* Quartzite is really granitic rock

R. F. SMITH CORP.

GEOTHERMAL DATA LOG

COMPANY REPUBLIC GEOTHERMAL INC.
WELL THERMAL ESCALANTE 57-29
FIELD WILDCAT COUNTY BEAVER
LOCATION SEC 29 T 30 S R 12 W
STATE UTAH COUNTRY U.S.A.

LOGGING GEOLOGISTS Wm. Easom, Dale A. Johnson, R. Yanez, R. Hernandez, J. Hill
PRESSURE INST. TYPE Silicon Chip TEMP. TYPE J-Thermocouple

DEPTH LOGGED FROM 380 Ft TO 7289 Ft.
DATE LOGGED FROM 10/6/77 TO 11/30/77
ELEVATION 5036'(GL)+8.5' KB ☒ DF ☐ GR ☐

-LITHOLOGY-

Sandstone	Siltstone	Graywacke Type # 1	Graywacke Type # 4	Solution Deposit	Basalt or Greenstone	Peridotite	Schist	Bentonite
Breccia	Claystone	Graywacke Type # 2	Chert	Minerlzd Deposit	Other Volcanic	Igneous Rock	Granite ~~Quartzite~~	Marble
Conglom.	Shale or Argillite	Graywacke Type # 3	Limestone	MELANGE'	Tuff or Tuff Brec	Granitic Rock	Serpentine	

ENGINEERING DATA

HOLE SIZE
12¼" to 1511'
6¼" to 5847'
6 1/8" to 7289'

CASING SIZE
13 3/8" to 300'
9 5/8" to 1480'
7" 1380' to 4478'

DRILLING RATE
☒ FT/HR ☐ MIN/FT

ROCK DENSITY----

DEPTH

LITHOLOGY

AIR AND MUD DRILLING DATA

TEMPERATURE (°F)
IN ---------
OUT ———

CO₂ ppm on Air —·—·—
TOTAL MUD GAIN / LOSS —·—·—

PRESSURE PSIG
IN ------
OUT ———

METHANE ppm
ETHANE ppm

H₂S ppm
% MOISTURE

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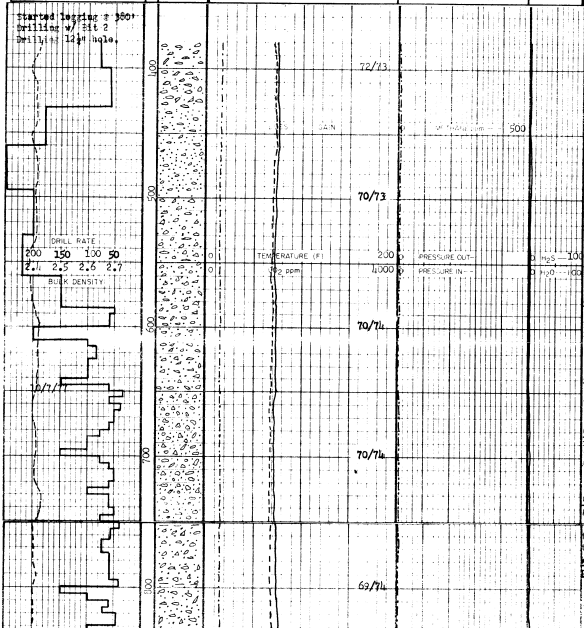
REMARKS

DESCRIPTIONS
CORE RESULTS
SURVEYS
FORMATION TESTS
MUD AGITATOR
ELECTRIC ☐
AIR ☒



Started logging @ 380'
Drilling w/ Bit 2
Drilling 12¼" hole.

Began Logging 10/6/77

Valley fill: Congl: reworked vol, red brn, rhyolitic welded tuff, ang to subang, tr sd.

Congl: as above, more pebbly.

Sand:med to vy crs,peb, ang to subang, red brn, reworked volcanics.

Sand & Congl:predom. red brn, med to vy crs, ang to subang, mostly reworked rhyolitic welded tuff.

Sand & Congl:predom red brn,med to vy crs, vy pebbly, ang to subang, reworked rhyolitic weld tuff, tr varicol alt.

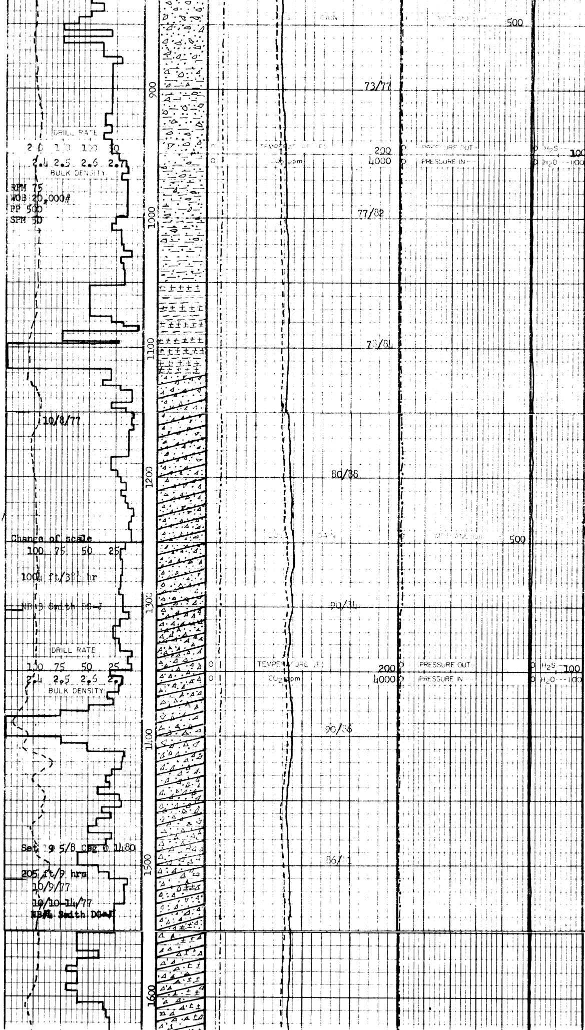
Sand & Congl:predom red brn, reworked tuff, as above, tr gry ls.

Congl:predom red brn, reworked vol, rhyolitic tuff, some varicol, yel & grn, tr sand.

Congl:predom red brn, gry,reworked vol, rhy tuff, ang to subang, tr wh to buff clay.

W 9.3 V 37 F 20 Fc 3
pH 9.2 Slds 5 Cl 1200

Congl:red brn to gry, pebbly, ang to subang, mostly fn grn tex, re-



worked rhyolitic tuff.

Sand & Congl:predom red brn, reworked rhyolitic tuff, vy clayey.

Sand & Congl: as above increase in clay, lt red brn, soft, silty, sandy.

Sand & Clay: reworked rhyolitic tuff, w/ st increase in lt red brn clay.

Sand & Clay: red brn reworked tuff, ang to subang, fn to med, w/ clay as above.

Bentonite:lt gry, tr alt lt gry tuff.

Bentonite:lt gry to wh, some altered lt gry tuff.

Tuff:rhyolitic, welded, predom red brn, part aph, some qtz.

Tuff:welded,rhyolitic w/some grys, banded, abund vitric & lithic frags, vesicular, amgydules w/poss zeolites.

Tuff: a/a, more pink, pred rd-brn.

W9.7 V 47 F 18.8 Fc 3
pH 9 Slds 10 Cl 1300

Tuff: pred red-brn to pink w/some grys, red/white banding, ang-sbang vitric & lithic frags, welded, vesicles w/clear qtz xtls

Tuff;rhyolitic, predom pink,welded, com gry, qtz common.

Tuff:lt gry, com red brn, qtz com, rhyolitic, less firm than above.

Tuff:as above, increase in percent lt gray.

Tuff:lt gry,some red brn, qtz com, prob frc.

Tuff:red brn, orange, abund qtz, rhyolitic.

Tuff:predom pink tan, com orange, some gry brn & grn, qtz com.

Tuff:rhyolite, pink gry abund qtz.

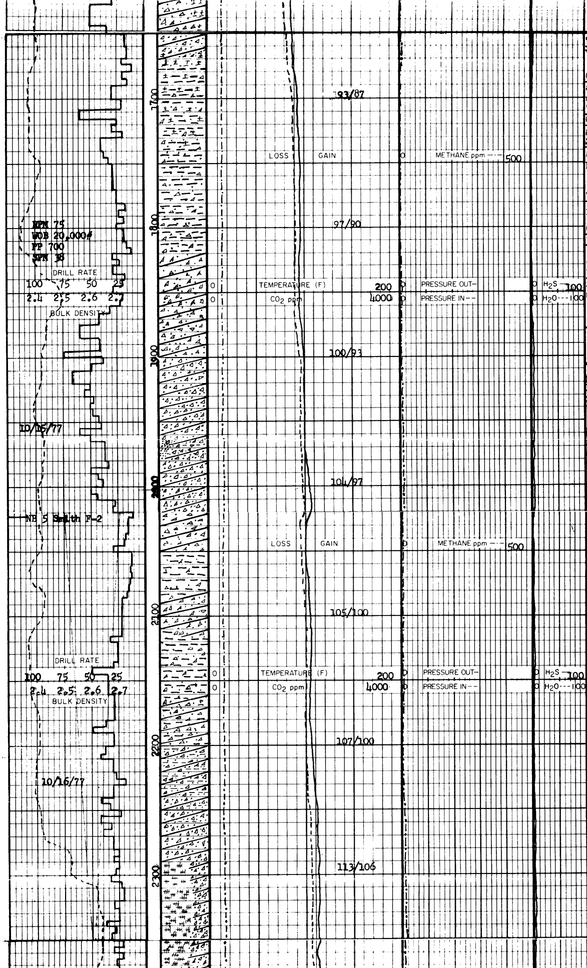
Tuff:rhyolitic,pink, red brn, orange, lt gry abun qtz, opal common in orange.

RAN Schlumberger log @1500'.

Drilling 8 3/4" hole.

Tuff: rhyolitic, predom pink, red brn, abund qtz, tr tan bentonite.

Tuff: rhyolitic, as above, tr chlorite, abund qtz, tr bent.



Tuff:red brn, rhyoliti
very altered, abun qtz

Clay:red brn, bent, ab
ang vol grains, some
well cemented sdst (?)
Tight hole on conectio
Clay:red brn, some lt
gry, bentonitic.
Sand:red brn, ang vol
grns, med to occ crs,
part well cemented

Tuff:predom red brn,
firm, abund qtz, may
be water deposited.
Clay:red brn, bent.
Tuff & Clay: as above,
tr green mineral, increase in mud vis.
Tuff: red brn, prob
frac, vein qtz, green
mineral

Tuff: red brn,some pin
tr lt yel,abund qtz.

Tuff: pred red-brn to
pink, some gray, abund
lithic and vitric frag
rhyolithic, com Qtz,
biotite, tr ltgry clay.

Sand: lt gray to pink,
fgr, wsrtd, wcons,
sbang-sbrd, prob rework
volcanics.

W 9.2 V 48 F 14.2 Fc 2
pH 9.5 Slds [illegible] Cl 850

Tuff:red brn, red orn,
welded, abun qtz,rhyolitic,firm, biotite
com, part altered.
Clay: red brn, bent,
w/ tuff as above.

Tuff:red brn, welded,
abund qtz, part alt
ash, tr lt yel,clayey.
Lost 13 bbl mud @ 2115

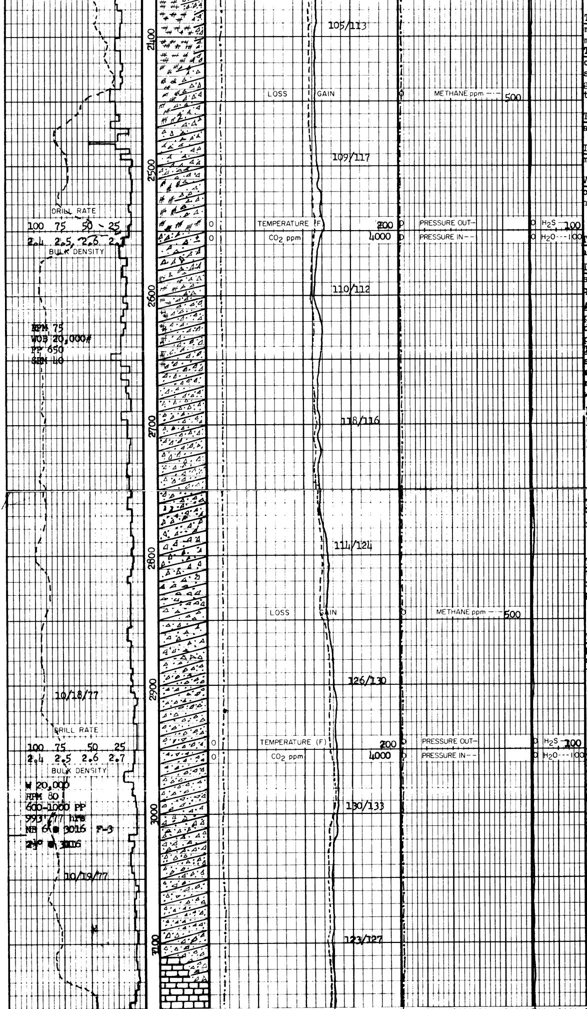
Clay;red brn, bent, w/
tuff granis as above.

Tuff: red brn, as above
tr lt gry w/red brn st
tr lt gry bent.

W 9.6 V 58 F 14 Fc 2
pH 9.2 Slds 7 Cl 1000
Tuff: red brn, orange,
gray, some pink & purp
abund ang vitric & lit
ic frags, com qtz, rhy
lithic, some becoming
porphyritic, tr red br
clay.

Andesite-Basalt(?).
Volcanic Tuff: as above
Basalt: pred dk grn,
some purples, fgr, abu
olivine, dk red iron
ores, some feldspar xt
porphyritic in pts. hd

No Shaker screen.



Tuff:lt gry, abun qtz, med gry, olivine, red mineral, some qtz.

Tuff: med to dk gry, olivine com, red min, some red brn tuff, prob grades from andesite to basalt.

Tuff: lt gry, welded, abun qtz, qtz Xls, firm

Tuff:red brn, abun qtz, med to dk gry, as above

Volcanic:andesite (?), basalt(?), greenish gry, hornblend, hard.

Tuff: red brn, lt gry, altered, qtz, tr bent.

Tuff: red brn, red orgn some biotite, welded, qtz abun, rhyolitic.

Andesitic Basalt(?): vol, pred greenish gry, vfgn, dk red min alterations-possibly hornblende.

Tuff: pred red brn-orgn, some gry, most rhyolitic ang-sbang lithic & vitric frags, qtz, biotite, welded in pts.

MW 9.6 Vis 47, pH 9.5
WL 13.2 FC 2 Cl 800

Tuff: as above, but more pink & wht, blk opaque mins, [illegible], abund biotite hex xlts.

Tuff: red brn, pink, tr lt gry, abun qtz, feld, some biotite.

Tuff: red brn, pink, tr lt gry, abun qtz, feld, some biotite, tr pyrite, hard.

Tuff: red brn, some pink, tr lt gry, abun qtz, feld, tr biotite, tr pyrite.

Tuff: pred pink, some red-brn & gray, ang frags, abund qtz, hex biotite xtls, rhyolitic in pts, feld, altered(? producing calc mat, pal yel & blk resinous mineralization.

W 9.8 V 52 F 10.8 Fc 2
pH 10.5 Slds 8 Cl 950

Tuff: red brn w/ lt. gry, abun qtz, com feld & biotite, tr green min.

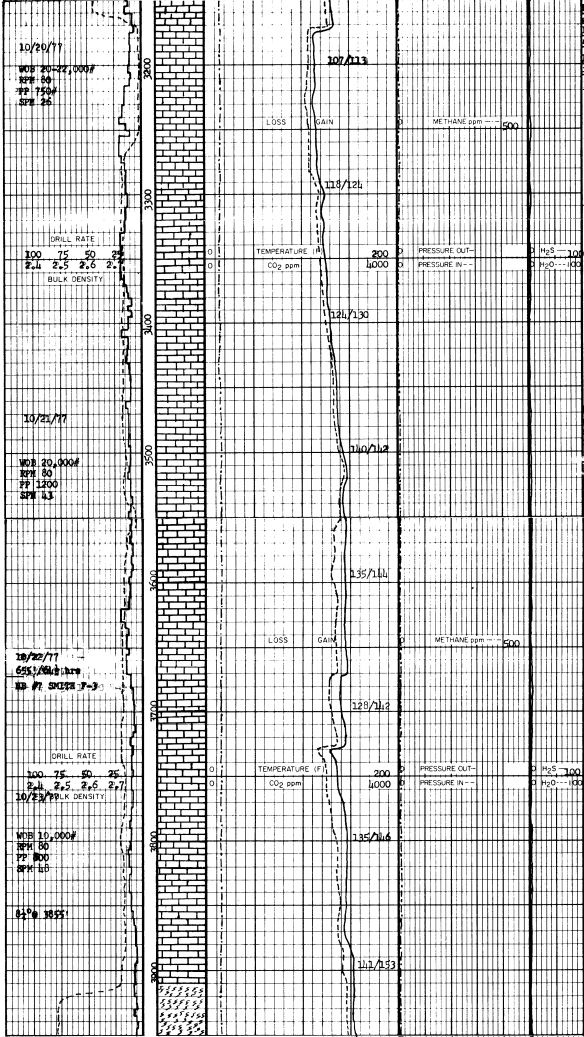
Tuff: pink to lt gry, some red brn, rhyolitic, come qtz, biotite, calc, ang frags, dism micro-xtln pyrite, altered.

No Shaker screen.

Lower Temp due to add-water to mud system.

W 9.8 V 48 F 9.8 Fc 2
pH 9.5 Slds 8 Cl 1000

Limestone: grades from calc tuff wht & lt gry,



Limestone: wht to lt. gray, fractured, pyrite.
Lost approx 300 bbl mud at 3176.

Lost approx 50 bbl more from 3176-3210.

Limestone: pred lt-med gry, micro xtln, pyr, dolo in pts, frac,

Limestone: a/a, dk gry.
Lag: 63 min @ 26 SPM.

Limestone: pred dk gry, some lt gry& wht, fracs w/ epidote & chlorite, pyr, dolomitic.

Limestone: lt gry, tan, tr banding, silic, abun pyrite on fracs.

Limestone: med gry, part argil, calc on frac, part tan, suggary tex

Limestone: white, vy lt gry, silic, part agril, some pyrite.

Limestone: white, vy lt gry, part silic, frac, pyrite common.

Limestone: part wht w/ st increase in dk gry, argil, tr chert, frac.

Limestone: pred lt-dk gry w/increasing wht, sugary tex, frac, dolo in pts, some silic.
W 9.2 V 60 F 9.8 Fc 2
pH 9.2 Slds 7 Cl 950

Limestone: a/a, but fracs filled by sec qtz xlts, pyr.

Limestone: wht, med to dk gry, part spotted, prob dolomitic, silic, qtz & qtz xls on fracs.

Start fan on ditch.
W 9.1 V 58 F 9.6 FC 2
pH 9.0 Slds 8 Cl 1100

Limestone: wht, med to dk gry, prt spotted, vy sil, slow efferves, qtz & qtz xls on fracs.
Lag: 58 min @ 30SPM.

W 9.1 V 59 F 9.6 FC 2
pH 9.0 Slds 8 Cl 1000

Limestone: wht, med gry, silic, prob dolomitic, qtz on fracs.

Dumped approx 150 bbl mud by accident.

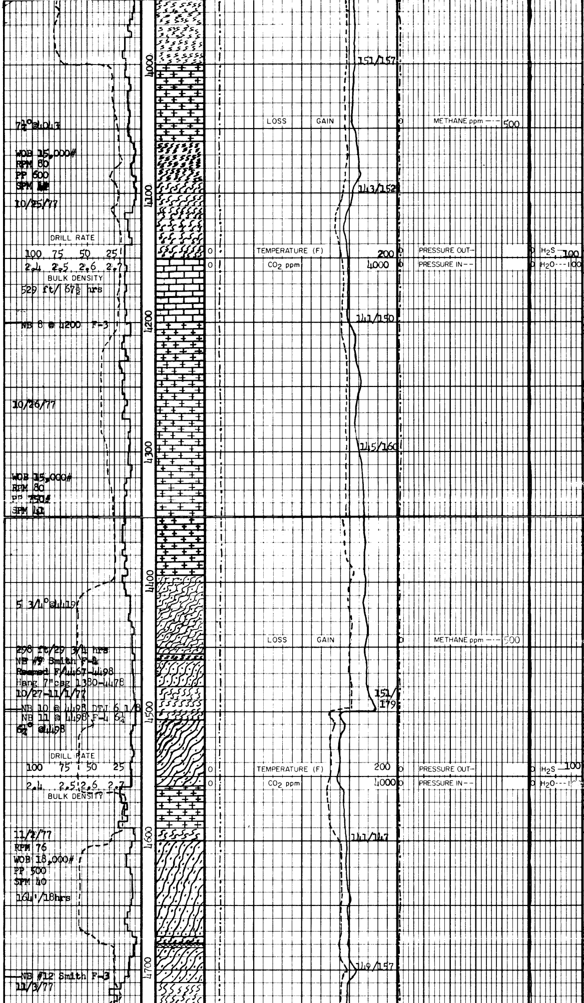
Limestone: pred med-dk gry, sugary tex, some dolomitic, silic in pts, prob argil.

Limestone: pred med-dk gry, fracs filled w/ qtz & qtz xlts, fine wht fibrous calc xlts prob aragonite, fossiliferous(?), argil.
Lag: 47 min @ 48 SPM.

W 9.1 V 55 F 9.8 Fc 2
pH 9.5 Slds 7 Cl 1000

Limestone: med to dk gry, argil, silic, prob dol, qtz on fracs.

Schist: wht to lt grn gry, calc in pts, pyr, chlorite, epidote(?), frac, calc veining.



7½° @4043

WOB 15,000#
RPM 80
PP 600
SPM [illegible]
10/25/77

529 ft/ 67½ hrs

NB 8 @ 4200 F-3

10/26/77

WOB 15,000#
RPM 80
PP 750#
SPM 41

5 3/4° @4419

298 ft/29 3/4 hrs
NB #9 Smith F-4
Reamed F/4467-4498
Hang 7"csg 1380-4478
10/27-11/1/77
NB 10 @ 4498 DTJ 6 1/8
NB 11 @ 4498 F-4 6¼
6¾° @4498

11/2/77
RPM 76
WOB 18,000#
PP 500
SPM 40
164'/18hrs

NB #12 Smith F-3
11/3/77

Schist: lt grn gry to wht grn, calc, chlorite some pyr, epidote(?), frac, veined in pts w/ calc, some red alterations, qtz & felds.

Marble: wht, fine xltn.

Marble: wht w/ slt tr blk & dk gry argil, fn xltn, tr chlorite & pyr, low degree meta.

Schist: lt gry to grn gry, calc in pts, abnt pyr, chlorite, fault gouge & slicks(?), qtz & felds, gd schist.

Cooling mud w/ water & fan.

Lag: 65 min @ 36 SPM.

Schist: lt-dk grn, pyr, chlorite, qtz, speckle.

Limestone: lt-dk gry, fn xltn, sugary tex, argil in pts, tr pr.

W 9.1 V 58 F 12.4 Fc 2
pH 10.5 Slds 6 Cl 1200

Marble: wht, fn xln, st tr pyrite, tr grn schis low degree metamorph.

Marble: pred wht, some lt gry.

Marble: wht to pale yellow, some lt gry & lt grn, tr lt gry quartzite w/ pyr.

Marble: lt-md gry, wht w/ blk min specs& vns, tr grn schist & lt grn to wht quartzite, fn xltn.

Lag: 59 min @ 41 SPM

Marble: lt to med gry, fn-med xln, vy silic, slow effer, tr pyrite.

Quartzite: predom med-dk gry, some wht, chlor, tr pyrite, tr shist.

Quartzite: wht, lt gry, chlor, tr pyrite, trace galena(?).

Schist: green gry, chloritic, tr epidote.

Quartzite: white, lt gry, chloritic, tr pyrite.

Ran Schlumberger Logs @4498.

Schist: grn gry, sli cal, chloritic, biotite, epdt.

Quartzite: wht, milky, chlorite, scat specks pyrite, calc veining, hard, prob fractured.

Lag: 34 min @ 39SPM.

Marble: white, abun slik w/calc & blk min, pyrite some fn xln.

Schist: lt-dk grn, chlorite, qtz, pyr, epidote(?), sli calc.

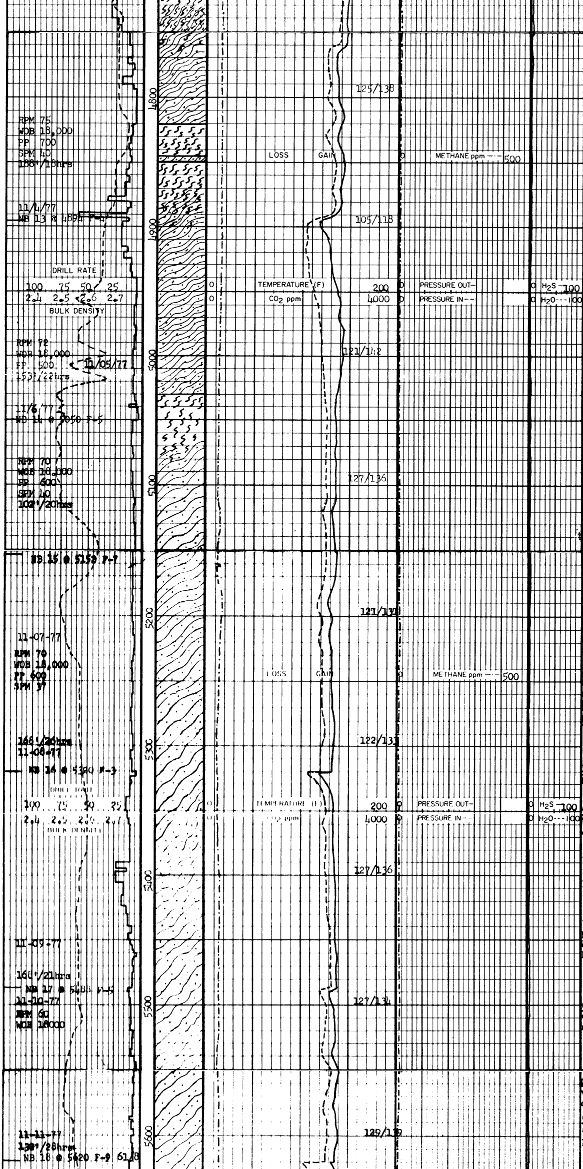
Quartzite: wht, mlky, chloritic, ~~tr~~ pyr & galena, hd, some calc veining, frac in pts(?).

Schist: lt to med green, chloritic, tr pyrite, qtz.

Gouge: (?) lt yel, lt gry, wht, tr red, part calc, slicks com, epidote.

Quartzite: as above.

Schist: blk grn w/wht



stks, ncalc, xtln tex, sucrosic, hd, qtz & qtz xlts in fracs, pyr.

Lost approx. 50bbls mud to hole, adding water.

W 8.7 V 32 F 20.1 FC 2
pH 9.5 Slds 2 Cl 1100

Quartzite:predom lt grn, abund chlor,com slicks, chlor marble,com pyrite.
Lag: 43 min @ 40 Spm

Schist:green gry, chlor, com slicks, pyritic.

Quartzite:clear, white, milky,spot calc, pyrite.

Schist:(?)green, abund chlorite, abun pyrite, tr cinabar (?), fracs.
C.O. 4894

Quartzite:grad change from shist to qtzite, abun chlorite & pyrite.
W 8.5 V 30 F 24.8 FC 3
pH 9.5 Slds 2 Cl 1200

Quartzite:clear,milky, rem grain struc, tr pyrite, tr chlor, hard.

Quartzite:white, lt gry, increase in chlor, tr pyrite, tr schist.

Schist:grn gry, micaceous, biotite, abun chlor.

Quartzite:pred. clr,vit, loc sucrosic,vf gr, tr muscovite,biotite, mnr chloritic schist, calc,& white weathered felds(kaolu?)

Quartzite:pred. clr,loc mlky,f-crs gr,mnr biot and chlor,traces kaol, tr schist,tr pyr

Lost 20 BBL mud,add sum water to build vol.

Fresh Water Mud
W 8.6 V 28 pH 9.5

Quartzite:clr,wht,tr of pink,some rem sd grs, m-crs,mnr kao frags,tr chlor,occ calc frags,tr dk gry marble.

Quartzite:a/a,clr ,mlky wht,ang-v ang,hard,tr calc frags.

Lost 25 BBL mud to hole

Lag time:42 min @ 37spm

Fresh Water Mud
W 8.6 V 28 pH 9.5 Sol 2

Quartzite:clr,mlky,wht, hd,minute tr of biot & chlor,occ abund wht kao (alt felds),

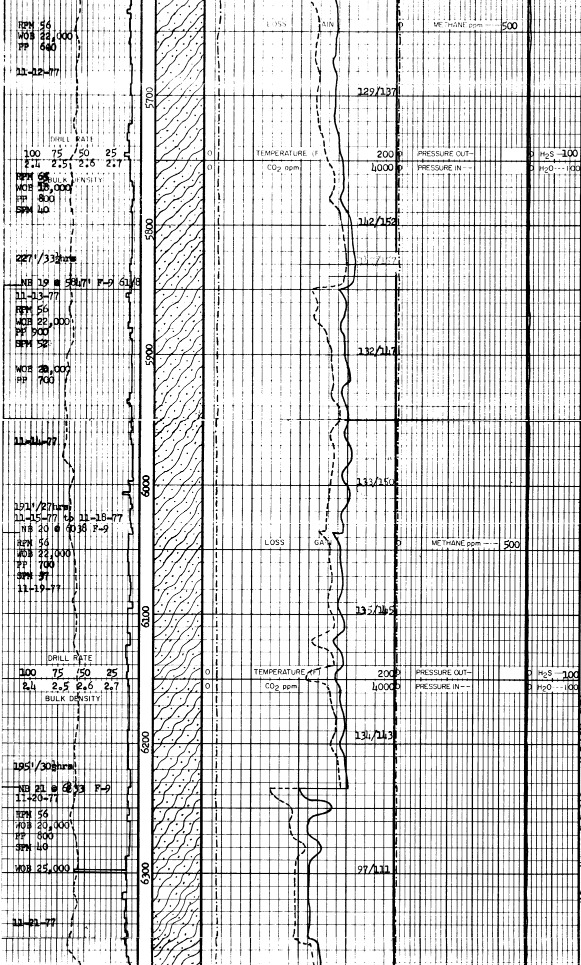
No chg in litho, incr in rate of penetration poss due to frac in formation.

Quartzite: a/a w/mnr-trc dk gry dolomite,in pt inc kaol.
W-8.6 V-27 pH-9.5
Drilling w/fresh water

Quartzite: a/a w/ tr calc, muscovite,&bio, mnr gn,gy clay

Quartzite:clr,wht,hd, vit,com slicks,tr grn chlor schist.

Quartzite:a/a,tr schist, appear' of biot,som lg pieces.



Quartzite:wht,clr,v hd, vit,occ sucrosic,occ lg biot flakes,tr chlor schist.

Drilling w/ fresh water

Quartzite:wh-vit w/ gn incl of chlorite?, vf xtls. Tr py,muscovite, biotite,calcite,& occ schist.

Increased rate of pen poss due to fractured fm.

Lag Time:44 min @ 40SPM

Quartzite:wht,clr,hd,w/ incl of py,biot,chlor, tr calc(frac fill?),tr chlor schist.

Quartzite:wht,clr,occ lt grn,hd,vit,often has incl of py,chlor,biot, galena(?),tr schist.

Quartzite:a/a,biot occ occurs as lg flakes,increase in size of musc.

Quartzite: wh-vit w/ occ incl (gn), occ incs of mus, bio; tr chlor poss phylitic.

Incr in rate of pen poss due to fractured fm.

Run Schlumberger Logs

Drilling w/ fresh water

Quartzite:wht,clr,hd, vit,incl of biot,chlor, musc.

Quartzite: wh-vit w/ occ gn incls, also occ incrs of biotite.

High fluid loss to fm; flux in temp caused by add of fresh fluid.

Quartzite:gen'ly a/a, wht,hd,w/ inclusions.

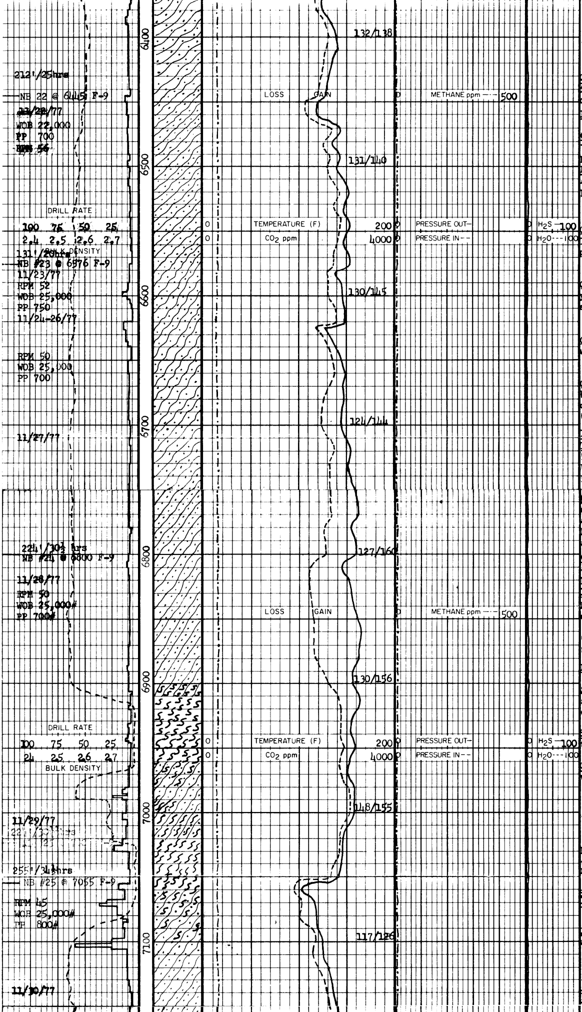
Quartzite:wht,clr,occ lt grn,v hd,slicks,incl of chlor,musc,py,w/ an increase of biot.

Quartzite:wht,hd,incl of chlor,biot,musc,w/ sl contamination from sump water.

Drilling w/ fresh water

Quartzite:wht,clr,vit, tr biot,chlor,musc,py.

Quartzite: wht, hard,



tr chlorite, tr pyrite
tr biotite, part frac.

Continuous loss of fl
to formation.

Quartzite:wht,clr,hd,
incl of py,musc,biot,
chlor.

Lag: 46min @ 37SPM.

Quartzite: clr, wht,
tr pink & lt gry, hard,
pyr, biotite, tr chlor.

Drlg with fresh water.

Approx 10-15bbls of mud
per hour lost to fm.

Quartzite:clr,wht,occ
lt grn,tr biot,chlor,
pyr,rare tr chlor schst

Quartzite:wht,clr,mnr
yel,tr chlor,biot,pyr,
schist.

Quartzite:gen'ly a/a,
wht,hd,w/ inclusions.

Quartzite:clr,mnr wht,
hd,vit,abund biot,tr
chlor & musc,contam'd
(tuff frags)from sump.

Lag: 45 min @ 38SPM.

Tr chlorite schist.

Quartzite: pred clr,
wht, some lt gry & pink,
pyr, some biotite,

Quartzite: [illegible]
slicks, prob fracd,
abund contams from sump.
Drilling w/ fresh &
sump water.

Quartzite: pred clr,wht,
some lt gry, tr lt grn,
pyr, biotite, hd,fracd.

Lag: 48 min @ 37SPM.

Approx 5-10bbls/hr
of mud lost to form.

Quartizte: as above,
more brittle.

Drlg w/ fresh water

Schist:dk grn-blk-wht,
sft,v schistose,sl calc
chloritic.

Schist:a/a,grn-blk,chlo
tr pyr.

Quartzite:wht,clr,hd,
vit,chlor,biot,frac'd.

Schist: dk grn, blk-
wht, chloritic, sl calc,
good schistosity, qtzt
in varying [illegible],
prob frac'd in parts.

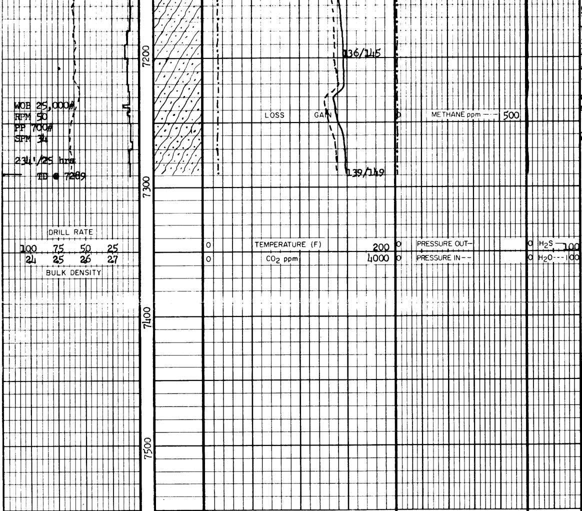
Adding salt to build
mud wt.

Schist:grn,blk-wht,sl
calc,chloritic,schistos

Quartzite:clr,wht,hd,
vit,biot,pyr,fractured.
tr grn chlorite schist.

Continous loss of 10-
15bbls/hr of mud to fm.

Lag: 52min @ 35SPM.



Quartzite: clr-wht, vit hd, frac'd, tr pyr & bio, tr grn chlor schist.

Drlg w/ fresh water. Approx 25bbl/hr of mud lost to fm.

Quartzite: clr-wht, vit, frac'd w/qtz xtls, abund bio, tr pyr, hd.

Quartzite: as above.

TD well @ 7289' on 11/30/77 @ 20:00.

Republic Geothermal
Thermal Escalante 57-29

LITHOLOGY

TEMPERATURE (F) OUT — IN - - -
CO2 ppm

PRESSURE psi OUT — IN - - -
METHANE ppm

H2S ppm
% MOISTURE

REMARKS
R F SMITH CORP

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