Log# 104261 Pg1

Borehole Completion Report. Report Date: _____ Page: 1 of 1.

WELL No: MW 27 Project Name: GTE Topaz Site. Douglas Co., Nv.

Location: NW 1/4; NE 1/4; NE 1/4; Sec 23, Twp 10 N, Rge 21 E; and 192.50 ft S, 1064.32 ft W of NE cor 26.

Description: MONITORING WELL

Drilling Summary

Spud Date:	13 June 98
Completion Date:	10 July 98
Drlg Contractor:	HARRIS
Rig Type:	Schramm R-3
Hole Diameter:	8 in.
Casing Diameter:	4 in.
Tot. Drld Depth:	160 ~~140~~ ft.
Wtr Entry Depth:	ft.
Static Wtr Depth:	ft.
Casing Lip Elev:	7367.13 ft.

Prepared by: R. CREWDSON

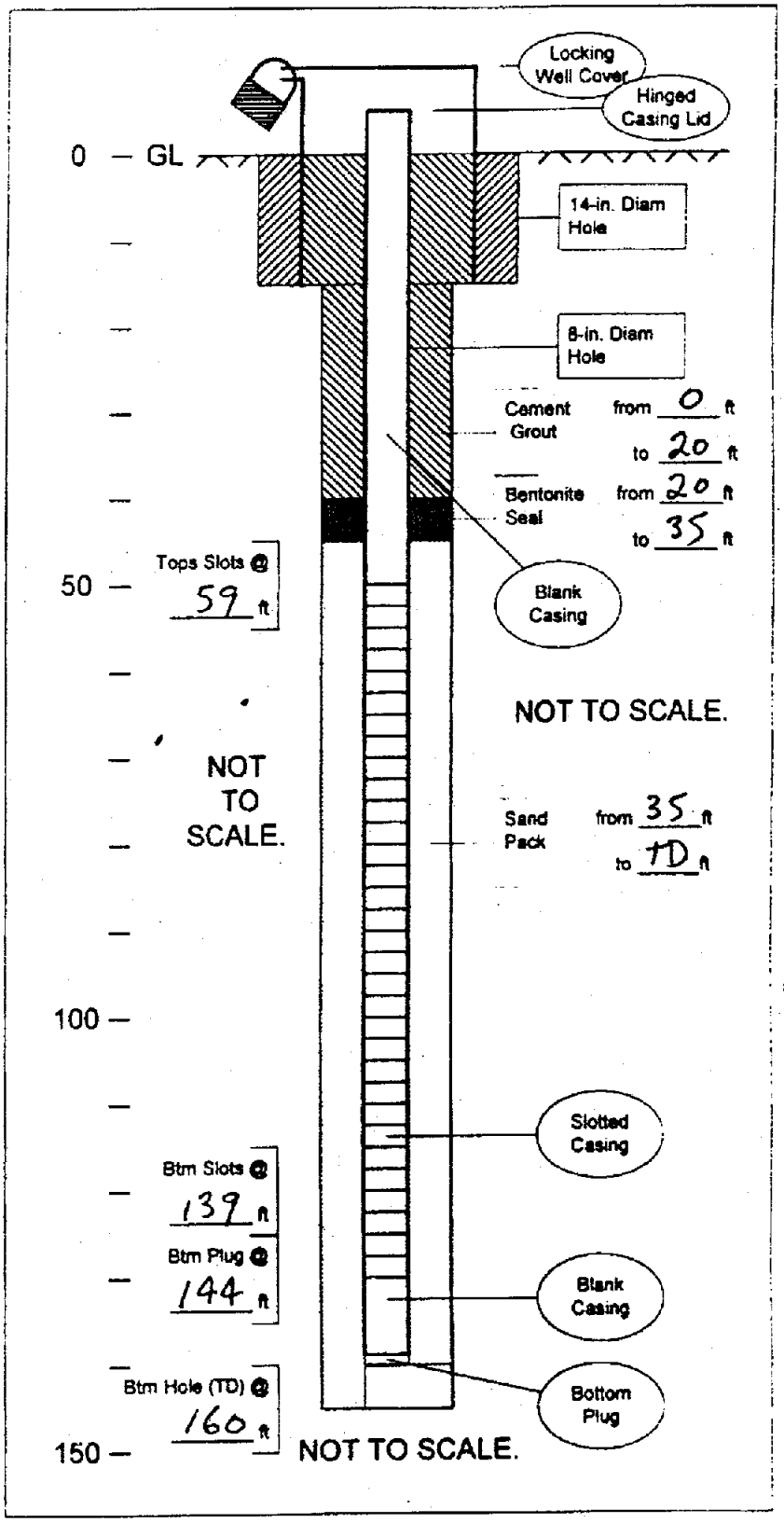
Completion Record

	Diam (in)	Depth Top	Depth Btm	Length (ft)
Conductor	10	-1	9	10
Blank Csg	4	0	59	59
Slot'd Csg	4	59	139	80
Blank Csg	4		144	5
Btm Plug			144	
TD Drld:			160	
1st Water Entry:		–		
Static Water Level:		67.8		

Legend.

Lithology:

GL to TD; Metasedimentary rocks; Mostly fractured gray slates, alteration to clays in fractures from surface to about 110-120 ft-depth, then fresh rock.



Sierra Scientific Services.
(661) 872-4221.

Time (0-2400)	OVA (ppm)	HC Odor	Secondary ~~HC~~ Stain Minerals	DESCRIPTION Lith, properties, etc.	Depth (ft.) ~~Depth (ft)~~	Fracture Density ~~Sample No.~~	Core Only: Dip from Horiz. Bedding (deg)	Fractures (deg)	Diam: B:F Offset (in.clkwse)	
6/13/98 16:00			Pyrolusite (brn-blk), Limonite (dk yellow), Clay (wht, pk, ch, plgrn), Calcite (clr-wht)	(2ndary mins = frac coatings, fillings and rock alteration) Lithology	0	(cm/side) Dimensions of Core Fragments				(Driller reports constant low rate of H_2O loss from surface. Rate increases from 35-40')
1630	ND ↓	no ↓		Slate dkgry blk, lam, fol. Metasiltstone med dkgry, prfol to mas, ilams Sl a/a. 11', 15': Soft, damp lt olive gry clays. 3cm + 7cm, rsp.	10	4-10 sub-ang	tabang, blocky	45°	60° 80°	110 mm 50 mm
1725						3-12 irreg	subang.	44°	90° 42°	65mm 105mm
1750				Slate dkgry blk, fis, fol, lam, mnr Metazst ilams. Grds to Metazst.	4 clays crumbly clayey rubble			38°	90°	65mm
1815				← Soft, plastic mix of lt olgry, brn gry + wht (mnr) clays. 3cm.	20	1-6 ang.	platey	50°	75° 40°	190mm 185mm
1835				Possible bedding plane shear: ← Rubbly gry-blk Sl w/ abundant gry yel to wht clays. Soft, damp clays + Slate.	22 soft, crumbly		Clayey rubble	45°	48° ~90° ~65°	95mm 45mm (irreg.) 175mm
1855				Metasiltstone med dk-dk gry, prfol, grdg to med gry (vf)-(m) Metass at base. Lt-mnr 2ndary clys + FeOx on fracs. Better condition than adjacent Slates.		5-20				
6/14/98 0715					30	1-5	subang blocky	47°	85°	140mm
0730						2-10	subang-ang blocky	40° (?-mas)	58° (irreg.)	115mm
0755										
0810										
0825					40	1-5	subang, blocky	50°	30° 75° 40°	0mm 40mm 140mm
0840						10-20				
0905	ND 2-3 ↓	no ↓		Slate dkgry to blk, lam, fol, com coarse rubble, loc abun gry yel clay alteration adj to fracs + along bedding.		1-3 ang	blocky	45°	80-90° (irreg.)	50mm
0930	3-5				50	2-10		45°	70° (irreg.)	105mm

Location: ____ft ____(N/S), ____ft ____(E/W) of _____ (ref pt).

Location: ____1/4, ____1/4, Sec____, Twp____, Rge____, ____BM.

Surface Elev: 7,364' Total Depth: 140'

Hole Diam: 3.78" (HQ) Water Entry Depth: _____

Date Drilled: June 13-15, 1998 Static Water Level: _____

Logged By: D. Goodwin

Sierra Scientific Services.
(805) 872-4221.

Location: GTE Topaz Site

Figure ____. Page 1 of 3.

Drilling Log of Hole No. MW27

Log #104261 Pg 3

Time (0-2400) 6/14/98	OVA (ppm)	HC Odor	2ndary ~~HC~~ Stain Mins. (P L C C)	Litho-logy	DESCRIPTION Lith, properties, moisture content, etc	Depth (ft)	Fracture Density Sample No. (on side)	Core Only: Dip from Horiz. Bedding (deg)	Fractures (deg)	Diam: B:F Offset (in.clkwse)	
0930		no			Slate med dk blu-gry w/ com v pl orange clay mottling.	50					
	3-5				Metasiltstone med lt-dk gry, pr-mod fol, com wht specks, thinly bedded (vf) ltgry-medgry Metass ibeds nr base. Overall mnr 2ndary mins on fracs.		2-4 (subang, blocky)	ltly weathered 40°(?) mas.	60° 75°	140 mm 60mm	Fracs glow under black light from 54' to below 100', with intermittent fluorescence from 57'-75'.
0955											
	5-10	vf									
	10-15	f						42° (irreg.)	80-90° 41°	145mm 105mm	
1020							3-12 (subang blocky)				
	40	s			v 5cm zone abun wht clay frags (1-5mm) in brngrygritty clay matrix. High-angle fracs.			40°	80°	57mm	
1045	10-15	f				60	1.5-4				
	35	m						30°(?)	45-65° (irreg.)	95mm	
	7-15	f							~90° (irreg.)	50mm	
1110					66-68': coarse rubble w/irreg. fracs + mod 2ndary mins. *		8-15 WL	30°	80°	140mm	
	↓				Slate gry blk, spotted, laud, ibeds ∀-wht specks Metasiltstone a/a, w-mod fol, v pl orange clay mottling basal 6' (76.5-83').	70	4-4 (sub rnd, irreg.)		80°	105mm	(Driller reports complete mud loss between 66' and 68'.)
1125								45°	80° 40° (irreg.)	35mm 90mm	
1135 1145	7-15 5										
1200	8	vf					3-10 (ang-sub-ang blocky)		72°	125mm	
1215	12				(* in massive rox, irreg fracs incl high-angle.)				72°	25mm	
	35							40°	70°	45mm	
1230	30	m			76-77.5': mix of fine (<1cm) soft Slate frags and 1-3cm Metasiltstone frags (blocky, subang.). 10cm soft, moist Slate altered to olive gry clay at top of interval.		fine (<0.5cm) crumbly				
	30										
	7-15	f									
1250	7						2-4 (fine)				
	20	m				80					
	13										
	10										
1310	11	f			82': Weathered, friable Slate frags (jagged but soft) alt to wht-pl orange (limonitic) clays.		3-6 (fine)	rubble weathered	-43° (irreg.)		
	17	m									
	11										
1335	3-5	vf/no			94-96': Subvert 0-2cm wide frac filled w/wht clay + rock splinters		fine brecciated	soft			
	↓										
1355	22	f			Metasiltstone med dk gry, pred mas, com rubbley w/mod-abun (loe) clays. Weathered.		1cm	angl. angl.	-41°	~85-90° 10°	50mm ~105mm
	11						8-20 (chippy rubble)				
1420	10					90	1-4 (loose)				
	15+				Slate gry blk, m-w fol, laud, ibeds Metasiltstone a/a. Com mnr wht clay + limonite coating fracs. Rare (inch) fractured, eg. 1cm at 97'.		WL	50°	45-51° 90° 40°	110 mm 45mm 75mm	(Intermittent complete mud loss while drilling from 91' to 96'.)
1455	11										
	7	vf					1-2 (round bmpebbles)				
1515	15										
	14										
	15						3-10 (subang blocky)				
	20	f									
1545	30							36°	90° (irreg.)	75mm	
	7										
						100		40°	90°(poor) 55°	55mm 105mm	

..... minor/ light amount
— — — moderate
——— abundant/heavy
▬▬▬ intense/pervasive
~~~ shearing
△△△ brecciation

Slate
Metasiltstone
Metasandstone
Metaconglomerate

ND not detected
WL water loss

Logged By: D. Goodwin
Date: June 13-15, 1998

Sierra Scientific Services.
(805) 872-4221.

Location: GTE Topaz Site
Figure ____. Page 2 of 3.
Field Log of Hole No. MW 27
~~~

Log # 104261 Pg 4

Time (0–2400) 6/14/98	OVA (ppm)	HC Odor	2ndary ~~HC~~ ~~Stain~~ Mins.	Lithology	DESCRIPTION Lith, properties, moisture content, etc	Depth (ft)	Fracture Density ~~Sample No.~~ (cm/side)	Core Only: Dip from Horiz. Bedding (deg)	Core Only: Dip from Horiz. Fractures (deg)	Core Only: Diam: B:F Offset (in.clkwse)	
	7				Slate dkgryblk-dkldugry, lamd, fol, loc sandy Metazst ibeds.	100		40°	60-65°	0mm	Fracs glow under black light to 116'.
1605	10	f					0.1-2				
	20										
	45	m									
	15				103.5': Breccia; gry blk-dkgry clay matrix with 1-8mm Sl, Metazst ang-subang pebs. Basal olive gry clys. Top contact = bedding plane. 15cm. Damp.		2-15 ang irreg				
1630	35							42°	52°	110mm	
	15										
	20	f					1-10 ang blky				
1645	7				106': Perv. gry yel cly alt. // fol.	110	4-15 WL	45°	62°	110mm	(Driller reports small H_2O loss from 111'-114'.)
	45	m			Metasiltstone crsng t/ Pebbley Metasandstone med-med dkgry, mas-prfol, com pl yel t gry brn clys along vertical basal frac.				48°	105mm	
1715	15	vf						~40°	80-90° (irreg.)	110mm	
1730	4-5	no			Slate gry blk, lamd, w fol, loc spotted, v. lt. 2ndary mins.		1-4 weathered clayey subang, blky				
1740	4-5	↓									
1800	2-3				Metasiltstone lt med-med dk gry, prfol to mas, 120-123': calc-cly mottling wht-yel gry, occas, rds to gry blk spotty Slate (ibeds).						
1815	ND					120	5-15+	~35° (?) (mas.)	80°	130mm	
	↓										
1840 6/15/98											
0730							1-3 ang blky				
0755								~34°	70°	100mm	
									80-90° (irreg.)	95mm	
					In hi-angle frac zone:						
					← rubble w/abun gry brn + yel gry clays. Clyshears.		~1-3 rubbly rubble	35°	85+°	95mm	
0825							10-25		90° (irreg.)	60mm	
						130					
0845					← rubble a/a w/ pred. mod yel clys. Clyshears (?).		1-2 crumbley rubble	42°	~80°	160mm	(Driller reports complete loss of returns from 132'-133'.)
							2-8 WL		52°	105mm	
0900								43°	50°	105mm	
									85-90°	93mm	
									"	193mm	
0925	↓	↓					3-15 loc f. pebble ang irreg-blky	41°	78°	135mm	
0940	ND	no				140			90°	65mm	
					140' T.D.						

no = no odor	pr = present	rock type, color, etc;
vf = very faint	abs = absent	clay, rust, qtz, other, if any.
f = faint	tr = trace	sed. type, gr. size, color, etc;
m = moderate	min = minor	dry = dusty
str = strong	mod = moderate	damp = some water
vs = very strong	abd = abundant	moist = more water
		wet = free water

Sample # 23075b = hole 23, depth 75 ft, 2nd split from top.
Dip & B:F offset assume core is vertical, shallow end up.
B:F offset is distance measured along core circumference from axis of Bedding apex to axis of Fracture apex.

Location: GTE Topaz Site

Logged By: D. Goodwin Date: June 13-15, 1998

Figure ____. Page 3 of 3.

Sierra Scientific Services.
(805) 872-4221.

Field Log of Hole No. MW27

Log# 104261 Pg 1

MW 27

Iron Conductor Pipe with locking cover.

Diameter 10 in.

Lip at 1 in. above GL.

Length: 10 ft; 1 to 9 ft Depth.

Note: opposing drain holes @ GL;
Note: 2x2 ft surface slab, sloping away;

Conductor Hole.
14 in. Diam.

Bore Hole.
8 in. Diam.

Schedule-40 PVC Casing with cap.

Diameter _____ in.

Csg Lip at _____ in. above GL.

	Length	Interval
Blank:	____ ft;	____ to ____ ft
Slotted:	____ ft;	____ to ____ ft;
Blank:	____ ft;	____ to ____ ft;

Bottom Plug at ____ ft.

6 inch casing

5 ft blank

2 inch cap

Back-fill Column.

Drain hole.

Ground Level (GL)

Cement annulus.
20 ft.

18 ft.

Depth

Slurry or cuttings backfill.
____ ft

____ ft.

Bentonite Seal.
15 ft.

35 ft.

Top of Slots;
59 ft.

Sand Pack.
109 ft.

Bot. of Slots.
139 ft.

Tot. Depth (TD).
144 ft.

GTE Topaz Site.
Completion Diagram.