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BENCH MARK GEOLOGICAL SERVICES

CON. DIV. DIST. 9 HYDROCARBON WELL LOG

ABBREVIATIONS

CO — Circulate Out
CG — Connection Gas
CB — Core Bit
DC — Depth Correction
DS — Directional Survey
DST — Drill Stem Test
DTG — Down Time Gas
FC — Filter Cake
LAT — Logged After Trip
NB — New Bit
NDR — No Data Recorded
NR — No Returns
PP — Pump Pressure
RPM — Rotary Speed
SPM — Pump Strokes
TG — Trip Gas
TGR — Trip Gas Recycle
Vis — Viscosity
WL — Water Loss
WOB — Weight on Bit
Wt — Density Of Drill Fluid

LITHOLOGY MODIFIERS

// — Anhydritic
B — Bentonitic
+ — Calcareous
■ — Carbonaceous Coaly
△ — Dolomitic
F — Fossiliferous
~ — Glauconitic
◇ — Oolitic
P — Pyritic
Λ — Siliceous

Cgl
Ss
Siltst
Sh
Coal
Chl
Salt
Anhy
Dol
Ls
Igneous
Mera
Tuff
No Sample

OPERATOR BLACKWOOD AND NICHOLS

WELL NE Blanco Unit 482

FIELD Basin Fruitland Coal

LOCATION sec 15 NE 1/4 R7W

CO. STATE San Juan Co., New Mexico

ELEVATION KB 6548 ft. GL 6534 ft.

SPUD DATE 4/11 thru 4/12/90

INTERVAL LOGGED 3116 - 3422 ft.

DATE LOGGED 4/11 thru 4/12/90

LOGGING GEOLOGISTS Randy Laney, Mike Mixter

INSTRUMENTATION FID Chromatograph and Total Gas Detector, Infrared CO₂ Detector

WELL LOCATION

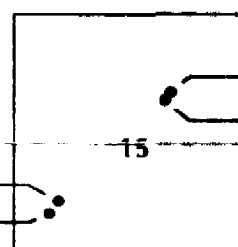
HYDROCARBON ANALYSIS

TOTAL GAS		
10	100	1000
GAS CHROMATOGRAPHY		
100	1000	10000
OIL INDICATOR		
0.01	0.1	1.0

Reported in Units	
10	100
Reported in PPM	
100	1000
Dimension Less	
0.01	0.1

LEGEND—GAS CURVES

TOTAL GAS	T
METHANE	1
ETHANE	2
PROPANE	3
ISO & N-BUTANE	4
OIL INDICATOR $\frac{C_2 + C_4}{C_1}$	0



RATE OF PENETRATION

Min./Ft.

DEPTH

LITHOLOGY OBSERVED %

STC FDT 6 1/4" 2-15's, 1 open

2.5 5 7.5 10

WOB 8
RPM 60
PP 650

TD 3422 ft.

7" casing set at 3116 ft.

5 ft. sample interval
Drilling with fresh water
Depth of Coal Intervals
(# of canistered samples)

100 units Total Gas = 1% methane
10 100 1000 units
100 1000 10,000 ppm

heavies 100 1000 ppm
CO₂ 1000 10,000 ppm

total 198 units
C₁ 6,250 ppm
C₂ 90 ppm

ONSET OF FLARED GAS
C₂ 3141-52 (1 can)

total 219 units
C₁ 16,500 ppm
C₂ 145 ppm

carbon dioxide

total 320 units
C₁ 16,870 ppm
C₂ 270 ppm

3282-90 (1 can)

Sh lt gy, some gn gy, sub blocky, firm, mod silty, non calc, gen non carb, intbd w/ blk vit coal

Coal black to gy blk, pred sub blocky, gen sub vit-vit material is finely dispersed & laminated, mod-very arg illac & carb, tr resin, gen poor quality coal

Sh v dk brn, sub plty earthy-sub res, v carb, scattered pyr, silty

Ss lt-med gy, pred f gr, sub ang, mod well srt, smpl disagg, clr-sli fros qtz grs, mod calc cat, occ gn grs (chlorite?), NF, NC

Ss med gy, gen f-occ med gr, fair srt, smpl disagg, clr-sli fros qtz, less calc than above, becoming more silty, NS

Siltst med brn, sub blkly -blkly, firm to hd, v sli calc, gen non carb, sandy in part, intbd w/ thin black vit coal, blocky w/ conch frac.

Coal black, sub blocky -blkly, v rr conch frac, vit material as finely banded to striated, pred sub vit, poor cleating, sme carb mat. tr pyr, overall fair quality coal

Sh m brn, sub blkly, frm non calc, not v carb, mod -v silty & sandy

Coal black & brn blk, sub blkly-blky, 20% vit, occ conch frac, sme carb & argill, tr resin mod pyr, fair quality coal, best of well

T/ P.C. Tongue 3307'

Ss lt gy-wh S&P, pred f gr, mod well sorted, smpl disagg, v sli calc glauc & carb-coaly grs tr brn dd intergran residue at top, NF, NC

Ss lt-med gy wh S&P, f gr, sub ang-sub rd, mod w srt, sli more fros than above, glauc & carb grs, no intgran residue, NF, NC

Sh med-dk brn, some brn blk, sub plty-sub blkly, mod sft, earthy, v carb-silty, occ coaly laminae

Siltst med-dk brn, sub blocky, firm, mod carb w/ some coaly grains,

Sh & Coal Sh is very dk blk-brn, sub blocky-sub platy, very carb w/ dispersed coaly material, coal is blk, blocky, pred vit, intbd w/ very carb Sh

T/ Main P.C. 3419'

T.D. sample- Ss med brn gy S&P, pred f gr, sub ang, fair srt, smpl disagg, glauc & carb grs, mod abnt brn dd intgran residue, NF, NC