



00244905

BEST IMAGE  
AVAILABLE

WELL SUMMARY

OPERATOR: C.R.A., Inc.

WELL: # 1-A Govt. (Hiawatha Area)

CLASSIFICATION: Wildcat

LOCATION: 1320' fnl x 850' fel of S17-T11N-R100W,  
Moffat County, Colorado

ELEVATION: 6425' Ground 6437' KB

SPUDDED: October 31, 1965

FINISHED DRILLING: December 8, 1965

CONTRACTOR: Signal Drilling Co., Denver, Colorado  
Toolpusher: Ted Strader

CASING: 10-3/4" @ 501' w/500 sx.  
7-5/8" @ 6738' w/380 sx.

CORES: None

DRILL STEM TESTS: Five DST'S - See Details

LOGGING SERVICES: Baroid 2-man logging unit 1750'-6741'  
Schlumberger: IES 504-6715; 6733-6956  
SGRC 504-6714; 6733-6955  
FAL 2650-6714  
Temp. 3000-6670

SAMPLES: American Stratigraphic Co., Denver, Colorado

TOTAL DEPTH: 6951' (Driller) 6956' (Schlumberger)

STATUS: Plugged & Abandoned

FORMATION TOPS:

Wasatch	(Surface)
Ft. Union	2693' (3732)
Lewis	5058' (1367)
Mesaverde:	
Almond	5745' (680)
Ericson	6694' (-269)



CHRONOLOGICAL LOG

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Oct. 31, Spud 11:30 P. M.  
Drilled 0-59 - 15" hole

Nov. 1, Drilled 59-76 - Lost circulation at 72' - mixing mud - lost  
approx. 2100 Bbls. Returns @ 11:30 P.M.

" 2, " 76-500  
" 500-613 - 9-7/8" hole

" 3, " 613-868

" 4, Ran 16 joints, 486.48' of 10-3/4", H-40, 32.75#  
casing - landed at 501' KB - Cemented by Howco  
with 500 Sx 50/50 Posmix, 2% gel & 2% CaCl<sub>2</sub>, followed  
by 50 Sx. regular cement, 2% CaCl<sub>2</sub>. Circ. Cement.

" 5, Pressure up to 1000# - OK - Drilled plug 7:00 P.M.  
Drilled 868-11140 - 9-7/8" hole

" 6, " 11140-1574

" 7, " 1574-2065

" 8, " 2065-2612

" 9, " 2612-2955

" 10, " 2955-3278

" 11, " 3278-3555

" 12, " 3555-3822

" 13, " 3822-4015

" 14, " 4015-4220

" 15, " 4220-4490

" 16, " 4490-4639

" 17, " 4639-4947

" 18, " 4947-5085

" 19, " 5085-5114 - Condition mud for DST - 18 hours.

" 20, " 5114-5267 - DST # 1 5115-5114 - Packer failure.



Nov. 21, Drilled 5267-5559

" 22, " 5559-5809 - 5½ hours circulate and condition hole.

" 23, " DST # 2 - 5738-5809 - Rec. 750' SGCM (See Details)  
5809-5840

" 24, " 5840-5998

" 25, " 5998-6156

" 26, " 6156-6278

" 27, " 6278-6423 - Circulate for DST 2 hours

" 28, " DST # 3, 6388-6423 - GTS in 10" - Max. 211 MCF - See Details  
6423-6454

" 29, " 6454-6614

" 30, " 6614-6706

Dec. 1, Ran Schlumberger logs preparatory to running 7-5/8" casing.  
Installed new motor on draw works - pipe strap correction  
T.D. from 6706' to 6714'.

" 2, " DST # 4, 6697-6716 (Schlumberger measurement) See Details  
6714-6728 (re-strap pipe found T.D. at 6714')

" 3, " 6728-6741  
DST # 5, 6719-6741 - Rec. 10' mud - See Details

" 4, Circulate hole - preparing to run 7-5/8" casing  
Running casing.

" 5, Ran 6740.59' of 7-5/8", N-80, 26.40# casing and landed  
at 6738' (KB) Cemented by Howco with 380 Sx. Plug down  
at 2:45 A.M.

" 6, WOC - Nippling up for air drilling

" 7, Blowing and drying hole  
Drilled 6741-6779 - Compressor broke down prep. to trip.

" 8, " 6779-6951 - At 6795' a brief (1 minute) blow of gas  
and died - stopped dusting - slight moisture - making  
pencil sized stream of water - cannot dry up - filled  
hole with mud - circulate preparatory to running logs

" 9, Circulate and condition hole - Ran logs.

" 10, Wait on Orders

" 11, Preparing to pull 7-5/8" pipe - prep to plug & abandon

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### SAMPLE DESCRIPTION

- 870-930 Shale, light gray to medium gray predominant, some tan to maroon - some mottling.
- 930-990 Shale, light gray, tan, maroon - mottled, blocky.
- 990-1080 Shale, light to medium gray with abundant tan and maroon shale.
- 1080-1200 Shale, light gray to medium gray, blocky with trace of tan and maroon shale - some greenish-gray shale.
- 1200-1560 Shale, light gray, medium gray, greenish-gray, with considerable brown, tan and maroon shale - some mottling - locally slightly micaceous.
- 1560-1810 Shale, light gray, medium gray and greenish-gray, with only trace of variegated shale.
- 1810-2110 Shale, as above, some variegated shale, some mottling.
- 2110-2140 Shale, as above, with considerable, medium grained, free sand grains in sample
- 2140-2230 Shale & Sandstone, shale as above, sandstone is light gray to white, fine to coarse grained - all drilled up into individual sand grains.
- 2230-2500 Shale, light gray to medium gray, some greenish-gray, blocky.
- 2500-2530 Shale & Sandstone, shale as above; sandstone is light gray, fine grained, friable but shows some clay-filling - numerous free sand grains. Note: Drilling time suggests mostly sand 2490-2525.
- 2530-2680 Shale, light gray to medium gray predominant, some greenish-gray, some maroon - some mottling.
- 2680-2690 Shale, as above with considerable dark gray, carbonaceous, locally sandy shale.
- 2690-2700 Sandstone, light gray, fine grained, salt & pepper, sub-angular to sub-rounded, friable but mostly clay-filled tight.
- 2700-2710 Coal, low grade sub-bituminous with much sandstone as above - may be coal from 2701-06, with shale below 2706.
- 2710-2720 Shale, medium gray with some fairly dark gray carbonaceous shale.
- 2720-2730 Shale, as above with considerable coal.



- 2730-2770 Sandstone, light gray, fine grained, salt & pepper, friable but clay-filled tight. Probably mostly sand 2728-66.
- 2770-2780 Shale & Coal, shale is light gray to medium gray, locally silty, coal sub-bituminous.
- 2780-2790 Shale, light gray to medium gray, silty, with considerable coal.
- 2790-2800 Coal, sub-bituminous.
- 2800-2850 Shale, light gray to medium gray, blocky, few streaks of carbonaceous material - some coal.
- 2850-2860 Skip
- 2860-2880 Shale, light gray to medium gray, blocky, some bentonite.
- 2880-2900 Shale, as above, with minor amount of coal, probably in thin streaks in shale body.
- 2900-2940 Shale, medium gray predominant, some fairly dark gray, blocky, locally slightly carbonaceous - trace lavender shale.
- 2940-2960 Shale, medium gray predominant, some light and dark gray, locally slightly carbonaceous - some gray to tan mottling.
- 2960-2980 Coal, sub-bituminous, much shale as above in samples.
- 2980-3000 Sandstone, light gray, fine grained, salt & pepper, fairly hard, dirty and tight - NSOF.
- 3000-3020 Coal, sub-bituminous - with perhaps thin beds of shale and sand.
- 3020-3050 Shale, medium gray, blocky, locally carbonaceous, with much light gray, fine to very fine grained, salt & pepper, dirty, tight sandstone grading to siltstone.
- 3050-3060 Coal, sub-bituminous (coal may be 3052-58).
- 3060-3070 Sandstone, light gray, fine to very fine grained, dirty, tight, with local carbonaceous streaks.
- 3070-3090 Coal, as above, probably from 3077-87.
- 3090-3110 Sandstone, light gray, fine to very fine grained, salt & pepper, dirty, tight - much gray shale - some silty and grades to siltstone.
- 3110-3150 Sandstone, shale & coal, all as above, perhaps interbedded
- 3150-3180 Sandstone, light gray, fine to very fine grained, dirty, tight - much shale and coal in samples.



- 3180-3220 Shale, medium gray predominant, some fairly dark gray, locally carbonaceous shale, some silty - trace bentonite.
- 3220-3240 Coal, sub-bituminous - random shale beds in coal.
- 3240-3320 Shale, medium gray, some slight greenish-gray, blocky, some tan and gray mottling. Some light gray, fine grained sandstone.
- 3320-3340 Shale & coal, shale as above, considerable sand as above.
- 3340-3370 Shale, medium gray to dark gray, carbonaceous and silty.
- 3370-3390 Sandstone & shale, sandstone is light gray, fine to medium grained, salt & pepper, fairly friable but tight; shale as above.
- 3390-3420 Coal, sub-bituminous (coal may be 3385-3417(?)).
- 3420-3470 Shale, medium gray to dark gray, mostly carbonaceous, possibly few streaks of coal.
- 3470-3480 Coal, with much siltstone and shale.
- 3480-3500 Shale, medium gray to dark gray, locally carbonaceous, abundant light gray siltstone.
- 3500-3540 Siltstone, light gray, slightly carbonaceous, salt & pepper, fairly hard, locally slightly calcareous, much gray shale.
- 3540-3570 Coal & shale, as above, possibly interbedded shale and coal.
- 3570-3590 Shale, medium gray to dark gray, carbonaceous, some brown shale showing some poorly preserved fossil remains (Ostracods?). Considerable light gray, fine grained sandstone.
- 3590-3620 Sandstone, light gray, fine to very fine grained, salt & pepper, fairly hard, dirty and clay-filled tight - no fluorescence in wet sample but an occasional fragment gives a very dull, near white fluorescence in dry sample.
- 3620-3630 Coal, low grade sub-bituminous, grades to lignite and very carbonaceous shale - a few poorly preserved fossil remains.
- 3630-3710 Shale, medium gray to dark gray, blocky, carbonaceous, with some interbedded coal and abundant light gray, fine grained, dirty, tight sandstone.
- 3710-3720 Skip
- 3720-3750 Sandstone, light gray, fine grained, salt & pepper, fairly hard, dirty, tight, grades to very fine grained to siltstone - much gray shale, with apparent thin streaks of coal.



- 3750-3820 Sandstone, light gray, fine to very fine grained, fairly hard, very dirty and tight, much siltstone.
- 3820-3850 Sandstone & shale, sandstone as above, shale is dark gray, blocky and fissile - locally carbonaceous
- 3850-3860 ----- sample mostly coal, but probably drilled gray to brownish-gray, hard sandstone with a few fragments showing a dull, yellowish, pin-point fluorescence - no cut to very, very slight cut.
- 3860-3870 Coal, probably mostly coal 3861-69 - much sand and shale in sample.
- 3870-3880 Coal, probably 3877-79 - remainder shale.
- 3880-3910 Shale, dark gray, blocky to fissile, fairly hard, carbonaceous, locally silty.
- 3910-3930 Sandstone, medium gray to light gray, fine to very fine grained,, salt & pepper, hard, dirty, tight.
- 3930-3950 Coal & Shale, coal low grade sub-bit.; shale is dark gray to black, very carbonaceous with numerous coal flecks.
- 3950-4000 Shale, dark gray, blocky to fissile, carbonaceous with few flecks of coal - considerable gray siltstone.
- 4000-4100 Shale, as above with possibly few thin coal streaks, also some siltstone.
- 4100-4450 Shale, medium gray to dark gray, blocky to fissile, locally carbonaceous with a few flecks of coal found locally - an occasional trace of light gray siltstone.
- 4450-4480 Sandstone, light gray to medium gray, very fine grained, dirty, tight and grades to siltstone.
- 4480-4550 Shale, medium gray to dark gray, mostly blocky. locally carbonaceous with a few flecks of coal in dark gray shale.
- 4550-4560 Sandstone, light gray to medium gray, fine grained, dirty (much carbonaceous material). very tight and grades to siltstone.
- 4550-4580 Shale & Sandstone, shale is medium gray to dark gray, mostly blocky, locally carbonaceous, few flecks of coal, considerable bentonite; sandstone is light gray, very fine grained, clay-filled tight.
- 4580-4780 Shale, medium gray to dark gray, blocky to fissile, locally slightly carbonaceous - some bentonite locally.
- 4780-4900 Shale as above, with a few thin streaks of siltstone, grading to very fine grained, tight sandstone.



- 4900-4920 Sandstone, light gray, fine grained, salt & pepper, friable but clay-filled tight - gives a good, blue-white fluorescence, poor, slow cut - good cut when crushed - 35 units gas.
- 4920-4930 Coal, sub-bituminous (coal probably 4921-29) 140 units gas.
- 4930-4950 Shale, medium gray to dark gray, locally carbonaceous - some gray siltstone - probably some coal.
- 4950-4980 Sandstone, light gray, fine grained, salt & pepper, friable, dirty and clay-filled - gives fair blue-white fluorescence, poor to fair cut.
- 4980-5000 Shale, medium gray to dark gray, locally carbonaceous & silty.
- 5000-5010 Coal, good sub-bituminous, bubbles much gas from fresh samples - 200 units gas, some of which is probably trip gas.
- 5010-5020 Shale, medium gray to dark gray, locally carbonaceous.
- 5020-5040 Sandstone, light gray to tan, some light brown, fine to medium grained, sub-angular to sub-rounded, fairly friable but tight.
- 5040-5060 Sandstone, light tan to white, coarse grained, some finely conglomeratic, sub-rounded to sub-angular, much milky chert in sample - probably in form of chert pebbles - appears to have good porosity but effective porosity is probably reduced by clay-filling.
- 5060-5110 Shale, mostly dark gray, usually silty, locally carbonaceous.
- 5110-5125 Sandstone, light gray to light brown, fine to medium grained, some light brown oil stain, but not 100% - good blue-white fluorescence & fair to good streaming cut - approximately 75% of sand shows oil stain - only 35 units of gas - does not appear to be a good, live oil stain - may be water bearing.
- 5125-5135 Sandstone, as above, but only minor amount showing oil stain.
- 5135-5145 Sandstone, mostly light gray fine to medium grained, salt and pepper, virtually no stain - still fair fluorescence and fair to poor cut.
- 5145-5220 Sandstone, light gray, fine grained, ill-sorted, salt & pepper, friable but appears to be completely clay-filled. NSOF.
- 5220-5230 Siltstone, medium gray, grading to silty shale.
- 5230-5320 Shale, medium gray to dark gray, blocky, locally silty and locally grades to siltstone.
- 5320-5730 Shale, dark gray, blocky to fissile, locally slightly silty, some finely disseminated mica.



- 5730-5740 Shale, as above with considerable light gray, fine grained, salt & pepper, friable but clay-filled tight sandstone. shows good blue-white fluorescence, fair to good cut in  $\text{CCl}_4$ .
- 5740-5760 Sandstone, light gray, fine grained, salt & pepper, Ill-sorted, mostly clay-filled but may be some effective porosity - good fluorescence and cut - 120 units gas.
- 5760-5800 Sandstone, light gray, fine grained, salt & pepper, few clusters, mostly free sand grains in samples - fair to good fluorescence - fair cut.
- 5800-5810 Shale, dark gray, blocky - much sand as above still in samples.
- 5810-5830 Coal, sub-bituminous - possibly a few shale streaks. Drilling time suggests coal 5814-25.
- 5830-5890 Sandstone, light gray, fine grained, salt & pepper, friable but clay-filled - considerable carbonaceous material. NSOF.
- 5890-5920 Shale, medium gray to dark gray, locally carbonaceous & silty.
- 5920-5950 Sandstone, light gray to nearly white, fine grained, salt and pepper, friable but completely clay-filled, no visible permeability - good blue-white fluorescence, virtually no cut except when sample is crushed - drilling time suggests some coal immediately above sand - some coal in sample.
- 5950-5980 Sandstone, light gray, very fine grained, hard, dietary, tight and grades to hard siltstone.
- 5980-6000 Shale, dark gray, locally silty, locally slightly carbonaceous.
- 6000-6010 Coal - drilling time suggests coal 6001-04.
- 6010-6025 ----- only coal in samples - drilling time suggests coal break 6020-25.
- 6025-6040 Sandstone, light gray, fine to very fine grained, salt & pepper, fairly hard, completely clay-filled, very dirty, NSOF.
- 6040-6050 Sandstone, light gray, fine grained, friable but clay-filled gives dull, golden fluorescence - no cut - some coal in sample, probably a thin coal bed at top of sand - 90 units gas.
- 6050-6085 Sandstone, as above, with maximum gas of 120 units tapering off to about 75 units at base.
- 6085-6090 Coal - drilling time suggests coal 6081-87.



- 6090-6110 Sandstone, light gray to medium gray, very fine grained, dirty, tight and grades to siltstone.
- 6110-6130 Shale, dark gray, blocky, locally silty and carbonaceous.
- 6130-6140 Coal, sub-bituminous - (by drilling time 6138-43)
- 6140-6150 Shale, dark gray, blocky to fissile, carbonaceous.
- 6150-6160 Skip
- 6160-6200 Shale, as above, with probably several thin streaks of coal.
- 6200-6210 Coal, (by drilling time coal 6209-13)
- 6210-6225 Sandstone, light gray, fine grained, fairly hard, very tight, slightly calcareous.
- 6225-6260 Shale, dark gray, blocky, hard, carbonaceous, some finely disseminated mica.
- 6260-6290 Sandstone, light gray, fine to very fine grained, slight salt and pepper, tight, calcareous, much clay-filling - drilling time suggests sand 6267-82.
- 6290-6300 Coal
- 6300-6310 Shale, dark gray, blocky to fissile, locally carbonaceous, hard.
- 6310-6330 Sandstone, light gray, fine to very fine grained, dirty and silty, very tight - gives a dull blue-white fluorescence - no cut - 75 units gas in top of sand - possibly a streak of coal at base.
- 6330-6340 Sandstone, as above, slight fluorescence, no cut.
- 6340-6350 Coal, mostly coal in sample, may be drilling some sand.
- 6350-6370 Sandstone, light gray, fine to very fine grained, dirty, tight, gives a dull, golden fluorescence - no cut - one short, fast peak of 100 units.
- 6370-6380 Sandstone, medium gray to brownish-gray, very fine grained, dirty, tight and grades to siltstone, slightly calcareous.
- 6380-6410 Sandstone, light gray, fine grained, fairly friable but has some clay-filling - dull to bright blue-white fluorescence - good cut - 190 units gas - drilling time suggests sand 6386-6403.
- 6410-6450 Shale, dark gray, blocky to fissile, fairly hard. locally silty.



- 6450-6460 Sandstone, light gray, fine grained, clay filled to siliceous cement, hard, very tight, very slight dull gold to bronze fluorescence - no cut.
- 6460-6530 Shale, dark gray, blocky to fissile, carbonaceous with some coal
- 6530-6560 Shale & sandstone, shale as above,; sandstone is light gray, fine to very fine grained, hard, tight and grades to siltstone.
- 6560-6590 Sandstone, light gray, fine to very fine grained, fairly hard, tight and clay-filled.
- 6590-6620 Shale, dark gray, blocky to fissile, locally carbonaceous, some finely disseminated mica - much coal in samples but probably not drilled.
- 6620-6695 Shale, as above.
- 6695-6725 Sandstone, light gray, fine grained, hard, tight, some siliceous cement.
- 6725-6741 Sandstone, as above, slow drilling, poor samples, ran 7-5/8" casing to 6741'

Air Drilling below 6741'

- 6741-6760 Dust - cleaning up hole - mostly cement.
- 6760-6795 Dust - probably sandstone - samples contain mostly fine, individual sand grains. At 6795' a puff of gas, burning a 20' flare for one minute and died. Hole stopped dusting at this point, some moisture came into hole - began making a stream of water about size of a lead pencil.
- 6795-6951 No Returns - hole making some moisture - would drill 30' then add detergent and water to clean hole - no sample recovery.



DRILL STEM TESTS

DST # 1      5115-5114 - Test off Anchor - 2 top packers

Packers held 2 minutes and failed - tried to reset tool four times and failed.

Recovery: 750' mud

Flow Pressures not usable

SIP 230<sup>1</sup>/<sub>4</sub># (?)

IHP 2525#

FHP 2525#

DST # 2      5738-5809 - Test off Anchor - 2 top packers

Initial Flow Period      5 minutes

"      Shut-in      "      30      "

Final Flow      "      90      "

"      Shut-in      "      60      "

Tool opened with fair blow, increasing to good blow in 5 minutes - continued throughout test - NGTS

Recovery: 330' SGCM (Approx. 3 Barrels)

IHP 2931#

ISIP 262#

FSIP 262#

IFP 112#

FFP 168#

FHP 2931#

BHT 150°

DST # 3      6388-6423 - Test off Anchor - 2 top packers

IF Period 10 Min.

ISI      "      30      "

FF Period 120 Min.

FSI      "      60      "

Gas to surface in 10 minutes - Gas immediately on final flow.  
Guaged gas with volumes as follows:

2 Minutes	205 M
5      "	211M
10      "	200 M
15      "	189 M
20      "	171 M
25      "	153 M
30      "	134 M
35      "	129 M
40      "	121 M

45 Minutes	116 M
50      "	101 M
55      "	101 M
60      "	95 M
75      "	90M
90      "	90 M
105      "	90 M (?)
120      "	90 M (?)



DST # 3 (Cont.)

Recovery: 1' mud in top of tool

IHIP 3217#  
 IFP (1) 75#  
 IFP (2) 56#  
 FFP 0  
 ISIP 2605#  
 FSIP 1788#  
 FHP 3217#  
 BHT 156°

DST # 4 6697-6716 (Schlumberger Meas.) Test off Anchor - 2 top packers

IF	Period	15 Min.	FF	Period	120 Min.
ISI	"	30 "	FSI	"	60 "

Gas to Surface in 17 Min. - Gauged as follows:

5 Minutes	11.2 M	45 Minutes	15.7 M
10 "	12.7 M	50 "	15.7 M
15 "	12.7 M	55 "	15.7 M
20 "	12.7 M	60 "	15.7 M
25 "	14.3 M	75 "	16.4 M
30 "	14.3 M	90 "	17.1 M
35 "	14.3 M	105 "	18.5 M
40 "	15.7 M	120 "	18.5 M

Recovery: 130' Mud  
 45' Muddy Salt Water

Water Tested: 24,000 PPM (Resistivity)  
 17,500 PPM (Titration)  
 Mud " 4,000 PPM (Resistivity)  
 3,200 PPM (Titration)

IHP 3408#  
 IFP 19#  
 FFP 57#  
 ISIP 1917#  
 FSIP 2389#  
 FHP 3408#



DST # 5

6720-6741 - Test off Anchor - 2 top packers

IF	Period	15	Minutes
ISI	"	30	"
FF	"	65	"
FSL	"	60	"

Tool opened with fair blow and continued throughout  
Initial Flow Period - On Final Flow tool opened with  
weak blow and died after 20 minutes.

Recovery: 10' Mud (2200 PPM)

IHP	3398#
IFP	11#
FTP	11#
ISIP	100#
FSIP	72#
FHP	3398#

# HOLE DEVIATION SURVEYS

<u>Depth</u>	<u>Deviation</u>	<u>Depth</u>	<u>Deviation</u>
98	$\frac{1}{2}$	2955	1
157	$\frac{1}{4}$	3245	$\frac{1}{2}$
211	$\frac{1}{4}$	3504	1
268	$\frac{1}{4}$	3722	$\frac{1}{2}$
356	$\frac{1}{4}$	3914	$\frac{1}{2}$
451	$\frac{1}{4}$	4015	$\frac{1}{2}$
515	$\frac{3}{4}$	4240	$\frac{1}{2}$
642	1	4422	$\frac{1}{2}$
769	$\frac{1}{4}$	4639	$\frac{1}{2}$
1020	$\frac{3}{4}$	4996	$\frac{1}{4}$
1246	$\frac{3}{4}$	5051	$\frac{3}{4}$
1342	$\frac{1}{2}$	5287	$\frac{1}{4}$
1574	$\frac{1}{2}$	5998	$\frac{1}{2}$
1757	$\frac{1}{4}$	6122	$\frac{1}{2}$
2010	$\frac{1}{2}$	6536	$1-\frac{3}{4}$
2353	1	6740	2
2657	$1-\frac{1}{4}$	6779	$1-\frac{3}{4}$



BIT RECORD

RUN No.	SIZE	MAKE	TYPE	IN	OUT	FEET	HOURS
-	15	HTC	OSC	0	500	500	16-3/4
1	9-7/8	HTC	OSC3	500	868	368	---
2	"	HTC	OSC3	868	1152	284	5 1/2
3	"	Smith	DT	1152	1342	190	5 1/4
4	"	HTC	OSC1	1342	1574	232	8
5	"	HTC	OSC3	1574	1757	183	5-3/4
6	"	HTC	OSC3	1757	2065	308	11-3/4
7	"	HTC	OSC3	2065	2353	288	9 1/2
8	"	HTC	OSC3	2353	2657	304	10 1/4
9	"	HTC	OSC3	2657	2955	298	13-3/4
10	"	Smith	DTJ	2955	3275	320	14 1/4
11	"	HTC	OSC3	3275	3504	229	11 1/2
12	"	Reed	YT3	3504	3722	218	14
13	"	HTC	OSC1G	3722	3914	192	9 1/2
14	"	HTC	OSC1G	3914	4015	101	8-3/4
15	"	HTC	OSC	4015	4240	225	17 1/2
16	"	Smith	DT2G	4240	4422	182	10
17	"	Smith	DT2G	4422	4521	99	10 1/4
18	"	Smith	DT2G	4521	4639	118	11 1/4
19	"	HTC	OSC1G	4639	4887	258	13 1/2
20	"	HTC	OSC1G	4887	4996	109	8 1/2
21	"	HTC	OSC1G	4996	5051	55	4
22	"	HTC	OWC	5051	5144	93	7 1/2
23	"	HTC	OSC1G	5144	5287	143	7
24	"	HTC	OSC	5287	5559	272	12 1/4
25	"	HTC	OSC1G	5559	5809	250	11
26	"	HTC	OWC	5809	5921	112	9 1/4
27	"	HTC	OWV	5921	5998	77	6 1/2
28	"	HTC	OWV	5998	6122	124	9-3/4
29	"	HTC	OWV	6122	6243	121	11
30	"	Smith	C2	6243	6357	114	11
31	"	HTC	OWC	6357	6423	66	5-3/4
32	"	HTC	OWC	6423	6536	113	13 1/4
33	"	HTC	OWV	6536	6633	97	11 1/2
34	"	HTC	W7	6633	6706	73	11 1/2
35	"	HTC	W7	6706	6741	35	15 1/2
36	6-3/4	HTC	W7	6741	6779	38	2 1/2
37	"	HTC	PRGL-J	6779	6951	172	9 1/2



DRILLING TIME

	05	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	00
900	3	3	4	5	5	4	4	4	5	5	5	7	5	4	5	6	5	6	6	7
1000	5	3	5	8	7	12	5	5	6	6	5	4	3	3	4	5	5	4	5	4
1100	4	4	4	4	5	10	10	10	8	8	5	5	5	3	4	4	3	4	3	5
1200	6	4	4	3	4	4	3	4	5	5	4	3	6	9	10	13	9	10	10	9
1300	9	10	18	13	12	14	8	12	15	12	10	8	7	8	16	11	10	9	8	9
1400	15	14	5	6	6	8	7	6	7	8	5	5	5	7	11	11	13	11	6	5
1500	5	6	7	5	6	5	7	7	18	10	4	12	23	25	17	5	5	6	6	5
1600	5	10	5	5	4	5	7	8	7	12	11	11	6	7	7	7	10	7	8	9
1700	9	8	5	8	9	8	10	11	12	15	17	18	6	17	15	8	8	5	7	10
1800	8	8	7	7	6	8	8	7	8	6	15	12	7	6	5	8	7	20	10	10
1900	9	15	21	14	9	8	10	16	9	10	8	8	7	7	9	8	6	10	8	8
2000	9	12	12	27	18	10	10	11	11	8	11	9	24	11	7	5	6	5	5	6
2100	6	4	5	4	4	5	5	5	5	5	7	7	6	5	4	4	4	4	5	4
2200	5	5	5	4	4	4	4	4	5	7	8	9	9	10	17	10	11	10	16	14
2300	15	15	16	18	20	18	8	22	21	27	21	10	7	7	5	7	6	7	6	7
2400	8	6	7	8	13	10	6	5	4	6	5	8	10	8	7	6	6	4	4	4
2500	5	5	5	5	5	5	4	8	14	11	9	10	8	8	12	11	13	20	15	9
2600	10	11	15	17	18	13	17	15	15	13	15	17	8	6	9	16	16	12	11	12
2700	11	13	16	20	11	8	7	9	10	10	8	11	15	17	11	10	15	10	9	12
2800	12	7	11	7	10	10	9	8	8	8	6	13	12	15	13	18	11	15	20	17
2900	15	13	15	17	13	14	10	11	19	20	19	13	14	10	10	7	9	15	9	13
3000	13	7	10	8	10	10	11	11	11	10	7	6	13	8	9	9	10	10	16	12
3100	9	10	9	12	12	13	14	11	9	12	12	8	10	12	12	10	15	16	17	15
3200	15	21	13	9	10	6	7	8	14	15	17	24	22	25	26	15	17	16	15	11
3300	10	9	8	10	10	10	8	9	13	17	15	15	25	17	16	9	10	5	5	5
3400	7	8	10	13	16	15	15	15	15	14	19	22	24	22	17	12	11	20	33	14
3500	18	18	10	11	15	15	15	18	6	12	5	5	8	21	18	9	10	21	32	19
3600	17	23	27	11	7	9	18	17	8	19	19	12	10	13	14	12	17	23	34	24
3700	26	19	25	46	27	10	10	14	16	13	10	7	12	16	12	11	11	11	14	17
3800	13	13	14	14	13	15	11	10	11	11	26	17	10	10	19	10	12	12	12	24
3900	23	27	32	24	26	13	13	12	6	15	15	38	29	25	28	13	25	35	29	40
4000	28	20	57	28	14	20	16	28	22	19	16	23	16	13	21	18	20	17	11	15
4100	19	22	18	11	27	27	17	22	25	28	22	25	22	21	25	25	30	31	28	21
4200	24	23	22	25	30	31	30	32	14	10	8	9	11	16	14	9	8	8	9	11
4300	16	12	12	9	10	12	6	14	11	11	16	13	12	21	21	17	24	23	24	24
4400	20	25	27	31	30	14	18	18	20	19	25	25	25	25	25	24	30	31	42	43



	05	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	00
4500	44	47	39	49	28	18	24	21	17	19	17	23	23	27	23	24	30	30	29	29
4600	31	41	42	38	34	41	38	43	17	25	21	14	14	12	13	12	12	13	13	14
4700	13	12	15	15	13	11	11	12	13	12	15	15	15	13	12	25	25	21	17	15
4800	15	11	13	13	15	13	10	11	16	16	15	9	12	15	15	12	11	10	15	14
4900	10	20	21	12	8	10	30	21	14	23	29	18	19	24	24	30	44	38	35	15
5000	3	5	9	12	12	19	12	13	28	84	41	29	29	30	23	21	22	22	17	18
5100	23	22	24	20	21	24	26	28	—	—	—	11	12	7	6	6	7	7	7	7
5200	7	7	7	9	13	16	16	17	18	16	18	17	16	17	27	32	35	30	20	21
5300	19	17	10	13	12	11	12	14	12	13	12	14	15	14	14	10	10	9	10	8
5400	8	9	11	10	12	11	12	10	10	11	12	11	12	13	14	11	11	13	13	15
5500	11	10	11	10	15	15	15	13	14	14	15	11	6	6	5	5	5	6	7	7
5600	5	7	9	9	9	10	11	12	11	11	11	10	10	12	13	13	13	12	12	12
5700	12	16	18	16	16	13	18	10	11	10	12	15	13	13	11	12	12	10	25	24
5800	21	30	31	9	10	15	13	9	10	15	19	22	24	27	24	32	28	27	34	38
5900	27	31	28	33	12	10	12	11	12	12	18	26	20	28	23	16	27	42	65	55
6000	11	28	35	36	9	24	32	23	22	17	13	14	12	14	14	15	8	10	15	27
6100	30	38	41	28	29	32	29	11	14	28	22	39	37	22	27	15	21	26	29	28
6200	19	21	19	15	20	27	34	46	35	37	31	33	26	17	14	16	26	29	10	22
6300	21	32	32	25	24	30	47	53	18	12	27	31	20	21	24	30	38	16	12	13
6400	17	32	35	39	34	25	25	17	30	23	26	26	37	31	46	36	50	30	45	35
6500	39	48	41	43	47	37	30	30	28	18	17	20	18	17	18	17	40	38	39	20
6600	21	40	35	68	66	68	52	43	53	29	33	45	40	37	43	55	43	36	24	50
6700	85	—	—	135	128	153	210	220	50	15	17	12	23	26	26	37	15	12	11	10
6800	14	12	16	18	17	18	17	17	20	20	19	17	18	13	20	13	13	15	16	16
6900	16	11	10	10	11	10	17	15	15	15										