PALM VALLEY #2

DOWNHOLE FLOW RECONFIGURATION/DRILL COLLAR PERFORATION REPORT

MAGELLAN

W.R. Arnold
October, 1995

WRA719.rad

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INTRODUCTION

A novel completion technique was employed during the drilling of Palm Valley #2 in February 1970. In anticipation of penetrating a significant gas flow, the 500 foot production hole section was mist drilled with a tubing completion above the drilling bottom hole assembly. Gas flows of approximately 4 MMSCFD were encountered in the lower Stairway, and upon penetration of a flow of approximately 70 MMSCFD in the top of the Pacoota P1, drilling was stopped and the well instantly completed by picking the bit off bottom, and landing the completion. A sliding sleeve just above the drilling BHA was opened, and the well was ready for production.

Palm Valley #2 has been the field's best well producing over 25 BSCF since 1983 with this original completion string; however, in early 1995 the well production rate started declining rapidly, and on one occasion died requiring a short blowdown to re-establish production. Minimum rate required to lift liquid analysis was performed, and suggested that due to the unique downhole configuration, the well was liquid loading.

Perforation operations were performed on 14 September, 1995 to attempt to improve the well's liquid lifting efficiency. By perforating the drill collar just above the non-return valve and allowing flow up through the drill collars, better lifting efficiency would be achieved due to higher flow velocity.

CONCLUSIONS

- Operational objectives were not fully achieved, yet the desired outcome was obtained. The program specified that two 15 foot perforation runs would be performed; however, after (probably during) the firing of the first gun, the gun became stuck and pulled off the wire at the cable head. The cable head, sinker bars, collar locator, and firing head were subsequently fished with slickline leaving the majority of the Enerjet strip in the well. Whereas this prevented the running of the programmed second gun, a large slug of water was lifted and production restabilised, thereby eliminating the need to perform the second gun run.

- In addition to achieving our main objective of establishing a constant production rate by eliminating liquid load up effects, an apparent "stimulation" has been achieved with production stabilizing at over 25 percent higher than the previous rate. It would seem that Palm Valley #2 was suffering from liquid loading effects for quite some time.

- Prior to perforating, a gamma ray log was acquired inside the drill collars over approximately 500 feet of previously unlogged wellbore. Due to sporadic tool noise, three logging passes were recorded and the log output was generated from the three passes.

- Based on the results of this operation on Palm Valley #2 and the current downhole configuration of Palm Valley #9, it is suspected that Palm Valley #9 may be suffering from a low liquid lifting efficiency problem. This will be looked at in close detail in the near future.

DISCUSSION

Well Previously Liquid Loaded

Analysis of the pre and post perforating production data (Figure 1) suggests that Palm Valley #2 was producing from a liquid loaded state. After perforating, the well produced back a four barrel slug of water. Gas production stabilized at a higher rate, and after producing back the initial slug, water-gas ratio (bbls water/MMSCF) restabilized at the same as before. These results suggest that the well was liquid loaded, rather than suffering a produced water lifting efficiency problem. Had this well previously unable to efficiently lift produced liquid, then an increase in water-gas ratio would have been expected with the improved downhole configuration. As this has not occurred, it is felt that the well was liquid loaded.

Of the four barrel slug of water produced immediately after perforating, approximately two barrels of this water were standing inside the drill collars before perforation, the other two barrels must have come from the borehole/drill collar annulus. This water was possibly held in irregularities in the borehole wall, suspended in low flow velocity regions, or as a standing column on the borehole bottom. Figure 2 and 3 show the well flow stream configurations before and after the perforation.

Gamma Ray Log

As stated above, a gamma ray log was acquired inside the drill collars over approximately 500 feet of previously unlogged wellbore. This log has been handed over to Martin Berry to be incorporated into the Palm Valley log data set. Preliminary inspection has shown the previously estimated formation tops were estimated to within ± 2 feet.

Possible Liquid Lifting Inefficiency in Palm Valley #9

Given the similar downhole configuration of Palm Valley #9 (Figure #5) and its current water production, it is suspected that this well may be suffering a liquid lifting efficiency/liquid loading problem. Although the downhole configuration is slightly different to that in the pre-perforation Palm Valley #2, liquid problems are a possibility. This will be looked at in detail in the near future.

FIGURES

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FIGURE 1

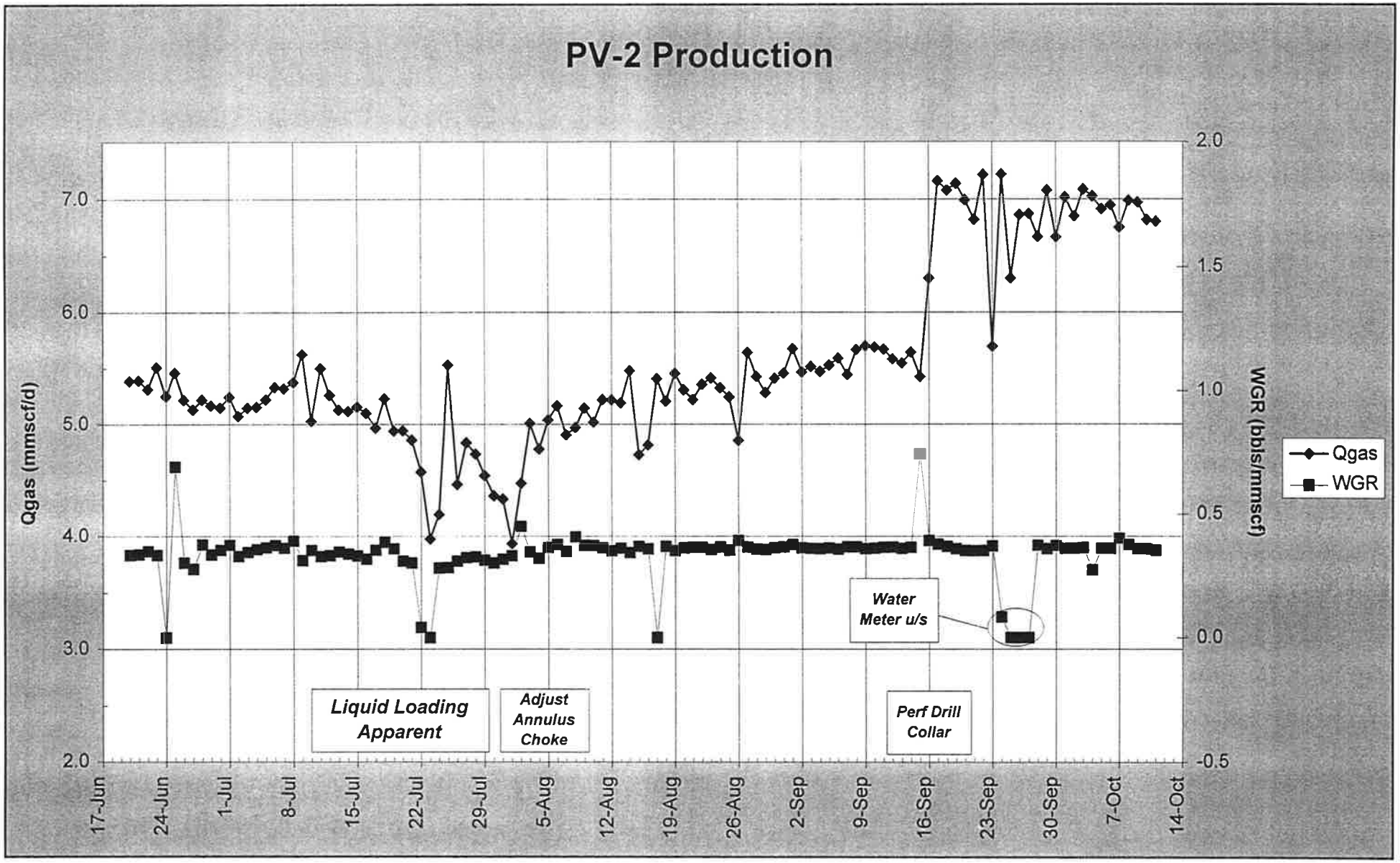

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FIGURE 2

Palm Valley #2 Drill Collar Perforation
Pre Job Downhole Flow Configuration

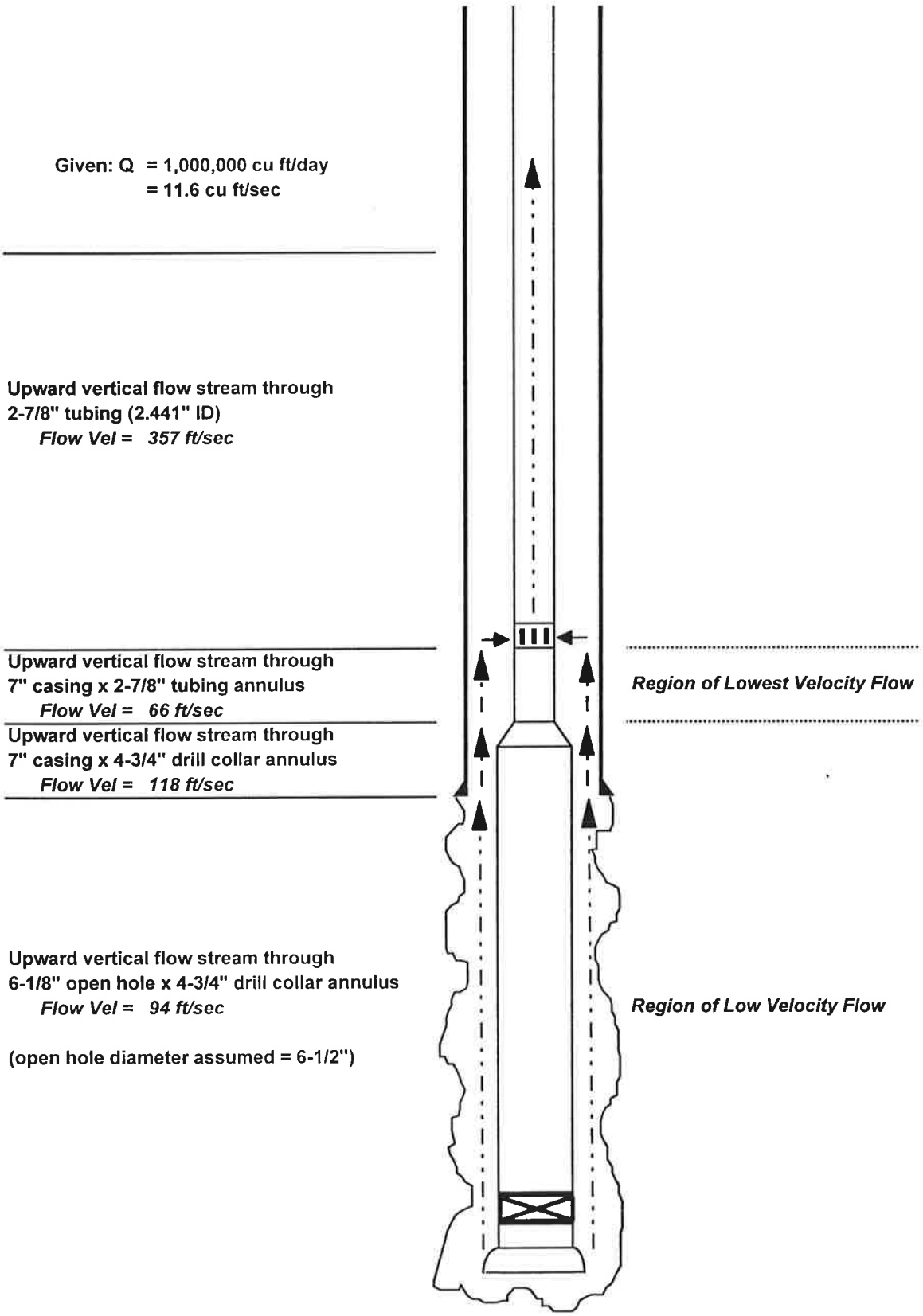

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FIGURE 3

Palm Valley #2 Drill Collar Perforation
Post Job Downhole Flow Configuration

Given: Q = 1,000,000 cu ft/day
= 11.6 cu ft/sec

Upward vertical flow stream through
2-7/8" tubing (2.441" ID)
Flow Vel = 357 ft/sec

Upward vertical flow stream through
4-3/4" drill collars (2-1/4" ID)
Flow Vel = 357 ft/sec

Downward vertical flow stream through
6-1/8" open hole x 4-3/4" drill collar annulus
(liquid flow assisted by gravity)
Flow Vel = 94 ft/sec

(open hole diameter assumed = 6-1/2")

Downward vertical flow stream through
6-1/8" open hole x 4-3/4" drill collar annulus
Flow Vel = 94 ft/sec

(open hole diameter assumed = 6-1/2")

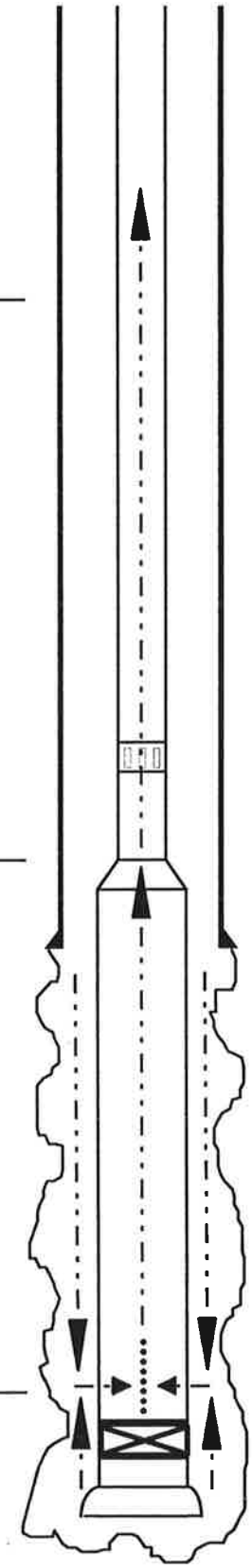

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FIGURE 4

DOWNHOLE COMPLETION

Palm Valley #2

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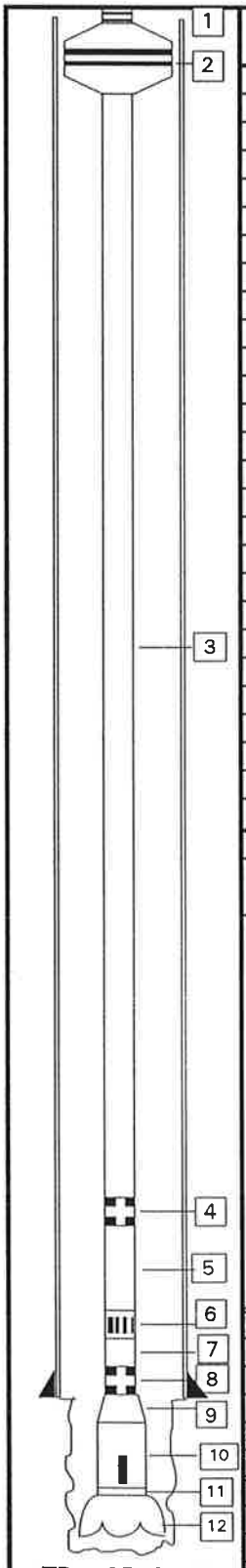

ITEM	DESCRIPTION	LENGTH (ft)	DEPTH KB (ft)	MIN. ID (in)
1	K.B. to top of tubing spool			
2	Tubing Hanger, Cameron 'HB-A', 2-7/8" EUE x 4-1/2" top			
3	192 jts Tubing, 2-7/8" 6.5# N80 EUE			
4	Landing Nipple, Otis type 'X', 2-7/8" EUE		6045.00	2.313
5	3 jts Tubing, 2-7/8" 6.5# N80 EUE			
6	Sliding Sleeve, Otis type 'XO' 2-7/8" EUE - **CLOSED**		6140.00	2.313
7	6' Pup jt, 2-7/8" 6.5# N80 EUE			
8	Landing Nipple, Otis type 'N', 2-7/8" EUE		6149.00	2.205
9	Cross-over swedge, 2-7/8" x 4-3/4"			
10	13 Drill Collars, 4-3/4" x 2-1/4"		6152.00	
11	Bit sub with float valve		6520.00	0.000
12	1 Drill Collars, 4-3/4" x 2-1/4"			
13	Bit, 6-1/8" OD *Bit bottom*		6545.58	
	16' Enerjet strip left in hole -- Last tagged at 6353' KB			

PERFORATION INTERVALS

FORMATION	INTERVAL (FT / KB)	GUN: SIZE	GUN: TYPE	GUN: PHASE	GUN: SPF	CHARGES: TYPE	CHARGES: WT(g)
lower Stairway	Openhole						
Horn Valley	Openhole						
Pacoota P1	Openhole						
Drill Collars (16/Sep/95)	6501 - 6515	1-11/16	E-jets	0	6	RDX	7

REMARKS: Perforated collars above float valve, and closed sliding sleeve to improve water lifting capacity of well

ANNULUS FLUID: annulus live and on production

PRODUCTION CASING\HOLE: 7" 23# J55 LT&C csg to 6054' \ 6-1/8" open hole to 6559

CALCULATED STRING WEIGHT:

SLACK-OFF WEIGHT:

TENSION:

NOT TO SCALE	WELLSITE SUPERVISOR	William R. Arnold	
PROPOSED:	DATE OF INSTALLATION		
RE-COMPLETION: 18-Sep-9	DRAFTED:	DATE:	
COMPLETION: 5-Feb-70	REVISED:	DATE:	
OTHER:			

FIGURE 5

DOWNHOLE COMPLETION

Palm Valley #9

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ITEM	DESCRIPTION	LENGTH (ft)	DEPTH KB (ft)	MIN. ID (in)
1	K.B. to top of tubinghead spool			
2	Tubing Hanger, Cameron type FBB-EN			
3	Tubing, 2-7/8" 6.5# N80 EUE			
4	Sliding Sleeve, Baker type CMD, 2-7/8" EUE		7204.01	2.31
5	Tubing, 1 jt, 2-7/8" 6.5# N80 EUE			
6	X-over, 2-7/8" EUE x DC threads		7239.74	
7	2 x Drill Collars, 4-1/2" x 2"		7300.66 bottom	
	Fish in Hole			
A	3 x Drill Collars, 4-1/2" x 2"		7302.14 top	
B	Bit Sub			
C	Tri-cone bit, 6" Hughes J3		7395.97 bottom	
	Fish is setting on a fill of carbonate chips at 7396' KB, and is filled with same up to 7308' KB			

PERFORATION INTERVALS

FORMATION	INTERVAL (FT / KB)	GUN: SIZE	GUN: TYPE	GUN: PHASE	GUN: SPF	CHARGES: TYPE	CHARGES: WT(g)
Pacoota P2	Open Hole						

REMARKS: External casing packers were utilized, providing a cement free annulus from 7239.7' to TD.

ANNULUS FLUID:

PRODUCTION CASING\HOLE: 7" csg to 7324', 8-1/2 " hole to TD.

CALCULATED STRING WEIGHT:

SLACK-OFF WEIGHT:

TENSION:

NOT TO SCALE	WELLSITE SUPERVISOR		
PROPOSED:	DATE OF INSTALLATION		
RE-COMPLETION:	DRAFTED:	DATE:	
COMPLETION: 16-Jun-93	REVISED:	DATE:	

ALL DEPTHS ARE MEASURED DEPTHS - THIS WELL IS DEVIATED

APPENDIX

Daily Reports

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MAGELLAN PETROLEUM AUSTRALIA LTD.
DAILY WELL SERVICE REPORT

Well Palm Valley #2	Date 15/Sep/95	Time 07:00	Report 1

Rig	
Move in Date	14-Sep-95
Days Operating	1
Daily cost	7291
Total cost	7291

Present operations	Fishing perforating gun #1
Future operations	Continue fishing

Last casing		set at		ft KB
Slow pump rate Pump #1		psi @		SPM
Pump #2		psi @		SPM

FLOW TESTING

Time	Pressure	Choke	Est. Rate

COMPLETION FLUID

Type	
Weight	
KCl	
NaCl	
Inhibitor	
Other	
Comment	
Vol pumped	
Vol lost	
Cum. lost	

FILTERS

VISCOUS PILLS

Type	
Vol	
Buffer	
Other	
Comment	

LOGGING

Tool	From (KB)	To (KB)
GR/CCL	6520	5900

FUEL

	On Hand	Used
Rig		
Camp		

WATER

	On Hand	Used
Rig		
Camp		

WEATHER

PERFORATING

	INTERVAL		GUN DESCRIPTION				
Formation	From (KB)	To (KB)	Type	OD	Phasing	SPF	Chg weight
4-1/2" Drill Collars (Pacoota P1)	6503	6518	Enerjets	1-11/16"	0 degrees	6	7 gm

PERSONNEL ON-SITE

Magellan	Three
Rig Contractor	
Completion Fluid	
Electric Line	Two
Slick Line	One
Stimulation	
Cementing	
Testing	
Other	
Crane	One

BOP DRILL & SAFETY

Pit drill?	Y N	Time	
Trip drill?	Y N	Time	
Safety Meeting			

ACCIDENTS

COMMENTS

Report by William R Arnold

MAGELLAN PETROLEUM AUSTRALIA LTD.
DAILY WELL SERVICE REPORT

Well Palm Valley #2	Date 15/Sep/95	Time 07:00	Report 1

COMPLETION DESCRIPTION AS RUN IN WELL

Item No.	Description	OD	ID	Thread	Length	Serial No.

ACTIVITY REPORT

TIME LOG			
From	To	Hours	Activity Description
7:00	9:00	2.00	Travel Alice Springs - Palm Valley
9:00	9:30	0.50	Arrive on location. Schlumberger commence rigging up.
9:30	12:15	2.75	Crane arrive on location. Schlum m/u 1-11/16" GR/CCL log. Load into lubricator.
12:15	12:32	0.28	Pressure test lub to FTHP = 9605 kPa. Zero tool at crown valve.
12:32	13:15	0.72	RIH w/ GR/CCL with well flowing.
13:15	15:00	1.75	Tag float valve in 2-1/4" drill collars at 6520'. Noisey tool response, therefore perform 3
			logging passes between tag & 5900' and will splice good sections together.
15:00	15:20	0.33	POOH GR/CCL
15:20	15:55	0.58	Respool 1000' of line due to large loops formed. Continue POOH GR/CCL.
15:55	17:00	1.08	Tool at surface. Depressure lub & break out GR/CCL. M/U gun #1 and load into lub. RIH.
17:00	17:40	0.67	Correlate on depth. Pick up 2' off tag depth of 6520'.
17:40	17:45	0.08	FTHP = 9530 kPa. Fire gun #1 - OK.
17:45	17:49	0.07	Attempt to POOH gun #1. Stuck. No movement with 1000 lbs pull (2/3 of weak point)
17:49	18:20	0.52	FTHP = 9480 kPa. Continue working wire up to 1000 lbs pull. No movement of gun.
18:20	18:30	0.17	Continue working wire up to 1100 lbs pull. No movement of gun. Choke back well.
18:30	19:10	0.67	Increase overpull until weak point pulled. POOH.
19:10	21:45	2.58	Rig down Schlum. Crane & truck retrieve slickline unit from PV#6B. Rig up slickline.
21:45	22:15	0.50	M/U fishing tool & load into lub. P. Test lub. Shut in well to allow fishing tool to drop. RIH.
22:15	22:50	0.58	Latch fish. Work fish, jarring up & down. Fishing tool periodically slipping off. No movement.
22:50	23:08	0.30	Open well back up. Continue to work fish, no movement.
23:08	23:20	0.20	POOH. SDFN.

TIME DISTRIBUTION

Rig Move		Circulating		Tripping		P Test	
Rig up/dwn	6.5	NU/ND WH		E Line	5.25	Flow	
Mix brine		NU/ND BOP		Swab		Kill	
Milling		Fishing	3	Repair			2

OTHER COMMENTS

Well flow dropped after perforating until after lifting a 2.8 bbl slug of water. Average gas flow rate has been 7550 m^3/hr (6.4 mmscfd) over last four hours.

MAGELLAN PETROLEUM AUSTRALIA LTD.
DAILY WELL SERVICE REPORT

Well Palm Valley #2	Date 16/Sep/95	Time 07:00	Report 2

COMPLETION DESCRIPTION AS RUN IN WELL

Item No.	Description	OD	ID	Thread	Length	Serial No.

ACTIVITY REPORT

TIME LOG			
From	To	Hours	Activity Description
9:30	10:00	0.50	Arrive on location. Shut in well. Rig up slickline. Required fishing tools will arrive Sat am.
10:00	10:43	0.72	Load 'B' shifting tool into lubricator. Pressure up lub and RIH. Attempt to close sleeve,
			tool sheared through. POOH to inspect tool.
10:43	11:10	0.45	Tool at surface - pin sheared. Re-pin tool with stronger stock and RIH.
11:10	11:25	0.25	Shift sleeve closed. Confirm closed by passing through sleeve several times. POOH.
11:25	11:35	0.17	Tool at surface - unsheared, therefore sleeve closed.
11:35	11:45	0.17	Open well on tubing only (100% choke).
11:45	14:37	2.87	Monitor well. See table on page one.
14:37	18:00	3.38	Open annulus to flow. Monitor well. See table on page one.

TIME DISTRIBUTION

Rig Move		Circulating		Tripping		P Test	
Rig up/dwn		NU/ND WH		E Line		Slickline	2
Mix brine		NU/ND BOP		Swab		Kill	
Milling		Fishing		Repair			10

OTHER COMMENTS

ENCLOSURE

Perforation/Gamma Ray Log

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