PR 83-37

MAGELLAN PETROLEUM AUSTRALIA LIMITED

BLUEBUSH NO. 1

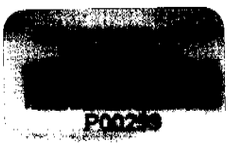
O.P. 189 NORTHERN TERRITORY

FINAL WELL REPORT

BY

R.M. BELL

AUGUST, 1983



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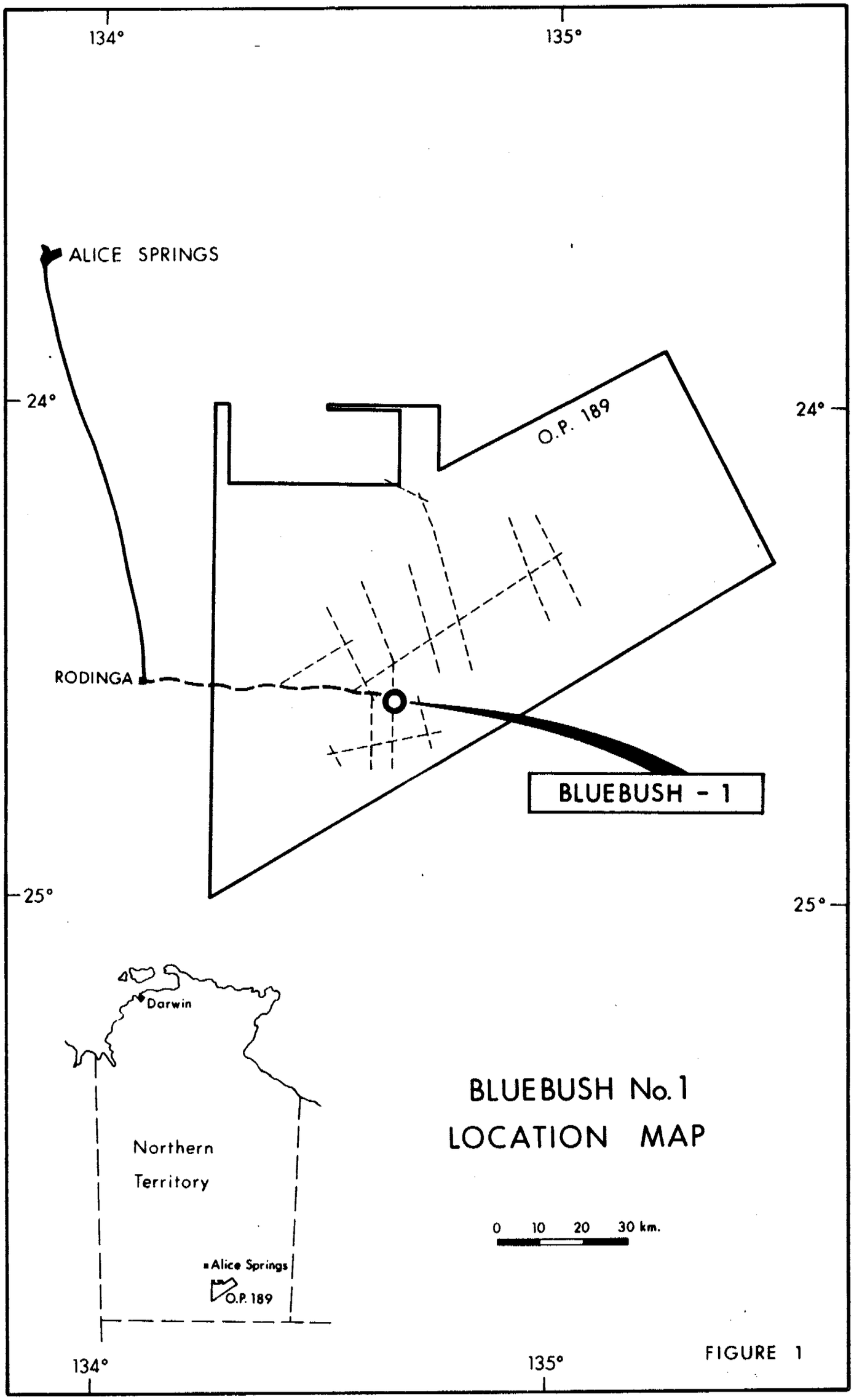

BLUEBUSH No. 1
LOCATION MAP

FIGURE 1

SUMMARY

1.1 Drilling

The Bluebush No. 1 well, located approximately 125 kilometres southeast of Alice Springs in O.P. 189, Northern Territory, was spudded on May 10, 1983. The hole was drilled to a total depth of 6,857 ft. using the OIME SL-750 rig and plugged and abandoned on June 19, 1983. The well has been converted to a water well.

A 17-½" hole was air drilled to 159 ft. and a 15" conductor pipe set and cemented at this depth. A 13-½" hole was drilled with air, mist, foam, and aerated water to 2,425 ft. Considerable problems were encountered in the upper part of the hole and it was only after several days of remedial treatment involving the emplacement of several cement plugs, gravel packing and the use of polymer gel plugs that 10-3/4" casing could be set at 2,418 ft.

It was intended to run wireline logs prior to running casing but deteriorating hole conditions made the use of these tools inadvisable.

A 9-7/8" hole was air drilled to 5,313 ft. at which depth a diamond core was cut in the Pertatataka Formation. Drilling resumed to 6,850 ft. using a 7-7/8" bit. At this depth, the hole was filled with a salt saturated polymer mud and a bottom hole diamond core cut from 6,850 ft. to 6,857 ft. Total depth of 6,857 ft. was reached on June 18, 1983.

Wireline logs were run from total depth to the 10-3/4" casing shoe and a gamma ray log run to surface. Geodex carried out a well velocity shoot and as no hydrocarbons had been encountered, the well was plugged and abandoned. The 10-3/4" casing was

perforated between 425 ft. and 445 ft. for future use as a water well. The rig was released at 0600 hours on June 19, 1983.

1.2 Geology

Bluebush No. 1 was drilled to test an anticlinal feature delineated by the Camel Flat seismic survey carried out by Magellan Petroleum in 1981. The seismic results defined a large salt cored structural trap with 85 square kilometres indicated aerial closure and 150 metres of vertical closure at Arumbera level. Potential reservoir sands within the Arumbera Sandstone were expected to be sealed by a thick Chandler Formation salt sequence. The Arumbera Sandstone outcrops 40 kilometres north of the Bluebush No. 1 location and consists of shales, clastic sediments deposited under marine and terrestrial conditions. Good porosities and permeabilities are known to be present in the fluvial sheet sands which have produced gas at up to 5 MMCFGD during drill stem testing in the Dingo No. 1 well 83 kilometres WNW of the Bluebush location. A secondary target was the Bitter Springs Formation which produced minor hydrocarbon shows in the Mt. Charlotte No. 1 well 78 kilometres WSW of the Bluebush location.

Unfortunately the Arumbera Sandstone was not present in the section penetrated in Bluebush No. 1 and no hydrocarbon shows were encountered. Correlation of the upper part of the well is conjectural at this stage as a full log suite was not obtained. It does, however, appear that at least some Goyder Formation could be present. The Chandler Formation salt sequence was thicker than anticipated. The bottom hole core taken in the Gillen Formation had negligable dips and there may be little or no structure related to movement of the Bitter Springs salt at this location.

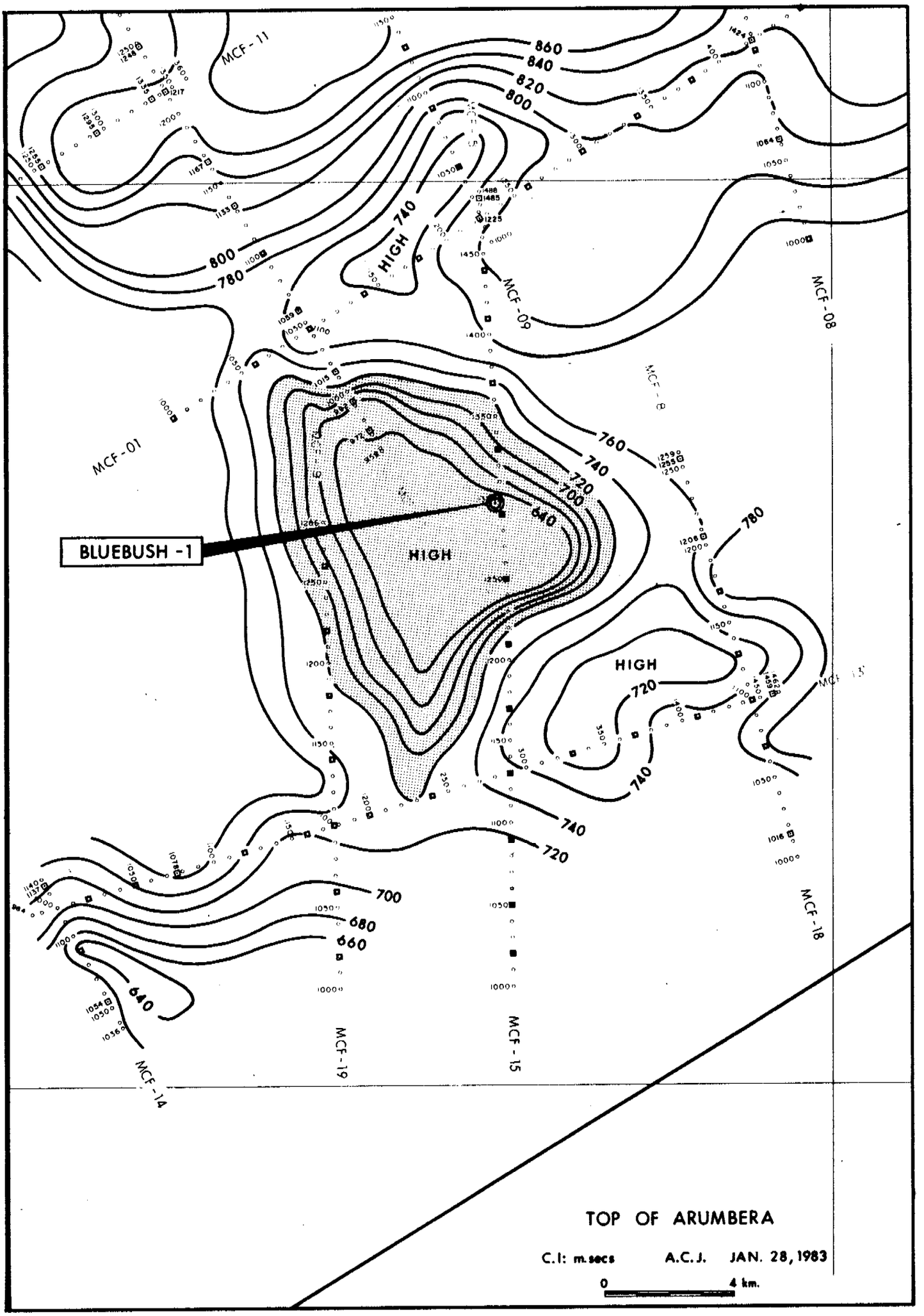
MCF - 11
MCF - 01
MCF - 09
MCF - 08
MCF - 18
MCF - 19
MCF - 15
MCF - 14
BLUEBUSH - 1
HIGH
HIGH
HIGH
860
840
820
800
780
760
740
720
700
680
660
640
TOP OF ARUMBERA
C.I: m.secs
A.C.J. JAN. 28, 1983
0
4 km.

FIGURE 2

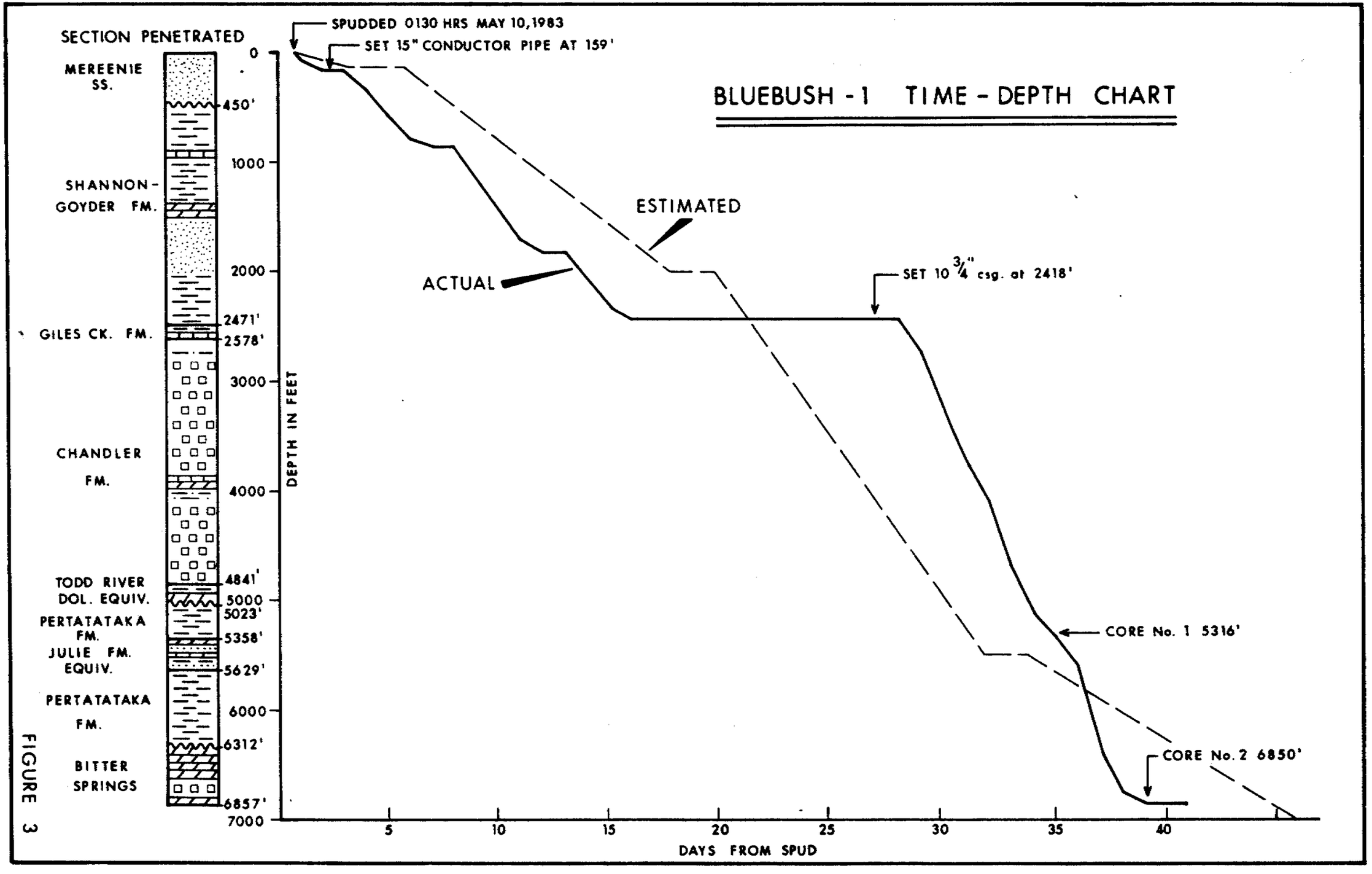
SECTION PENETRATED
MEREENIE SS.
SHANNON - GOYDER FM.
GILES CK. FM.
CHANDLER FM.
TODD RIVER DOL. EQUIV.
PERTATATAKA FM.
JULIE FM. EQUIV.
PERTATATAKA FM.
BITTER SPRINGS
0
450'
1000
2000
2471'
2578'
3000
4000
4841'
5000
5023'
5358'
5629'
6000
6312'
6857'
7000
DEPTH IN FEET
SPUDDED 0130 HRS MAY 10,1983
SET 15" CONDUCTOR PIPE AT 159'
BLUEBUSH - 1 TIME - DEPTH CHART
ESTIMATED
ACTUAL
SET 10 3/4" csg. at 2418'
CORE No. 1 5316'
CORE No. 2 6850'
5
10
15
20
25
30
35
40
DAYS FROM SPUD

FIGURE 3

INTRODUCTION

Bluebush No. 1 was drilled by Magellan Petroleum Australia Limited to determine the stratigraphy and hydrocarbon potential of a large salt-cored anticlinal structure on the southern flank of the Camel Flat syncline.

Wellsite operations were supervised by Mr R. Bell, Wellsite Geologist; Mr J. Hodgkinson and Mr K. Skirka, Drilling Supervisors; under the overall supervision of Mr D. Benbow, Operations Manager in Brisbane.

WELL HISTORY

3.1 General Data

Name:	Bluebush No. 1
Operator:	Magellan Petroleum Australia Limited, 8th Floor, National Australia Bank Building, 420 George Street, BRISBANE 4000
Tenement Holder:	Coastal Caribbean Oils & Minerals Ltd., c/- 8th Floor, National Australia Bank Building, 420 George Street, BRISBANE 4000
Petroleum Tenement:	Oil Permit No. 189, Northern Territory
Location:	Latitude 24° 35' 15" S Longitude 134° 39' 00" E
Elevation:	Ground Level 1,140 ft. (347 metres) Kelly Bushing 1,160 ft. (353 metres)
Total Depth:	6,857 ft. (2,090 metres)
Drilling Commenced:	0130 hours May 10, 1983
Rig Released:	0600 hours June 19, 1983
Drilling Time to Total Depth:	39 days
Status:	Plugged and abandoned, converted to a water well.
Total Cost:	$1.64 million (est. 21/6/83)

3.2 Drilling Operations

A 17-½" hole was air drilled from surface to 159 ft. using a Hughes OSC 1GJ bit. An air hammer was required from 65 ft. to 159 ft. At this depth 15" conductor pipe was run and cemented to surface.

After drilling out the conductor pipe, 13-½" hole was drilled with air mist and aerated water to 2,425 ft. using three Hughes X33 bits. The section from 160 ft. to 615 ft. caused problems after each trip for a new bit and it was necessary to ream several bridges and tight spots.

Water influx increased from a small amount at 225 ft. to 500 to 600 barrels per hour when drilling ceased at 2,425 ft. Standing water level was approximately 350 ft. The section penetrated had dips thought to be in excess of 30° to approximately 850 ft. The high water flows eroded the softer zones leaving the more resistant bands as ledges on the low side of the hole on which the bit was hanging up. Hole deviation was regularly checked and kept to a minimum by using a low weight on the bit but even a 2° to 3° deviation was sufficient to aggravate this problem.

At 2,425 ft. the water in the lower part of the hole was displaced with a fresh water gel mud prior to running wireline logs and running 10-3/4" casing. Several attempts were made to run wireline logs but it was not possible to get below 160 ft., immediately below the conductor pipe. An attempt to run the 10-3/4" casing also failed at this depth.

Several days were spent attempting to ream the 13-½" hole and return to 2,425 ft. Two 12-¼" square drill collars and a 13-½"

reamer were added to the bottom hole assembly in an effort to clean up the upper part of the hole. Attempts to ream past 422 ft. were unsuccessful and it was decided that the section above this depth should be repaired, if possible, before attempting to clean to bottom.

Three 100 sack cement plugs were run at 200 ft. The first two plugs could not be located but the third plug gave an apparent rise of 6 ft. This plug could not be located after running back into the hole. The hole was then reamed from 165 ft. to 213 ft. and three more 100 sack plugs set at 207 ft., 213 ft. and 209 ft. Lost circulation material was then run above 209 ft. (21 sacks HySeal and 22 sacks Kwik Seal). A 100 sack cement plug was then run at 198 ft. Two 20 barrel plugs of Pal-Mix 110R were then run at 198 ft. and 178 ft. Lost circulation material in the form of cotton husks was then run in the hole. A 100 sack cement plug was then run at 197 ft. followed by more cotton husks. After wiping the L.C.M. to bottom, a 30 barrel plug of Pal-Mix was run at 197 ft. The hole was reamed from 197 ft. to 208 ft. and blown dry. Open end pipe was run in the hole and gravel poured down the annulus. A 50 sack cement plug was run in the gravel at 203 ft. More gravel was added and further cement plugs of 50 or 75 sacks run at 195 ft., 193 ft., 183 ft., 175 ft., 157 ft., and 161 ft. Cement was tagged at 160 ft. but the hole would not hold fluid. More gravel was added to the hole and further cement plugs of 50 sacks or 25 sacks run at 160 ft., 155 ft., 152 ft., and 152 ft. The top of the cement was tagged at 145 ft. The cement was drilled out to 165 ft. at which depth circulation was lost. A 10 barrel Pal-Mix plug was set at 155 ft.

A 13-½" hole was reamed from 165 ft. to 891 ft. occasionally pumping water without returns to wash the bit down. The bit

was then run into 2,425 ft. reaming occasional tight spots. While pulling the bit, fresh water gel mud pills were spotted at 1,400 ft. and 900 ft.

No attempt was made to run wireline logs at this stage as it was considered expedient to run casing before any further hole deterioration occurred. There was also danger of getting a tool stuck, particularly one with a caliper device.

Considerable difficulty was experienced in running the 10-3/4" casing. As with the bit, this tended to hang up on ledges and had to be rotated past these using the make-up tongs. Difficulty was experienced from 220 ft. to 900 ft. It was necessary to circulate the casing down through 80 ft. of fill to reach the required depth of 2,418 ft. The casing was cemented with 375 sacks at the bottom and the annulus cemented with 65 sacks above a petal basket set at 136 ft.

Blow out preventors were installed pressured tested to 1000 PSI and the casing drilled out with a 9-7/8" Hughes J22 bit.

A 9-7/8" hole was drilled with dry air to 5,316 ft. at which depth a 14 foot diamond core was cut. Hole size was then reduced to 7-7/8" and a Hughes J33 bit used to air drill to 6,850 ft. At this depth, the hole was filled with a salt saturated polymer mud and a 7 foot bottom hole diamond core cut to 5,857 ft. Wireline logs and a velocity survey were then run. The 10-3/4" casing was perforated from 425 ft. to 445 ft. and abandonment cement plugs set at 5,270 ft., 2,295 ft., and 600 ft. The rig was released at 0600 hours on June 19, 1983.

3.3. Drilling Data

Rig Data:

Drilling Contractor:	Mereenie Joint Venture		
Drilling Plant:	Make:	O.I.M.E.	
	Type:	Model SL-5 (SL-750)	
	Rated Capacity:	12,500 ft. with 4-½" O.D. drill pipe	
	Motors:	3 - Caterpillar D-3408 (compounded) 385 B.H.P. each	
Mast:-	Make:	Parco Model P-131	
	Type:	Cantilever	
	Rated Capacity:	550,000 lbs (10 lines)	
Pumps:-	Make:	2 - Continental Emsco Triplex	
	Type:	F-800 - V-belt driven from compound	
	Size:	6-3/4" x 9"	
Rotary Table:-	Make:	IDECO LR-275 (27-½")	
	Capacity:	570 tons dead load	
Blowout Preventors:-	Make:	Cameron	Cameron
	Model:	"U" Double Gate	"D" Annular
	Size:	13-5/8"	13-5/8"
	Rating (PSI):	5000	5000
Choke Manifold:-	Make:	McEvoy	
	Size & Type:	3" - 5000 PSI W.P. choke and kill with one positive and one adjustable choke and Cameron 3" - 5000 H.C.R. flanged valve	
Mud Tanks:-	Size & Capacity:	3 tank system - returns, settling and suction - Total capacity: 777 barrels	
Shale Shaker:-	Make:	Brandt	
	Type:	Single dual screen	
Mud Mixers:-	Make:	4-Brandt heavy duty	
	Type:	32" blade - electrically driven	
Desander:-	Make:	DEMCO	
	Model:	84, comprising 4 x 8" cones	
	Capacity:	540 to 700 GPM electrically driven	

Desilter:-	Make:	DEMCO
	Model:	412-H, comprising 12 x 4" cones
	Capacity:	960 to 1080 GPM electrically driven
Drill Pipe:-	4-½" O.D. 16.6 lbs/ft. API Grade "E" - EUE. Seamless range 2 - 18° taper, internally coated with 6-¼" O.D. by 3-½" tool joints, hardbanded, 4-½" x H connections	
Drill Collars:-	6 x 8" O.D. 2-13/16" I.D. x 31 ft. 6-5/8" reg. connections	
	12 x 7" O.D. 2-13/16" I.D. x 31 ft. 4" I.F. connections	
	27 x 6-½" O.D. 2-¼" I.D. x 31 ft. 4" I.F. connections	
	3 x 4-1/8" O.D. 2" I.D. x 31 ft. 3-½" reg. connections	

Air Drilling Equipment

Air Compressors:-	Make:	3 only Sullair units
	Model:	900/250 D.U.
	Capacity:	900 CFM at 250 PSI each
Air Compressor booster:-	Make:	Knigh Industries
	Model:	K.O.A. Model 2
	Capacity:	245 PSI inlet and 1400 PSI discharge at 1500 CFM
Diverter:-	Make:	Shaffer
	Model:	Type 79 rotating BOP
	Size:	13-5/8"
	Rating:	3000 PSI
Injection Pumps:-	Make:	2 only "LATO"
	Model:	LATO L421D
	Capacity:	6 GPM at 2135 PSI each Powered by Lombardini diesel engines

Hole Size:

17-½" hole:	Surface to 159 ft.	(0 - 48 metres)
13-½" hole:	159 ft. to 2,425 ft.	(48 - 739 metres)
9-7/8" hole:	2,425 ft. to 5,316 ft.	(739 - 1,620 metres)
7-7/8" hole:	5,316 ft. to 6,850 ft.	(1,620 - 2,088 metres)
7-27/32" hole:	6,850 ft. to 6,857 ft.	(2,088 - 2,090 metres)

Casing Details:

Conductor Pipe

15" O.D. ¼" wall welded conductor pipe run to 159 ft. The conductor pipe was cemented with 120 sacks "Class A" cement plus 3% calcium chloride. Cement u-tubed and the top of cement was tagged at 70 ft. inside the conductor pipe. The annulus was filled to surface with 30 sacks "Class A" cement plus 3% calcium chloride.

Surface Casing Details

Ran 62 joints (2,401 ft.) of 10-3/4" O.D. 40.5 lb/ft. grade H-40 short thread and coupling, range 3 casing. Landed at 2,418 ft. and cemented with 200 sacks construction cement plus 8.5 gallons econolite and 100 lbs CFR 2 (slurry weight 14.0 lbs/gal.). This was tailed with 175 sacks "Class A" cement plus 100 lbs CFR 2 (slurry weight - 15.6 lbs/gal.).

A petal basket was run on casing joint no. 60 (136 ft.) and the annulus cemented to surface with 75 sacks "Class A" cement.

The cement in the casing was displaced with 234 barrels of water and the plug bumped with 650 PSI. No centralizers or scratchers were used.

Drilling Fluids:

Air was used to drill the 17-½", 13-½", 9-7/8", and 7-7/8" hole to 6,850 ft. Air injection rates were 1,800 cubic feet per minute or 2,700 cubic feet per minute depending on whether two

or three primary compressors were used. The booster compressor was used when needed to meet pressure requirements. At 6,850 ft., the hole was filled with a salt saturated, 7% KCl, polymer mud which was used while cutting diamond core no. 2 to 6,857 ft., running wireline logs and setting abandonment plugs.

From surface to 159 ft. a stiff foam was used. Foam was used to drill the 13-½" hole to 245 ft. at which depth a minor water influx necessitated the change to air-mist drilling. Due to a substantial increase in water influx below 425 ft., the 13-½" hole was effectively drilled with aerated water from this depth to casing point at 2,425 ft. Water influx was estimated at 60 barrels per hour at 425 ft. This increased to: 300 barrels per hour from 600 ft. to 1,000 ft.; approximately 400 barrels per hour from 1,000 ft. to 1,700 ft. and from 500 to 600 barrels per hour from 1,700 ft. to 2,425 ft.

The water in the basal part of the 13-½" hole was displaced with a fresh water gel mud prior to attempting to run wireline logs and 10-3/4" casing. This mud had a weight of 8.6 lbs per gallon, a viscosity of 40, and a PH of 9.5.

After drilling out from the 10-3/4" casing and blowing the hole dry, air was used to drill 9-7/8" hole to 5,316 ft. Very minor water influx occurred from 2,425 ft. to 2,478 ft. but only after the air compressors were shut down for several minutes for deviation surveys were the cuttings slightly damp. Good dust returns were normally obtained.

From 5,316 ft. to 6,850 ft. the 7-7/8" hole was drilled using dry air. Good dust returns were maintained.

At 6,850 ft., the hole was filled with a salt saturated polymer mud. This was used while cutting a bottom hole core, running

wireline logs and setting abandonment plugs. A stock of 700 barrels of salt saturated polymer mud had been mixed and maintained from 3,000 ft.; after entering the Chandler Formation salt section, in case water bearing formations were encountered.

The mud properties while running wireline logs are listed below:

Weight:	10.0
Viscosity:	44
Filtrate API:	5
Wallcake:	½mm
Solids:	13%
PH:	9.0
Chloride:	180,000
KCL:	7%

Bit Record:

A detailed bit record is included in Appendix E.

Plugging Operations:

During the repair operations, 23 cement or Pal-mix 110R plugs were run using a Halliburton cement unit. Brief details of these plugs are listed below:

Plug No. 1 - 29/5/83: Pumped 60 barrels high viscosity gel followed by 2 barrels water. Set a 100 sack 15.2 lbs/gal to 15.8 lbs/gal cement plug at 200 ft. Plug displaced with 1.5 barrels water. Plug could not be tagged.

Plug No. 2 - 29/5/83: 100 sacks cement, average weight 15.5 lbs/gal, set at 200 ft., displaced with 2 barrels water. Plug not located.

Plug No. 3 - 29/5/83: 100 sacks cement, average weight 15.2 lbs/gal, set at 200 ft., dispaced with 1.5 barrels water. Plug not located.

Plug No. 4 - 30/5/83: 100 sacks cement, average weight 15.5 lbs/gal, set at 207 ft., displaced with 1.5 barrels water. An apparent 5 foot fill was recorded after setting, but the plug was not tagged on running back into the hole.

Plug No. 5 - 30/5/83: 100 sacks cement, average weight 15.6 lbs/gal, set at 213 ft., displaced with 1.5 barrels water. Plug not located.

Plug No. 6 - 30/5/83: 100 sacks cement, average weight 15.6 lbs/gal, set at 209 ft., displaced with 1.5 barrels water. Plug not located.

Plug No. 7 - 30/5/83: 100 sacks cement, average weight 15.8 lbs/gal, set at 198 ft., displaced with 1.5 barrels water. Plug not located.

Plug No. 8 - 31/5/83: 20 barrels Pal-Mix 110R, 30 lbs/barrel, set at 198 ft., displaced with 1.5 barrels water.

Plug No. 9 - 31/5/83: 20 barrels Pal-Mix 110R, 30 lbs/barrel, set at 178 ft., displaced with 1.5 barrels water. Plugs 8 and 9 not located.

Plug No. 10 - 31/5/83: 100 sacks cement, average weight 15.7 lbs/gal, set at 197 ft., displaced with 1.5 barrels water. Plug not located.

Plug No. 11 - 31/5/83: 30 barrels Pal-Mix 110R, 30 lbs/barrel, set at 197 ft., displaced with 1.5 barrels water. Plug not located.

Plug No. 12 - 31/5/83: 50 sacks cement plug 3% calcium chloride, displaced with 1.5 barrels water, set at 203 ft. Plug set in gravel fill.

Plug No. 13 - 1/6/83: 50 sacks cement with 3% calcium chloride, set at 195 ft., displaced with 1.5 barrels water. Plug set in gravel fill.

Plug No. 14 - 1/6/83: 50 sacks cement with 3% calcium chloride, displaced with 1.5 barrels water, set at 193 ft. Plug set in gravel fill.

Plug No. 15 - 1/6/83: 50 sacks cement with 3% calcium chloride, displaced with 1.5 barrels water, set at 183 ft. in gravel fill.

Plug No. 16 - 1/6/83: 50 sacks cement with 3% calcium chloride, displaced with 1.5 barrels water, set at 175 ft. in gravel fill.

Plug No. 17 - 1/6/83: 75 sacks cement with 3% calcium chloride, displaced with 1.5 barrels water, set at 157 ft. in gravel fill.

Plug No. 18 - 1/6/83: 50 sacks cement with 3% calcium chloride, displaced with 1.5 barrels water, set at 161 ft. in gravel fill.

Plug No. 19 - 2/6/83: 50 sacks cement with 3% calcium chloride, displaced with 2.5 barrels water, set at 160 ft. in gravel fill.

Plug No. 20 - 2/6/83: 25 sacks cement, displaced with 2.5 barrels water, set at 155 ft. in gravel fill.

Plug No. 21 - 2/6/83: 50 sacks cement with 3% calcium chloride, displaced with 1.5 barrels water, set at 152 ft.

Plug No. 22 - 2/6/83: 50 sacks cement with 3% calcium chloride, displaced with 1.5 barrels water, set at 152 ft.

Plug No. 23 - 3/6/83: 10 barrels Pal-Mix 110R, 30 lbs/barrel, set at 155 ft., displaced with 1.5 barrels water.

Abandonment Plugs:

Plug No. 1 - 5,270-5,370 ft.: 50 sacks Class A cement, 14.8 lbs/gal, displaced with 74.8 barrels mud.

Plug No. 2 - 2,323-2,463 ft.: 75 sacks Class A cement, 14.6 lbs/gal, set at 2,323 ft., displaced with 33 barrels mud. Top of plug tagged at 2,295 ft.

Plug No. 3 - 600-650 ft.: 25 sacks Class A cement, 14.5 lbs/gal, displaced with 8 barrels water.

3.4 Formation Sampling

Ditch Cuttings:

Cuttings samples were collected at 10 foot intervals from 160 ft. to total depth of 6,857 ft. An extra unwashed sample was taken every 30 ft. over the same interval. The cuttings samples were described, dried, where necessary, and bagged. Three sets of 10 foot samples were prepared.

While using air, foam or aerated water, samples were collected using a trap installed in the blooie line. While large quantities of water were being produced during the drilling of the 13-½" hole, samples were collected at the end of a 2" pipe extending from the blooie line to a water storage pit.

A description of samples from 160 ft. to 6,850 ft. is presented in Appendix A.

Coring:

Two conventional diamond cores were cut in Bluebush No. 1, one in the Pertatataka Formation and one bottom hole core in the Gillen Member of the Bitter Springs Formation. The following is a summary of coring operations:

Core No.	Interval	Footage Cut	Footage Recovered	Percentage Recovery
1	5,316-5,330 ft.	14'	13'	93
2	6,850-6,857 ft.	7'	4'2"	60

Total footage cored was 21 ft. Footage recovered was 17'3", for an average of 82 percent.

A detailed description of the cores is contained in Appendix B.

An 8" sample from each core was sent to AMDL in Adelaide for source rock analyses. The results of this study is included in Appendix C.

A 4" sample from each core was sent to the B.M.R. in Canberra for age determination. The results of this study is included in Appendix D. This report will be forwarded when available.

Side-Wall Sampling:

No side-wall samples were taken.

Fluid Sampling:

Two water samples were collected while drilling the Mereenie Sandstone. One representing the fresh water encountered from 225 ft. to 1,000 ft. and, one representing the salty water encountered from 1,600 ft. to 2,425 ft. These samples were analysed by the Northern Territory Water Resources Department in Alice Springs. Results of the water analyses are attached as Appendix F.

3.5 Logging and Surveys

Wireline Logging:

Gearhart Australia wireline logs were run at 6,857 ft. An unsuccessful attempt to run wireline logs was made after drilling the 13-½" hole. It was not possible to get the tools past 160 ft.

The following wireline logs were run at total depth of 6,857 ft. All logs were run at scales of 2" = 100 ft. and 5" = 100 ft.

Dual Laterolog-Micro Spherically Focused Log	2,416-6,845 ft.
B.H.C. Sonic Log	2,416-6,835 ft.
Compensated Density-Neutron Log	2,416-6,846 ft.
Gamma Ray Log	0-6,845 ft.

Penetration Rate and Gas Log:

Rates of penetration measured by Gearhart mud loggers using a Bristol line attached to the Kelly hose are shown in Enclosure 1, the Gearhart Grapholog, and the Composite Log, is shown in Enclosure 2. The penetration rate, weight on bit and rotary torque are also displayed on the rig geolograph charts, a copy of which is retained in Magellan Petroleum's Alice Springs Office.

Air samples from the blooie line were continuously monitored for hydrocarbons and hydrogen sulphide. No indications of either hydrocarbons or hydrogen sulphide were recorded during the drilling of Bluebush No. 1.

The following section was penetrated in Bluebush No. 1:

Age	Formation	Depth (K.B.) (K.B. 1,160')	Depth (A.S.L.) (S.L. 1,140')	Thickness
Quaternary	Alluvium	Surface	+1,140' (+347m)	18' (5m)
Siluro-Devonian	Mereenie Sandstone	38' (12m)	+1,122' (+342m)	412' (126m)
Late Cambrian	Goyder Fm?- Upper Shannon Fm?	450' (137m)	+ 710' (+216m)	1,339' (408m)
"	Shannon Fm?	1,789' (545m)	- 629' (-192m)	682' (208m)
Middle Cambrian	Giles Creek Fm	2,471' (753m)	-1,311' (-400m)	107' (33m)
Early Cambrian	Chandler Fm	2,578' (786m)	-1,370' (-418m)	74' (23m)
	Salt Unit	2,652' (808m)	-1,482' (-452m)	2,189' (667m)
"	Todd River Dolomite Equiv?	4,841' (1,476m)	-3,681' (-1,122m)	182' (55m)
Late Proterozoic	Pertatataka Fm	5,023' (1,531m)	-3,863' (-1,177m)	1,289' (393m)
"	Julie Fm Equiv.	5,358' -5,629' (1,633m)	-4,198' (-1,280m)	271' (83m)
Proterozoic	Bitter Springs Fm			
	Loves Creek Member (Unit 3)	6,312' (1,924m)	-5,152' (-1,570m)	40' (12m)
	Loves Creek Member (Units 1 & 2)	6,352' (1,936m)	-5,192' (-1,583m)	226' (69m)
	Gillen Member	6,578' (2,005m)	-5,418' (-1,651m)	279'+ (85m+)
	Total Depth	6,857' (2,090m)	-5,697' (-1,736m)	

Hole Deviation:

Steep (30°+) dips were encountered in the first 850 ft. of section. Below that depth several unconformities, some faulting or thrusting, and a thick salt sequence were anticipated. Deviation surveys were, therefore, run frequently (every 100 ft. through some sections). Remedial action, usually reducing the weight on bit, was taken each time deviation varied significantly from the previous reading. The maximum deviation recorded was 7° between 6,350 ft. and 6,400 ft. Deviation survey results are listed below:

Depth	Deviation	Depth	Deviation	Depth	Deviation
54'	5-½°?	2,020'	1°	4,516'	3/4°
70'	1-1/8°	2,140'	1°	4,674'	1-3/4°
100'	1-½°	2,341'	2°	4,769'	2°
150'	Misrun	2,537'	3°	4,896'	1-½°
145'	½°	2,632'	1-½°	5,021'	1°
265'	½°	2,726'	3/4°	5,116'	1°
420'	1°	2,905'	1-3/4°	5,275'	1°
518'	2-¼°	3,000'	2-½°	5,437'	1°
579'	2-¼°	3,094'	3-½°	5,595'	½°
639'	3°	3,189'	2-¼°	5,753'	½°
701'	1°	3,283'	2-¼°	6,069'	½°
790'	2°	3,379'	2-½°	6,357'	7°
860'	2°	3,474'	3°	6,386'	7°
951'	2-½°	3,568'	2°	6,490'	6°
1,050'	2-½°	3,663'	1-3/4°	6,585'	5-½°
1,174'	1-½°	3,758'	2-½°	6,670'	4-½°
1,269'	1-½°	3,853'	1-½°	6,765'	3-½°
1,370'	1°	3,947'	1-¼°	6,828'	3-¼°
1,491'	1°	4,042'	1-½°		
1,744'	1°	4,137'	1-½°		
1,830'	1-½°	4,264'	1-¼°		
1,908'	1°	4,390'	1°		

Temperature Surveys:

The following down hole temperatures were recorded:

Wireline Log	Depth	Time since Circulation Ceased	Maximum Temperature Recorded
Dual Laterolog	6,845'	6-2/3 hrs	144°F (62°C)
Sonic	6,835'	12 hrs	144°F (62°C)
Neutron-Density	6,846'	16-1/3 hrs	154°F (68°C)

3.6 Testing

No drill stem tests were carried out during the drilling of Bluebush No. 1.

GEOLOGY

4.1 Objectives

Bluebush No. 1 was drilled to investigate the hydrocarbon potential of Cambrian-Proterozoic sediments on the southern margin of the Camel Flat area. The nearest oil exploration wells to Bluebush No. 1 are Pancontinental Petroleum Limited's Dingo No. 1, located 83 kilometres WNW and Transoil (N.T.) Pty. Ltd., Mt. Charlotte No. 1, located 78 kilometres to the WSW. Dingo No. 1 produced gas at rates up to 5 MMCFD from the Late Proterozoic Arumbera Sandstone and minor gas shows and fluorescence were noted in the Proterozoic Bitter Springs Formation in the Mt. Charlotte well.

Bluebush No. 1 was located on the northern flanks of a large (85 square kilometre aerial closure) salt cored structural trap. The structure had an indicated vertical closure of 490 ft. (150 metres) at the base of the Chandler Formation salt. Thrusting from the north was evident in the section overlying the Chandler salt. A comparison of the interval velocities obtained from the Camel Flat seismic survey and those from Dingo No. 1 and Mt. Charlotte No. 1 suggested that at the Bluebush No. 1 location the Arumbera Sandstone would underlie the Chandler Formation salt. Up to 700 ft. (213 metres) of Arumbera Sandstone was expected to be present in a structurally favourable position sealed by the overlying salt.

Some evidence of salt diapirism was also noted in the salt member of the Bitter Springs Formation. Bluebush No. 1 was programmed to be drilled into this unit to determine its reservoir and hydrocarbon potential.

4.2 Stratigraphy

A stratigraphic sequence as listed in the following table was penetrated in Bluebush No. 1. The large influx of water encountered while drilling the surface hole resulted in poorly representative samples as much of the softer and finer grained sediments were washed out. It was also not practicable to run any wireline logs prior to running 10-3/4" casing and consequently only a gamma ray log through casing is available over this section. Stratigraphic correlation of this section is therefore somewhat conjectural. There is good correlation between the Cambrian-Proterozoic section penetrated in the Mt. Charlotte No. 1 well and the section encountered in Bluebush No. 1. This section has been sub-divided based on the latest stratigraphic data and therefore the Mt. Charlotte section may also need to be revised.

Age	Formation	Depth (K.B.) (K.B. 1,160')	Depth (A.S.L.) (S.L. 1,140')	Thickness
Quaternary	Alluvium	Surface	+1,140' (+347m)	18' (5m)
Siluro-Devonian	Mereenie Sandstone	38' (12m)	+1,122' (+342m)	412' (126m)
Late Cambrian	Goyder Fm?- Upper Shannon Fm?	450' (137m)	+ 710' (+216m)	1,339' (408m)
"	Shannon Fm?	1,789' (545m)	- 629' (-192m)	682' (208m)
Middle Cambrian	Giles Creek Fm	2,471' (753m)	-1,311' (-400m)	107' (33m)
Early Cambrian	Chandler Fm	2,578' (786m)	-1,370' (-418m)	74' (23m)
	Salt Unit	2,652' (808m)	-1,482' (-452m)	2,189' (667m)
"	Todd River Dolomite Equiv?	4,841' (1,476m)	-3,681' (-1,122m)	182' (55m)
Late Proterozoic	Pertatataka Fm	5,023' (1,531m)	-3,863' (-1,177m)	1,289' (393m)
"	Julie Fm Equiv.	5,358'-5,629' (1,633m)	-4,198' (-1,280m)	271' (83m)
Proterozoic	Bitter Springs Fm			
	Loves Creek Member (Unit 3)	6,312' (1,924m)	-5,152' (-1,570m)	40' (12m)
	Loves Creek Member (Units 1 & 2)	6,352' (1,936m)	-5,192' (-1,583m)	226' (69m)
	Gillen Member	6,578' (2,005m)	-5,418' (-1,651m)	279'+ (85m+)
	Total Depth	6,857' (2,090m)	-5,697' (-1,736m)	

Quaternary-Surface to 18 ft. (18 ft.)

This section consists of soft red brown, very fine grained, sandy alluvium, probably derived from weathered Mereenie Sandstone.

Mereenie Sandstone 38 ft. K.B. - 450 ft. K.B. (412 ft.)
Age - ?Middle Devonian

The Mereenie Sandstone at Bluebush No. 1 consists of 412 ft. of sandstone with minor claystone beds. The sandstone is clear, white, occasionally pale brown, fine, medium and occasionally coarse to very coarse grained, with sub rounded to rounded grains, and variable sorting. It is quartzose, with rare lithic grains and occasional mica and rare feldspar, and has silica, clay and occasionally calcareous cement. The sandstone is well compacted in part, occasionally silty and has some zones with good visible porosity. Minor yellow brown to chocolate brown, soft to firm, occasionally silty claystones occur, particularly in the section from 330 ft. to 450 ft.

A small flow of fresh water was encountered at 225 ft. and more substantial flows at 425 ft.

Outcrop of Mereenie Sandstone near the wellsite has dips of around 30°. Drilling problems in this part of the section suggests that dips of this order, or greater, are also present in the subsurface.

Goyder Formation?-Shannon Fm? 450 ft. - 2,470 ft. (2,020 ft.)
Age - Late Cambrian

Correlation of the section from 450 ft. to 2,642 ft. has proved rather difficult. The large water influx encountered, while

drilling surface hole, resulted in the samples being poorly representative. Due to deteriorating hole conditions, only a gamma ray log run through surface casing was obtained over this section. This log indicates that several predominantly siltstone and shale zones occur which were not recognized while drilling. Cuttings from these units were dispersed in the high volumes of aerated water produced while drilling. Large quantities of Mereenie Sandstone cavings also masked the drilled section. It is possible that more carbonates were present than were noted in the cuttings.

It does appear, however, that the section in Bluebush No. 1 between the base of the Mereenie and the Cambrian Giles Creek Formation, is more sandy than would be expected from surface mapping in this area. It was initially proposed that some Mereenie Sandstone had been repeated by thrusting, but the gamma ray log indicates the section to consist of discrete sand or carbonate units interbedded with shales or siltstones. This is not consistent with the more massive Mereenie Sandstone generally present in this area.

Interval velocities obtained from the well velocity survey over most of this section indicate a predominantly siltstone sandstone sequence. Only the lower 270 ft. of this unit has high velocities, but in this section the sandstones are tight, and well cemented with minor carbonates.

The seismic section through the Bluebush well indicates the presence of a section with fairly uniform thickness between the basal Mereenie reflector and the top of the Chandler salt unit. Dependent on the interval velocities, and the reflectors used, this unit ranges in thickness from 1,400 ft. to 1,800 ft. The apparent increase in thickness of this section, as drilled in Bluebush No. 1, is probably related to dip or minor faulting.

The well was expected to encounter a Shannon Formation-Giles Creek Formation section which has been mapped in outcrop to the east and west of the Bluebush location. In outcrop these formations consist of several hundred feet of interbedded carbonates and mudrocks. No sandstones sequences have been mapped. Adjacent outcrop has been remapped since the drilling of Bluebush No. 1 and indicates the presence of between 1,000 ft. and 1,215 ft. of Giles Creek, Lower Shannon and possible basal Mereenie. No obvious sandy units were recognised.

The Pacoota Sandstone, Horn Valley Siltstone, and Stairway Sandstone units are not thought to be present in this area and it is, therefore, proposed that the section penetrated in Bluebush No. 1 below the Mereenie Sandstone is equivalent to the Goyder Formation underlain by a sandy facies of the Shannon Formation. This section overlies a relatively thin Giles Creek Formation consisting of interbedded carbonates and mudrocks.

Some minor repetition due to faulting may occur in this section. This would account for the apparent marked change in dip below about 850 ft. and the change in salinity of formation water below approximately 1,600 ft.

The section from 450 ft. to 980 ft. in Bluebush No. 1 consisted of thinly interbedded limestones, dolomites, sandstones, siltstones and claystones. The siltstones and claystones were not very evident in the drill cuttings as they were probably dispersed in the large quantities of aerated water associated with the drilling of this section.

The limestones were grey, grey green, pale brown, tan, and white, generally finely crystalline, occasionally oolitic, and probably fractured with calcite in filling. Some vuggy porosity was present in part. The dolomites were grey brown, grey green, tan, occasionally pink and yellow, hard, microcrystalline,

argillaceous, in part, and graded to dolomitic limestone or siltstone in part. Sandstones were clear, white, yellow or pale brown, fine to occasionally coarse grained, and quartzose with variable sorting, silica and clay cement, and occasional iron staining. Rare black manganese oxide matrix was noted in some sandstones. Porosity varied from very poor to good. Up to 300 barrels per hour of aerated fresh water was produced from this section.

The siltstones were red brown to grey green, with minor purple streaks, firm, occasionally calcareous, micaceous and sandy in part, and grading in part to claystone. The claystones were brown, brick red, and occasionally green, soft to firm, blocky, micaceous, and variably silty.

Problems encountered while drilling this section were probably related to high dips possibly in excess of 30° which resulted in the formation of ledges. Both the drill string and the 10-3/4" casing tended to hang up on these ledges.

The section from 980 ft. to 1,332 ft. in Bluebush No. 1 is shown on the gamma ray log to be a predominantly siltstone sequence with minor thin bands of limestone and sandstone.

Samples were very poor while drilling this section and consisted mainly of sandstone washed out of the upper part of the well. It appears that the majority of the siltstone cuttings were dispersed in the large volumes of water produced from the overlying section.

The siltstones encountered in this section were red brown to occasionally green, micaceous in part, variably sandy, rarely dolomitic and graded in part to claystone.

The limestones were very thin (generally less than 2 ft.), white to cream, and microcrystalline. The sandstones were white, pale pink, pale brown, very fine to rarely coarse grained variably argillaceous and occasionally iron stained. Much of the sand may have washed out of the siltstones and claystones.

No problems were encountered while drilling this section and while running casing. The section had either washed out sufficiently to cause no problems or dips are much less than in the overlying section. The consistency of steep northward dips in outcrops south of the well suggests that the dips remain steep.

The section from 1,332 ft. to 1,789 ft. in Bluebush No. 1 consisted of sandstone with interbeds of claystone, siltstone and minor limestone and dolomite.

The gamma ray log shows the section to consist of discrete sandstone units up to 12 ft. thick separated by siltstone or claystone beds up to 10 ft. thick. The interbedded nature of this unit is not in accord with a normal massive Mereenie Sandstone section, and it is therefore thought not to be a repeat sequence.

The sandstones are white, pale brown, rarely orange brown, very fine to occasionally coarse grained, quartzose, occasionally silty, micaceous and ferruginous. They are variably sorted with sub rounded to rounded grains with clay and silica cement. Porosity is variable dependent on the degree of compaction, sorting and cementation. The siltstones and shales are red brown, with minor limonitic yellow brown, micaceous and shaly in part. Minor thin white, cream, and pale brown microcrystalline, occasionally oolitic limestones are present in the upper part of this section.

Water influx increased to 600 barrels per hour in this section and became quite saline (10,000 PPM) below approximately 1,500 ft.

From 1,789 ft. to 2,471 ft., the section consists of a series of interbedded sandstones, siltstones and claystones with minor limestones and dolomites. It is possibly correlable with the lower Goyder and the Shannon Formations.

A fairly massive 100 ft. sandstone is present in the lower part of this section from 2,260 ft. to 2,360 ft.

The sandstones are white to clear, occasionally yellow, and rarely pink, fine, medium and occasionally coarse grained, quartzose with minor lithic grains and rare chert, and occasionally micaceous. They have clay, silica, occasionally dolomitic cement, have variable sorting with generally sub angular to sub rounded grains and are occasionally iron stained. The sandstones are well compacted and resilicified in part, particularly towards the base of this unit. Rare thin sandstones streaks having a black manganese matrix were noted throughout this section.

The siltstones are brown to yellow brown, rarely pinkish red and yellow, very friable, micaceous, occasionally sandy, variably calcareous and dolomitic.

The limestones and dolomites are white, cream, and brown, microcrystalline, occasionally oolitic, and variably sandy with rare chert.

Giles Creek Formation 2,471 ft. - 2,578 ft. (107 ft.)
Age - Middle Cambrian

This section in Bluebush No. 1 consists of interbedded dolomites, limestones and siltstones and is tentatively correlated with the Giles Creek Formation. The limestones and dolomites are up to 12 ft. thick, white, cream, grey and brown, hard, predominantly microcrystalline with some silty streaks and minor chert. The

siltstones are red-brown and grey, hard, micaceous, slightly, dolomitic in part, and occasionally sandy.

Chandler Formation 2,578 ft. - 4,841 ft. (2,263 ft.)
Age - Early Cambrian

The upper part of the Chandler Formation in Bluebush is comprised of halite, limestones and dolomites. The majority of the formation consists of massive halite with a middle section of limestones, dolomites and siltstones.

The section from 2,578 ft. to 2,642 ft. consists of interbedded cream, light grey and brown, hard, microcrystalline, occasionally argillaceous dolomites and limestones, and red brown variably dolomitic siltstones. Minor light brown and tan chert was associated with the carbonates.

This unit and the base of the overlying Giles Creek Formation can be correlated on log characteristics with the Basal Jay Creek Limestone overlying Chandler Formation salt in the Mt. Charlotte No. 1 well.

From 2,642 ft. to 3,872 ft., the section is comprised of clear, colourless crystalline, halite with thin streaks of dolomitic siltstone and rare thin bands of anhydrite.

The section penetrated from 3,872 ft. to 4,080 ft. consisted of limestones underlain by dolomitic siltstones.

The upper 18 ft. of this unit consists of white and cream, finely crystalline, sugary textured, occasionally dolomitic limestone interbedded with halite. The rest of the unit consists predominantly of red brown, soft to firm, micaceous

occasionally calcareous, dolomitic, and sandy siltstone with thin beds of dolomite. This section can be correlated with a similar silty sequence within the Chandler Formation salt in the Dingo and Mt. Charlotte wells.

From 4,080 ft. to 4,841 ft., the section drilled consisted of clear, colourless, crystalline halite with thin streaks of red brown dolomitic siltstone.

Todd River Dolomite? 4,841 ft. - 5,023 ft. (182 ft.)
Age - Early Cambrian

This section is particularly evident on the wireline logs and forms a distinct unit between the overlying evaporites and the underlying Pertatataka Formation. Correlation is uncertain but it is probably equivalent to uppermost part of the Todd River Dolomite or may possibly be basal lower Chandler Formation. It consists of red brown to brown siltstones with rare limestone or dolomite streaks. The siltstones are dolomitic and occasionally calcareous, and micaceous, and grade in part to a very fine grained grey, silty sandstone.

There is a similarity on the sonic log between a 30 ft. section at 3,100 ft. in Mt. Charlotte No. 1 and this unit in Bluebush No. 1. This section in Mt. Charlotte has previously been tentatively assigned to the Arumbera Formation but could perhaps be Todd River Dolomite equivalent.

Pertatataka Formation 5,023 ft. - 6,312 ft. (1,289 ft.)
Age - Late Proterozoic

This unit consists predominantly of shales. Near the top is a well defined zone of limestones, dolomites and underlying glauconitic sandstones which may be the Julie Formation

There is reasonable correlation with the Pertatataka Formation as defined in the Mt. Charlotte No. 1 well.

The upper part of this section overlying the Julie Formation may possibly represent a shaly facies of the lower Arumbera Formation but the almost total lack of any arenaceous sediment suggests that this is unlikely.

From 5,023 ft. to 5,110 ft., the section penetrated in Bluebush No. 1 consisted of blue grey, with minor red brown, and rare orange shales. The shales are firm to soft, blocky, micaceous, variably dolomitic and slightly silty in part.

From 5,110 ft. to 5,358 ft., the section consists of predominantly chocolate brown and red brown shale with minor interbeds and stringers of green and orange brown shale. The top of this section is slightly calcareous and dolomitic and the shales are hard, sub fissile, micaceous and occasionally pyritic.

Core No. 1 taken in this section consisted of massive to very finely bedded chocolate brown shale with rare interbeds up to 1-½" (3.5 cm) thick of green shale. Radiometric age determination to be carried out on samples from Core No. 1 should assist with correlation of this unit.

This section from 5,358 ft. to 5,629 ft. can be correlated on log characteristics with a section of almost identical thickness in the Mt. Charlotte No. 1 well. It has been tentatively designated as Julie Formation.

The top of the section from 5,358 ft. to 5,403 ft. consists of limestone and minor dolomites with interbeds of chocolate

brown, blue green, green and rare purplish grey shale. The limestones are light grey, brown, occasionally orange, hard, microcrystalline, rarely oolitic, occasionally sandy and grade to dolomite in part.

From 5,403 ft. to 5,562 ft., the section consists of grey green, blue grey, and red brown, micaceous, variably calcareous and dolomitic, occasionally glauconitic and silty shales with minor thin streaks of grey very fine grained, quartzose, slightly glauconitic, silica cemented, tight sandstone.

The lower part of the Julie Formation from 5,562 ft. to 5,629 ft. is a dominantly sandstone sequence with minor interbeds up to 7 ft. thick of dark brown to brown silty noncalcareous shale. The sandstones are grey to grey green in colour, very fine to fine grained and rarely medium grained, quartzose, slightly lithic and micaceous, variably glauconitic and silty in part. They are moderately sorted, with generally sub angular to sub rounded grains, are well compacted with silica cement and have no visible porosity. The percentage of glauconite increases towards the base of this unit.

The Pertatataka Formation in Bluebush No. 1 from 5,629 ft. to 6312 ft. is a predominantly shale sequence with thin interbeds and streaks of siltstone and grey to grey green fine grained quartzose, silty, glauconitic tight sandstones.

The shales from 5,629 ft. to 5,850 ft. are grey brown, grey green, blocky, sub-fissile, occasionally silty, dolomitic in part, variably glauconitic with minor gypsiferous zones and rare pyrite.

From 5,850 ft. to 6,060 ft. the shales are predominantly brown, reddish brown, and chocolate brown, micaceous, variably silty and sandy. They are generally non-calcareous with rare pyrite and gypsum.

Below 6,060 ft. the shales are grey, dark grey and occasionally brown, firm to hard, blocky, sub-fissile, micaceous, slightly pyritic in part, generally dolomitic, and rarely glauconitic.

Bitter Springs Formation 6,312 ft. - 6,857 ft. (545 ft.)
Age - Proterozoic

The Bitter Springs Formation penetrated in Bluebush No. 1 has been subdivided into the Loves Creek and Gillen Members. These subdivisions are based on similarity to outcrop lithologies and log characteristics.

Loves Creek Member - Unit 3 6,312 ft. - 6,352 ft. (40 ft.)

This unit has been tentatively assigned to the Bitter Springs Formation but could be Basal Pertatataka Formation.

In Bluebush No. 1 this unit consists of thin white and brown, hard, microcrystalline, occasionally argillaceous dolomites, and dark grey, red brown, and grey green, micaceous, dolomitic, silty shales.

A marked increase in hole deviation at or close to the top of this unit suggests that it has high dips or is contorted.

Loves Creek Member - Units 1 & 2 6,352 ft. - 6,578 ft. (226 ft.)

This section in Bluebush No. 1 consists of predominantly massive white, cream, grey, brown, reddish brown, and pinkish

brown, dense to microcrystalline, occasionally argillaceous dolomites with minor thin streaks and beds of red brown, grey green, and green shale. Thin beds of halite up to one foot thick were also noted.

Gillen Member 6,578 ft. - 6,857 ft. (279 ft.)

The top of the Gillen Member in Bluebush No. 1 is tentatively placed at the top of a massive anhydrite section extending from 6,578 ft. to 6,793 ft. The anhydrite is clear to light grey, translucent and fine to coarsely crystalline with only minor thin interbeds and streaks of dolomitic limestone, dolomite and rare halite. Some silty and shaly streaks also occur. Interbeds of carbonates and shales become more prevalent towards the base of the anhydrite section.

Below 6,793 ft., the Gillen Member consists of finely interbedded dark grey shale, pale brown, finely crystalline dolomite and light grey crystalline anhydrite.

Dark grey shales recovered in Core No. 2 are mature for oil generation and have a moderate source potential.

Core No. 2 also demonstrated that dip in this section is negligible with observed dip of 0° to 5°. The beds were not contorted.

4.3 Porosity, Permeability and Formation Fluids

Zones of good porosity were recorded while drilling the Mereenie Sandstone. These were associated with a slight influx of fresh water at 225 ft. and an influx of up to 60 barrels per hour at 425 ft. The coarser grained sandstones were broken up in

cuttings, but fair visible porosity was noted in the finer grained consolidated sandstones. Porosity and permeability are dependent on the degree of compaction and cementation.

Sandstones within the Goyder Formation had good porosity and permeability as evidenced by an increase in the influx of fresh water to approximately 300 barrels per hour while drilling the upper part of this section. Some slight vuggy porosity was noted in limestones in the upper part of the Goyder Formation.

Water influx increased marginally to 400 barrels per hour while drilling the Goyder Formation, and some fair visible intergranular porosity was noted. Water salinity increased from 2,000 PPM chlorides to 10,000 PPM chlorides at approximately 1,600 ft. An increase in water influx to 600 barrels per day indicated some good porosity and permeability in this section. No significant increase in water was noted below 1,900 ft., and the sandstones were generally well compacted, recrystallized in part, or argillaceous resulting in poor porosity and permeability.

Samples were slightly damp while drilling the first 40 ft. below the casing shoe at 2,416 ft. This could suggest slight porosity is present in sandstones in this section or it may be a filtrate effect from drying cement.

The water recovered from this section contained 11,000 PPM chlorides.

The rest of Bluebush No. 1 from 2,471 ft. to 6,857 ft. was drilled with dry air, and no influx of fluids was noted. No visible porosity was seen in any limestones and dolomites. The sandstones within the Julie and Pertatataka Formations

were well compacted with silica or dolomitic cement, silty and glauconitic in part, and had no apparent porosity.

Some fracture porosity may be present in limestones, unconformably underlying the Mereenie Sandstone. No other fracture porosity was evident, and in the Bitter Springs Formation a fracture noted in Core No. 2 was totally infilled with anhydrite.

4.4 Structure

Bluebush No. 1 was drilled on the northern flank of a domal feature delineated by the Camel Flat seismic survey carried out by Magellan Petroleum in 1981.

The seismic results defined a large structural trap of which 85 square kilometres of indicated aerial closure and 490 ft. (150 metres) of vertical closure at the base of the Chandler Formation.

The structure was cored by Bitter Springs salt and overlain by a large intrusion of Chandler salt which was expected to act as a seal for any possible hydrocarbons.

This salt has pierced overlying formations immediately to the south of the Bluebush No. 1 location as evidenced by Chandler Formation outcrop. Some thrusting from the north is postulated, but seismic definition is not adequate over the crest of the structure to locate the thrust planes.

Seismic correlation indicates the interval overlying the Chandler salt does not vary markedly in thickness to the north and south of the east west trending thrust. This suggests there has only been limited marginal displacement at least within the Chandler salt and overlying formations.

4.5 Relevance to the Occurrence of Petroleum

No hydrocarbon shows were recorded during the drilling of Bluebush No. 1. The primary target, sandstones in the Arumbera, were not present, and any porosity encountered was water filled. Most of the siltstones and claystones present in the upper part of the well were washed out in the large volumes of aerated water produced during the drilling of the surface hole and it is therefore difficult to estimate their source potential.

The thick shales and siltstones within the Pertatataka Formation have poor source rock potential. Almost no organic carbon was present in Core No. 1.

Dark grey shales of the Gillen Member of the Bitter Springs Formation were analyzed. They contained moderate amounts of thermally mature type 2-3 kerogen, and were rated as a fair potential oil source (Appendix C).

4.6 Contributions to Geological Concepts

Bluebush No. 1 demonstrated that the sandy facies of the Arumbera Sandstone which produced gas at Dingo No. 1 does not extend to the southern flank of the Camel Flat syncline. A siltstone section underlying the Chandler Formation salt and overlying the Pertatataka might be a lateral equivalent of the lower Arumbera.

The Bluebush structure is related to salt diapirism and some north-south compression that has affected evaporites, in the lower Chandler, and overlying units. However, cores taken in the Pertatataka Formation and the Gillen Member have almost no apparent dip. It is likely therefore that only gentle

structures exists within these formations in this area. The location of Bluebush No. 1 well could be off the flank of any existing structural closure in these formations.

Poor sample quality and the lack of a full suite of wireline logs in the surface hole has made correlation of the Bluebush section above the Chandler Formation very conjectural. Seismic profiles across the Bluebush structure indicate that considerable horizontal movement has taken place including some thrusting. It was not possible to determine the presence of a thrust fault in the well, but some faulting and possible repetition may be present.

It was considered during the drilling of the upper part of the well that the sandy section seen in samples below 800 ft. may have been a repeated Mereenie Sandstone sequence. The gamma ray log, however, shows this section to consist of thinly interbedded sandstones, limestones and dolomites with discrete and well developed beds of siltstone and claystone. This type of section is inconsistent with the generally more massive sandstones associated with the Mereenie Sandstone in outcrop and in other exploratory wells in the area.

The section from 450 ft. to 2,471 ft. is now considered to be equivalent to the late Cambrian Goyder and Shannon Formations. These are more arenaceous than where mapped in outcrop to the east and west of the Bluebush location. The true thickness of these formations may be much less due to high dips, in at least part of this section.

The middle Cambrian Giles Creek Formation is considerably thinner at the Bluebush location than where it has been measured in outcrop, 12 kilometres to the west (107 ft. against 387 ft.).

A thick Chandler Formation salt unit was present in Bluebush No. 1. A limestone and siltstone unit in the middle of the salt sequence has some resemblance to siltstone units in the Chandler salt in the Dingo and Mt. Charlotte wells.

A siltstone unit just below the Chandler salt is correlated with the uppermost part of the Todd River Dolomite. This overlies a thick Pertatataka Formation consisting of barren shales. A limestone and glauconitic sandstone sequence within the upper part of the Pertatataka Formation is tentatively correlated with the Julie Formation.

The limestone, dolomite, and anhydrite section below the Pertatataka has been correlated with the Proterozoic Bitter Springs Formation. The Loves Creek Member and the upper part of the Gillen Member are recognised in Bluebush No. 1.

Enclosure 3 diagrammatically illustrates the stratigraphic relationships between Bluebush No. 1 and the nearest exploration wells in the area, Mt. Charlotte No. 1, Dingo No. 1 and McDills No. 1.