—	—	—
		Child 20	—	—
NITRATE	4	Adult 120	—	—
FLUORIDE	0.4	15	5.0	—
CARBONATE	Not Determined	—	—	—
SODIUM	138	—	—	—
POTASSIUM	13	—	—	—
CALCIUM	65	100	—	—
MAGNESIUM	44	100	300	—
TOTAL DISSOLVED SALTS	883	3,000	8,000	1,000
RESIDUE ON EVAPORATION	—	3,000	8,000	1,000
pH <u>8.6</u>				

General remarks of Analysing Officer with particular reference to suitability of the water for the purpose for which it is stated to be required.

The above results are forwarded for your information.

Signature *[Handwritten Signature]*

Date 13-11-69

* 14.3 milligrams per litre equals 1 grain per gallon. 4375 gr in gallon



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10 DEC 1966

The General Manager,
Magellan Petroleum (N.T.) Pty. Ltd.,
G.P.O. Box 455,
PERTH, W.A. 6001

Dear Sir, West Waterhouse No. 1.

Enclosed for your information are the results of analyses by gas chromatography of two gas samples collected while blowing hole at 6,440 feet. The gas is thought to be from a small zone in an interval between 5,962 and 5,912 feet.

Also enclosed are the results of tests carried out on six water samples which you submitted together with the two gas samples referred to above.

Yours faithfully,

(N. H. FISHER) *per note*
Director

C.C.

The Area Manager,
Magellan Petroleum (N.T.) Pty. Ltd.,
P.O. Box 413,
ALICE SPRINGS, N.T. 5750

REFER TO	SEEN BY
	<i>[Signature]</i>
	STP
RECEIVED	
19 DEC 1969	
TO BE HANDLED BY	ANSWD OR HANDLED BY
GIVE DATE & REFERENCE	

WEST WAREHOUSE NO. 1

Analysis of two gas samples from 6448'
by gas chromatography

<u>Component</u>	<u>Sample No. 1</u> <u>% Mol. Vol.</u>	<u>Sample No. 2</u> <u>% Mol. Vol.</u>
Oxygen	14.4	14.4
Nitrogen	59.6	59.6
Carbon dioxide	0.95	0.90
Methane	22.9	22.9
Ethane	1.72	1.70
Propane	0.27	0.26
i - Butane	240 ppm	225 ppm
n - Butane	675 ppm	625 ppm
i - Pentane	175 ppm	175 ppm
n - Pentane	200 ppm	175 ppm
Hexanes	225 ppm	175 ppm
Heptanes and higher hydrocarbons	175 ppm	150 ppm

WEST WATERHOUSE NO. 1.
Water Analysis

<u>Sample depth</u> (feet)	<u>Resistivity</u> (ohm-meters at 20° C)	<u>Salinity</u> (ppm NaCl)	<u>pH</u>
1870	2.42	900	9.5
3600-3845	7.14	700	6.5
4226	6.96	580	6.5
5068	0.93	9400	6.5
5865	0.056	228,000	6.0
5895	0.058	210,000	6.0

APPENDIX 2

CORE DESCRIPTIONS

and

ANALYSES

CORE DESCRIPTIONS

Core No. 1 Formation: Pacoota Sandstone

Cored Interval: 5,912' - 5,929', cut 17', recovered 17'
(100%)

Coring Time: 9, 12, 9, 9, 6, 8, 10, 9, 14,
19, 27, 22, 21, 27, 37, 28, 27.

Dip appears to be approximately horizontal. No shows.

SANDSTONE

5,912.0' - 5,918.5' Light grey, very fine and fine
(6.5') grained, silty, with numerous
floating medium and coarse grains,
few medium grained stringers,
medium to poorly sorted, sub-
angular to sub-rounded, larger
grains rounded, orthoquartzitic,
tightly welded by secondary silica,
quartz grains show abundant second-
ary quartz overgrowths, traces of
pyrite and black rounded grains.
Thin black carbonaceous laminae,
partings and flecks in places.
Vertical fractures between 5,912'
and 5,913' filled with secondary
crystalline anhydrite.

SANDSTONE

5,918.5' - 5,929.0' As above, medium grained between
(10.5') 5,924.7 and 5,925.2', organically
reworked along many beds, numerous
worm tracks and trails on bedding
planes. Numerous black shaly bands
up to two inches thick, partings

and flecks. Numerous vertical fractures between 5,919' and 5,921' filled with secondary crystalline anhydrite, maximum fractured zone shows about three vertical fractures per four inches of core diameter which has broken the core into blocks along fracture planes and bedding planes. Less numerous vertical and horizontal fractures between 5,923' and 5,923.9'. A few similar fractures elsewhere.

Remarks:

Bedding is irregular with small scale slumping and cross-bedding. Dip measurements cannot be made accurately. Fluorescence along fracture planes is probably due to anhydrite. Sandstone is tight, but shows some fracture porosity.

Core No. 2

Formation: Pacoota Sandstone

Cored Interval: 6,520.00' - 6,520.25', cut 0.25', recovered 0.25' (100%).

Coring Time: 113

No accurate dip evaluation possible. No shows.

SANDSTONE

6,520.00 - 6,520.25'
(0.25')

Grey, fine to medium grained with some coarse grains, medium to poorly sorted, sub-angular to sub-rounded, orthoquartzitic, tightly welded by secondary silica, slightly dolomitic and calcareous,

slightly silty in part, numerous black grains and black shaly flecks, trace of pyrite.

One horizontal fracture at 1-1/2 inches from the top. A very thin undulating black shaly laminae is interbedded with the sandstone 1-1/4 inches from the top. Bedding is not apparent.

Sandstone has no intergranular porosity, but shows some porosity along one fracture plane.

Core No. 3 Formation: Pacoota Sandstone
 Cored Interval: 6,520.25' - 6,528.00', cut 7.75',
 recovered 7.66' (98.84%).
 Coring Time: 12 (part foot only), 47, 87, 115, 62,
 42, 44, 127.

Dip appears to be approximately horizontal. No show.

SANDSTONE

6,520.25' - 6,522.00' (1.75') Grey, dark grey, fine to medium grained with floating coarse grains and occasional larger grains greater than 1mm., medium to poorly sorted, sub-angular to sub-rounded, occasional larger rounded grains, silty and argillaceous in parts with black uneven shaly partings and thin laminae, very hard, well consolidated by interstitial silica, abundant secondary quartz overgrowths with scattered crystal

faces, numerous black mineral grains and black flecks of probable organic origin, very slightly calcareous, traces of pyrite.

Small scale cross-bedding.

Horizontal hairline fractures at 6,522.83' and 6,524.00'. Vertical hairline fractures between 6,522.75' and 6,522.91'.

SANDSTONE

6,522.00' - 6,526.50'
(4.50') Grey, dark grey, medium to coarse grained, as above. Slumped bedding between 6,525.41' and 6,525.91'. Few horizontal hairline fractures between 6,525.00' and 6,526.50'. Minor black shaly bands up to one inch thick between 6,524.33' and 6,524.75'.

SANDSTONE

6,526.50' - 6,528.00'
(1.50') Light grey to grey, very fine to fine grained, well to medium sorted, sub-angular to sub-rounded, orthoquartzitic, very hard, tightly welded by secondary silica, vitreous lustre, abundant pyrite aggregates in parts, few black uneven shaly partings and thin bands, traces of black mineral grains. Sandstone is organically

reworked in the upper half foot.
Numerous horizontal and vertical
hairline fractures below 6,527'.
Core is badly broken up between
6,527.08' and 6,527.58'.

Remarks:

Sandstone generally has no visible
intergranular porosity, except a
trace indicated between 5,526' and
6,526.50'. Some fracture porosity
shown.



COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

CNR, CONSTITUTION AVENUE AND ANZAC PARADE, CANBERRA

Postal Address: Box 378, P.O. Canberra City 2601

Telephone: 49 9111 Telegrams: Buromin Telex: 62109

In reply please quote:

69/1414
68/2032

20 JAN 1970

The Manager,
Magellan Petroleum Australia Ltd.,
4th Floor,
Bowman House,
Edward and Adelaide Streets,
BRISBANE. QLD. 4000.

Dear Sir,

West Waterhouse No. 1.

Please find enclosed the results of core analyses performed
on samples from cores 1 and 3 from the above well.

Yours faithfully,

N.H. Fisher(N.H. FISHER) *for*
Director

SEEN BY	
DATE	21 JAN 1970
RECEIVED BY	
GIVE DATE & PURCHASE	

CORE ANALYSIS RESULTS

NOTE: (i) Unless otherwise stated, porosities and permeabilities were determined on two plugs (V&H) cut vertically and horizontally to the axis of the core. Ruska porosimeter and permeameter were used with air and dry nitrogen as the saturating and flowing media respectively. (ii) Oil and water saturations were determined using Soxhlet type apparatus. (iii) Acetone test precipitates are recorded as Neg., Trace, Fair, Strong or Very Strong.

WELL NAME AND NO. WEST WATERHOUSE NO. 1

DATE ANALYSIS COMPLETED JANUARY 12, 1970

Core No.	Sample Depth		Lithology	Average Effective Porosity two plugs (% Bulk Vol.)	Absolute Permeability (Millidarcy)		Average Density (gm/cc.)		Fluid Saturation (% pore space)		Core Water Salinity (p.p.m. NaCl)	Acetone Test	Fluorescence of freshly broken core
	From	To			V	H	Dry Bulk	Apparent Grain	Water	Oil			
1	5914'		Sst; v. f. gr silty, mic	6.2	Nil	Nil	2.48	2.64	37	Nil	N.D.	Neg.	Nil
1	5928'		Sst; f. gr.	9.4	Nil	Nil	2.38	2.63	23	Nil	N.D.	Neg.	Nil
3	6522'		Sst; n. gr Sl. arg.	1.1	Nil	Nil	2.62	2.65	23	Nil	N.D.	Neg.	Nil
3	6526'		Sst; n. gr.	3.4	Nil	Nil	2.59	2.68	10	Nil	N.D.	Neg.	Nil

Remarks: - Core 2 - No sample.

General File No. ~~52/093~~ 69/1414
Well File No. 68/2032

APPENDIX 3

WIRELINE LOGS

WIRELINE LOGS

Wireline logs were run in West Waterhouse No. 1 on two occasions. Logs recorded are as follows:-

<u>Date</u>	<u>Log Type</u>	<u>Interval (feet)</u>
2/ 9/69	Induction-Electric	466' - 4,474'
	Acoustic Velocity- Gamma Ray-Caliper	Surface - 4,474'
6/10/69	Acoustic Velocity- Gamma Ray	4,480' - 6,515'
	Guard	4,480' - 6,500'
	FORxo-Caliper	4,480' - 6,500'

Good intergranular porosity is present in the Mereenie formation over the interval 3,540 to 3,960 feet as indicated by cuttings, wireline logs and water produced through perforations in the 9-5/8 inch casing. Porosity determination from wireline logs in the objective Stairway and Pacoota sandstones is generally low with a maximum average of 7.5 percent over the cleaner intervals in the lower Stairway and 9.5 percent in the cleaner Pacoota sandstones.

APPENDIX 4

DRILLSTEM TESTS

FLUID SAMPLER DATA				Date <u>7-10-69</u> Ticket Number <u>T 457930</u>					
Sampler Pressure _____ P.S.I.G. at Surface		Kind of Job <u>DST</u>		Halliburton District <u>Brisbane</u>		Tester <u>B. BORAIN</u> Witness <u>L. Anderson</u>			
Recovery: Cu. Ft. Gas _____		Drilling Contractor <u>ODTE. Rig 3</u>		EQUIPMENT & HOLE DATA					
cc. Oil _____		Formation Tested _____		Elevation _____ Ft.					
cc. Water _____		Net Productive Interval _____ Ft.		All Depths Measured From _____ Ft.					
cc. Mud _____		Total Depth <u>6520</u> Ft.		Main Hole/Casing Size <u>9 5/8</u>					
Tot. Liquid cc. _____		Drill Collar Length <u>147</u> I.D.		Drill Pipe Length _____ I.D.					
Gravity _____ ° API @ _____ °F.		Packer Depth(s) _____ Ft.		Depth Tester Valve _____ Ft.					
Gas/Oil Ratio _____ cu. ft./bbl.		RESISTIVITY		CHLORIDE CONTENT					
Recovery Water _____ @ _____ °F. _____ ppm		Recovery Mud _____ @ _____ °F. _____ ppm		Recovery Mud Filtrate _____ @ _____ °F. _____ ppm					
Mud Pit Sample _____ @ _____ °F. _____ ppm		Mud Pit Sample Filtrate _____ @ _____ °F. _____ ppm		Mud Weight _____ vis _____ cp					
TYPE		AMOUNT		Depth Back Pres. Valve		Surface Choke		Bottom Choke	
Cushion		Ft.		Ft.		Ft.		Ft.	
Recovered		Feet of							
Recovered		Feet of							
Recovered		Feet of							
Recovered		Feet of							
Recovered		Feet of							
Remarks <u>Hole in. Below Average condition. Drill collars get partially stuck while trying to set packer. pulled tool out of hole.</u>									
TEMPERATURE		Gauge No. <u>1907</u>		Gauge No.		Gauge No. <u>1906</u>		TIME	
Depth: <u>6528</u> Ft.		Depth: _____ Ft.		Depth: _____ Ft.		Depth: _____ Ft.		Hour Clock	
Est. _____ °F.		<u>24</u> Hour Clock		Blanked Off		<u>24</u> Hour Clock		Tool _____ A.M.	
Actual <u>153</u> °F.		Blanked Off <u>Yes</u>		Blanked Off		Blanked Off <u>No</u>		Opened _____ P.M.	
Pressures		Pressures		Pressures		Pressures		Tool _____ A.M.	
Field		Office		Field		Office		Closed _____ P.M.	
Initial Hydrostatic <u>3053.1</u>						<u>2690.8</u>		Reported _____ Minutes	
First Period Flow Initial								Computed _____ Minutes	
Flow Final									
Closed in									
Second Period Flow Initial									
Flow Final									
Closed in									
Third Period Flow Initial									
Flow Final									
Closed in									
Final Hydrostatic									

Legal Location: West Waterhouse
 Lease Name: 1
 Well No.: 1
 Test No.: 1
 Tested Interval: 6525
 County: Price Springs
 State: N.T.
 Lease Owner/Company Name: Mogellon Petroleum Corporation

	O. D.	I. D.	LENGTH	DEPTH
Reversing Sub	5"		1.00'	
Water Cushion Valve				
Drill Pipe			840.00'	
Drill Collars			147.13'	
Handling Sub & Choke Assembly			2.00'	
Dual CIP Valve			4.68'	
Dual CIP Sampler				
Hydro-Spring Tester			5.1'	5671
Multiple CIP Sampler				
Extension Joint				
AP Running Case			4.15'	6675
Hydraulic Jar			3.34'	
VR Safety Joint			2.32'	
Pressure Equalizing Crossover				
Packer Assembly	7 3/4"	1.75"		5091
Distributor				
Packer Assembly				
Flush Joint Anchor	5"		28.00'	
Pressure Equalizing Tube				
Blanked-Off B.T. Running Case				
Drill Collars				
Anchor Pipe Safety Joint				
Packer Assembly				
Packer Assembly				
Anchor Pipe Safety Joint	x Sub		3.27'	
Side Wall Anchor	x Sub		.75'	
Drill Collars	6"	2 3/4"	811.00'	
Flush Joint Anchor	x Sub	2 3/4"	.75'	
Blanked-Off B.T. Running Case	5"			6528

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EQUIPMENT DATA

LITTLE'S 22600 4/00-16.17.18

