

# FOH #3 Deepening

Geothermal  
MD Mudlog



711 Saint Andrews Way  
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COMPANY  
WELL  
LOCATION

U.S. Navy  
FOH #3 Deepening  
Sec#36, T18N, R29E, MD B & M

ELEVATION  
COUNTY  
FIELD  
API No.  
SPUD DATE  
LOGGING DATES  
LOGGING DEPTHS  
CO. GEOLOGIST  
COMPANY MAN  
CONTRACTOR  
RIG  
MUD COMPANY  
TYPE  
LOGGING GEOLOGISTS

3930' GL 3954' KB  
N.A.S. Fallon  
Churchill, Nevada  
000-00000  
2/19/2005  
2/19/2005-3/05/2005  
6959' to 8959'  
Steve Bjornstad  
Ken Bonin Sr., U.S. Navy Rep  
Welch & Howell Drilling  
#17  
Geo Drilling Fluids  
Gel/Water  
Bill Gilmour, Fred Pulka,  
Doug Milham

BIT SIZE

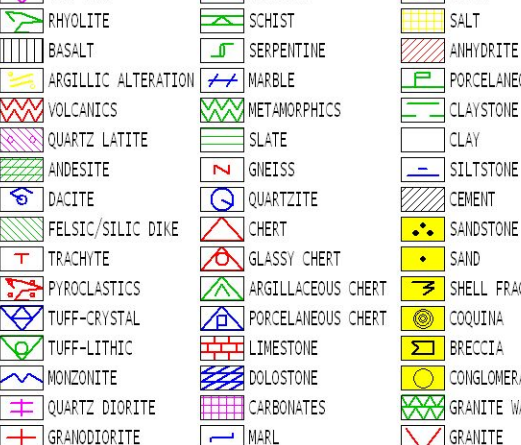
17.5" to 70", 12.25" to 500'  
8.5" to 2935'  
6.125" to 8959'  
13.375" at 67'  
9.625" at 485'  
7" at 2931' (=2938' new K.B.)

CASING

## Abbreviations

CO Circulate Out  
LAT Logged After Trip  
CG Connection Gas  
WG Wiper Gas  
TG Trip Gas  
SG Survey Gas  
NR No Returns  
NB New Bit  
WR Wiper Run  
WB Weight On Bit  
PP Pump Pressure  
SPM Strokes Per Minute  
POOH Pull Out of Hole  
LC Lost Circulation

## Symbols



Drill Rate

Drill Rate  
Overhaul  
Weight On Bit

40 30 20 10  
100k 75k 50k 25k

## Lithology

## Fractures

## Mud Loss

## Minerals

Quartz  
Calcite  
Pyrite  
Hematite  
Epidote  
Chlorite  
Sericite  
Anhydrite

## Temperature

Temp. In  
Temp. Out  
Delta T

250 0  
250 0  
200 0

## Gases

CO2 Gas  
CH4  
Pit Volume

4000  
2000  
1000

## Descriptions

NOTE: FOH#3 ORIGINALLY  
DRILLED AND TD IN SEPTEMBER  
OF 1993 TO A DEPTH OF 6952'  
WITH 7" LINER RUN TO 2931'.  
THE WELL WAS RE-ENTERED IN  
FEBRUARY 2005, AND WITH THE  
LINER PULLED WAS DEEPEENED  
FROM 6952' ON 2/19/2005 WITH  
A 6.125" BIT.

MW 8.6 VIS 44 PV 15 YP 9  
FL 7.8 PH 9.0 CL-460PPM

NOTE: DEPTHS BASED ON K.B.  
FROM DRILLER'S PIPE TALLY;  
RIG FOR DEEPENING 7" HIGHER  
K.B.; OLD 6952' = NEW 6959'.

PHYLLITE: BLACK; V FIRM TO HD;  
PHYLLITIC TO DULCE EARTH; STR;  
GRN; SCATTERED DISSEM  
PYR, OCC AS THIN VEINS; OCC AS  
SERND CTGS WITH ASHY COATINGS;  
POSS FINGERLING ZONING; POSS AS  
LITHIC CLASTS W/ I ASHY TUFF.

MARBLE: WHITE TO LT GRAY OCC W/  
BLACK ARGILL STREAKS; MOD HD;  
FINE TO COARSE XSTLN; V  
ACTIVE TO PASSIVE MASSV  
VEIN FILL; TR QTZ/QTZT LAMS;  
OCC TO COM DISSEM PYR, OCC AS  
DISCONTINUOUS VEINS.

METATUFF: PL GRN TO WHT; MOD HD  
TO HD; SILIC; FN XSTLN; SPOTTY  
CALC; COM MOTTLED; VARIABLY  
CHLORITIC; OCC CALC VEINS; OCC  
FN PYR; TR EPIDOTE; RR HEMTT.

GREENSTONE: PL TO DK GRN; COM  
MOTTLED; COM SPECKLED; MOD HD;  
VARIABLE CALC; APPS AS ALTERED  
VOLCANICS; COM .5 MM  
PORPHYBLASTS; IRREG SHAPED;  
POSS ALBITE; CHLORITIC; OCC  
EPIDOTE; TR HEMTT; TR PYR; GRDS  
TO METATUFF.

MW 8.6 VIS 40 PV 15 YP 6  
FL 7.2 PH 8.5 CL-440PPM  
LOST 180 BLS IN 24 HRS

VOLCANICS: DK GRAY TO BLK, DK  
GRN; MOD HD; DENSE; FN TO MOD  
XSTLN; NON TO SL CHLORITIC; SL  
TO MOD ALTERED; MAFIC; TR  
DIFFERS F/ LIGHTER ALTERED  
TUFFS DUE TO DARKER APPRNC; OCC  
W/ CALC VEINS ATTACHED.

METATUFF: PL GRN TO WHT; COM  
MOTTLED; HD; FN XSTLN; SPOTTY  
CALC; OCC SL CALC; OPAQUE; OCC  
P-P CUBIC PYR; TR W/ THIN QTZ  
VEINS; RR ASHY TUFF, POSS DUE  
TO BIT MECHANICS.

GREENSTONE: PL TO DK GRN, COM  
MOTTLED; FIRM TO HD; COM  
GRANULAR APPRNC; Pervasively  
CHLORITIC; OCC PYR SEAMS; CALC  
OCC TO COM ISOT; POSS ALBITE; TR  
SPECULAR HEMTT; DECRSD .5MM  
PORPHYBLASTS OF POSS ALBITE;  
RR 2MM QTZ VEINING.

NOTE: CONTINUED TR AMTS OF  
BLK CARBONACEOUS MTRL  
OBSERVED AS MICROLAM W/QTZ  
DISPLAYING A SCHISTOSE TEX @  
7240'

METAVOLCANICS: PL TO DK GRN TO  
WHT; VARIOUS F/ GREENSTONE TO  
METATUFF; OCC SMECTITIC  
AMYGDULES; MOD HD; VARIOUS  
DEGREES OF ALT; OCC TO COM MAGN

METACRYSTALLINE: @ 7320'; PL  
ORG TO WHT MOTTLED; HD;  
HYPOCRYSTALLINE; CRYSTALS OF  
QTZ & FSPR; OCC HEMTT, TR CUBIC  
PYR.

MW 8.7 VIS 41 PV 15 YP 13  
FL 7.2 PH 9.0 CL-410 PPM

GREENSTONE: PL TO MOD GRN, OCC  
DK GRN; MOD HD; HYDROLYTIC;  
CHLORITIC; MOD CALC; .2-.4MM  
ALBITE; ASSOC W/ DOM AMT OF  
EPIDOTE; TR PYR.

RHYOLITE: WHT TO PL GRN; FNTLY  
MOTTLED; HD; UNIF; POSS CHLORITIC;  
CRYPTOXSTLN; OCC QTZ PHENOS;  
GRDS TO XSTL TUFF; DECRSD ALTS;  
POSS METATUFF; V. SLIC; POSS  
GRDS IN AMT & SIZE OF PYR; OCC  
CALC.

GREENSTONE: MED LT TO MOD DK  
GRN; SPECKLED, OCC FRM TO DOM  
MOD HD; OCC BT DECRSD FN;  
OFF-WHT PORPHYBLASTS OF POSS  
ALBITE; OCC EPIDOTE, CALC; RR  
PYR; SL TO OCC HI MAGNETIC  
CONTENT.

RHYOLITE: LESSER WHT TO V PL  
GRN; OCC SL MOTTLED; MOD HD TO  
HD; DOM CRYPTOXSTLN; DECRSD  
AMT TO OCC QTZ PHENOS; SL CALC;  
DECRSD FN PYR (BBS); RR AS  
CHLORITIC, RR HEMTT, DOM ALONG  
POSS PLANER FRAC SURFS.

NOTE: SURVEY @ 7465' NO GOOD  
MRT=276 F

CRYSTAL-LITHIC TUFF: WH SME  
ROSE & LT GRN; SPKLD CLR-GRN-  
BLK; COM CLR 0.5-2MM APHAN;  
EUHED TRIANG QTZ PHENO; MNR-15%  
CHLORTZD GRN MAF LITHS; APHAN  
DULL MTRX; W/ LITHIC CALC  
REPL; COM DISSEM RED HEM & SME  
VNG; TR DISSEM/VN PYR; TR EP VNG

RHYODACITE: MOD RDISH BRN; MOD  
HD; PORPH; ABUN .5-1.5 MM WHT  
PLAG PHENOS; LATHS; RR BIOT;  
SCATTERED HEMTT; RR EPIDOTE;  
SPOTTY CALC.

RHYOLITE: WHT TO V PL GRN TR  
FNT BRN MOTTLED; HD TO MOD HD;  
DENSE; CRYPTOXSTLN; W SCATTERED  
SBHRL; TO EUHRL; BLK; RR  
PHENOS; OCC FN CUBIC PYR; TR  
CALC VNG; TR FN DISSEM HEMTT;  
FNTLY CHLORTZD.

MW 8.7 VIS 43 PV 19 YP 16  
FL 7.0 PH 8.0 CL-388PPM

QUARTZ DIORITE: GRNGRY OVERALL;  
SPKLD GRN-LT GRY-BLK; F-M GR  
EQUIGRAN APR; APPROX 20-40% MAF  
& CHLORTZD MAF 40-60% FELD 10-  
20% QTZ; R 1-4 MM CLR ANHED QTZ  
PHENO; TR-1% BLK OPAC; TR  
MAS WH CLR GRN; TR DISSEM HEM  
& PYR; TR YEL-YELGRN EP VNG

LITHIC TUFF: LT GRN CAST; MOTT  
WH-LT GRN CRPTOXLN MTRX W/ SUCR  
LSTR; F-M LOC C GR FELSIC-MAFIC  
ANG LITH; PLI; LOC FELD/QTZ  
TEX; DEVIAT W/ CALC REPL OF GND-  
MASS; MAF MSLTLY ALT TO CHLOR &  
LOC EP; TR R DISSEM PYR/HEM; LOC  
TR EUHED QTZ FF; LOC QTZ PHENO

RHYOLITE: WHT TO LT GRY TO PL  
GRN; HD TO MOD HD; DENSE;  
CRYPTOXSTLN; SILIC; UNIFORM; SL  
CALC; SL CHLORITIC; RR DISSEM  
QTZ; TR FN CUBIC PYR; TR DISSEM  
HEMTT.

MW 8.8 VIS 39 PV 14 YP 9  
FL 6.8 PH 9.0 CL-380PPM

LITHIC TUFF: MULTICLDR; HD TO V  
HD; SILIC; WELDED; META;  
VAGUELY LITHIC; LITHIC; LOC  
CLEAVE ACROSS CLAST  
BOUNDRIES; CLASTS 1-3MM.

LITHIC TUFF: MARG ALT LT GRN;  
WHICH CRPTOXLN HD DEVIT MTRX;  
ANG ORNG-GRN-BLK-GRY LOC ROSE  
F-C GR LITH; LOC FELD/QTZ  
XLS; COM EUTAX TEX; ABNT CALC

SURVEY @ 7846' 13.5 DEG, 242 F

FELSITE: M GRN; SPKLD GRY CLR &  
GRN; EQUIGRAN F-M GR; APHYRIC;  
GEN EQNT XLN APR; LOC SL-MOD  
FOL; DOM QTZ-FELD W/ 20%  
CHLORTZD MAF; COM F  
DISSEM OPAQ INCL MAGN; DECR HEM

MW 8.8 VIS 41 PV 18 YP 10  
FL 6.5 PH8.5 CL-410PPM

NOTE: POH @ 7921' FOR NB#4

RHYOLITE: WHT, LT GRY, PL GRN,  
FNTLY MOTTLED; MOD HD TO HD;  
DENSE; CRYPTOXSTLN; POSS ALBITE;  
WELDED, (META); TUFF; RR FN  
MAFIC INCLUSIONS; SL CHLORITIC;  
FELS; TR FN CUBIC PYR; CALC;  
TR ANHRL QTZ VEINING; TR  
ANHRL EPIDOTE.

LITHIC TUFF: WHT TO LT GRY, TR  
V PL GRN; HD; VITRIC; OPAQUE;  
SHARP, ANG CTGS; SL CAR;  
VARIABLE LITHICS; DOM CLEAVES  
ACROSS CLASTS; SCATTERED SBHRL  
REPLACEMENT SLIC; LOC UNALF  
CHLORITE; TR PYR; RR DISSEM PYR  
ALONG FRACS.

MW 8.8 VIS 40 PV 20 YP10  
FL 6.7 PH 8.4 CL-800PPM

LITHIC TUFF: WH-MED GRY; CTGS  
SPKLD GRN-GRY-BLK-ORNG & WH W/  
V ANG F-C GR LITH LPLI & R XLS;  
HD DEVIT CALC ALT WHISH MTRX;  
DISTINCT-FZY LPLI GR BD

FELSITE: M GRY-GRNGRY; WH-GRY-  
GRN-CLR & BLK GR; F-M OCC C GR  
SIZE; DOM ANHED W/ BLK; RR  
EUHED FELD; APPROX 50% FELD  
20-30% MAF & 10-30% QTZ; MAF  
MARG-PERV ALT TO CHLOR;  
YEL EP+QTZ VNG; HEM+CALC VNG; V  
COM VF BLK-BRN MAGN OPAQ; ASSOC  
WH-LT GRN; LITHIC TR; LOC  
VARCOL F-C GR ANG LPLI IN A  
DEVIT SILICIFIED/CALC MTRX

ALTERED LITHIC TUFF: WHT TO LT  
GRY TO PL GRN; HD; DENSE;  
VITREOUS; TRANSLUCENT; HAS  
WELDED APPRNC; APPRNT  
GREENSCHIST ALTRD; FELSIC  
LAPILLI; CRYPTOXSTLN; OCC  
EPIDOTE; OCC BIOTIT; OCC  
REPLACED BY CHLORITE, CALC W/TR  
THIN CALC VNG; TR PYR, OCC TINY  
WHT SPOTS; POSS RESELTZD  
ALBITE; STRONG TR MAGNET.

MW 8.8 VIS 40 PV 16 YP 9  
FL 6.7 PH 9.1 CL-850PPM

ALTERED LITHIC TUFF: LT GRY-WH  
W/ LT GRN CAST; GEN V HD ANG  
BRIT CTGS; INCR SILICIC & LOC  
CALC ALT; PLI; INCR  
MTRX & BARELY VIS; COM EQNT-  
ELONG CHLORTZD MAF/BIOT GR; LOC  
SOFT FRI; POSS W/ FELD; RR  
EQUIGRAN F-M GR FELSITE CTGS W/  
20-30% RELICT MAF; YEL EP VNG &  
LOC ALT; F-M TR DISSEM PYR & HEM  
VNG; TR CLR QTZ FF; OVERALL  
HIGHLY SILICIC APR W/ MOSTLY  
WHISH CTGS; INCR HOMOG APR

WELDED TUFF: DOM WHT TO TR V PL  
GRN; HD TO MOD HD; DENSE; DOM  
VITRIC; SILIC; CRYPTOXSTLN;  
DECRSD TO TR LAPILLI; CALC; TR  
EPIDOTE; V RR PYR; CALC;  
MAFICS; SL CHLORITIC; 8300'.

NOTE: STGR TR CLR DRUSE QTZ @  
8300'.

CARBIDE 08314', 49 MN @ 82SPM  
100% THEOR, 3 UNITS.

RHYOLITE: WHT TO V LT GRY; MOD  
HD TO HD; CRYPTOXSTLN; LOC  
HOMO; SIMILAR TO WELDED/ALTERED  
TUFF BUT W/ INCRS IN SILICA; RR  
PLAG PHENOS; OPAQUE; V RR  
PYR; OCC MAFIC/BIOTIT INCLU;  
SCATTERED EPIDOTE, TR AS  
MICROVEIN; TR SL CHLORTZD.

MW 8.8 VIS 41 PV 17 YP 9  
FL 6.5 PH 8.8 CL-500PPM

RHYOLITE: WH-PALE LT GRN; V HD  
ANG CTGS; SL TRNSL & EDGES; MAS  
HOMOG APR W/ NO BANDING OR  
RELICT TEX; COM TR GR IRREG  
CHLORTZD MAF GR; TR ANHED QTZ &  
FELD XLS; LOC XCUT DUK  
LPLI OF EQUIGRAN F GR FELSITE &  
LOC DK BRN APHYRIC GEN UNALT  
ANDESITE; ABNT POWD WH FELD; CALC  
ZNS; MOST CTGS CALC IN PT; DECR  
EP VNG; TR TRNSL BLUE OPAL

RHYOLITE: WHT, OCC LT GRY & V  
PL GRN; HD; DENSE; CRYPTOXSTLN;  
APR; COM HAF; FELD; HAF; RR  
MAF; LOC CHLOR/CALC PHENO; MOST  
CTGS CALC IN PT DUE TO ALIT;  
ASSOC WH-LT GRN; FIRM TUFF W/  
R RELICT LAMS & XLS/LPLI; INCR  
CALC VNG; TR CHLOR EP VNG; TR  
DISSEM & VN PYR; R HEM VNG;  
MARG-PERV CHLORTZN OF MOST CTGS

NOTE: COM WHT MED XSTLN  
CALCITE VEINING F/8850-8880'.

RHYODACITE: WHT TO LT GRN, OFTN  
SPECKLED; SOFT & ASHY TO MOD HD  
MICROXSTLN; VARIABLE SILIC;  
APPR; GRN; RICH; POSS DEFTED;  
CHLORITIC; COM .5-2MM WHT CALCIT  
VEINING; RR PYR.

MW 8.9 VIS 43 PV 19 YP 11  
FL 6.0 PH 9.0 CL-400PPM

RHYOLITE: DOM WHT TO OCC V PL  
GRN; MOD HD TO HD; CRYPTOXSTLN;  
5% CHLOR & ALT OF BIOTIT; RR FN  
PYR PHENOS; UNIFORM; TR CALC  
VNG; RR PYR.

TOTAL DEPTH: 8959' 20:30,  
3/5/05