Sutherlin Unit 1

STATE DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES
1005 STATE OFFICE BUILDING
PORTLAND, OREGON 97201

EXPLORATION LOGGING
A SUBSIDIARY OF BAKER INTERNATIONAL

REMARKS

DRILLING CONTRACTOR: BRINKERHOFF DRLG. CO.
RIG NO.: 53
SPUD DATE: 11 JULY 1978
TYPE MUDS: GELEX/LOW SOLIDS/LIGNOSULFONATE

CASING RECORD

20" AT 643 FT. AT 13-3/8" AT 3606
16" AT 1858 FT. AT 9-5/8" AT 9503

HOLE SIZE

26" TO 643' TO 12¼" TO 9511'
17½" TO 1897' 8½" TO 13,177
~~15" TO 3634'~~ TO

ABBREVIATIONS

NB	NEW BIT	W	MUD WEIGHT
RRB	RERUN BIT	V	MUD VISCOSITY
CB	CORE BIT	F	MUD FILTRATE ☒ CC/30 MIN
CR	CIRCULATE RETURNS	FC	FILTER CAKE
NR	NO RETURNS	SD	SAND CONTENT
PR	POOR RETURNS	S	SALINITY ☐ G/G ☒ PPM CL
LAT	LOGGED AFTER TRIP	R	RESISTIVITY OF MUD
TG	TRIP GAS	RF	RESISTIVITY MUD FILTRATE
CG	CONNECTION GAS		
C	CARBIDE		
DST	DRILL STEM TEST		
]	DST INTERVAL		
▮	CORE INTERVAL		

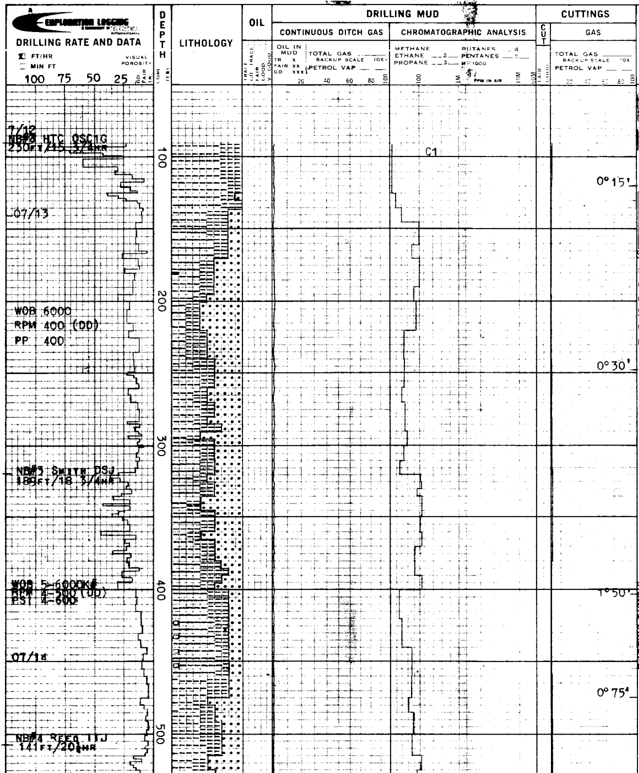
COMPANY: MOBIL OIL CORPORATION
WELL: "SUTHERLIN UNIT" No. 1
FIELD: OAKLAND AREA
LOCATION: FR NW COR 2580' S & 2480' E
SEC 36, T24S-R5S, WN
COUNTY, STATE: DOUGLAS, OREGON
API WELL INDEX NO. 36-019-20012
ELEVATION: 483' (G.L.) 511' KB
DATE: FROM 7/11/78 TO 3/9/79
DEPTH: FROM 90' TO 13,177
UNIT NO. 34
LOGGING GEOLOGISTS:
BILL ALTER
TOM CARSON
DOUG CRAIG
CHUCK MCKILLOP

OIL: Based on live oil in unwashed cuttings and percentage staining of washed cuttings.

GAS UNITS: Gas Detector calibrated to record 100 units with a mixture of 2% methane-in-air.

LITHOLOGY SYMBOLS

▣	Z	⧄	⊓	■	☐	⊟	☰	⊡	⊡	⊙	Λ	V	☒	B
LIMESTONE	DOLOMITE	GYPSUM AND ANHYDRITE	SALT	COAL AND LIGNITE	CLAY	SHALE	SILTSTONE	SANDY SILTST	SAND	CONGLOMERATE	CHERT	VOLCANICS	INTRUSIVE	BASALT



REMARKS AND LITHOLOGY DESCRIPTION

30" CONDUCTOR PIPE SET AT 88FT.

DYNA DRILLING w/17½" BIT

SH: DK GRY, SILTY, MNR MED GRY VFN Ss.

W	V	F	Fc
9.2	52	20	1
S	pH	SOL	OIL
300	9.5	6½%	-

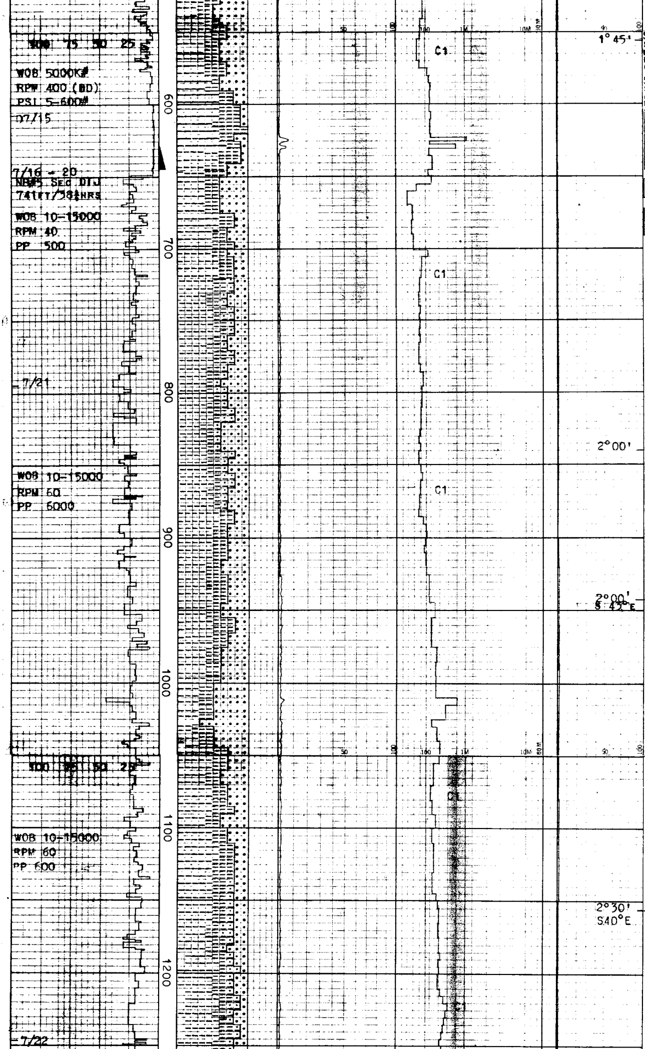
SH: LT GRY-GRY, BLKY-SUBFISS, MOD HD, NON-CALC GRDG TO SLTST, LT GREEN-GRY, MOD HD, Ss, GRY, WH, VF-F, SUBANG w/LITHIC FRAGS, MUSC, FELDSPTHIC MTX, FRIAB

Ss: LT GRY, VF-F, w/ LITHIC FRAGS, MNR CSE QTZ GRS, TR FELDSPAR, INTERBED MED-DK GRY SH & SLTST.

Ss: LT GRY, VF-MED, TR FELDSPAR, INTERBED MED GRY SH, SILTY, FIRM, MNR CSE QTZ GRS.

SH, GRY, LT GRY, MOD HD, BLKY-SUBFISS, BEC LESS SLTY
SLTST, LT GRY, GREEN GRY MOD HD, NONCALC
LS, BUFF, SFT FLAKES
SS, GRY, WH, VF-F, SUBANG GRNS W/ ANG BLK LITHIC FRAGS, WH MICA, ABDT FLDSPTHC MTX, WH, FRIAB TRS OF GREEN POSS OLIV, BEC UNCONS

Ss: LT GRY, VF-MED, FLDSPTHC MTX IN PT, TR LITHIC FRAGS, F-CSE UNCONSOL QTZ, SH MED-LT GRY, V FIRM, SILTY, OCC TR TAN LS.



SS, WH, GRY, VF-F, LOC C, SUBANG QTZ, FLDSPTHC MTX, W/DEVPT OF KAOL, FRIAB, FR-GD POR, SEC OLIV, BLK LITHIC FRAGS

SH, GRY, DK GRY, BLKY-SUBFISS, HD, COMP, NON-CALC BEC SL CALC IN PRTS, GRDG TO SLTST

W	V	F	Fc
9.3	48	19.3	1
S	pH	SOL	OIL
300	7.5	7%	-

20" CASING SET AT 643

DRILLING AHEAD WITH 12¼" BIT

SH: MED-DK GRY, SILTY IN PT, VF-F LT GRY Ss, TR CSE QTZ GRS.

SS: WH-LT GY, MOD-V HD FRI; PRED VF-F, SBRD-SBANG, CLR QTZ/CALC MTX.

SH, SLTST: M-DK GY, HD, BRITTLE, SUBFISS, NON-MOD CALC, SME SDY.

C = 12U AT 37VIS
LAG=27MIN / 60SPM

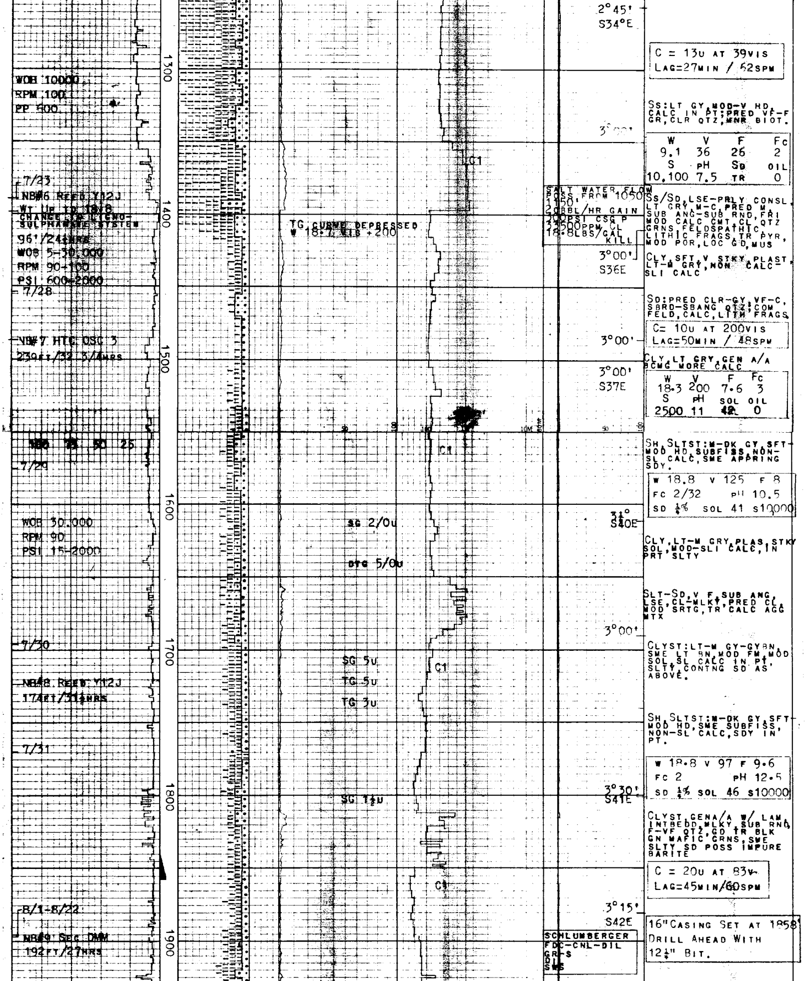
SH: MED-DK GRY, SILTY, FIRM-HD, MOD CALC IN PT, LT GRY VF-F Ss, OCC TR TAN Ls.

SS: VF-MED, LT GRY, FRI, SLI-MOD CALC, F-CSE UNCONSOL QTZ, MNR AMT BIOTITE.

SS: VF-F, WELL CMTD, CALC, HD.

SH: MED-DK GRY, SUBFISS FIRM-HD, SILTY, LT GRY VF-F Ss, CALC IN PT, TR GRY-TAN Ls.

SH, SLTST: LT-M GY-GYBN, MOD HD, BRITTLE, MOD CALC, SUBFISS, SME SDY; SCATT TAN-LTBN, V HD LS.



C = 13u AT 39VIS
LAG=27MIN / 62SPM

SS:LT GY,MOD-V HD, CALC IN PT;PRED VF-F GR,CLR QTZ,MNR BIOT.

W	V	F	Fc
9.1	36	26	2
S	pH	SD	OIL
10,100	7.5	TR	0

SALT WATER FLOW
POSS. FROM 1050
1150'
20BBL/HR GAIN
200PSI CSG P
32500PPM CL
18.8LBS/GAL
KILL

SS/SD,LSE-PRLY CONSL, LT GRY,M-C,PRED M, SUB ANG-SUB RND,FRI MOD CALC CMT,CL QTZ GRNS,FELDSPATHIC, LITHIC FRAGS,TR PYR, MOD POR,LOC GD,MUS

CLY,SFT,V STKY,PLAST, LT-M GRY,NON CALC-SLI CALC

SD:PRED CLR-GY,VF-C, SBRD-SBANG QTZ;COM FELD,CALC,LITH FRAGS.

C= 10u AT 200VIS
LAG=50MIN / 48SPM

CLY,LT GRY,GEN A/A BCMG MORE CALC

W	V	F	Fc
18.3	200	7.6	3
S	pH	SOL	OIL
2500	11	42	0

SH,SLTST:M-DK GY,SFT-MOD HD,SUBFISS,NON-SL CALC,SME APPRING SDY.

W 18.8 V 125 F 8
FC 2/32 pH 10.5
SD ¼% SOL 41 S10000

CLY,LT-M GRY,PLAS,STKY SOL,MOD-SLI CALC,IN PRT SLTY

SLT-SD,V F,SUB ANG, LSE,CL-MLKY,PRED CL, MOD SRTG,TR CALC AGG MTX

CLYST:LT-M GY-GYBN, SME LT BN,MOD FM,MOD SOL,SL CALC IN PT, SLTY,CONTNG SD AS ABOVE.

SH,SLTST:M-DK GY,SFT-MOD HD,SME SUBFISS, NON-SL CALC,SDY IN PT.

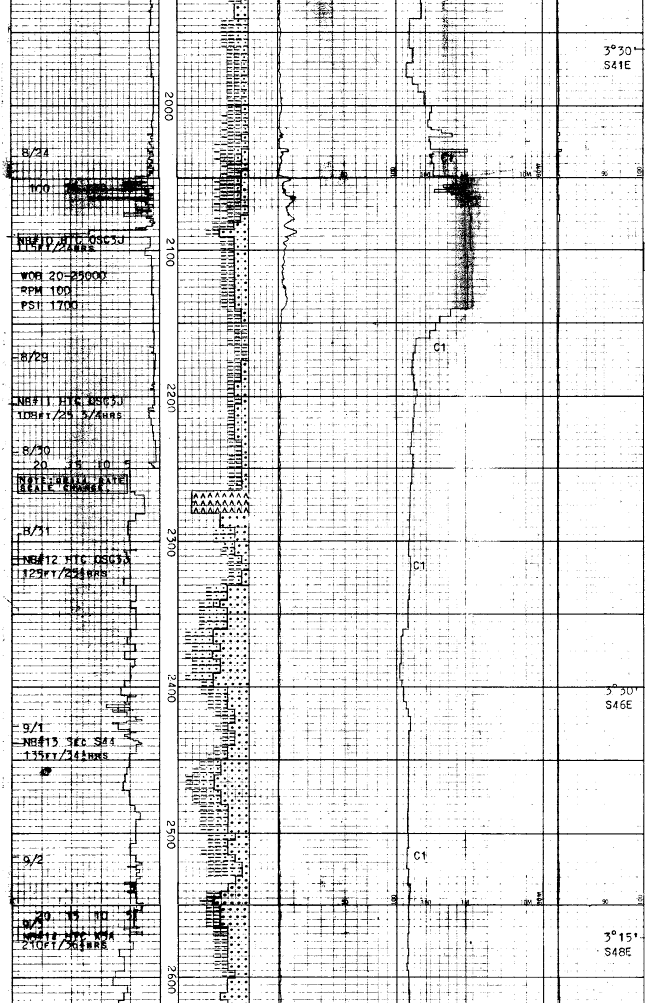
W 18.8 V 97 F 9.6
FC 2 pH 12.5
SD ¼% SOL 46 S10000

CLYST,GEN A/A W/ LAM, INTBEDD,MLKY,SUB RND, F-VF QTZ,GD TR BLK GN MAFIC GRNS,SME SLTY SD POSS IMPURE BARITE

C = 20u AT 83V
LAG=45MIN/60SPM

SCHLUMBERGER
FDC-CNL-DIL
GR-S
DIL
SWS

16"CASING SET AT 1858'
DRILL AHEAD WITH
12¼" BIT.



SH., SILTST M-DRK GRY W/COALY INCL.

CLY: M GY, SFT, V SOLU.

W 10.0 V 32

SH, SLTST: M-DK GY, MOD HD, BRITT, SME LAM, NON CALC, SDY IN PT.

NOTE: BUILDING MUD WT UP TO 20PPG AT 2089'

SLTST, DRK GREY, SOL. W/FINE GR DOM, SRD. QTZ & BLACK VOLC

CLY: M-DK GY, SOL, V STICKY, WHYDR, SLTY.

C =21U AT 67V
LAG=43MIN/59SPM

SD: PRED CLR, VF-F GR, SBRD-SRANG QTZ IN LT-M GY, SME GYBN, CLY MTX, SL-MOD CALC.

CHERT LT TAN TO CREAMEY

W 19.7 V 69 F 12.0
FC 2/32 pH 12
SD ¼% SOL 45.5
S 9500

SLTST; GREY, SOL., W/ AGG OF INTBD FINE GR QTZ SS & BLACK VOLC P CMTD CLAY. TR GLAU.

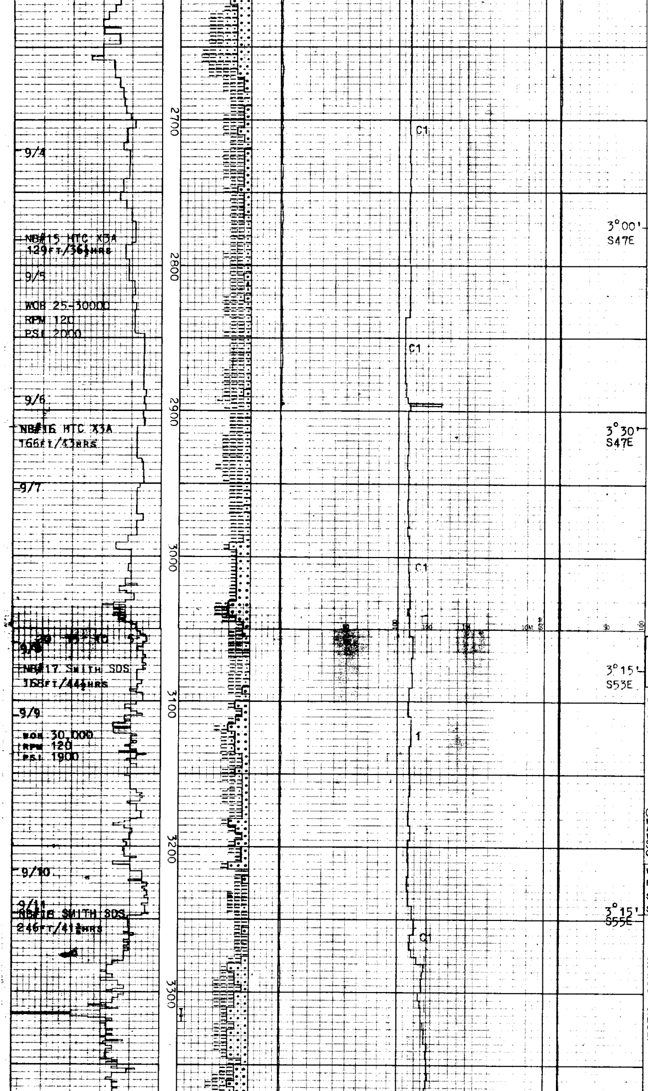
CLY: M-DK GY, SOL, W HYDR, STICKY; CONTNG VF-M, PRED F GR QTZ SD

SLTST, CLYST: LT-M GY, MOD FM, MOD SOLU, SME SL BRITT, SME WITH SD AS ABOVE.

W 19.6 V 66 F 10.2
FC 2/32 pH 11.5
SD ½% SOL 47 S 7500

C=22U AT 69V
LAG = 50MIN AT 58SPM

SILTST. MED GRY W/ INTBD V FINE DOM. QTZ ANG. SD.



CLY: M-DK GY, W HYDR, SOLU, STICKY; INTBD / PRED CLR, VF-F GR QTZ SD AS ABOVE.

W 19.6 V 63 F 10.1
FC 2/32 PH 12.0
SD ¼% SOL 46 S 7500

9/4

3°00'
S47E

NB#15 HTC X3A
129FT/36½HRS

CLYST: M GY, MOD FM, MOD SOLU, W HYDR, SLTY.

9/5

WOB 25-30000
RPM 120
PSI 2000

CLYST, SLTST: M GY, MOD FM, HYDR, SCATT CALC MAT; INTBD/HD, M-DK GY, VF SS(SDY SLTST?)/ CALC CMT & SCATT BIOT.

9/6

SH, SLTST: M-DK GY, SFT-V HD, LAM, SME BRITTLE.

NB#16 HTC X3A
166FT/43HRS

3°30'
S47E

CLYST: LT GY, SL FIRM GUMMY, NONCALC, TR VFN SDY; SLTST: MED GY, SL HD-HD, SDY W/ VFN QTZ SD; TR-MINOR CL, VFN, LOOSE QTZ SD

9/7

W 19.7 V 70
S 7500PPM

SD: PRED CLR, UNCONSOL F-CSE GR, SBRD-SBANG QTZ; SCATT TR CALC, CHL, MICA.

C= 23U AT 72VIS
LAG= 60MIN W/62SPM

9/8

W 19.7+ V 72 F 10
FC 2/32 PH 12.5
S 7500PPM SD ½%
SOL 46%

NB#17 SMITH SDS
168FT/44½HRS

3°15'
S53E

CLYST: LT GY, SOFT, GUMMY, SDY W/VFN-MED QTZ SD; GRAD TO V FIRM-SL HD SLTST; LOOSE SD THRU OUT IS CL, VFN-MED, QTZ

9/9

WOB 30,000
RPM 120
PSI 1900

CLYST: LT GY, SOFT-SL FIRM, GUMMY, NONCALC, ABUND SDY IN PLACES W/VFN, CL QTZ SD.
SD: CL, VFN-FN, LOOSE, QTZ, SUBANG-SUBRND

9/10

W 19.7+ V 78 F 9.8
FC 2/32 PH 12.0
S 5500PPM SD 2½%
SOL 45% OIL 0%

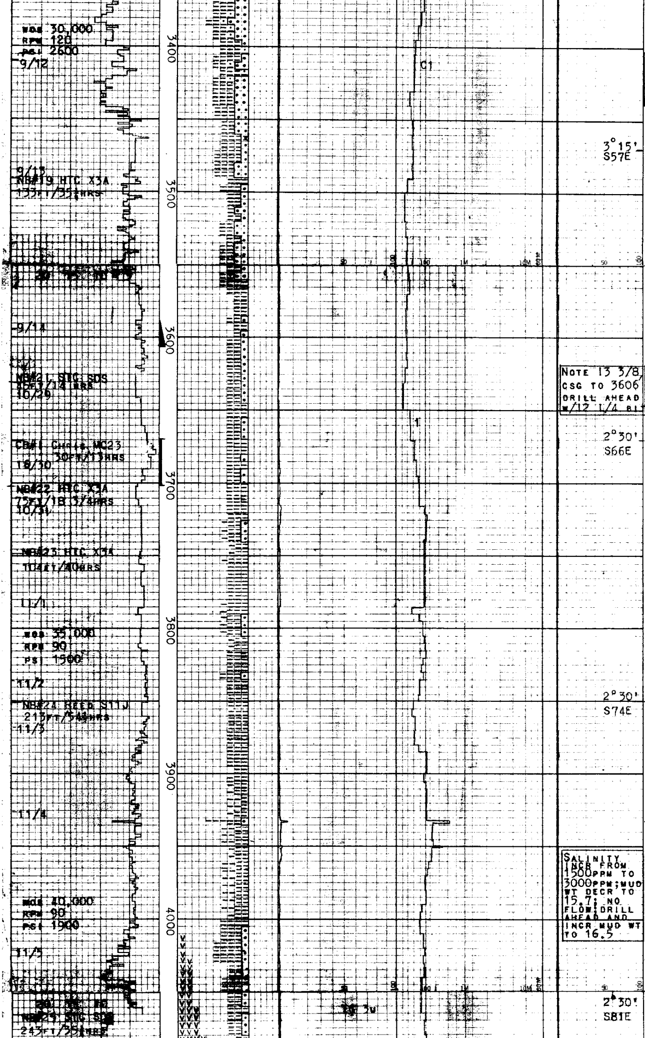
9/11
NB#18 SMITH SDS
246FT/41½HRS

3°15'
S55E

SD: PRED CLR, UNCONS, VF-F, SME M-CSE, SBRD-SBANG QTZ/SCATT TR CHL IN LT-M GY SLTST/ CLYST.

SLTST, CLYST: M GY-GYBN, MOD FM, NON CALC: INTBD GN, GY, WTHRD SFT-HD, FRAC, CHLORITIZED TUFF(?).

C= 14U AT 75VIS
LAG= 63MIN W/60SPM



NOTE 13 3/8" CSG TO 3606' DRILL AHEAD W/12 1/4 BIT

SALINITY INCR FROM 1500PPM TO 3000PPM; MUD WT DECR TO 15.7; NO FLOW; DRILL AHEAD AND INCR MUD WT TO 16.5

CLYST: LT GY, SOFT-SL FIRM, GUMMY, V SLTY W/ GRAD TO SL FIRM SLTST; CLYST & SLTST ARE SDY W/VFN-OCC MED GR SD, PREDOM QTZ

W 19.8 V 75 F 9.2
FC 2/32 PH 12.5
S 6500PPM SD 2½%
SOL 46% OIL 0%

CLYST: LT-M GY, SFT, W HYDR, SDY; INTBD M-DK BN, V HD, SLTY LS.

SD: PRED CLR, VF-F, SME M-CSE, SBRD-SBANG QTZ IN M GY SLTY CLYST; TR CHL, CALC MAT.

W 19.7 V 57 F 9.2
FC 2/32 PH 10.5
S 4500PPM SD ¼%
SOL 46% OIL 0%

ON TRIP AT 3624FT WELL FLOWED SALT WATER W/SALINITY OF 17,000PPM CL

RAN SCHLUMBER DIL, SONIC, HDT, SWC / FDC-CNL-GR AT 3634'

CORE#1 SHALE, DRK GRY, W/FINE INCL., OF MICA; BLACK VOLC FRAGS. TRACE PYRITE

W 17.8 V 72 F 10.4
FC 3/32 PH 10.0
S 1900 SOL 49
SD ¼% OIL 0%

SLTST, CLYST: M-DK GY, SFT-MOD HD, SME HYDR, SME SUBFISS; SCATT TR LSE VF-F QTZ SD GRS.

CLYST: LT-MED GY, SFT TO FIRM, SL-MOD CALC SLTY IN PART W/GRAD TO SLTST
SLTST: DK GY, MOD HD CLYEY; TR-MINOR SD, VFN-FN, CL, LOOSE

W 16.8 V 53 F 9.8
FC 2/32 PH 12.0
S 1500PPM SOL 47%
SD ¼ OIL 0

CLYST: AS ABV; SH: DK GY, MOD HD, SL-MOD CALC

W 16.0 V 60

SD: CL, FN-MED, FRIAB TO LOOSE, SUBANG TR PYRITE: CUBIC

C= 51U AT 60VIS
LAG= 52MIN W/57SPM

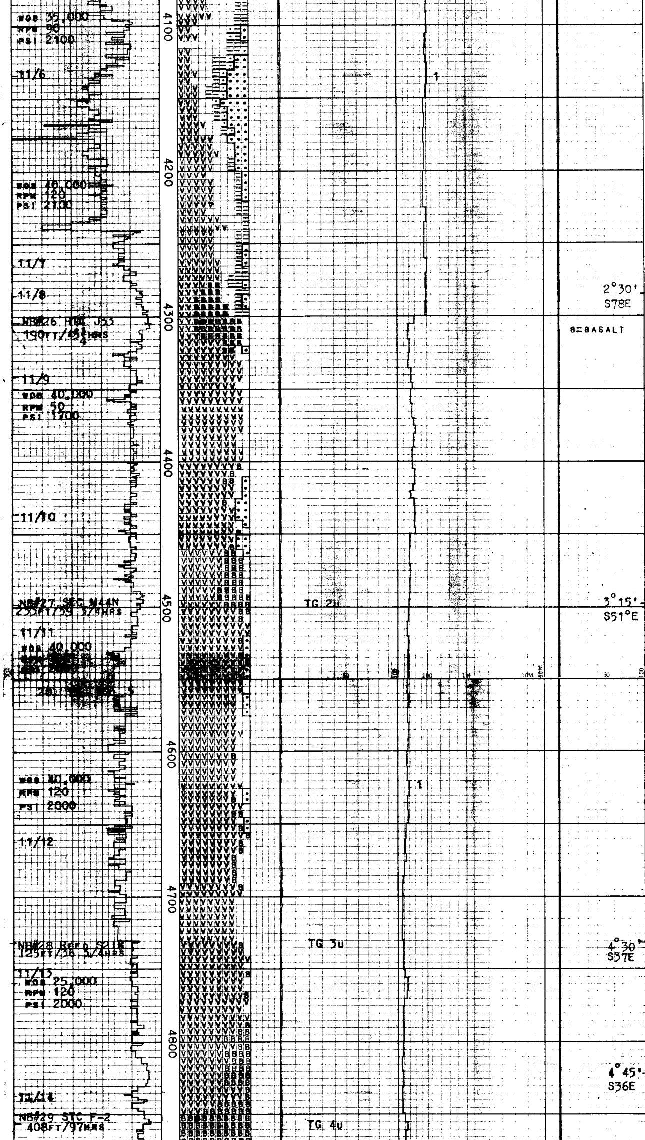
W 16.0 V 60 F 10.1
FC 2/32 PH 10.5
S 2100PPM SD ¼
SOL 44% OIL 0

SD: CL, YEL, ORNG, VFN-MED, LOOSE

W 16.6 V 60

VOLC: MED GRN, FIRM-HD, FRIAB IN PART; CLYST, AS ABV

VOLC: WELDED TUFF(?), GY, GYGN, GN, MOD HD-V HD, NON-SL CALC; COM CHL.



C= 30U AT 59VIS
LAG= 57MIN W/55SPM

CLYST: LT GY, SOFT, V SLTY, V SDY W/VFN SD, ABUND VOLC

SD: CL, WH, GRN, ORNG, VFN-MED, PREDOM VFN-FN, LOOSE AND IN LT GY CLY, AS ABV, ABUND GR VOLC

W 16.7 V 57 F 9.6
FC 2/32 PH 10.0
S 4300PPM SD ½%
SOL 39% OIL 0

VOLC: TUFF PRED LT-DK GY, COM GN MOD HD, SME V HD, SL CALC; COM VCOL LITH FRAGS.

TUFF: REDBN, SFT-MOD HD.

W 16.7 V 49 F 10.0
FC 2/32 PH 11.0
S 3800PPM SD ¼
SOL 37% OIL 0

BASALT: DK GY-BLK, V HD, V FN GR, BLKY

VOLC: MED BRN/GY, HD, BLKY, CHLORITIC

VOLC: AS ABV, AND TUFF, RED/BRN, FIRM-HD, CHLORITIC

W 16.5 V 57 F 8.0
FC 2/32 PH 10.5
S 4800PPM SD TRACE
SOL 38% OIL 0

VOLC: MED BRN/GY, SFT-HD, MINOR BASALT SCAT LOOSE, CHLORITIC

SD: CLR, BASALTIC, VFN-FN, OCC MED, LOOSE

W 16.4 V 58 F 9.0
FC 2/32 PH 11.0
S 5300PPM SD TR
SOL 36% OIL 0

BASALT: M-DK GY, GN, GYGN, HD-V HD, BRITTLE COM ZEOL.

C= 25U AT 55VIS
LAG= 65MIN W/50SPM

VOLC: MED-DK GY, FIRM-MOD HD, MINOR BASALT, CHLORITIC

W 16.6 V 62 F 9.0
FC 2/32 PH 11.0
S 5500PPM SD TRACE
SOL 36% OIL 0

B = BASALT

VOLC TUFF: MED GY, SFT W HYDR, COM BSLT FRAGS, VCOL LITH FRAGS.

TR-MINOR SD: SOME BASALTIC, VF-FN; TR VFN-FN, CLR QTZ, LOOSE TR MICA, CL-DK BRN

C= 20U AT 58VIS
LAG= 65MIN W/54SPM

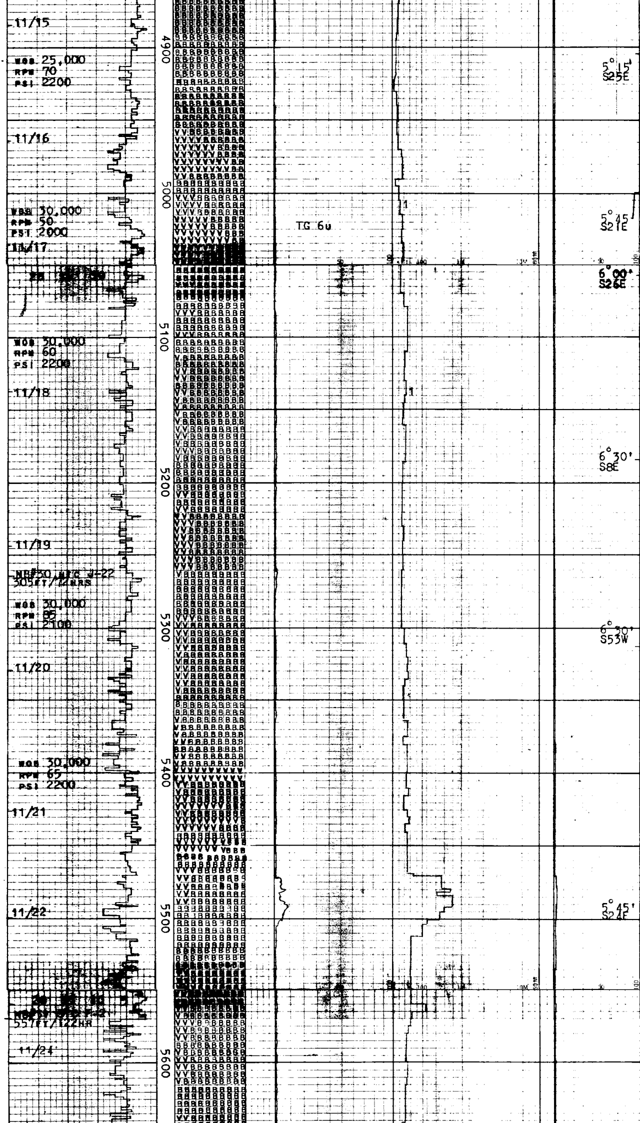
VOLC TUFF: MED GY, SFT-MOD HD, PREDOM FIRM, CHLORITIC; SCAT BASALT FRAGS, BLK BLKY, V HD

W 16.6 V 57 F 9.2
FC 2/32 PH 11.0
S 5000PPM SD ½%
SOL 36% OIL 0

VOLC TUFF: MED GY/BRN, FIRM-V HD, PREDOM FIRM, CHLORITIC, SCAT ZEOL; TR RED/BRN, FIRM TUFF; SCAT V HD BASALT FRAGS THRUOUT; TR-MINOR SD: CLR, BLK, ORNG, VFN-FN W/OCC MED GR, LOOSE, BASALTIC IN PART

W 16.7 V 55
S 4500PPM

BASALT: DK BRN-BLK, FN GR, V HD, ZEOLITIC, CHLORITIZED, MINOR FELDSPAR, OLIVINE INCL



BASALT: MED GY/BRN, TR RED/BRN, HD-V HD, VFN GR, BECOM LESS CHLORITIZED W/DEPTH, TR ZEOLTTES, SOME OLIVINE INCL

C= 15U AT 59VIS
LAG= 84MIN W/53SPM

W 16.7 V 53 F 8.8
FC 2/32 pH 11.5
S 5100PPM SD TRACE
SOL 36% OIL 0

VOLC (TUFF): LT-MED GY, LT GRN/GY, SL SFT-FIRM, CHLORITIZED, ABUND BASALT FRAGS, ABUND ZEOLITES

BASALT: MED-DK BRN, HD-V HD, MINOR OLIVINE INCL, TR-MINOR CHLORIT

ADD STABLIZER TO BHA AT 5021FT

BASALT, MED-DRK GRY AS ABOVE W/LARGE INCL CHLORITE. TR ZEOLITE FINE GR FELDS & OLIV CRYSTALS, REL UNALTD MINOR TR. TUFF SOL W/CHLORITE.

W 16.7 V 53 F 9.0
FC 2/32 pH 12.0
S 4500PPM SD ¼
SOL 36% OIL 0

BASALT: MED-DK BRN/GY, PREDOM FN GR, MOD HD, TR-MINOR ZEOLITE, VARYING AMTS CHLORITE CRYSTALS OLIVINE

BASALT AS ABV W/ MINOR TUFF: LT GY/GRN, SFT-FIRM, V CHLORITIC, ABUND BASALT FRAGS

C= 15U AT 60VIS
LAG= 79MIN W/55SPM

W 16.7 V 53
S 4000PPM

BASALT: MED-DK BRN/BLK, PREDOM FN GR, MOD-V HD, VARYING AMTS CHLORITE AND ZEOLITES; TR-MINOR SD: CL, DK BRN, VFN-FN GR, LOOSE, BASALTIC

W 16.7 V 55 F 8.8
FC 2/32 pH 12.5
S 3500PPM SD ¼
SOL 36% OIL 0

BASALT: GRY-BLK, ABUND FELDS CRYSTALS, OLIVINE & IRREG CHLORITIZED ZONES. COMMON QTZITIC BANDS. MIN ZEOLITE. TRACE SERPENTINE.

VOLC TUFF, RED-LT BRN SOL W/ INCL OF CHLORITE & BASALT FRAGS.

INTERBED BASALT AND RED TUFF: TUFF: LT-MED GY, SFT-FIRM, CHLORITIC

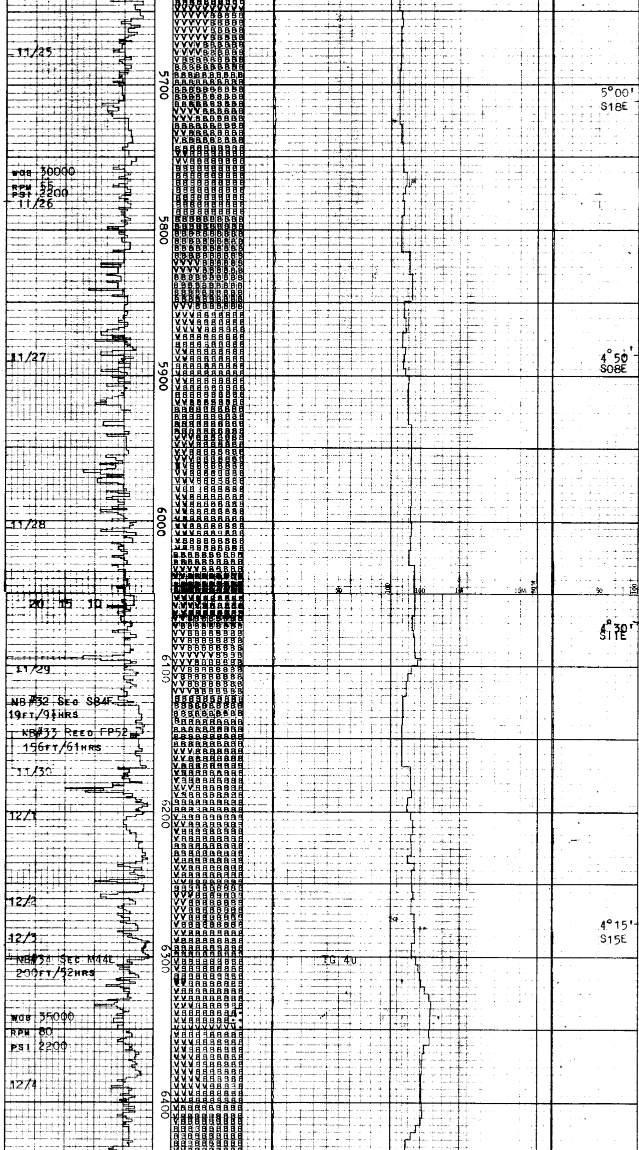
W 16.7 V 55
S 4000PPM

BASALT, MED DRK GRY TR OLIVINE & FELDSP VESICULAR & FRACTURED NUMEROUS BANDS OF CLR - MILKY QTZ & QTZ CRYSTALS.

WELL FLOWED AT 5500FT
DRILL AHEAD W/ 17 LB /CU FT.

BSLT: M-DK GY, GYBN, GY-GN, V HD, FRAC, VESICULAR, FILLED/ZEOL; ABNT CHL, COM QTZ; INTBD REDBN TUFF.

W 17.1 V 51 F 11
FC 2/ SD .5 PH 11
S 4500 PPM



VOLC TUFF: DK RDBN-BN SFT-MOD HD, W HYDR; TUFF: LT-M GY, SFT-MOD HD, FM, SME CHLORITIC.

BASALT, DRK GRY, NUM FLDS (MANY TWIN.) OLIVINE, INCL OF CHLORITE & IRREG QTZITIC PATCHES OF POSS VOLC GLASS. RD MILKY QTZ PEBBLES FM GAS CAVITIES. TR OF SERPENTINE.

W 17.0 V 52 F 9.8
FC 2/32 pH 11.0
S 4300PPM SD ½
SOL 37% OIL 0%

BASALT AS ABOVE W/ INTBD DRK RED TUFF. OXIDIZED REDDISH BASALT W/FLDS. NUM BANDS OF MILKY QTZ CONTAINING NATIVE COPPER.

C=16U AT 51VIS
LAG=95MIN W/50SPM

BASALT, DRK GRY W/ FELDS, OLIVINE, & BRN HORNBL AS ABOVE & INTERB. DRK BRN BASLT MAFIC MINLS MORE WTHRD. CONTNS OLIVINE, FLDS, & BIOTITE ZEOLITES COMON. TO BOTH. W/INTERB OF GREEN & BRN SILICIFIED DENSE FRAGS. POSS FORMER TUFF.

W 17.0 V 51 F 9.3
FC 2/32 pH 12.0
S 4500PPM SD ½%
SOL 36% OIL 0%

BASALT: M-DK GY, GYBN, GNGY, PRED HD-V HD, SME WTHRD, VESICULAR, FRAC: COM ZEOL, QTZ, OLIVINE, CHL, V SL TR NATIVE COPPER.
TUFF: REDBN, SFT-MOD HD. CONTNG ZEOL.

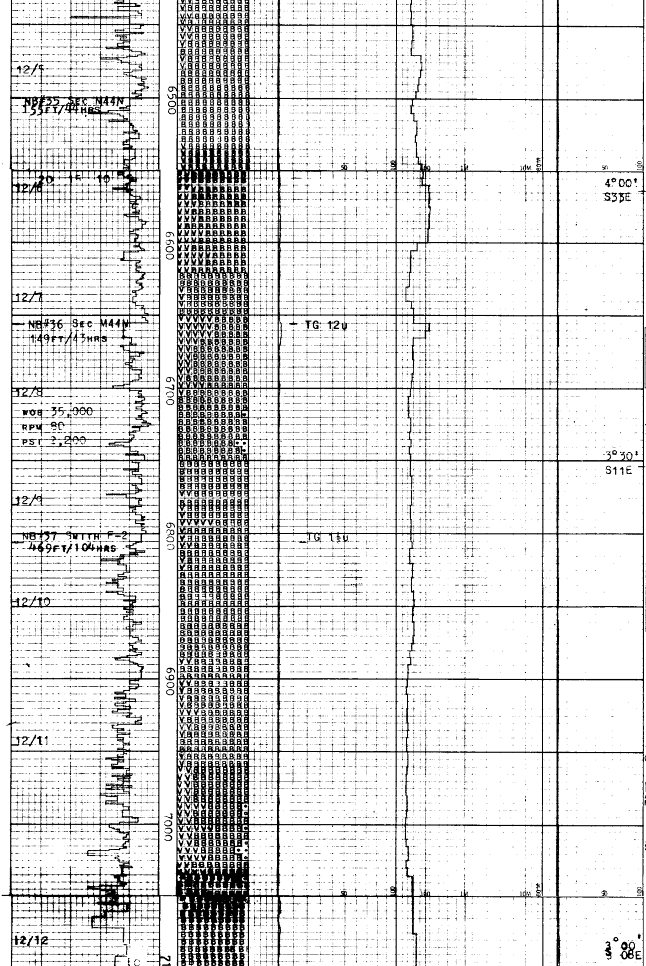
BASALT, DRK GRY-BRN, SIL REPLACEMENTIN PART FRM MILKY TO LT GRN. PREDOM OLIVINE & CLUST. OF FELDS- OCCAS BIOTITE, ZEOLITE & CLORITIC INCL. THIN INTERB OF RED-PURPLE TUFF W/ IRREG INCL OF QTZ.

W 17.0 V 51 F 9.2
FC 2/32 pH 12
S 3600 SD ¼%
SOL 37% OIL 0

TUFF(?): LT-M GN, SFT HYDR TO V HD, GLASS SHARDS PRESENT. V HD TUFF XLN/SME ZEOL INCL.

BASALT: M-DK GY, GNGY, PRED HD-V HD, VESICULAR, PORPH, INTSTL PLAG/OLIVINE & PYROX PHENOCRYSTS, SME CHL, ZEOL, & PYROX ALT TO BIOT, TR NATIVE COPPER, OCC INTGRAN TEXT/INTGROWN PLAG LATHS AROUND PYROX, WTHRD BSLT: RED-REDBN, GY, SFT-HD, PLAG WTHRING TO CLAY, SERPENTIZED OLIVINE, PYROX ALT TO BIOT, BASALTIC SD: VF-F, ANG, IN CLY MTX.

C = 15U AT 52V
LAG=110MIN/63SPM



BASALT:M-DK GY,GYBN, GYGN,SME WTHRD TO LT GY-GYGN & CLAYEY,SFT/ V HD,VESICULAR,FRAC/ ZEOL,FLD,QTZ,OLIVINE, SERPENTINE,CHL,V SL TR NATIVE CU IN QTZ.

BASALT:GN,GNGY,GY,SF- V HD,F-VF GR,INTSTL & EUH PLAG,EUHED OLIVINE AUG ALT TO BIOT,COM CLY ALT,COM SERP,ABNT ZEOL/SME LSE EUHED XLS,ABNT HEMATITE,GN CU MNRL(?).

C = 14U AT 52V
LAG=110MIN/52SPM
PUMP,#1

BASALT:M-DK GY,GYBN, GYGN,SFT-V HD,VESICULAR;BASALTIC SD:VF-F GR,SBANG VCOL FRAGS INCL QTZ,OLIVINE,FLD ZEOL,CHL,SERPENTINE; LT GY,GYBN,REDBN CLY.

W 17.2 V 49	F 9.6
FC 2/32	PH 11.0
S 6000PPM	SD TR
SOL 42%	OIL 0

BASALTIC SD:VGT,LOOS-SFT,ANG-SB ANG,PR SRTNG,FLD DOM,ABNT AUG,ABNT OLIVINE,BIO CHL,CU MIN

BASALT:DOM M-DK GY, GYBN,COM BN,GYGN,MOD-V HD,VESICULAR,FILLED /ZEOL,COM QTZ,OLIVINE AUG,MUCH OCCURING AS SD AS ABOVE;COM ALT OF BSLT TO LT-M BN, GYBN,SFT,HYDR CLY.

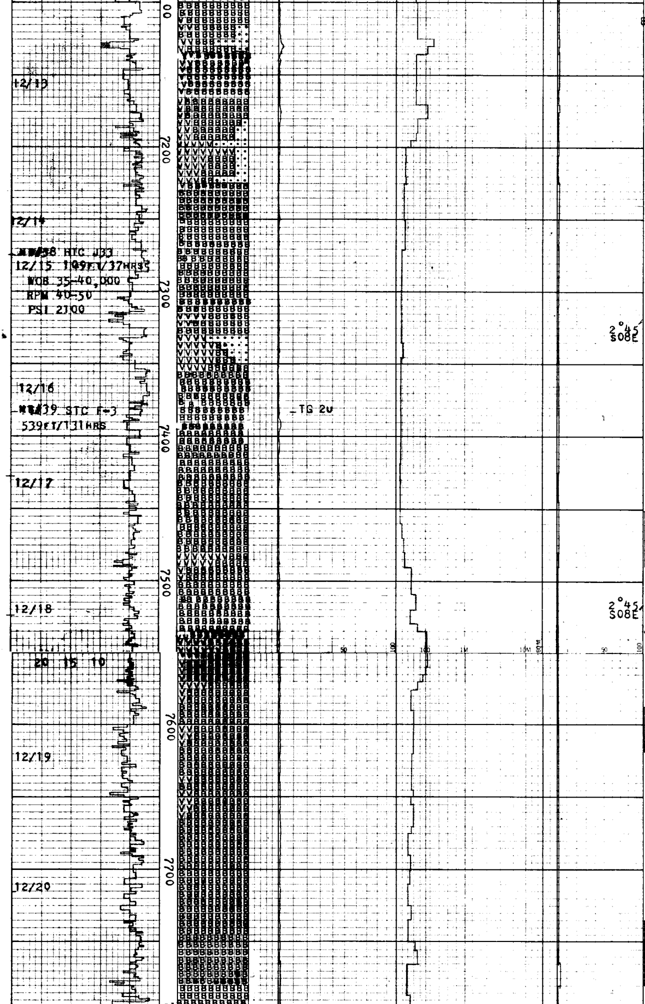
W 17.0 V 48	F 9.8
FC 2/32	PH 12.0
S 4000	SD ¼%
SOL 39%	OIL 0

BASALT:PRED M-DK GY, GYBN,BN,GYGN,MOD-V HD VESICULAR,CONTNG MINERALS AS ABOVE;ABNT VF-F BASALTIC SD; WTHRD BASALT:LT BN, GYBN,GYGN,DK GYBN, SME ALT TO CLY.

TUFF:RD-DK RDGY,S-FM CLAYEY,MOD HYDR;OCC LITHIC FRAG,OCC PUM FRAG,NO SHARDS,~~ANT~~ ABNT ZEOLITE NODS, BASALT:AS ABOVEW/ ABNT SMALL ZEOLITE NODS

BASALTIC SD:VGT,LSE, ANG-SB ANG,C-V F,PR STNG,FLD DOM

W 17.1 V 50	F 9.8
FC 2/32	PH 12
S 4500	SD ¼
SOL 41	



BASALT:DK GY,DK GYGN, HD-V HD,VEHSICULAR, W/ ZEOLITE FILLINGS, EQ AMNT PLAG & PYROX -OLIVINE,COM CHL, SERP, TR NATIVE CU W/ CU MIN, TR GNST
WEATH BASALT:MOST PLAG ALT TO GY CLAY W/ BASALTIC SHOWING NO SIGNS OF TRANS,V FRESH ABNT SERP
TUFF:RD,RDBN,VF-M GR ABNT REXL SHARDS W/ FLOW ORIENT,ZEO FILL CHL & HEM AS ALT PROD

BASALT,DRK GRY W/GRY FELDS LATHS DOM OLIVINE & QTZ W/CHL & MLKY ZEOL MAINLY AS VUG FILL.

W 17.1 V 52 F 9.6
FC 2/32 PH 12
S 3800 SD ¼
SOL 37

BASALT AS ABOVE, V FINE GRAINED SOME OLIVINE & FELDSP. LATHS & TRACE OF ZEOL. DOM OLIVINE.

C= 15U AT 52VIS
LAG=128MIN/48SPM
PUMP #1

BASALT,DRK GRY W/ GRY PLAGIO.,IRREG INCL. OF QTZ & ZEOLITE. TRACE MAFIC MINERAL POSS OLIVINE &CHLORITE FRESH-SL OXID.

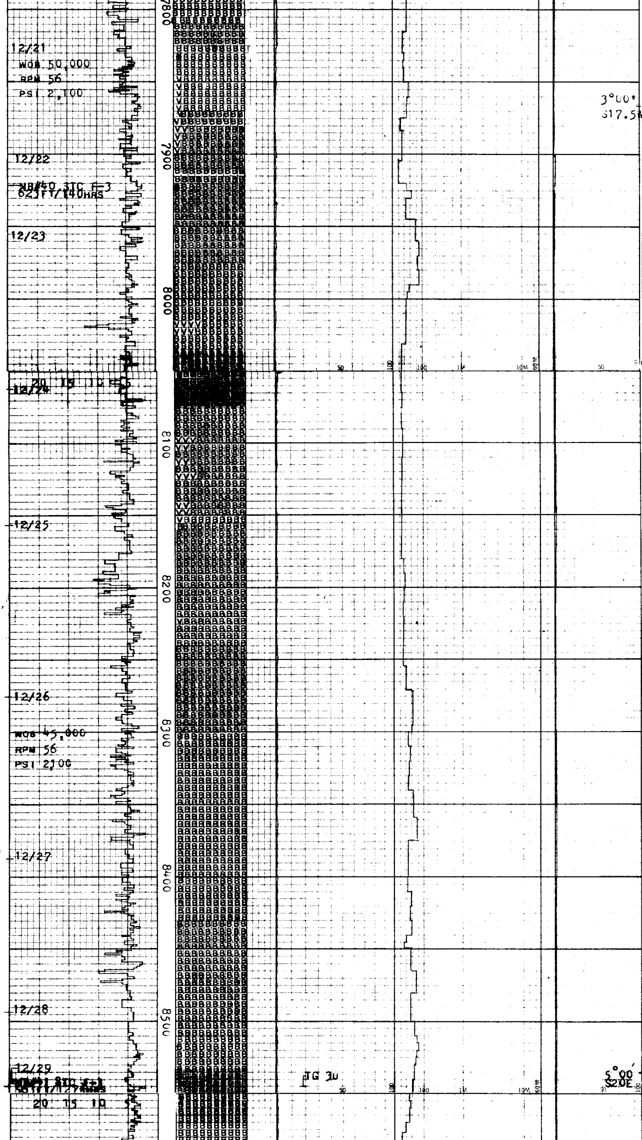
BASALT: DK GRY,F-MD GR,HD,EQ AMNT PLAG & MAFICS(PYROX,OLIV), COM ZEO & OCC SEC QTZ VUG FILL, W/ LOC SM WEATHERING.

W 17.1 V 52 F 8.2
FC 2/32 PH 12.0
S 3500PPM SD ¼%
SOL 38% OIL NIL

C = 12U AT 52 VIS
LAG=159MIN AT 53SPM
PUMP #2

BASALT:GY-DK GY,V HD, VF MXLN,OCC VF GR SUBHED PLAG & PYROX IN GNDMS,OCC F GR EUHED PLAG,APPROX EQ AMNTS PLAG & MAFICS (PYROX & OLIV),OCC GN PLAG,COM ZEO,CHL UBIQ MAGN APPROX 1%,TR SEC QTZ IN VUG FILL,TR NATIVE CU & CU MINS, OCC WEATH ZONES W/ CLAY MINLZTN,SL SOFT, PRLY HYDR

W 17.2 V 54 F 8.0
FC 2/32 PH 12.5
S 3000PPM SD ¼%
SOL 37% OIL 0



BASALT:M-DK GY,GYBN BN,V HD,XLN,COM VESICLES FILLED/ZEOL, OCC GN PLAG,ETC. AS ABOVE,SCATT MAGN IN GROUNDMASS,SL TR CU &CU MNRLS;TUFF:REDBN SFT-MOD HD,VESICULAR /ZEOL.

BASALT:M-DK GY,GYBN, HD-V HD,VF XLN, GLASSY,PRED FRESH, SME WTHRD;COM ZEOL, OCC GN FLD,MAGN IN GROUNDMASS;SL TR CU& CU MNRLS.

W 17.1 V 49 F 8.0
FC 2/32 PH 11.5
S 3500PPM SD 4%
SOL 37% OIL 0

BASALT,MED-LT GRY W/ LT GRY PLAGIO LATHS & POSSOLIVE/MAGNTIT INCL OF ZEOL,SERP & CHLOR W/OCCAS IRREG GRNQTZ REPLAMNT. MINOR RED TUFF OR OXID. BASALT.

C = 10U AT 48VIS
LAG = 145MIN AT
45 SPM

BASALT,MED GRY V APHANITIC,ZEOLITIC INCL. FINE LATHS GRY, RANDOM ORIENT. FELDSP. MED GRN QTZITIC MAT. AS INCLUSIONS. TRCE CHLOR.

BASALT:ALT,OX,REDBN, SFT,CLAYEY,W HYDR, COM CHL,SCATT SM VESICLES.

W 17.2 V 53 F 8.0
FC 2 PH 12
S 3200 SD 1/4
SOL 37 OIL 0

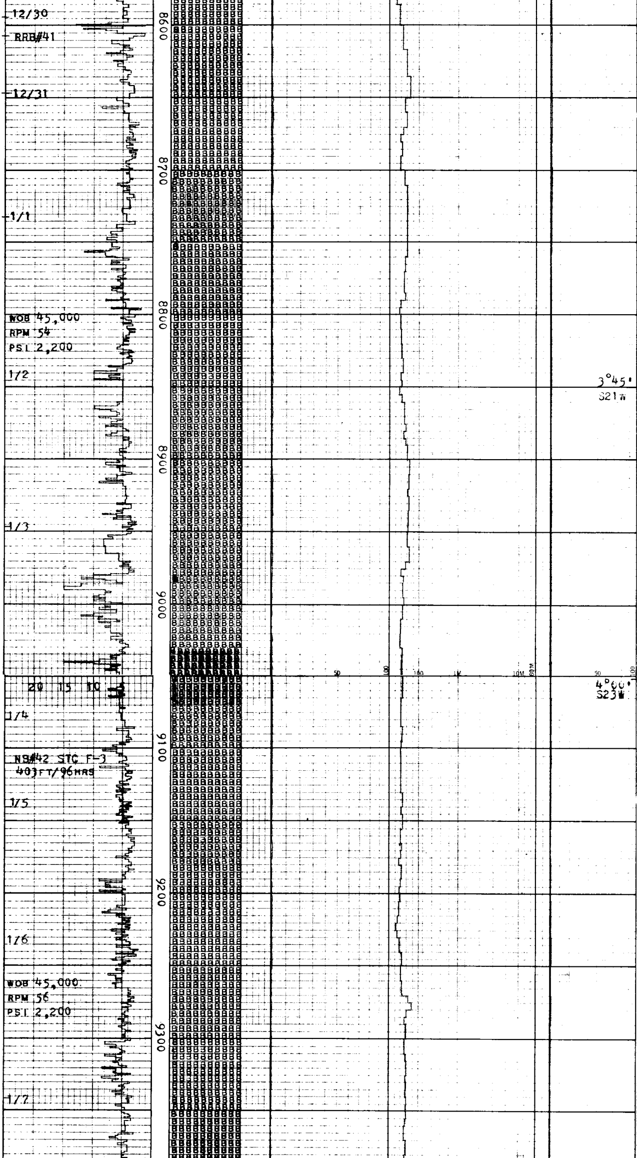
BASALT:DK GY,GNGY,BN, APHAN,HD/INCR IN RD VESICLES FILLED/PRED ZEOL,SME/CHL RIMS; ALT BSLT:LT-M GYBN, SFT,CLAYEY,HYDR,COM CHL.

BASALT, MED-LT GREY V APHAN.,MICROCRYST. W/ABUND ZEOLITE AS RD VUG FILL & VEIN FILL. OCCAS FINE QTZ VEINS. WHT FELDS LATHS. IRREG INCL DRK GRN QTZITIC MATERIAL.

BASALT,RED,SOFT & ALTERED, HIGHLY OXIDIZED

BASALT, MED-DRK GRY MICROCRYSTALINE. INCL OF IRREG QTZ & ZEOL. W/FINE FELDSP LATHS. ALSO ALT. BASALT, RED, HARD, W/ZEOLITE INCL. TRACE OF PHLOGOPITE, IN BOTH TYPES W/DRK GREEN CHLORITE.

W 17.2 V 52 F 8
FC 2 SD 1/4 PH 11
S 3100 SOL 37



BASALT MED GRY, SOME GRY FELDS, IRREG. QTZ INCL. W/ OLIVINE/PYROXENE. RD'D ZEOL. IN VUGS & ANG PIECES FROM POSS. VEIN FILLING. INCL. OF CHLORITE.

BASALT:M-DKGY-GYGN, V HD FRESH MICXL SCATT VESICLES/ZEOL, LOC CHLORITIZED, MNR OLIVINE MAGN IN GROUNDMASS; REDBN BASALT(TUFF?):HD, VESICULAR/ZEOL.

W 17.2 V 51 F 8
FC 2 SD ¼ PH 11
S 3200 SOL 38

C = 5U AT 49VIS
LAG= 150 MIN/52SPM

BASALT:PRED FRESH, M GY-GYBN, GYGN, V HD, MICROXLN, VESICULAR/ZEOL & SME QTZ FILL, SME/ CHL RIMS, MAGN IN GROUNDMASS; ALT BASALT:REDBN, SFT-MOD HD, SME VESICLES.

W 17.2 V 50 F 8.0
FC 2/32 PH 11.0
S 3500PPM SD ¼%
SOL 38% OIL 0

BASALT:M GY-GYBN, SME REDBN-REDGY, ALTERED, SFT, W HYDR, VESICULAR/ZEOL & SCATT QTZ, MAGN IN GROUNDMASS, CHL IN GRNDMSS & AS RIMS OF VESICULAR MAT, V SL TR CU.

W 17.2 V 53 F 8.0
FC 2/32 PH 12.0
S 4100PPM SD ¼%
SOL 38% OIL 0

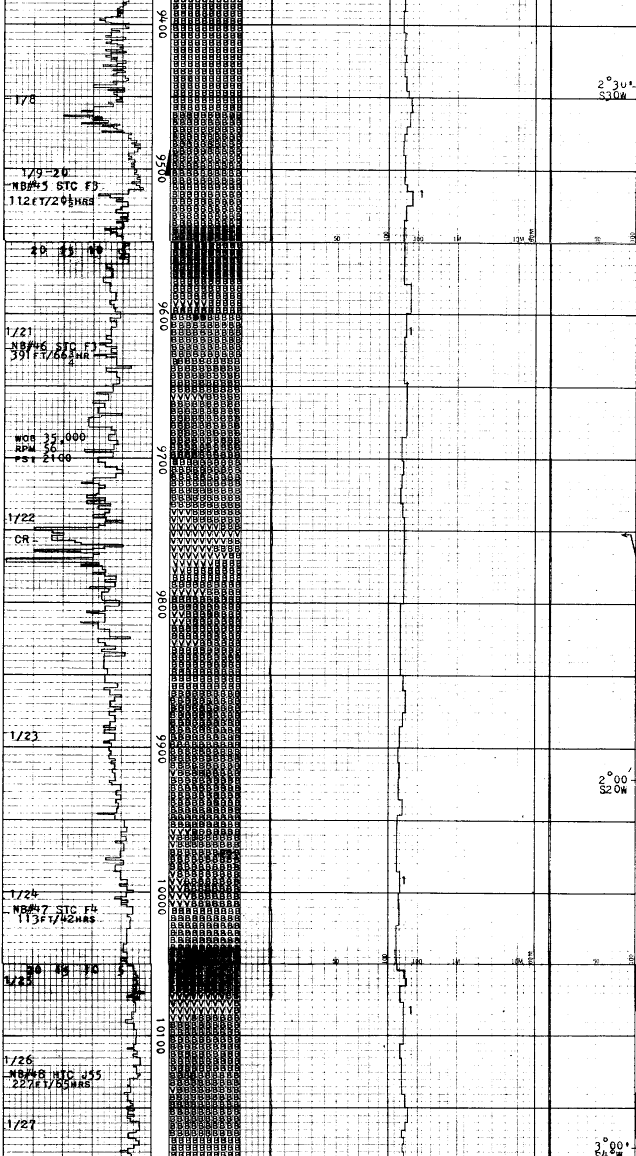
BASALT:M-DK GY-GYGN, MNR GYBN, FRESH, V HD; MICROXLN, VESICULAR/ZEOL & MNR QTZ/SME CHL AS BEFORE, MAGN & NATIVE CU AS ABOVE.

W 17.2 V 48 F 9.2
FC 2/32 PH 11.0
S 4200PPM SD ¼%
SOL 38% OIL 0

C = 8U AT 48 VIS
LAG=158.5MIN/50SPM

BASALT:M-DK GY, GYBN, GYGN, V HD, FRESH, MICROXLN, VESICULAR, FILLING OF ZEOL, SME QTZ, SME CHLORITIZATION, MAGN IN GRNDMSS.

W 17.2 V 49 F 8.4
FC 2/32 PH 12
S 3500PPM SD ¼%
SOL 38% OIL 0



BASALT: M-DK GY, GYBN, GYGN, V HD, MICRO-V F XLN, VESICULAR, COM ZEL FILL, SOM SEC QTZ, SOM CHL, ABNT MAG ENOUGH TO SET OFF AIRPORT INSPECT ALARMS, COM ZONES OF ALT BAS; PREL GY CLAY, SFT-FM, PRLY HYDR, PR SOL, NOT V STKY; OCC V THIN TUFF BEDS

RAN SCHLUM DIL, SONIC
HDT, SWC, FDC-CNL-GR
AT 9511FT. SET 9 5/8"
CASING AT 9503FT.
DRILL AHEAD 8½" HOLE

C= 20U AT 48VIS
LAG= 61MIN W/52SPM

W 16.5 V 48 F 10.4
FC 2/32 PH 12
S 3000PPM SD ¼%
SOL 38% OIL 0

W 15.8 V 45 F 8
FC 2/32 PH 12
S 2600 SD ½
SOL 34 OIL 0

C = 15U AT 45 VIS
LAG = 64 MIN@50 SPM

BASALT, MED-DRK GRY OLIVINE, MAGNETITE, FINE LATHS OF FELDSP MINOR ZEOLITES & CHLOR. INCLUSIONS.

W 15.8 V 50 F 9.7
FC 2/32 PH 12
S 2500PPM SD ¼
SOL 34% OIL 0

BASALT: MED-DK GY/BRN, OCC BLK, VFN GR, HD, V CHLORITIC, MINOR TO ABUND MAGNETITE, RARE-OCC QTZ AND FELDSPAR CRYSTALS

VOLCANICS (TUFF): LT GRN, SOFT, CHLORITIC; INCLUS DK GRN, HD TUFF; SCAT QTZ & FELD V CRSE CRYSTAL ANG; SCAT BASALT FRAGS; TR SD: DK GRN, BLK, VFN, LOOSE, BASALTIC

S 2500PPM

W 15.1 V 48 F 10
FC 2/32 PH 12
S 2600 SD ¼
SOL 26% OIL 0

BASALT: DK GY-DK GRN V HD, V CHLORITIC, MINOR MAGNETITE, SOME FELDSPAR, TR CRSE QTZ GR

BASALT: VARYING IN COLOR FROM MED GY-DK GY, HD, CHLORITIC, SERPENTINE, MINOR ZEOLITES

W 15.1 V 46 F 9.6
FC 2/32 PH 12
S 2400PPM SD ¼
SOL 30% OIL 0

BASALT: MED-DK GY, VFN GR, HD, CHLORITIC W/ INCLUS SERPENTINE, MINOR MAGNETITE, VAR AMTS FELDSPAR, MINOR ZEOLITES; TR VOLC TUFF: LT GY-LT BRN, SFT-HD

VOLCANICS: (TUFF) PALE RED/BRN, SOFT-V FIRM, CHLORITIC, SCAT FELD

BASALT: PREDOM LT GRN, VFN GR, W/BLK INCL, VESICULAR IN PART; MINOR ZEOLITE

W 14.8 V 48
S 1800PPM

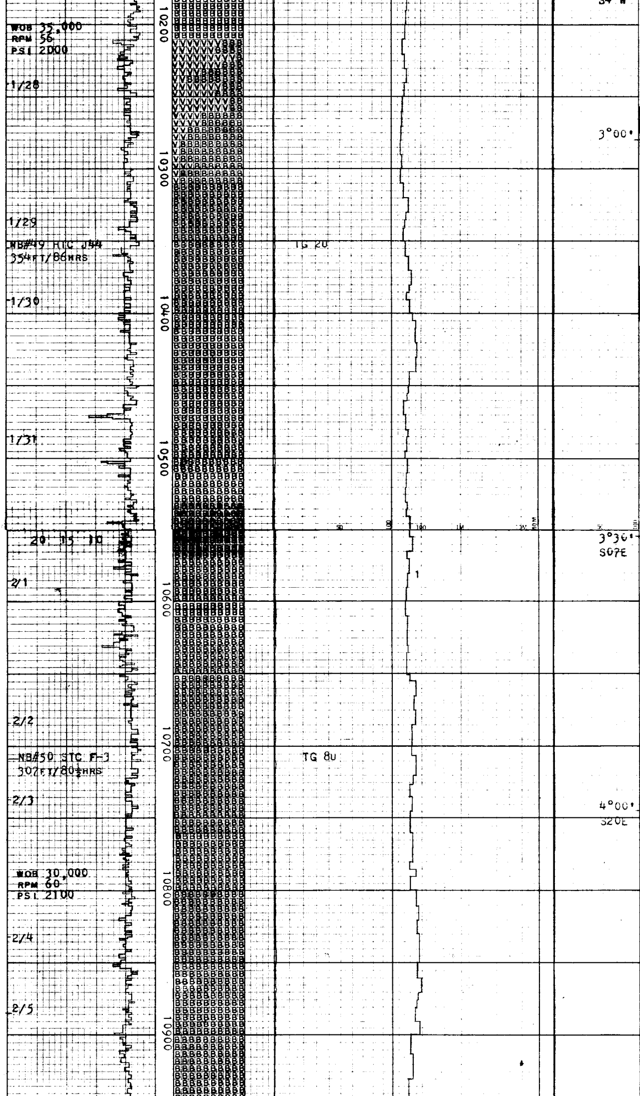
W 14.5 V 51 F 9.1
FC 2/32 PH 12
S 2000PPM SD ¼
SOL 26% OIL 0

VOLCANIC TUFF: RED/BRN, SOFT-HD, PREDOM FIRM

BASALT: MED-DK GY/GRN VFN GR, HD-V HD, TR CHLORITIC

C= 17U AT 59VIS
LAG=68MIN W/54SPM

W 13.6 V 48 F 8.8
FC 2/32 PH 12
S 1800PPM SD ¼
SOL 23% OIL 0%



BASALT:M-DK GY,GYBN, GYGN,HD-V HD,APHAN, LOC CHL,MAGN IN GROUNDMASS.

TUFF: RED/BRN,SOFT-SL HD,PLAG FRAGS; DK GY BASALT: V HD, CHLORITIC,W/PLAG CRYSTALS

TUFF: LT GY/GRN,SOFT-FIRM, CHLORITIC,SCAT PLAG FRAGS, MINOR BASALT AS ABV

W 13.5 V 47 F 8.6
FC 2/32 PH 12
S 1800PPM SD ¼
SOL 23% OIL 0

BASALT: MED-DK GY, GY/GRN, HD-V HD, CHLORITIC IN PART, MINOR-ABUND PLAG CRYSTALS AND OCC IN VEINS,ABUND MAGN

BASALT: PREDOM AS ABV, PREDOM VFN GR, ABUND PLAG INCL AND LOOSE CRYSTALS

W 13.5 V 50 F 8.8
FC 2/32 PH 11
S 2000PPM SD ¼
SOL 22% OIL 0

BASALT:MED-DK GY, MINOR CHLORITIC,V HD, PREDOM FN GR, LT GY AND WEATHERED IN PART, ABUND PLAG CRYSTALS; TR RED, HD VOLC TUFF

W 13.5 V 43 F 8.8
FC 2/32 PH 12.0
S 1800PPM SOL 22%
SD ¼% OIL 0

C= 25U AT 45VIS
LAG= 65MIN W/55SPM

BASALT:M-DK GY,GYGN, HD-WTHRD SFT,MICXLN, VESICULAR / ZEOL & QTZ FILLING,SME/CHL, MAGN IN GROUNDMASS, V SL TR NATIVE CU IN CLR QTZ GRS.

BASALT: AS ABV AND V WEATHERED IN PLACES; V CHLORITIC

W 13.5 V 50 F 7.8
FC 2/32 PH 12
S 2000PPM SD ¼
SOL 22% OIL 0

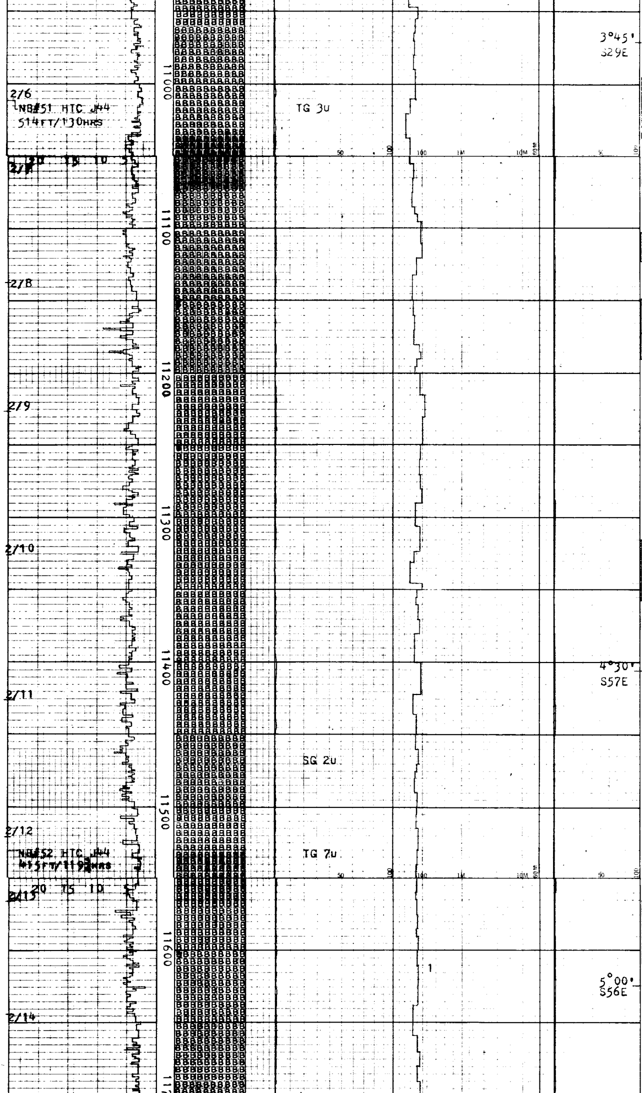
BASALT: PREDOM MED GY, MINOR RED/BRN, PALE GRN, PREDOM FN GR, V CHLORITIC, VESICULAR W/QTZ AND ZEOLITES, TR COPPER, V WEATHERED IN PLACES TO LT-MED GY, MINOR AMT MAGNETIC

W 13.6 V 52 F 7.8
FC 2/32 PH 12.0
S 2000PPM SD ¼%
SOL 22% OIL 0

BASALT: MED GY, GY/GRN, PREDOM FN GR, IN PART V CHLORITIC, COMM QTZ FRAGS, ZEOLITES, WEATHERED

W 13.5 V 47 F 8
FC 2/32 PH 12
S 1800 SD ¼
SOL 22% OIL 0

BASALT:M-DK GY-GYBN, HD-V HD,SME WTHRD SFTER,SME VESICLES/ ZEOL & QTZ FILLING, SME/CHL RIMS,COM CHL MAGN IN GRNDMSS.



BASALT, MED-DRK GRY QTZ INCL. AS FRACT. FILL. GREY FELDSP, CHLORITE & TR. SERP. POSS YEL-BRN OLIVINE ABUND. MAGNETITE.

W 13.6 V 54 F 8.0
FC 2/32 PH 12.0
S 1800PPM SD 1/4%
SOL 22% OIL 0

BASALT:PRED M GY GYGN, MOD-V HD FRESH-WTHRD, ZEOL & QTZ FL FRACS& VESICLES, SME /CHL RIMS; COM CHL, MAGN IN GRNDMSS.

C=20U AT 45VIS
LAG = 85MIN W/58SPM

W 13.2 V 48 F 8.0
FC 2/32 PH 12.0
S 1500PPM SD 1/4%
SOL 21% OIL 0

BASALT, DRK GRY, SL VUGULAR W/ZEOL MATERIAL. QTZ VEINS & QTZ ALT. OF CHLORITE. GRY FELDSPAR

BASALT:M-DK GY-GYGN, PRED HD&FRESH, FRAC &VESICLES/ZEOL&QTZ FL:COM CHL,OCC SERP, ELONG PLAG XLS.

W 13.0 V 47 F 7.8
FC 2/32 PH 12.0
S 1500 SD 1/4%
SOL 21% OIL 0

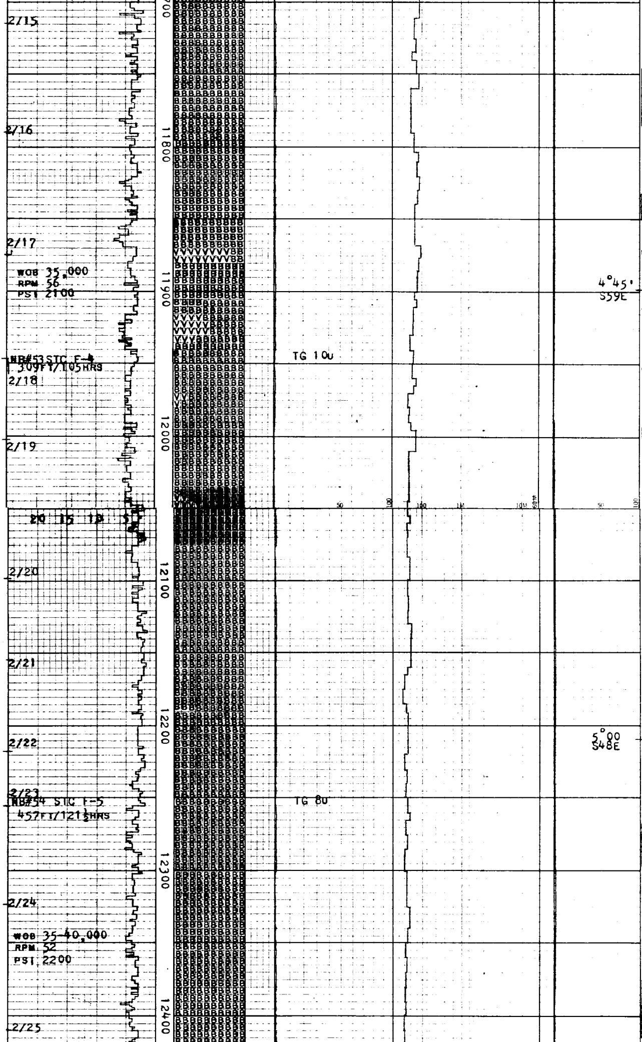
BASALT, DRK GRY-DRK GRN. INTBED VESIC W/ZEOLITIC & MILKY QTZ VUG FILL, FINE THIN FELDSP LATHS. SOME CHLORITE & OLIVINE.

BASALT, DRK GRY V APHANITIC, VESICUL. W/ZEOLITIC & MILKY QTZ VUG FILL. SMALL CHLORITE INCL.

W 13.1 V 49 F 7.3
FC 2/32 PH 12.0
S 1500 SD 1/4%
SOL 21% OIL 0

BASALT, DRK GRY, V. FINE GR. SL VESIC W/ GRN COAT. MILK QTZ & ZEOL FILL. TR NAT. CU. CHLOR., GRY FELDSP, QTZ INCL, OLIVINE & MAGNETITE.

C= 20U AT 48VIS
LAG= 68MIN W/60SPM



BASALT: MED-DK GY, V FN GR, HD, CHLORITIC, OCC HEMATITIC, V MAGMETITE, ABUND-MINOR FRAC AND VESICLES, FILLED W/ QTZ ANS ZEOLITE

W 13 V 47 F 7.7
FC 2/32 PH 12
S 1500 SD 1/4%
SOL 21% OIL 0

BASALT: PREDOM AS ABV, BUT W/DECR AMT CHLORITE, AND LESS VESICLAR AND ZEOL; ABUND AMT MAGNETITE; RARE HEMATITE

W 13.0 V 49
S 1500PPM

VOLC. REDBRN, V APH. W/FINE CLR CRYST. INCL. UNIFORM DISSEMINATED DARK GRN INCL. OF CHLORITE.

VOLC TUFF: LT GY, LT GRN, SOFT, SILT-MED SIZE GR CHLORITE, BASALT, AND SOME QTZ; SMPLE V CHLORITIC

BASALT: MED-DK GY, V FN GR, HD CHLORITIC, UNWEATHERED, MINOR AMT VESICLES AND ZEOLITES IN VARYING AMT

C= 19U AT 51VIS
LAG= 75MIN W/58SPM

W 13 V 49 F 6.9
FC 2/32 PH 12
S 1500 SD 1/2%
SOL 22% OIL 0

VOLC TUFF: RED BRN, SOFT-FIRM, UNIFORM, SL CHLORITIC

BASALT, MED GRY W/ NUMER. INCL. OF ZEOL. & GRY MILK. QTZ MINOR FELDSP; OLIV. & CHLORITE INCL.

C= 26U AT 47VIS
LAG= 83MIN W/48SPM

BASALT: MED-DK GY, V HD, SIL IN PLACES, V FN GR, APHANITIC IN PART, MINOR CHLORITE, MINOR ZEOLITES, ABUND MAGNETITE

MINOR RED BRN BASALT, ABUND HEMATITE

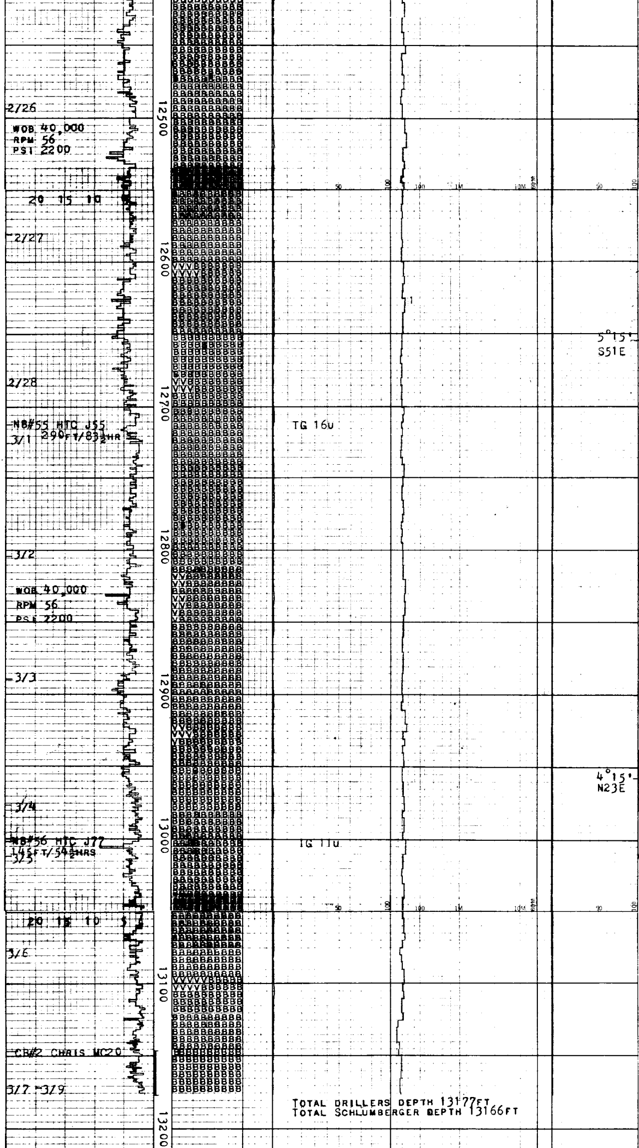
W 13.0 V 46 F 6.6
FC 2/32 PH 12.5
S 1800PPM SD 1/4
SOL 23% OIL 0%

BASALT: MED GY, HD-V HD, FN GR, V CHLORIT LOC, RARE COPPER, LESS SILICEOUS THAN ABV, VESICELAR (SILICA FILLED), ZEOLITES IN VARYING AMTS

W 13.0 V 48 F 6.7
FC 2/32 PH 12.5
S 1800 SD 1/4
SOL 22% OIL 0

BASALT: MED GY, HD-V HD, APHANITIC-V FN GR, ABUND MAGNETIT RARE COPPER, MOD VESICULAR W/VESICLES FILLED W/SILICA AND ZEOLITES, SMPLE CHLORITIC IN VARYING AMTS; MINOR-MOD AMT HEMATITE IN SOME SMPLES

W 13.0 V 45 F 6.6
FC 2/32 PH 12.0
S 1600PPM SD 1/4%
SOL 23% OIL 0



TOTAL DRILLERS DEPTH 13177FT
TOTAL SCHLUMBERGER DEPTH 13166FT

BASALT: MED GY/BRN, MED GY, FN GR, HD-V HD, V CHLORITIC IN PLACES, OCC SCATT PIECES CHLORITE, RARE COPPER ASSOC W/ THE CHLORITIC BASALT, RARE-OCC LOOSE FN-MED QTZ GR

W 13.0 V 44 F 6.7
FC 2/32 PH 12.0
S 1600PPM SD ¼%
SOL 23% OIL 0

C= 23U AT 45VIS
LAG= 76MIN W/48SPM

BASALT: M-DK GY, GYBN, OCC RDBN, VHD-HD, MICXLN, SME VESICLES & FRAC FILLED/QTZ & ZEOL, COM CHL IN BSLT & ZEOL, MAGN IN GNDMS, V SL TR NATIVE CU.

VOLC TUFF: RED BRN, SL FIRM-MOD HD, SL-MOD CHLORITIC

W 13.0 V 43 F 6.6
FC 2/32 PH 12.0
S 1600PPM SD ¼%
SOL 23% OIL 0

VOLC TUFF: REDBN AS ABOVE, SFT-MOD HD, MOD FM, SOLU.

BASALT: M-DK GY, GYBN, HD-VHD, MICXLN, VES & FRACS/QTZ & ZEOL FILLING, SME CONTNG CHL, SCATT CHL, MAGN IN GRNDMSS.

BASALT: PREDOM AS ABV, MINOR PLAG AND QTZ, V CHLORITIC IN PLACES W/RARE TR COPPER, ALTERED; MINOR RED BRN, SOFT-HD TUFF

W 13.0 V 49 F 6.4
FC 2/32 PH 12.0
S 1600PPM SD ¼%
SOL 23% OIL 0

C= 16U AT 49VIS
LAG= 77MIN W/48SPM

BASALT: LT-M GY-GYGN, HD-VHD, MICROXLN, COM CHL THRU, MNR PLAG & QTZ, RARE TR CU, MAGN IN GROUNDMASS.

TUFF: LT GY/GRN, PALE PURPLE, SOFT-HD, PREDOM FIRM-HD; MOD-V CHLORITIC

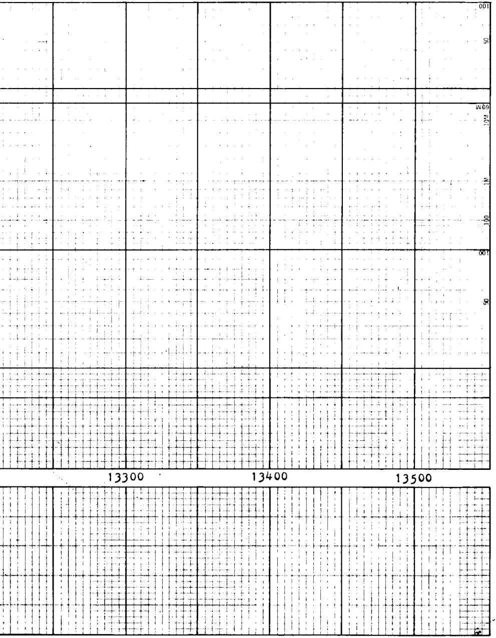
W 13.0 V 51 F 6.4
FC 2/32 PH 12.0
S 1600PPM SD ¼%
SOL 21% OIL 0

BASALT: GY, LT GY-GYGN, HD-VHD, VF GR-MICXLN, COM VES/PRED ZEOL FILLING, COM CHL, SME MAGN, MNR QTZ, SERP.

BASALT: BN-REDBN, GYBN, HD-VHD, APHAN-MICROXLN, INCR IN VESICLES, SCATT CHL THRU, OCC THIN PLAG LATHS, MNR SERP, MAGN IN GRNDMSS, RARE CU.

TUFF: RED/BRN, SL FIRM-MOD HD, UNIFORM

CORE #2 BASALT MED GRY - GRN. VESIC. W NUMEROUS VUG FILL OF ZEOLITE & QTZ. TRACE OF FELDSP. & MAGNETITE. V. FINE GRAINED.

RAN SCHLUMBERGER DIL, BHC, FDC, CNL, GR, HDT, CST, VEL SURV.
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