GL04352.9

EXLOG SMITH R.F. SMITH CORP.
GEOTHERMAL DIVISION
GEOTHERMAL DATA LOG

COMPANY GEO OPERATOR CORP.
WELL PRATI #25
FIELD GEYSERS
COUNTY SONOMA STATE CALIFORNIA
LOCATION 2208'N,2707'W of SE corner Sec35,T12N,R9W
ELEVATION 2347' + 25' KB ☒ DF ☐ GL ☐
CONTRACTOR/RIG Loffland Brothers #50
SPUD DATE 3/31/86 TD DATE 5/28/86
TD 8966' TRUE VERT DEPTH 8778.55'
BOTTOM HOLE LOCATION 1056.83'N - 1087.92'W
WELL STATUS Capable of Production
COMPANY REPRESENTATIVE M. Crumb, D. Johnson

LOG INTERVAL
DATE LOGGED 3/31/86 to 5/28/86
DEPTH LOGGED 68' to 8966'
MUD DRILLING 68' to 5755'
AIR DRILLING 5755' to 8966'
TEMPERATURE INSTRUMENT TYPE T-Thermocouple
PRESSURE INSTRUMENT TYPE Silicon Chip
GAS TRAP-AGITATOR ELEC ☐ AIR ☒
LOG SCALE 1:600 UNIT NO. 321
LOG PREPARED BY M. Egbert, J. Fenton, D. Drimmel
D. Van Horsen

HOLE SIZE		CASING RECORD	
26"	to 281'	30"	at 63'
20½"	to 2388'	22"	at 281'
14¾"	to 5755'	16"	at 2380'
10⅝"	to 8966'	11¾"	at 5750'

ENTRIES-WATER/STEAM

5797'-20#	8373'-8#
6085'-5#	8544'-5#
6251'-10#	
6452'-27#	
6802'-21#	
7010'-5#	
7047'-46#	
8218'-19#	
8232'-10#	
8240'-20#	

✱ = TESTED ZONES

LOST CIRCULATION ZONES

4203'-4220'	5755'
4337'	
4867'	

MISC. REMARKS
Run 6.5" orifice test for 9 hours at a depth of 8966', flow rate at 211,100#/hr & stable.

LITHOLOGY SYMBOLS

Breccia	Tuff and tuff-breccia	Conglom.
Graywacke	Sandstone	Siltstone
Claystone Argillite	Limestone Dolomite	Chert
Solution Deposit	Mineralized Zone	Granitic Rock
Intermed. Igneous	Basic Igneous	Peridotite
Acidic Volcanic	Intermed. Volcanic	Basic Volcanic
Porphyry	Serpentine	Schist Gneiss
Felsite		

SECONDARY MINERALS
Q = QUARTZ
C = CALCITE
P = PYRITE
E = EPIDOTE
x = Chlorite
s = Sulfides

NB	NEW BIT	W	MUD DENSITY
RRB	RE-RUN BIT	V	FUNNEL VISCOSITY
CB	CORE BIT	PV	PLASTIC VISCOSITY
WOB	WEIGHT ON BIT	YP	YIELD POINT
RPM	REVS PER MINUTE	F	FILTRATE API
SPM	STROKES PER MINUTE	FC	FILTER CAKE
CFM	CUBIC FT PER MINUTE	SOL	SOLIDS- %
NR	NO RETURNS	SD	SAND CONTENT- %
C	CARBIDE TEST	S	SALINITY- PPM Cl
LAT	LOGGED AFTER TRIP	CA	CALCIUM- PPM Ca
BHT	BOTTOM HOLE TEMPERATURE	RM	MUD RESISTIVITY
TC	TIME SINCE CIRCULATION		WIRELINE LOG RUN
	CASING SHOE		WATER/STEAM ENTRY
	CORED INTERVAL		ORIFICE/FLOW TEST
	NO RECOVERY		

DRILL RATE ft/hr ☒ min/ft ☐ m/hr ☐ min/m ☐
ROCK DENSITY (g/cc)
DEPTH
LITHOLOGY
SECONDARY MINERALIZATION
TEMPERATURE °C ☐ °F ☒ IN OUT
PRESSURE KSC ☐ PSI ☒ IN OUT
LOSS/GAIN M³ ☐ BBLS ☐
H₂S ppm
CO₂ ppm
METHANE ppm
ETHANE ppm
SURVEYS
RESISTIVITY Ω-M
LITHOLOGY DESCRIPTION AND REMARKS

Note: Run conductor to 63', center punch hole f/63'-68' with 26" hole opener. RIH w/17½" bit. Begin logging @68' on 3/31/86.

Note: Drill to 290' w/ 17½" bit, open hole to 26" to 281', run 22" casing with shoe @ 281', drill ahead on mud w/17½" bit f/290'

W 65 V 80 PV 5 YP 45
pH 12.0 F 48 FC 3/
S 400 Sol 2.6 Sd tr.

Graywacke: dk-m gry(N3-N5) w/loc lt gn cast, mg-vfg, genly fg, fr-gd gr bndrs, tr pyr, tr marcusite f/210-220', tr-4% vn calc, tr qtz, **Argillite**: grysh blk (N2)-dusky bl(5PB3/2), sooty-phyll, loc schose, **Siltstone**: dk gry(N3)-mod yel brn(10YR5/4), sft-mod hd, **Serpentine**: lt bl gn(5BG6/6)-brill gn(5G6/6), sft-mod hd, tr **Chert**.

Graywacke: con't a.a. w/**Blueschist**: dsky-blu (5PB3/2), loc grn bnds firm, mcro-grnulr to sl fibr, tr **Serpentine**

W 67 V 42 PV 8 YP 36
pH 11.5 F 60 FC 3/-
S 400 Sol 4.6 Sd ½

Graywacke: m dk-m gry (N4-N5), loc lt gn cast, vfg-fg, subrndd-ang casts of qtz, fspr, arg & cht, mod hd-sft, loc brit, com rexln appr, loc flt gouge brec & frac fill, com-abd calc microvng, tr-1% clr qtz, tr bronze mica, poss? tr rdsh-brn goethite/limonite, tr pyr, **Siltstone**: dk gry(N3)-dusky yel(5Y-6/4), loc grad into graywacke, sft-fri, **Argillite**: genly sooty grysh blk(N2), v sft, tr -10% **Serpentine**: cont a.a., bril gn(5G6/6)-mod gn(5G5/6), mod hd-sft, loc tr **Blueschist**: a.a.

Graywacke: m gry-m dk gry(N5-N6), pred fg, gd gr bndrs, pred firm - loc friable, sub rndd-anglr, sil mtrx, decr calc mcro-vng, tr silv mica, poss?, tr pyrite vng & flakes w/**Siltstone**: gryish blk-dk gry(N2-N3), hd, mass, w/**Argillite**: a.a., tr **Chert**, tr **Greenstone**.

W 68 V 46 PV 8 YP 22
pH 10.5 F 20 FC 1/-
S 400 Sol 5.6 Sd tr

Graywacke: m-dk gry(N3-N5), gd-pr gr bndrs, loc rexln, up to 20% qtz vng w/microvns of calc @910'-940', genly vfg, **Argillite**: grysh blk(N2)-grysh bl(PB5/2), v sft, phyll-schose appr, **Siltstone**: cont a.a.

Graywacke: m-m lt gry (N5-N6), vfg-fg, bcming clner & more mass w/ depth f/1030'.

Graywacke: dk gry-m gry (N3-N5), gd-fr gr bndrs, pred mod hd-friable, sil mtrx-becmng arg w/depth, loc arg clasts w/in, loc grn tint, tr calc mcrovng, tr bronze mica, tr detrital epid.

W 68 V 55 PV 7 YP 32
pH 11.0 F 28 FC 2/-
S 400 Sol 5.6 Sd tr

Graywacke: pred m dk gry(N4), mod hd, loc brit, cnt'd sil mtrx, loc slty-arg mtrx, v wl srtd, loc com detr chlor & sericite & biotite.

Graywacke: cont'd a.a., m dk-m gry(N4-N5), pred gd gr bndrs, loc v gd-fr, wl-v wl srtd, rndd-sub rndd grs of fspr & qtz & arg w/loc grs of chrt & epidote, loc com detr micas, pred sil mtrx, loc calctc-slty mtrx, fol abs.

W 67 V 49 PV 5 YP 32
pH 11.0 F 40 FC 2/-
S 300 Sol 4.6 Sd Tr.

Graywacke: a.a., sft-mod hd, cont'd sil mtrx, loc slty, loc dissem sulfides, **Argillite**: blk grysh(N1-N2), loc brnsh blk(5YR2/1), sft-fri, mass, **Siltstone**: grysh blk-dk gry(N2-N3), loc brnsh blk(5YR2/1), sft-fri, mass, slty, loc com detr sericite.

Graywacke: cont a.a., bcming cln in appr w/ depth, mass, slty-loc mg, genly fg, loc tr brn micas, tr detr epid, **Siltstone**: a.a. **Argillite**: a.a.

Graywacke: cont a.a., mod hd to hd, loc mg con't loc det epidote & micas, loc grs of chert, **Argillite**: cont a.a., **Siltstone**: cont a.a., loc poss org mat.

W 68 V 46 PV 7 YP 16
pH 10.5 F 42 FC 2/-
S 300 Sol 5.6 Sd tr

Note: Drill 17½" hole to 2390', run E-logs. Open hole to 20½" to 2388', run 16" casing with shoe @2380'. Drill ahead with 14¾" bit.

Graywacke: m. gry-m. lt. gry(N5-N6), gd gr bndrs, well srtd, silmtrx, mod hd-hd, tr qtz & calc vng, tr **Greenstone** @ 2460' w/**Siltstone**: a.a.

W 67 V 45 PV 5 YP 26
pH 11.5 F 54 FC 2/-
S 300 Sol 5.1 Sd ½

Graywacke: pred m dk-m gry(N4-N5), loc gnsh blk(5G2/1), mod hd, pred gd gr bndrs, loc fr, sil mtrx, cont'd wl srtd, mass appr, cont'd loc com detr micas, loc tr detr epidote, loc tr dissem sulfides.

Graywacke: dk gry-m gry (N3-N5), loc grnsh blk (5G2/1), pred fg, wl srt, sil mtrx, loc calc & qtz vng, tr chert & argillit clasts w/in, tr dissm pyrite w/**Siltstone**: brnsh-blk(5YR2/1), firm-friable, mass, dull w/ tr **Argillite**: a.a.

W 67 V 48 PV 5 YP 30
pH 10.5 F - FC 2/-
S 200 Sol 4.6 Sd tr

Graywacke: genly cont a.a., m dk-m gry(N4-N5), silic mtrx, loc tr arg mtrx, vfg-fg, loc slty, mod hd-hd, com calc vng, tr qtz, loc tr pyr, tr micas.

Graywacke: a.a., w/**Siltstone**: brnsh blk(5YR2/1), sft-m hd, mass, dull, rare dissm pyrite.

Felsite: wht(N9) w/ lt brn cast, glasy appr, v silic, vuggy & ves, brit, up to 60% f/3140'-3290'

Graywacke: cont a.a., incr flt brec w/mg-cg ang rk frag of arg & cht, incr qtz & calc vng, **Siltstone**: a.a.

W 65 V 50 PV 4 YP 34
pH 10.5 F 36 FC 2/-
S 200 Sol 2.6 Sd tr

Graywacke: dk-m gry(N3-N5), vfg-fg, loc slty, occ mg, mod hd-hd, sil mtrx w/loc arg mtrx, tr qtz vng, tr-2% calc vng, tr pyr, tr detr epid, **Siltstone**: dk-m dk gry(N3-N4), mod hd, grad w/graywacke, **Argillite**: brnsh blk(5YR2/1)-blk (N1), genly sooty, loc phyll.

W 66 V 55 PV 10 YP 20
pH 10.5 F 42 FC 2/-
S 200 Sol 3.6 Sd tr

Graywacke: m dk gry-m lt gry(N4-N6), vfg-pred fg, gd gr bndrs, wl srtd, mod hd-hd, sil mtrx, tr arg clasts w/in, tr calc vng, rare pyr & detrital epidote.

Graywacke: genly a.a., bcming gnsh blk(5GY-2/1), mass, cln appr, tr detr epid, tr calc vng, tr pyr, **Siltstone**: dk gry(N3), mod hd-sft, **Argillite**: gry blk(N2), sm surf w/occ phyll shn.

Graywacke: genly a.a, m-dk gry(N3-N5) to pale gn(10G6/2), vfg-fg, loc mg, hd, wl srtd, subang-subrndd clasts, genly silic w/occ arg, tr detr epid, tr pyr, **Siltstone**: a.a.

W 66 V 44 PV 7 YP 15
pH 11.0 F 30 FC 2/-
S 200 Sol 3.6 Sd tr.

Note: Lost circulation @ 4203', 50bbls/hr, lose complete circ @4210' & regain partial circ w/LCM, POH @4220' & set cmt plug. Ream 500' of Posi-drill run & drill out cmt, twist off & leave 16' of fish in hole, get fish on second try, POH & mag DC's, begin Rotary drilling.

Graywacke: m gry-dk grysh blk(N5-N2), bcming grysh brn(5YR3/2) w/ incr arg & slt w/depth, loc tr detr epid.

W 65 V 46 PV 8 YP 16
pH 10.5 F 30 FC 2/-
S 200 Sol 2.6 Sd Tr.

Graywacke: m-m dk gry (N5-N4), loc gn cast, vfg-fg, genly cln & mass w/blky appr, loc tr pyr, tr qtz vng, tr micas.

Graywacke: genly a.a., loc dk gnsh gry(5G4/1), hd, sil, v wl-wl srtd, loc wk fol, loc com vn calcite.

Graywacke: cont a.a., sil mtrx, loc arg mtrx, gd gr bndrs, loc tr detr epid, tr mica, tr pyr.

Graywacke: cont'd a.a., **Siltstone**: grysh blk-blk(N2-N1), sft, vfg, loc fg, loc tr wk fol, pr-mod srtd, loc phyl shn, loc tr dissem pyr, tr calctc vng, **Argillite**: blk(N1), sft, loc tr wk fol, v wl srtd.

W 64 V 48 PV 5 YP 25
pH 10.5 F 45 FC 2/-
S 200 Sol 1.6 Sd Tr.

Note: Periodic mud loss while drilling & on surveys of 15-80 bbls/hr f/4337'. Continuously losing 15-20 bbls/hr f/4867'.

Chert: grysh brn-mod red brn(5YR3/2-10R4/6), pale gn-v lt gry(10G 6/2-N8), v hd, mass, loc dissem pyr, tr qtz vng, tr gn platey mnrl poss serp, **Greenstone**: dk gnsh gry(5G4/1), mod hd, mass-blocky, mott appr.

Siltstone: grysh blk-dk gry(N2-N3), mass, dull, firm-mod hd, com dissm pyr, com calc frac fill & vng w/ **Argillite**: genly grysh-blk(N2), mod hd, sl lam.

W 65 V 55 PV 12 YP 14
pH 10.5 F 36 FC 2/-
S 150 Sol 2.6 Sd ½

Siltstone: cont'd a.a., **Argillite**: cont'd a.a.

Graywacke: dk gry-med gry(N3-N5), hd, wl srtd, vfg-pred fg, gd-fr gr bndrs, sil mtrx, tr calc vng, rare pyr vng, poss tr sec epidote w/ **Siltstone**: cont a.a.

Note: Drill to 5755', run E-logs, circ & cond mud, loose 200 bbls, pump LCM pill. Run 11¾" casing w/ shoe @5750' & hanger @2148', lap test-no good, run bond logs, perforate csg, squeeze cmt w/EZSV & RTTS tools several times to get good cmt job, use NB#12 & NB#13 to c/o cmt. Drill ahead on air w/10⅝" bit f/5755'.

Note: Steam Entry @ 5797', 20# initial incr, temp incr f/150-196°F, CO₂ incr f/ 22160-32650ppm, CH₄ incr f/0-625ppm.

Graywacke: dk gry-m gry (N3-N5), hd, sil, loc slty, gd-fr gr bndrs, loc rexln appr, genly v wl srtd, decr calcite w/depth, loc tr dissem & vn sulfides, tr vn epidote incr w/depth.

Note: Steam Entry @ 6085', 10# initial incr, stable at 5#. No temp incr, CO₂ incr 2000ppm, CH₄ incr 800ppm. Hole occasionally packing off causing large pressure flucuations, slug hole to clean-out.

Note: Steam Entry @ 6251', 10# initial incr & stable, initial temp incr 10°F, CO₂ incr 2000ppm, CH₄ incr 800ppm.

Graywacke: cont a.a., silic mtrx, loc arg mtrx, incr rexln appr, incr vn epid.

Note: Steam Entry @ 6452', 27# initial incr & stable, 8°F temp incr & stable, CO₂ incr 5000ppm, CH₄ incr 300ppm.

Note: H₂S values = 0 f/5755'-6669' because of H₂S monitor tape malfunction.

Graywacke: cont'd a.a., loc rexln appr, gr bndr gd-fr, loc pr, fspr gr loc alt, loc tr vn epidote, **Siltstone**: grysh blk-m dk gry(N2-N4), mod hd, vfg, loc rexln appr, loc phy shn, loc tr dissem & vn pyrite.

Note: Trip @6669', CO₂=41000, CH₄=5800, wet test H₂S=906ppm, C/NC flow rate=48148#/ hour.

Note: Steam Entry @ 6802', 33# initial stable @21#, 5°F temp incr & stable, H₂S incr 30ppm

Graywacke: cont'd a.a., grn bndrs fr-pr, loc gd, loc blchd appr, incr vfg, **Siltstone**: cont'd a.a., loc rexln appr.

Note: Steam Entry @ 7010', 5# incr & stable, 8°F incr & stable, no gases, wet test H₂S=649ppm.

Note: Steam Entry @ 7047', initial 56# incr, stable 46#, temp incr 25°F & stable, no CO₂ incr, initial CH₄ incr 2000ppm, wet test H₂S=504ppm.

Note: Trip @7140', CO₂=41000, CH₄=8000, wet test H₂S=616ppm, C/NC=89368#/hour.

Graywacke: cont a.a., sl incr rexln appr, inds gr bndrs, silic, fol wk, tr calc vng, tr vn epid.

Graywacke: m gry-m dk gry(N5-N4), loc lt grnsh gry(5G8/1), hd, sil, loc slty, wk-mod fol, gr bndrs fr-pr & loc indst, cont'd fg & loc vfg, r tr actinolite.

Note: 2'-15' of fill on connections, slug hole & add third compressor to clean out.

Graywacke: cont a.a.

Note: Trip @7615', CO₂=41,000, CH₄=4865, wet test H₂S=706ppm, C/NC=88,762#/hr.

Graywacke: m gry-m dk gry(N5-N4), altered appear, silic, loc slty, hd, gr bndrs indst, tr dissm pyr, rare grn minrl.

Graywacke: cont'd a.a., **Siltstone**: grysh blk-dk gry(N2-N3), sft-mod hd, slty, loc phyl shn, loc dissem pyrite.

Graywacke: cont'd a.a., **Siltstone**: cont'd a.a.

Note: Trip @8148' CO₂=41,147, CH₄=5947, wet test H₂S=659 ppm, C/NC=100,225#/hr.

Graywacke: m lt gry-m dk gry(N6-N4), rexstln, hd, silic, indst gr bndrs, w/**Siltstone**: genly gry-blk(N2), mass, com dissm pyr, tr epid vng.

Note: Steam Entries @ 8218', 19#, 2°F, stable, 8232', 10#, 6°F, stable, 8240', 20#, 6°F, stable, CO₂ max 40,150 ppm, CH₄ max 4375 ppm, Wet test H₂S=458 ppm, C/NC=108,496#/hr.

Note: Steam Entry @ 8331', 8#, no temp incr, no gas incr.

Note: Steam Entry @ 8373', 8# initial and stable, 5°F gradual temperature increase, no gas increase, wet test 466ppm H2S, C/NC=101,263#/hr.

Note: Trip @8495' CO₂=28,950, CH₄=1750, wet test H₂S=731 ppm, C/NC=121,516#/hr.

Note: Steam Entry @ 8544', 5# initial and stable, no temperature or gas increase. Wet test H₂S=504ppm, C/NC=110,179#/hr.

Note: No returns(NR) f/8640'-8690' due to problems at flow ditch.

Note: Trip @8648', CO₂=36,000, CH₄=2813, wet test H₂S=892ppm, C/NC=132,215#/hr

Siltstone: dk gry(N2), mass, mod hd, altered, w/**Serpentine**: wht(N9)-lt grnsh gry(5GY8/1), sft, smooth, waxy appear, w/multicolor **Chert**.

Graywacke: lt gry-m gry (N7-N5), hd, indst gr bndrs, silic, possible ? hornfels, v alter appear w/**Siltstone**: genly dk-gry(N3), mass, mod hd, alter appear w/**Argillite**: grysh blk(N2), mod hd, tr dissm pyr.

Graywacke: cont a.a., tr tourmaline, tr prehnite, **Siltstone**: a.a.

Note: TD well @8966', run E-logs, run 6.5" orifice test for 9 hours - stable flow rate @211,100#/hr, well on bleed.

SURVEYS RESISTIVITY REMARKS-LITHOLOGY