GL02173

SCHLUMBERGER LOGGING DATA

DATE	TYPE OF LOG RUN	LOGGED INTERVAL	TOTAL DEPTH
9 April 79	Dual Induction-Laterolog	320' - 1207'	1205'
9 April 79	Compensated Neutron Log- Formation Density	90' - 1213'	1205'
9 April 79	Temperature Log	0' - 1205'	1205'
9 April 79	Dipmeter Log	320' - 1212'	1205'
3 May 79	Dual Induction-Laterolog	1192' - 6938'	6946'
3 May 79	Compensated Neutron Log- Formation Density	1192' - 6944'	6946'
3 May 79	Temperature Log	0' - 6946'	6946',
3 May 79	Dipmeter Log	1196' - 6944'	6946 '

Copies of these logs follow.

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CEMENTING OPERATIONS

Introduction

Two major kinds of cementing operations were carried out during the drilling of De Braga #2. The first type of operation involved the setting of cement plugs to seal off lost circulation zones in the 1300' to 1500' interval. The second type of operation was the cementing of the 13-3/8" and 9-5/8" casing string.

A total of 1835ft³ of cement was mixed, pumped and set in six separate plugs to control lost circulation. These efforts occupied nearly four days of rig time and accounted for a total cost of approximately \$65,900. These efforts are discussed below.

The cementing of the 13-3/8" and 9-5/8" casing strings required an additional 1143ft³ of cement. These efforts are described in a separate section below.

Lost Circulation Control Efforts

Lost circulation created problems drilling the 8-3/4" lower hole almost immediately after drilling out of the 9-5/8" casing shoe. Four plugs were set in drilling from 1309' to 1355'. While drilling out the fourth plug at 1326', circulation was lost again. The fifth plug was set by installing a Halliburton De Braga #2 - Cementing Operations

EZSV bridge plug in the 9-5/8" casing and squeeze cementing through it to 50 psi surface pressure. This was successful, and drilling out continued to 1450', where a sixth plug was needed.

Table 1 presents a description of the lost circulation cementing operations in De Braga #2. Table 2 describes the cement additives used.

Both API class "B" and class "G" cements were used, depending on availability. In two cases, preflushes containing lost circulation material and a viscous gel, Versagel[®], were tried without notable success. This preflush is still under evaluation.

Casing Cementing Operations

The 20" surface conductor was cemented in place with readymixed concrete poured between the casing and 26" hole prior to the start of drilling operations.

The 13-3/8" and 9-5/8" casing strings were cemented with slurries of class "G" cement using guide shoes and insert floats. Each string was cemented in a single stage. The slurry for the 9-5/8" string was mixed with perlite to reduce the hydrostatic head and consequent fluid loss to the formation. Table 3 shows a detailed description of the cementing operations for setting casing.

TABLE 2

SUMMARY AND DESCRIPTION OF CEMENT ADDITIVES USED ON DE BRAGA #2

	-	FL	INCTION OF AD	DITIVE	
ADDITIVE	DESCRIPTION	LIGHTEN SLURRY WEIGHT	ACCELERATE SETTING TIME	CONTROL LOST CIRCULATION	REMARKS
Perlite (expanded)	treated volcanic material	х			absorbs water under high pressure
Silica Flour	finely powdered silicon dioxide		•		prevents loss of strength at high temperatures
Gęl	Wyoming-type bentonite -	x		× • -	increases suspension of particulate additives; maintains even distribution of other additives; reduces slurry weight
CaCl ₂ ,	in powder or flake form		x		accelerates early strength
CFR-2 (*)	a napthalene polymer		x		a cement dispersant to reduce viscosity and a friction loss reducer
Gilsonite	particulated naturally occurring asphaltite	x		X	<pre>inert - does not absorb water; high cement strength; resists corrosion; granular lost circulation additive</pre>
Nut-Plug (**)	walnut shells			x	granular lost circula- tion additive

(*) Halliburton trademark

(**) Magcobar trademark

TABLE 3 - SUMMARY OF CASING CEMENTING OPERATIONS

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DATE INCHES FEET AT, FT. FT ³ MATERIAL CEMENT Concrete Concre Concrete Concrete	
cement (100 water Spacer 100 sepiolite Preflush	· .
100 sepiolite Preflush	•
4/9/79 9-5/8 1205 1194 1115 50 water Spacer	
611 Class "G" 1:1 40% 3% 0.5% cement	
100 Class "G" 40% 0.5% Good surface returns cement	

DRILLING FLUID SUMMARY

Attached are sheets which detail the mud properties, additions, and costs on a daily basis. The following summarizes our experiences with the drilling fluid, and highlights those operations which increased the drill fluid cost.

Numerous problems were experienced due to high permeability zones encountered between 900' and 1500', which resulted in higher costs in this interval. In fact, over 50% of the total drilling fluid costs were incurred in this interval. Before presenting a detailed account of these problems, let us dispense with the rest of the drill fluid operation with a short summary.

The drilling fluid used was a dispersed mud which utilized bentonite and attapulgite for viscosity, a tannin compound for fluid loss control and to maintain a dispersed mud system, and caustic soda to maintain the pH of the mud. This drilling fluid performed adequately and economically in the trouble free sections of the hole.

The problems with the drilling fluid were all related to pressure control. High permeability zones were encountered which acted as lost circulation zones when the mud weight exceeded the reservoir pressure, and which flowed formation water into the wellbore if the mud weight was less than the reservoir pressure. As outlined in detail below, a series of events was repeated several De Braga #2 - Drilling Fluid Summary

times in which the well would start the flow, the mud weight would be increased to stop the flow, and then circulation would be lost. When the weighted mud supply was exhausted the well would flow again. Making up a mud system, especially a weighted mud system, and then losing it is very costly, so these zones were plugged with cement. However, cement acts as a contaminant in the mud system and destroys its desirable properties. Consequently, the cement contamination had to be treated out of the mud, increasing the cost.

What follows is a detailed synopsis of the problems that occurred, and how they affected the mud system.

After the intermediate (12-1/4") hole was drilled to 1205', the hole was to be logged, but while preparations were underway, the hole started to flow. Eventually the well had to be killed by circulating a weighted mud $(72\#/ft^3)$. This section of hole was subsequently cased and cemented. 8-3/4" hole was then drilled to 1309', where a total loss of returns occurred. Mud containing lost circulation materials was spotted at the bottom of the hole, but the well started flowing. Weighted mud (70#/ft³) was pumped into the hole to stop the well from flowing, and the flow not only stopped, but all returns were lost. The mud weight was reduced to 68#/ft³, and the well started to flow again. Subsequently, cement was pumped into the well to seal off this problem zone. Five cement plugs were set before drilling could continue below 1355', and one more cement plug was placed around 1450'. Each time that cement was displaced into the well, the mud had to be reconditioned.

Pg 2

To summarize, the mud system performed well and economically (\$400-600/day) except in the trouble area frrm 900' to 1500', where costs reached \$1000-\$4000/day due to lost circulation, water flows, and cement contamination.

DE BRAGA 12

TABLE 1 LOST CIRCULATION CONTROL BEFORTS

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	PLUG VUNGER-	DEPTH OP OPEN BOLI	DRILLED DEPTH FEET	CIRCULATION METHOD	PLUG VOLUHS	MATERIAL	PERLITS BY WT. CEMENT	SILICA PLOUR BY WT. CEMENT	GEL BY WF. CEMENT	CFR-3 BY WT. CEHENT	GILGONITE 0/SK. CEMENT	NUT PLUQ		TIME TO NEXT OPERATION HOURS	WELLHEAD SQUEELE PRESSURE PSIG	THEORETICAL	REMARKS
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79	Preflue		1355	OEDP 8 939'	190	Versage1	•-				•••	50/ga	1'	Continuous			Followed by 30ft ³ water spaces
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	Lay down tools, run 7'	" to 69	40'		, ····								·····		L_		. <u>.</u>			<u> </u>	·		
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· · · ·	DRILLING FLUID SERVICES	RON HUBBS		NEVADA	· .	26		· · · · · · · · · · · · · · · · · · ·		<u>d</u>	l,,		<u>, </u>		L		<u></u>
	DATE MEAS- URED XXXX MUD VIS DEPTH WT. SEC	ANGLE AND DIREC- TION RATE Gpm) FLOW TEMP. TON PV.	GELS PH	API H.T.H.P. FLUID FLUID P ₁ LOSS LOSS	My Pm	SALT OR CHLORIDI		d -/	- KN		BAR LS	KWT PLUG	CEL CEL				MUD
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	Drlng. cement, drlng.			Wait on lo			t of hole.		·····		·····						
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	4-13 1326 .73 66 34		$\frac{re. cmt. woc.}{3 1 / 5 11.8}$		2.3 4.2		0 3 1		larteo	10 2		70					4.837.00
, ·	Build weight, cmt, wo	c, clean out cm		2. torque @	1326, wel	1 flo;	ng. shut in.	build wt		t for	cmt.)		······································				12,214.00
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UN GEOTHERMAL DIVISION

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TECHNICAL REPORT ON DE BRAGA #2 CHURCHILL COUNTY, NEVADA

INDEX

Preface:	-	Organization of Report
Chapter	1:	Well Summary
Chapter	2:	Geologic Report
Chapter	3:	Well History
Chapter	4:	Fishing Operations
Chapter	5:	Time - Depth Progress Graph
Chapter	6:	Logging Data
Chapter	7:	Bit Record
Chapter	8.:	Cementing
Chapter	9:	Drilling Fluid Summary (Magcobar)
Chapter	10:	Fluid Analysis .

PREFACE

Organization of Report

This report presents the technical details of the drilling of Union Oil Company's De Braga #2 well, Churchill County, Nevada. The report consists of the ten chapters listed in the Index, as well as the well logs taken by Schlumberger. The content of each chapter is summarized in the following. All depths in the report refer to rotating kelly bushing (R.K.B.) unless otherwise indicated. R.K.B. is 11.5' above ground level (G.L.).

Chapter 1 presents a summary of the operations required to drill and complete De Braga #2. The results of a post-drilling flow test are presented. A listing of contractors used is also included.

Chapter 2 summarizes what was learned about the hydrothermal system encountered by De Braga #2. This includes data on forma-tion lithologies, and other geological information.

Chapter 3 contains a well history describing the day to day operations during the drilling of De Braga #2. Also included is a detailed description of the casing strings, and a listing of deviation surveys with the corresponding maximum reading thermometer results. The one minor fishing operation engaged in while drilling this well is described in Chapter 4.

A time-depth progress graph is presented in Chapter 5. This graph also indicates the occurrence of events of major technical interest while drilling De Braga #2.

Chapter 6 lists the various kinds of logging data taken during the drilling of De Braga #2. Copies of each of the individual logs are supplied with the report. Maximum reading thermometer temperature surveys taken are also listed here.

Chapter 7 presents technical information about the drill bits used in De Braga #2.

Chapter 8 describes cementing operations carried out during casing jobs and to control lost circulation.

Chapter 9 is a technical summary of the drilling fluids used in drilling this well. This section was prepared in part by Magcobar, the sales, service and engineering company responsible for the drilling fluids program.

Chapter 10 includes analyses of formation water samples taken during the drilling operations.

OUTLINE OF WELL SUMMARY

- I. General Information
 - A. Well Record
 - B. Contractors Used
- II. Drilling Operations
 - A. Rig Information
 - B. Preparation of Location and Setting of 20" Conductor
 to 94' (R.K.B.)
 - C. 17-1/2" Hole: 94' to 312' (13-3/8" Casing Set to 310')
 - D. 12-1/4" Hole: 312' to 1205' (9-5/8" Casing Set to 1194')
 - 1. General Description of Hole Drilled
 - 2. Water Flow Experienced at 1205' While Logging
 E. 8-3/4" Hole: 1205' to 6946' (7" Liner Hung from 987'
 - to 6940')
 - 1. General Description of Hole Drilled
 - 2. Problems Encountered and Their Resolution
 - a. Loss of Returns and/or Water Flows at 1309',
 1328', 1355', and 1450' Required Cementing for
 Control
 - b. Drill Collar Box Parted at 6946' and Required Fishing
 - F. Logging Efforts: Schlumberger
 - 1. 12-1/4" Hole
 - 2. 8-3/4" Hole

De Braga #2 - Outline of Well Summary

G. Well Completion

III. Post-Drilling Operations

Results of Flow Test on 5/22/79, Including Temperature

and Pressure Surveys

I. GENERAL INFORMATION

UNION OIL CO. OF CALIFORNIA GEOTHERMAL DIVISION

WELL RECORD

WELL # 2 CONTRACTOR Coastal Drlg. Co. FIELD Stillwater Prospect LOCATIONS6700130"E 947.29' from the NW GOTHET OF Sec 6. TINN B31E. MDW (well is located in NW4 of Sec 6) B.H.L. 30.8'S, 240.2' E of surface loc. DEPTH: T.D. 6946'T.V.D. 6940'E.T.D. 6940' ENDERMY ENGINEER Allen Inman COMPANY ENGINEER Allen Inman COMPANY ENGINEER Allen Inman SIZE WEIGHT GRADE THERAD TOP BALK: 10.5'S' 4.5'.5 Buttrass 11'. KB. 1104'.KB. Comented surf. to 31 -5/3" 4.6'ft. SS.Buttrass 11'. KB. 1104'.KB. Comented surf. to 31 -5/4".40*/ft. KSS BUTTAS SUBT SESURE RATING WELL HEAD ASSEMBLY MAKE TYPE SIGH HEAD SPOOL WKM Flat X Studded 10"-600X3"-300 2000 esi KASTER VALVE(S) WKM Gate 3" SUBTED LINER FROM GATAM ENTRIES: DEPTH LBS. INCREASE Not Applicable Sterney Solo VALVES SMAB VALVE WKM Gate 3"	LEASE De Braga	L	,	SPUI	DATE 4/6/7	79 COMP. DATE 5/7/79
FIELD Stillwater Prospect NIG # 2 LOCATIONS GROUND Corner of Sec 6, T19N, R3LE, MDM, (well is located in NWA of Sec 6) ELEVATIONS: GROUND 11' K.B. TO GROUND 11' K.B. TO GROUND 11' March 1 Store of Sec 6, T19N, R3LE, MDM, (well is located in NWA of Sec 6) K.B. TO GROUND 11' DEPTH: T.D. 6946'T.V.D. 6940'E.T.D. 6940' NTFE WELL: EXPL. XX DEV. DEPTH: T.D. 6946'T.V.D. 6940'E.T.D. 6940' STM HOT WTR_XX INJ DEPTH: T.D. 6946'T.V.D. 6940'E.T.D. 6940' STM HOT WTR_XX INJ COMPANY ENGINEER_Allen Inman CASING RECORD SIZE WEIGHT GRADE THREAD SUE 944/ft H40. PAPROVED SA'KB comented surf to 19' S12E WEIGHT GRADE THREAD S12E WEIGHT GRADE THREAD S12E WEIGHT GRADE TOP BOTTOM REMARKS S12 GALft KS5 S12 S141/ft H40. S12 FREAD TOP BOTTOM REMARKS S12 GALft KS5 Suttrass (I - 6, 0, 3, 10, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0				CON	RACTOR Coas	stal Drlg. Co.
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De Braga #2 - General Information

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Contractors Used B&W Inc. Bill's Casing Tong Service Coastal Drilling Company Dresser Industries Diamond Transport Dick Howell Drilco Driltrol Halliburton H&H Oil Tool Hughes Tool Company Jack Tedford, Inc. Magcobar Midway Fishing Tool Northern Truck Service Oilwell Supply Powers Welding Rodney A. Weishaupt Schlumberger Smith Tool Company Tillett Tool and Service West Coast Oil Tool W-K-M Wellhead Systems Lowell Emery Surveyors

Page 2

II. DRILLING OPERATIONS

A. RIG INFORMATION:

Coastal Drilling Company Rig #2 is an Oilwell 52T with a 96' Bender Derrick, 11.5' substructure and a 52T Drawworks. The rig is rated to drill to a depth of 8000'. It is powered with two V8 GMC Diesel Engines rated at 600 INT. h.p.. The rotary table is a National 17-1/2". The rig is limited to a 350,000# casing capacity.

B. PREPARATION OF LOCATION AND SETTING OF 20" CONDUCTOR TO 94' (R.K.B.):

The location, sump and roads were built by Rodney A. Weishaupt. A 26" conductor hole was drilled to 83' G.L., 94' R.K.B. by Dick Howell. Twenty-inch (20") conductor pipe was run and cemented from the surface to 83' G.L. with Ready-Mix Concrete.

C. <u>17-1/2" HOLE: 94' to 312':</u> (13-3/8" Casing Set to 310')

Coastal Rig #2 moved in, rigged up, and was placed on day rate at 2400 hours, 4/6/79. The rat hole was drilled immediately thereafter. The well was spudded in at 0600 hours on 4/6/79, and 17-1/2" hole drilled to 312'.

310' of 13-3/8" 61#/ft K55 buttress casing was set and cemented to surface. The 20" casing was cut off to ground

De Braga #2 - Drilling Operations

C. Continued -

level. A 12"-900 well head, a 20" Hydril GK, and a Double Shaffer blowout preventer were installed and tested to 1000 psi.

- D. <u>12-1/4" HOLE: 312' to 1205'</u>: (9-5/8" Casing Set to 1194')
 - 1. General Description of Hole Drilled

The 12-1/4" hole was drilled from 132' to 1205' through a thick clay sequence, the Lahontan Valley Group. A single bit drilled the entire interval at an average rate of 76'/hour. No significant losses of circulation were observed during the drilling of this interval.

2. Water Flow Experienced While Logging

While logging tools were being prepared to run from 1205' the well commenced flowing. The mud weight was raised and mud was circulated to 727' and 1205' in sequence. A weight of $70\#/ft^3$ stopped the flow, and logging was carried out.

- E. <u>8-3/4" HOLE: 1205' to 6946' T.D.</u> (7" Liner Hung from 987' to 6940')
 - 1. General Description of Hole Drilled

The 8-3/4" hole was drilled from 1205' to 6946' through a variety of sandstones, siltstones, and volcanics. The only major lost circulation occurred near the top of the interval. De Braga #2 - Drilling Operations

E. Continued -

2. Problems Encountered and Their Resolution

a. Partial loss of circulation or water flows, depending on mud weight, occurred several times in the interval 1300' to 1500'. Six lost circulation plugs (total cement volume 1835ft³) were set during the four days required to drill this section. Circulation was regained with the placement of cement plug
#6. More detailed discussion of the cement used is contained in Chapter 8.

b. Parted Drill Collar Box at 6946':

A drill collar box twisted off while drilling at 6946'. The lost tools were recovered on the first run with an overshot fishing tool.

F. LOGGING EFFORTS

Schlumberger logs were run as follows:

12-1/4" Hole Section - to 1205'

DIL-8 (1205'-312' Dual Induction Laterolog 8)

FDC and CNL (1205'-312' Formation Density Log - Compensated Neutron Log)

Dipmeter (1205'-312')

Temperature Log = 222°F @ 950'

8-3/4" Hole Section - to 6946' T.D.

DIL-8 (6946'-1194' Dual Induction Laterolog 8)

De Braga #2 - Drilling Operations

F. Continued -

FDC and CNL (6946'-1194' Formation Density Log -Compensated Neutron Log) Temperature Log = 312°F @ 6946'

Dipmeter (6944'-1196')

G. WELL COMPLETION

A combination blank and slotted liner production string, 7" 26# 8RD LT&C casing was run with a Midway liner hanger (7" x 9-5/8") on top and a cement guide shoe on bottom. The liner was hung with the top at 987' and the shoe at 6940'. The perforated section of liner extends from 2724' to 3241', 3408' to 3725', 4220' to 5146', 6303' to 6503' and 6625' to 6940'. Expanding baskets were run at 2040', 2090' and 2130'. The slot designation measure is 18-2-6-150, 150 mesh, 2" slots. A 10" W-K-M 2000# valve was installed on the 10" casing head with a 10"-600 x 3"-600 flat flange on the valve which reduces to a 3"-600 studded adapter and 3"-600 W-K-M full opening valve to facilitate wire line work.

An "A" frame to support the sheave for wire line operations and flow piping for testing purposes was installed.

All drill pipe and tools were laid down and loaded out. The Coastal Drilling Company Rig #2 was released at 2400 hours, 5/7/79.

III. POST DRILLING OPERATIONS

Current plans are to conduct extensive testing and to continue to monitor temperatures to make reservoir evaluations.

De Braga #2 was produced for 3 hours and 37 minutes on May 22, 1979. Mass produced to the pit during the test was 505,000# for an average rate of 140,000#/hour. Wellhead pressure and temperature were stable at 20 psig and 252°F throughout the test.

Maximum reservoir temperature of 336°F was recorded on the static survey the day before the test. The temperature and pressure survey reports follow this section.

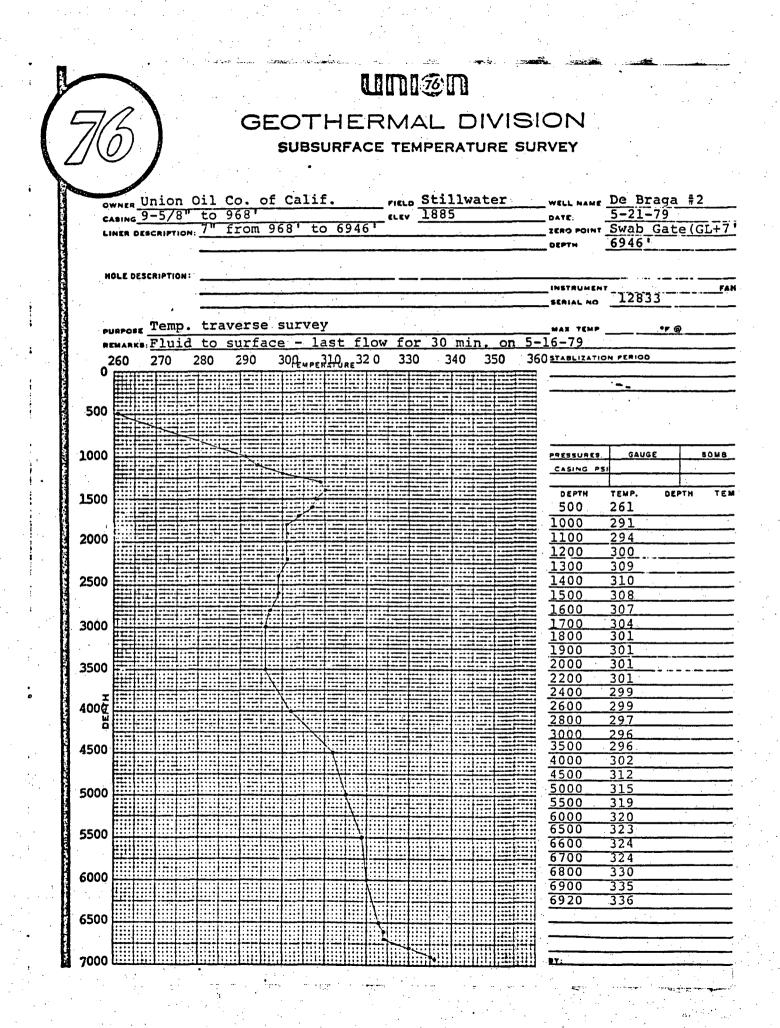
Flash was 8%, based opon 336°F reservoir temperature and a pressure of 20 psig at the orifice.

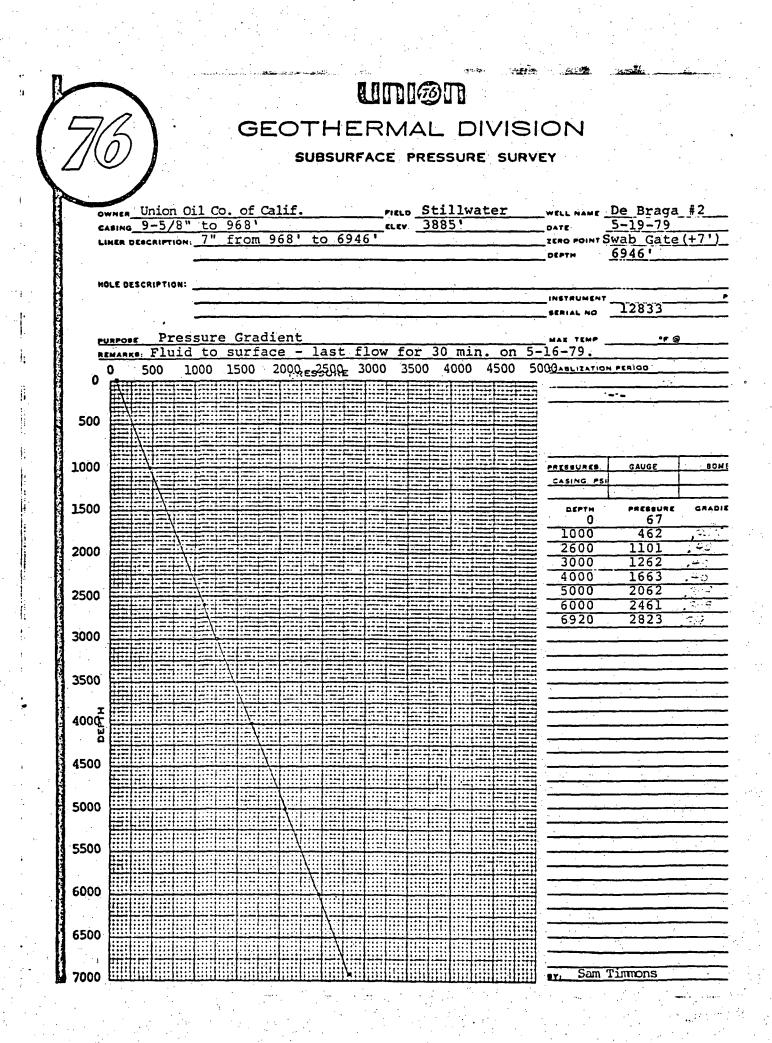
The temperature survey shows a high gradient in the bottom 250' of the hole indicating that temperature may continue to rise rapidly with depth.

Pressure build-up data has not yet been evaluated. A formal report will be prepared of all the testing including analysis of the data.

De Braga #2 - Post Drilling Operations

This report, and further temperature and pressure surveys following the buildup will be included in an addendum to this technical report when they are available.





GEOLOGIC REPORT ON THE DE BRAGA #2 WELL

STILLWATER, CHURCHILL CO., NEVADA

De Braga #2 was drilled to a total depth of 6964'. The following is a description of the rock types encountered in the well to total depth. The descriptions are based on examination of the well cuttings by binocular microscope in the field. Except for the clays of the Lahontan Valley group, no attempt has been made to divide the lithologies into formal formational intervals.

LITHOLOGY

Lahontan Valley Group

De Braga #2 was spudded in Recent alluvium composed of sand, silts and clays. From 100' to 1280', the well penetrated the Lahontan Valley group. In the Stillwater area, this group is composed of light gray and light green-gray clays which are occasionally calcareous and range from clean to silty or sandy. A very high rate of penetration of the drill bit occurs in this formation - up to 250 to 300' per hour. This thick clay sequence may be the impermeable cap rock over the entire Stillwater area. It is Pleistocene in age.

Pre-Lake Lahontan Sediments

From 1280' to 2400' a section of sandstones and siltstones were penetrated. These are typically very fine sandstones, largely composed of subangular quartz and feldspar with occasional De Braga #2 - Geologic Report

varied and multi-colored lighic rock fragments. Quartz overgrowths on quartz grains is common as is a white Kaolinitic(?) matrix which gives the sandstone a low porosity. Pyrite and calcite are secondary minerals which are common in this interval. At the base is a thin 30' zone of light gray and light green, pyritiferous chert.

Pre-Lake Lahontan Tertiary (?) Volcanics and Sediments

From 2400' to total depth a variable section was penetrated which was composed of volcanics, siltstones and sandstones. Complicating the determination of the stratigraphy which was drilled through in this interval was the inability of the hole to stay in gauge and washing-out of drilled hole was continually contaminating ditch samples with lighologies already drilled. The caliper log shows the hole was rarely in gauge and washouts in the 8-3/4" hole occasionally enlarged the hole to as much as 16".

The volcanics penetrated in this interval consisted of extrusive volcanics, finely crystalline to porphyritic and occasionally with zeolite or agate amygdules. In the finely crystalline basalts about 30% is composed of a bronze-colored(?) orthopyroxene (bronzite?) and about 70% light green, chloritized feldspar. In the prophyritic extrusives are micro-phenocrysts in an aphanitic matrix, occasionally with zeolite or agate amygdules.

The sandstones are largely volcanic, light green, poorly sorted with abundant green, chloritic clay matrix. Siltstones are

De Braga #2 - Geologic Report

gray, brown and green and are also probably derived from volcanics. Calcite is very common through this volcanic-sedimentary sequence but pyrite appears to be present only down to about 5100'.

A major lost circulation zone was encountered near the top of this sequence in the interval, 1309' to 1370'. No other lost circulation occurred in this entire sequence.

A preliminary study of the field print of the dipmeter survey in this sequence suggests it is essentially flat.

TEMPERATURE

A Schlumberger temperature log was run upon reaching total depth. The running of this log was interrupted by the well starting to flow from artesian water zones just below the 9-5/8" casing. Heavier mud had to be mixed and circulated <u>within</u> the casing so as not to disturb the rebounding temperatures in the open hole below the casing. This tool was on bottom 37 hours after stopping circulation and recorded a maximum temperature of 327°F at total depth.

Below the casing at 1196' the temperature increased rapidly to about 290°F at about 1400' and remained there until about 4800'. From 4800' to total depth (6946') the temperature increased from about 290°F to 327°F (about 1.7°F per 100').

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Well History.

Form 3358 (Rev 6/67)

Pg 2

4/9/79 Continued -

casing. Cemented with shoe at 1194', insert float at 1115' with 611ft³, 105#/ft³ slurry of "G" cement with 1:1 perlite, 40% SSA1, 3% gel, 0.5% CFR-2, followed by 100ft³ "G" cement with 40% SSA1 and 0.5% CFR-2. Preceded cement with 200ft³ water, 100ft³ sepiolite, SSA1, flush, with 50ft³ water. Had good cement returns to surface. C.I.P. at 2015 hours. W.O.C.

4/10/79

W.O.C. 2 hours. Removed cement head. Removed B.O.E. Cut off 13-3/8" and 9-5/8" casing. Welded on a 10"-600 series W-K-M casing head. Tested weld to 1000 psi. Installed B.O.E.'s. Tested CSO to 1000 psi. Laid down 7" drill collars. Picked up 6" drill collars.

4/11/79

R.I.H. Located top of cement at 1103'. Tested Hydril and pipe rams to 1000 psi. O.K. Drilled cement from 1103' to shoe at 1191' and cement to 1205'. Drilled
8-3/4" hole from 1205' to 1309'. Lost all mud returns.
Pulled into casing. Mixed pit of lost circulation material and gel mud. R.I.H. to 1309'. Well started flowing.
Closed Hydril. Had 70 psi on annulus. Opened choke.
Pumped 200bbls mud. Well flowed. Closed well in. Mixed
70#/ft³ mud. Pumped into hole. Killed well and stopped
lost circulation. Pulled to 700'. Unable to circulate
with 68#/ft³ mud. Pulled to 520'. Well started flowing.
Closed well in. Killed well with 68#/ft³ mud. P.O.H.
R.I.H. with bit and float sub on 4-1/2" drill pipe to 881', well started flowing. Closed well in and rigged
up HOWCO.

4/12/79

Hung 4-1/2" O.E.D.P. at 881'. Closed Hydril. Mixed and pumped 200ft³ "B" cement, 1:1 perlite, 40% SSA1, 3% gel and 0.5% CFR-2. C.I.P. at 0020 hours. Well went on vacuum after 4 hours. Pumped plug #2 through bit at 682'. Mixed and pumped 400ft³ cement as before. C.I.P. at 0700 hours. W.O.C. 4 hours. Filled hole with 20 bbls mud. P.O.H. Picked up drilling assembly. R.I.H. to top of cement at 911'. Drilled cement to 1309'. Drilled 8-3/4" hole from 1309' to 1355'. Located obstruction at 1328'. Drilled on obstruction 30 minutes. P.O.H. Checked stabilizer and bit. R.I.H. Drilled on obstruction. Well started flowing. Closed well in.

4/13/79

Mixed a pit of 72#/ft³ mud. Killed well. P.O.H. R.I.H. with O.E.D.P. to 907'. Closed in well. Mixed and pumped 190ft³ Versagel, mixed with 4# nut plug per gallon with 20ft³ water, 100ft³ "B" cement, 1:1 perlite, 40% SSA1, 3% gel and 0.5% CFR-2. C.I.P. at 0520 hours. Pulled 3 stands. Closed rams. W.O.C. 4 hours. R.I.H. to top of cement at 1126'. Drilled cement from 1126' to 1355'. Well started flowing. Closed well in. Mixed mud and killed well. P.O.H. Ran O.E.D.P. to 939'. Pumped 200ft³ water, and 190ft³ Versagel mixed with 5# walnut hulls/gallon, 4/13/79 Continued -

20ft³ water and 200ft³ "B" cement, premixed with 1:1 perlite, 40% SSA1, 3% gel and 0.5% CFR-2. Displaced with 15ft³ water. Pressure built to 3000 psi. Pulled to 682'. Pumped out 100ft³ cement to surface. P.O.H. W.O.C.

4/14/79

W.O.C. 4 hours. Ran drill pipe to top of cement at 1061'.
P.O.H. R.I.H. with bit. Drilled cement from 1061' to
1326'. P.O.H. Made up HOWCO EZSV. Well started flowing.
Killed well. R.I.H. Set EZSV at 1065'. Mixed and pumped
100ft³ "B" cement premixed with 1:1 perlite, 40% SSA1,
3% gel, and 0.5% CFR-2, followed by 250 sacks cement,
premixed with 0.75% CFR-2 and 25# gelsonite/sack. Displaced
with 150ft³ water. Reverse circulated and pulled 180'.
W.O.C. 6 hours. Stabbed into EZSV. Pressured to 400
psi. Plug held O.K. P.O.H. Made up drilling assembly.

4/15/79

Drilled out EZSV at 1065' and stringers of cement from 1131' to 1220' and hard cement to 1355'. Drilled 8-3/4" hole from 1355' to 1450'. Lost 25% of returns after 1370'. P.O.H. Ran O.E.D.P. to 1159'. Closed rams. Mixed and pumped 420ft³ "G" cement with 0.75% CFR-2. Displaced with 92ft³ mud. P.O.H. W.O.C. 4 hours. Filled hole with 10bbls mud. R.I.H. Drilled out cement from 1155' to 1450'. Drilled 8-3/4" hole from 1450' to 1674'.

- 4/16/79 Drilled 8-3/4"hole from 1674' to 2494'.
- 4/17/79 Drilled 8-3/4" hole from 2494' to 3113'.
- 4/18/79 Drilled 8-3/4"hole from 3113' to 3837'.

4/19/79 Drilled 8-3/4" hole from 3837' to 4192'.

- 4/20/79 Drilled 8-3/4" hole from 4192' to 4401'. Plugged bit. P.O.H. Picked up 6" monel and drill collar. R.I.H. with bit #11. Drilled 8-3/4" hole from 4401' to 4433'.
- 4/21/79 Drilled 8-3/4" hole from 4433' to 4772'. Surveyed. Broke survey wire line. P.O.H.
- 4/22/79 R.I.H. with bit #12. Washed and reamed from 4750' to 4772'. Repaired drawworks rotary drive chain. Rig down from 0100 to 1930 hours. Drilled 8-3/4" hole from 4772' to 4800'.
- 4/23/79 Drilled 8-3/4" hole from 4880' to 5124'. P.O.H.
- 4/24/79 P.O.H. R.I.H. with bit #13. Drilled 8-3/4" hole from 5124' to 5328'.

De Braga #2

4/25/79Drilled 8-3/4" hole from 5328' to 5531'.4/26/79Drilled 8-3/4" hole from 5531' to 5878'.4/27/79Drilled 8-3/4" hole from 5878' to 6042'.4/28/79Drilled 8-3/4" hole from 6042' to 6209'.4/29/79Drilled 8-3/4" hole from 6209' to 6413'.4/30/79Drilled 8-3/4" hole from 6413' to 6701'.5/1/79Drilled 8-3/4" hole from 6701' to 6826'.

5/2/79 Drilled 8-3/4" hole from 6826' to 6946'. Twisted off. P.O.H. Left 290' of drilling assembly in hole. Top of fish at 6656'. Made up Midway 8-1/8" fishing tool, jars and bumper sub. R.I.H. Picked up fish. Circulated and conditioned mud.

5/3/79 Chained out of hole. Recovered all of fish. Rigged up and ran Schlumberger temperature log, DIL, Compensated Neutron Formation Density Log and Continuous Dipmeter.

5/4/79 R.I.H. with drilling assembly to 2100'. Circulated and conditioned mud. P.O.H. and reran Temperature Log from the surface to 6946'. Ran 8-3/4" bit to 4000'. Circulated bottoms up. R.I.H. to 6946'. Conditioned mud. P.O.H. Laid down drill pipe.

> Continued to P.O.H., laying down drill pipe and drill collars. Rigged and ran combination blank 7"26# K55, 8 round, LT&C production liner, hung liner on Midway 7" x 9-5/8" liner hanger at 987' with guide shoe at 6940'. Slotted casing intervals, from 2724' to 3241', 3408' to 3725', 4220' to 5146', 6303' to 6503' and 6940' to 6625'. Cement baskets placed at 2040', 2090' and 2130'. P.O.H. Laid down liner setting tool. R.I.H. with 9-5/8" HOWCO RTTS and set at 916'. Backed off lower kelly cock at 12'. Removed B.O.P.E.

5/6/79

5/5/79

Installed 10"-600 W-K-M master valve, 10"-600 x 12"-900 cross-over spool and 12"-900 Hydril. Stabbed into lower kelly cock at 12'. Released RTTS. Circulated to cool hole. P.O.H. R.I.H. with 8-3/4" bit with well flowing to 947'. Mixed and displaced 200 bbls 71#/ft³ mud to kill well. P.O.H. R.I.H. picking up 3-1/2" drill pipe to 6900'. Dumped pits and refilled with fresh water. Plugged bit. P.O.H.

5/7/79

Continued P.O.H. Laid down one joint plugged drill pipe. R.I.H. with well flowing two inch stream to 810'. Closed well in. Squeezed away 250 bbls water at 100 psi. R.I.H.

Pg 4

5/7/79

Continued -

with well flowing two inch stream to 3750'. Shut well in. Squeezed away 250 bbls through drill pipe and 100 bbls through kill line. R.I.H. with well flowing a two inch stream of water to 6940'. Pumped 700 bbls fresh water, dumping returns. Well dead after pumping 350 bbls and flowing two inch stream after pumping 700 bbls. P.O.H. laying down 4-1/2" and 3-1/2" drill pipe. Stopped at 4697', 2763' and 1535' to pump fresh water while dumpir; returns. Pumped a total of 2400 bbls fresh water. Well produced approximately 600 bbls additional fluid. Shut well in. Tightened all well head bolts. Tore out Hydril. Laid down Kelly. Released rig for move to Ruby Valley at 2400 hours. De Braga #2

CASING DETAIL

NO.		TENCON	MOD	DOMMON
JTS.	DESCRIPTION	LENGTH	TOP	BOTTOM
	13-3/8" 54.5# K55 BUTTRESS	· ·		
,	13-3/8" B&W S.O.W. Guide Shoe	1.85	308.15	310.00
	13-3/8" 54.5# K55 Buttress	16.80	291.35	308.15
,	Casing Cut-Off	•		
1	13-3/8" 54# K55 Buttress Casing	40.65	250.70	291.35
				(Insert Float)
6	13-3/8" 54# K55 Buttress Casing	252.70	+ 2.00	250.70
7		312.00	KB +2.00'	
	(KB = 11.00')			
	9-5/8" 40# K55 BUTTRESS			
	13-3/8" S.O.W. B&W Guide Shoe	1.30	1192.70	1194.00
2	13-3/8" 54.5# K55 Buttress Casing	76.78	1115.92	1192.70
28	13-3/8" 54.5# K55 Buttress	1117.92	+ 2.00	1115.92
	Casing			(Insert Float)
-			•	
30	TOTAL:	1196.00	KB +2.00'	
••• ·	(KB = 11.00')			н. Н
· · · ·				
	7" 26# K55 8RD LT&C			
			· .	· .
	7" B&W Guide Shoe	1.30	6938.80	6940.00
8	7" 26# K55 8RD LT&C Slotted	313.15	6625.55	6938.70 _/
•	Casing	100 00		
.3	7" 26# K55 8RD LT&C Casing 7" 26# K55 8RD LT&C Casing	122.25	6503.30	6625.55
. 5	/" 26# K55 8RD LT&C Casing	199.93	6303.37 5146.06	6503.30
28	7" 26# K55 8RD LT&C Casing 7" 26# K55 8RD LT&C Slotted	1157.31	5146.06	6303.37
23		925.60	4220.46	5146.06
1 .	Casing	405 20	3735 36	4000 40
12		495.30	3725.16	
8	7" 26# K55 8RD LT&C Slotted	316.98	3408.18	3725.16
4	Casing 7" 26# K55 8RD LT&C Casing	166 30	22/1 70	3409 19
13	7" 26# K55 8RD LT&C Casing 7" 26# K55 8RD LT&C Slotted	166.39 516.99	J641.17 J73/ 00	3241.79
1.2	Casing	770.22	2124.00	3441./9
42	7" 26# K55 8RD LT&C Casing	1733.75	991.05	2724.80
	Midway 7"x9-5/8" Liner Hanger	4.05	987.00	991.05
2		2000	207100	
151	00073 T -	5953.00		
TOT	TOTAL:	2222.00		
		· · · · · · · · · · · · · · · · · · ·	· ·	· · · ·

Top of liner @ 987', Below K.B. KB = 11.00'

FISHING OPERATION

SUMMARY

Well Depth:	6946' (T.D.)
Date:	May 2, 1979
Top of Fish:	6656'
Length of Fish:	290'
Result:	Complete recovery on first attempt.

Only one minor fishing operation was required on De Braga #2, caused by the failure of a 6-1/16" drill collar box in the thread portion, three threads up from the Drilco relief area.

The fish was recovered with a Bowen spiral grapple 8-1/4" O.D. overshot with an 8-1/4" lip guide and a 6" basket grapple with mill control, run on a Bowen 6" bumper sun and hydraulic jar and run on six 6-1/4" drill collars. No problems were encountered in recovering the fish on the first attempt.

The total fish consisted of an 8-3/4" bit, an 8-3/4" stabilizer, 6-1/2" monel drill collar, 8-3/4" stabilizer, 6-1/4" drill collar, an 8-3/4" stabilizer and seven 6" to 6-1/2" drill collars.

FLUID ANALYSIS

Water samples were collected during the drilling of De Braga #2 and sent to Union Oil Company's Science and Technology Division laboratories at Brea, California for analysis. The results of those analyses are not yet available for inclusion in this report. When the analyses are finished, an addendum will be furnished to complete this section.