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OIL CON. DIV.
DIST. 3

BENCH MARK GEOLOGICAL SERVICES

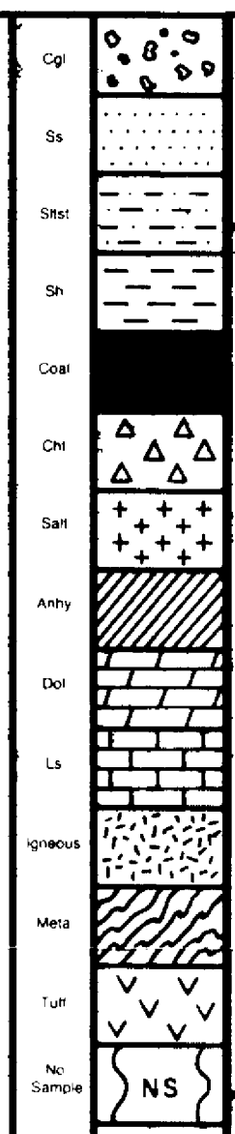
HYDROCARBON WELL LOG

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
WI — Water Loss
WOB — Weight on Bit
Wt — Density Of Drill Fluid

LITHOLOGY MODIFIERS

// — Anhydritic
B — Bentonitic
⊥ — Calcareous
■ — Carbonaceous, Coaly
⊥ — Dolomitic
F — Fossiliferous
N — Glauconitic
ϕ — Oolitic
P — Pyritic
Λ — Siliceous



OPERATOR BLACKWOOD AND NICHOLS

WELL NE Blanco Unit 403R — FIELD Basin Fruitland Coal

LOCATION sec 9 [redacted] — CO./STATE Rio Arriba Co., New Mexico

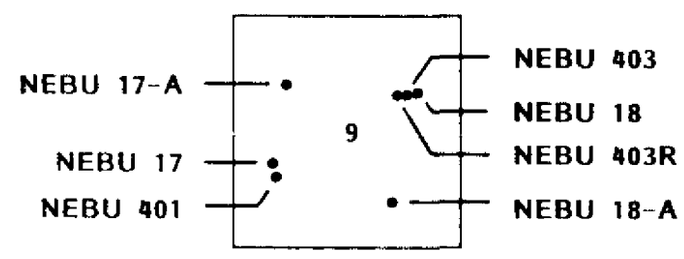
ELEVATION KB 6325 ft. GL 6311' (ungrd) — SPUD DATE

INTERVAL LOGGED 2959 - 3200 ft. — DATE LOGGED 6/10/90

LOGGING GEOLOGISTS Randy Laney, Mike Mixter

INSTRUMENTATION FID Chromatograph and Total Gas Detector, Infrared CO_2 Detector

WELL LOCATION



LEGEND — GAS CURVES

TOTAL GAS	T
METHANE	1
ETHANE	2
PROPANE	3
ISO & N-BUTANE	4
OIL INDICATOR $\frac{C_3 + C_4}{C_1}$	0

HYDROCARBON ANALYSIS

TOTAL GAS	10 100 1000	Reported in Units 10 100
GAS CHROMATOGRAPHY	100 1000 10000	Reported in PPM 100 1000
OIL INDICATOR	0.01 0.1 1.0	Dimension Less 0.01 0.1

RATE OF PENETRATION Min./Ft.

STC FDTL 6 1/4"
3-24's

2.5 5 7.5 10

WOB 8-10
RPM 100
PP 1025

TD 3200 ft.

Porosity G F P — CORE DS DST

DEPTH — LITHOLOGY OBSERVED %

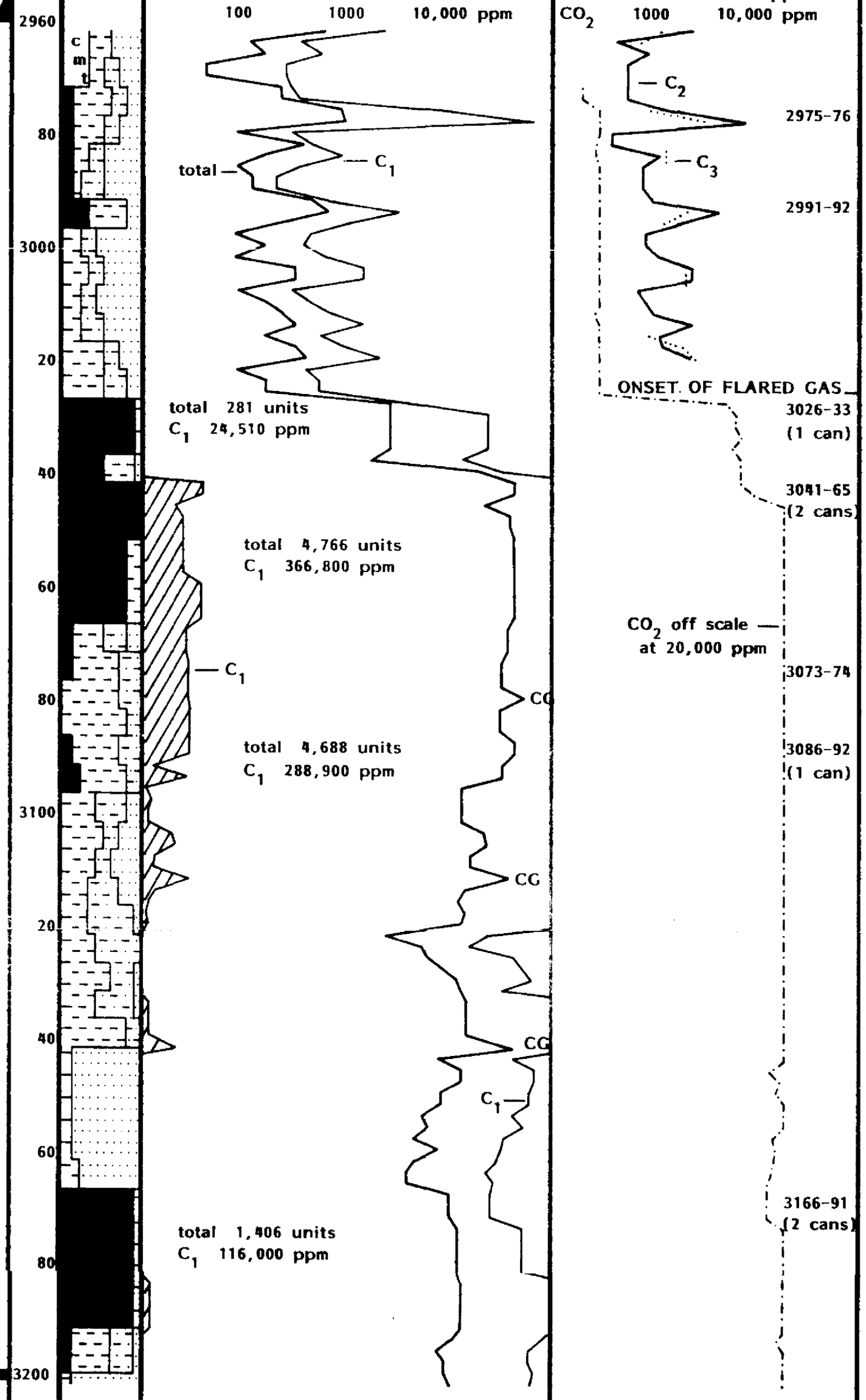
7" casing set at 2959 ft.

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
CO_2 1000 10,000 ppm



Visual Show G F P T — Lithology Interp — Lithology Descriptions and Remarks

Ss lt-m brn,vf gr,sub ang,poor-fair srt, fros,disagg,v calc cmt NS

Sh & Coal Sh is v dk brn to brn blk,sub platy,soft,res to sub vit luster,very carb, intbd w/ blk,sub blky, gen vit Coal

Ss lt-med brn,pred vf gr,sub rd-sub ang, poor-fair srt,fros, disagg,calc cement,NS

Sh m-dk brn,blk brn, sub plty,res,v carb, silty in part,coaly

Coal blk,sub blky,40-50% vit,some carb mat. sec calc in cleats, drilled up extremely f gr,fair quality coal

Coal blk,good blocky text w/ some conch frac,50% vit gen as finely striated to cse banded,less carb than above,tr sec calc,good to very good qual coal

Sh v dk brn blk to blk,sub platy-sub blky res to sub vit luster, soft,intbd w/ blk vit striated coaly lamin.

Coal blk,sub blocky, 30-40% vit as fine banding,some carb mat, fair -good qual. coal

Sltst lt-m gy brn,sub blocky-blocky,earthy luster,sli calc,gen w/ carb-coaly inclusions mod sandy in part

Sh med to dk brn,some blk brn to blk,sub plty,res luster,w/ blk coaly lam and lenses

T/ P.C. Tongue 4141'

Ss lt-m brn gy,gen f gr,sub ang-sub rd w/ some qtz overgrowths, gen clr-sli fros qtz grs,mod srt,glauc & carb grs,abnt brn dd intgran residue,very faint yel flor,NC

Coal extremely good development of blocky text w/ conch frac & cleats-best at base, 75-90% vit luster,gen massive w/ some micro-banding,tr carb matter tr thin film sec calc in cleats,tr pyr,excellent quality coal,best of well

T/ Main P.C. 3198'

TD sample- Ss lt gy wh S&P,f gr,sub ang, mod srt,sli calc,mod fri-not disagg,fair porosity,good gn yel flor,med yel slo stmg cut,strong condensate odor