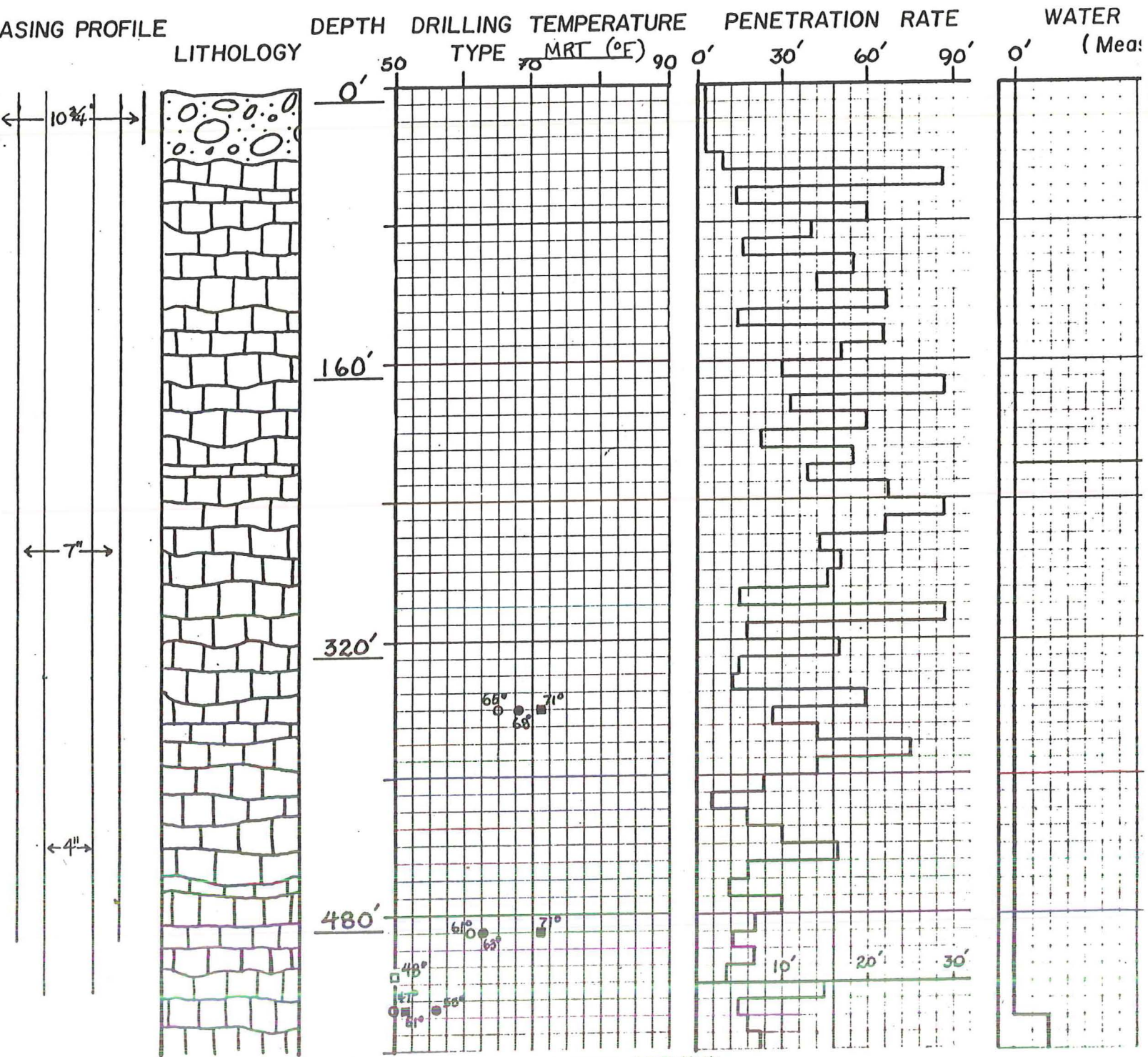




# Diamond Shamrock (Page 1)

## Thermal Power Company

HOLE CTGH-1 SPUD DATE 6/7/86 COM  
 FIELD CASCADE/CLACKAMAS COUNTY MARION STA  
 LOCATION T8S, R8E, SEC. 28 ELEVATION ~3840'   
 CONTRACTOR / RIG BOYLES BROS. GEOLOGIST (S



● MUD IN      □ BOREHOLE GEOPHYSICAL SURVEY (AFTER HOLE STATIC 12 HRS)  
 ○ MUD OUT

COMPLETION DATE                      TOTAL DEPTH                     

STATE OREGON TOTAL VERTICAL DEPTH                     

KB of             GL BOTTOM HOLE LOCATION                     

LOGICIAN(S) GOODWIN, MCDANNEL DATE                     

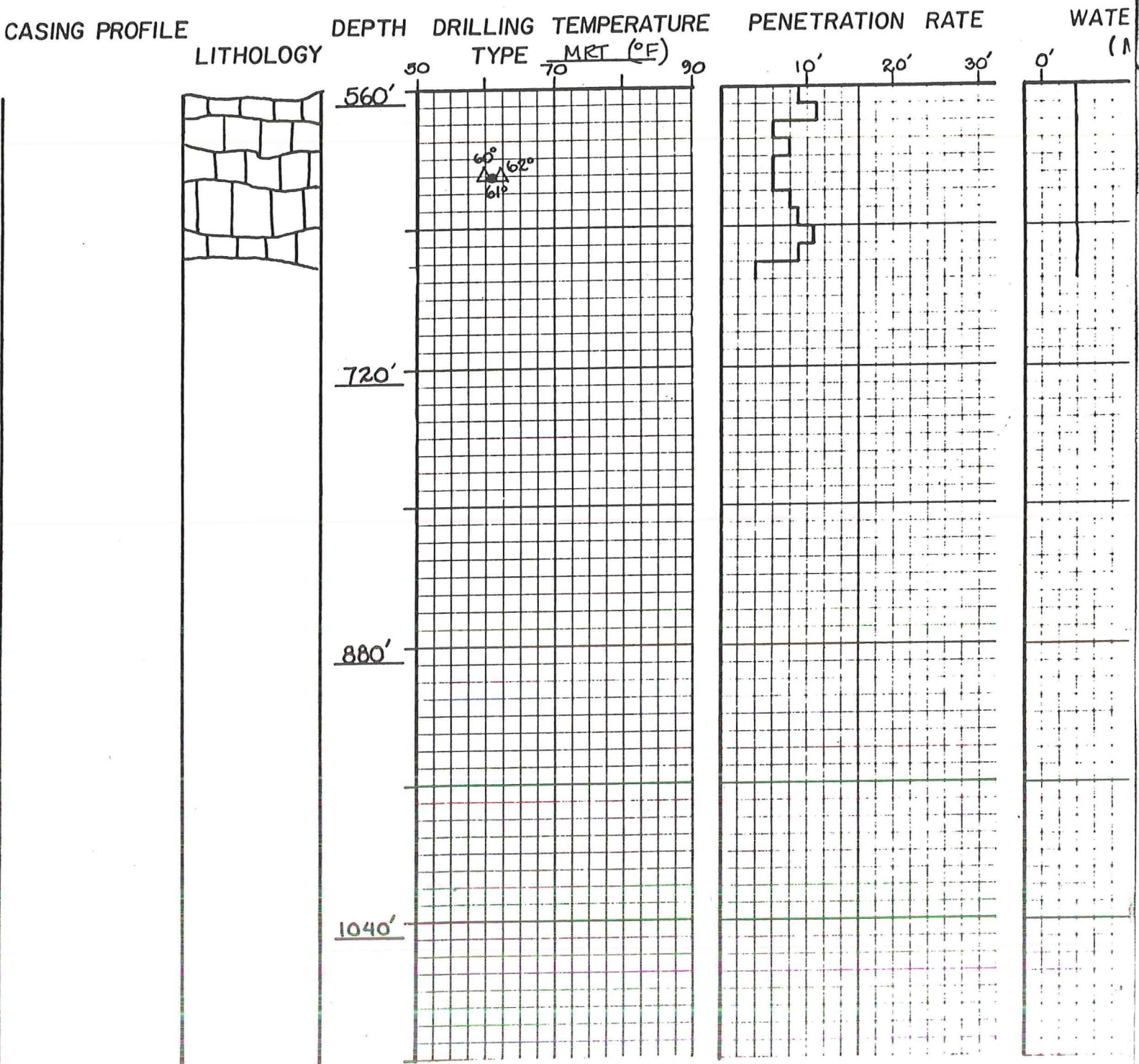
WATER LEVEL (Measured)	LOST CIRCULATION ZONES	LITHOLOGIC DESCRIPTION	COMMENTS
	<p>220' (rods in hole) Fluid level 80' after 12 hours of no activity. ~300 gal. returned level to zero. 6/11. 7:30.</p> <p>400' - Partial loss (~10%) ~100 gpm. 1000 gal. loss LCM brought full returns. 6/11. 16:00- 17:00</p> <p>425' - Total loss. 100 gpm. 3000 gal. loss. LCM brought full returns. 6/11. 10:00. Decrease in mud viscosity suggests small H<sub>2</sub>O entry @ 425'.</p> <p>536' - Partial loss. ~50% 178 gpm = 450 gal. loss 5:10 a.m. 6/22</p> <p>540' - Total loss @ 25 gpm 6 a.m. 6/22 Static water level ~20' below surface</p>	<p>0'-40': Qal. Basaltic boulders and cobbles (till)</p> <p>40'- : BASALT/BASALTIC ANDESITE LAVAS dk-med gry, minor red-bmn. Aphyric to sparsely porph: phenos of plag, ol, pyx</p> <p>Alteration: most of rock is fresh. Minor FeOx, clays; limonite, hematite 140'-150' tr. sulfide?</p>	<p>ROTARY DRILLING</p> <p>0'-35' 12 1/4" rock bit 10 3/4" casing</p> <p>35'-517' 8 3/4" button bit (Smith F3)</p> <p>150' inclination survey: 1/2° ±</p> <p>220' inclination survey: 1/2° ±</p> <p>527' completed rotary drilling. began coring inclination survey: 2° ±</p> <p>517' set 7" casing 0'-488' borehole geophysical survey: resistivity, temperature, density, caliper, deviation, sp.</p> <p>(cemy surf BOP + Fe)</p>



# Diamond Shamrock (Page 2)

## Thermal Power Company

HOLE CTGH-1 SPUD DATE 6/7/86  
 FIELD CASCADE/CLACKAMAS COUNTY MARION  
 LOCATION T8S, R8E, SEC. 28 ELEVATION ~3840'  
 CONTRACTOR / RIG BOYLES BROS. GEOLOGIST \_\_\_\_\_



○ MUD OUT    △ MRT to BH.  
 ● MUD IN  
 ■ MAKE-UP H<sub>2</sub>O

COMPLETION DATE                      TOTAL DEPTH                     

STATE OREGON TOTAL VERTICAL DEPTH                     

KB of             GL BOTTOM HOLE LOCATION                     

LOGICIAN(S) MCDANIEL, GOODWIN DATE                     

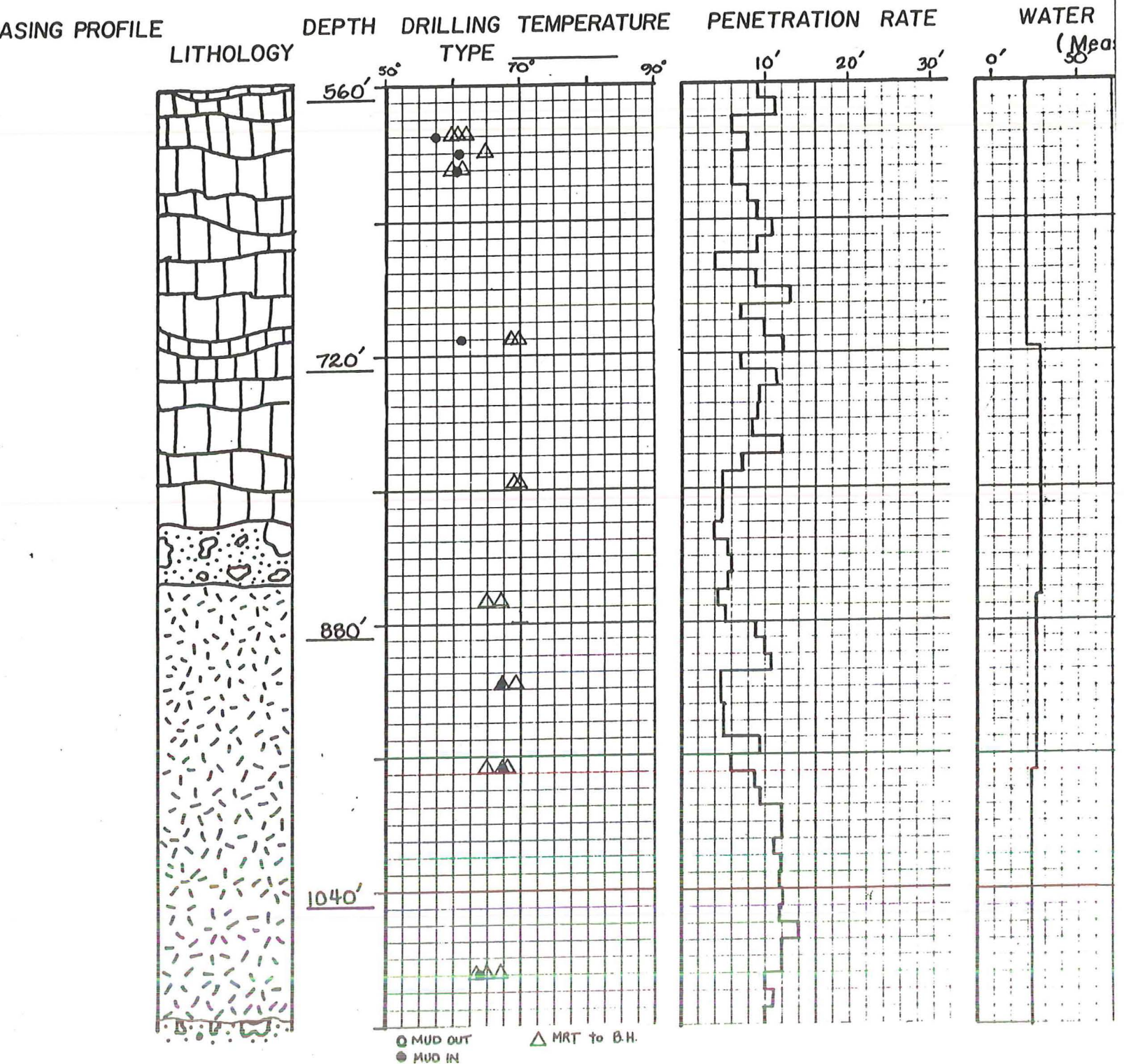
WATER LEVEL (Measured)	LOST CIRCULATION ZONES	LITHOLOGIC DESCRIPTION	COMMENTS
<p>0'</p>	<p>Total loss continues. (LCM added 545'-579') Static water level ~ 20' below surface Pump rate varies 7- 18 gpm (400-1,000 gal/hr)</p>	<p>BASALT/BASALTIC ANDESITE (as above) Med lt gry - med gry, finely porphyritic ~10% phenos of plag, ol, pyx. Glomerocrysts com. Fractures common. White to pinkish clays coat fracture surfaces &amp; fill vesicles. Zones of rubble, ash &amp; scoria mark flow contacts @ 579', 604'</p>	<p>527'-589': HQ <sup>(3.937")</sup> core bit #1 Christensen impreg. (grey) 0-527: 4" casing core drilling w/bentonite mud w/polymers average recovery of core 100%-75%</p>



# Diamond Shamrock

## Thermal Power Company

HOLE CTGH-1 SPUD DATE 6/7/86 COM  
 FIELD CASCADES/CLACKAMAS COUNTY MARION STA  
 LOCATION T85, R8E, SEC. 28 ELEVATION ~ 3840'   
 CONTRACTOR / RIG BOYLES BROS. GEOLOGIST (S



COMPLETION DATE                      TOTAL DEPTH                     

STATE OREGON TOTAL VERTICAL DEPTH                     

KB of             GL BOTTOM HOLE LOCATION                     

LOGIST(S) GOODWIN/MCDANNEL DATE                     

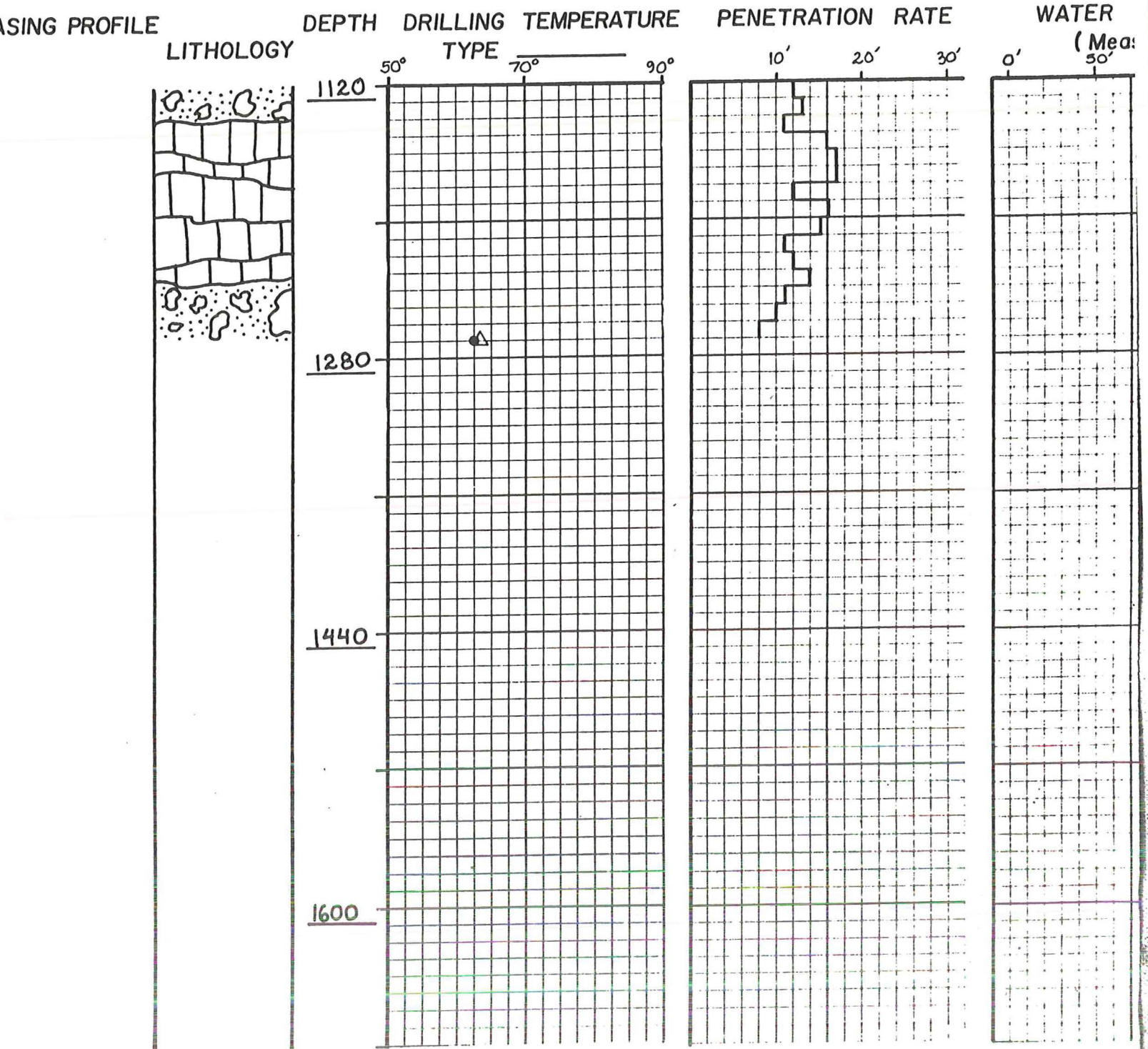
WATER LEVEL (Measured)	LOST CIRCULATION ZONES	LITHOLOGIC DESCRIPTION	COMMENTS
	<p>Total loss continues. LCM added 545-579' Pump rate varies: 7-15 gpm. (400-1,000 gal/hr)</p> <p>730' pulled up to 540' added LCM bomb. No returns.</p>	<p><b>BASALT / BASALTIC ANDESITE</b> (as above) Med lt gry-med gry finely porphyritic, 70% phenos &amp; glomerocrysts: plag, ol, pyx White &amp; pink clays coat frac. surfaces &amp; vesicles. Zones of rubble, scoria, ash mark flow boundaries @ 579', 604', 688', 707', 771', 792'</p> <p><b>815' - VOLCANIC DEBRIS FLOW/ LAHAR.</b> sub angular to sub- rounded pebbles &amp; boulders of basalt/basaltic andesite &amp; rare dacite in yellowish-brown clay matrix. Matrix is sandy &amp; includes crystals of feldspar, cpx, opx, bio- tite. Matrix supported. Unsorted. Lt to med pink &amp; brn clays, red FeOx, minor limonite.</p> <p><b>854' - DIORITE.</b> shallow level (sub-volcanic) intrusive. Med lt gry fine gr. porphyritic. Phenos of plag, cpx, opx; groundmass of plag, pyx, black iron bearing mineral Unit is intensely fractured. 76°-80°, vertical. Clay on fracture surfaces (pink, brn), locally heavy pyroclastic, red FeOx, mmr plag → clay, tr. limonite, localized tr. chlorite.</p> <p><b>1112' - VOLCANIC DEBRIS FLOW</b> a/a @ 815', w/ porphyritic clay clasts.</p> <p><b>1138' - BASALT.</b> med-med dk gry. 7-12% phenos: plag, cpx, olivine, Lt. orange &amp; pinkish clay coat fracture surfaces, pyro- clastic, hematite, rare limonite. Locally plag → clay.</p>	<p>527' - Bit #1. HQ core bit. Christensen gray impreg. (3.937)</p> <p>0-527' : 4" casing hung from 7" casing core drilling w/ bentonite+ polymers</p> <p>589' - Bit #2 (same specs as #1) Bridge @ 575' on R/H</p> <p>733' - Directional survey 2.5° S13E</p> <p>859' - Bit #3 (same specs as #1)</p> <p>947' - Tripped to grease rods to alleviate rod chatter. Bridge @ ~600' on R/H. Core barrel sanded in. Tripped rods. Bridge @ ~600' on R/H.</p>



# Diamond Shamrock

## Thermal Power Company

HOLE CTGH-1 SPUD DATE 6/7/86 COI \_\_\_\_\_  
 FIELD CASCADES/CLACKAMAS COUNTY MARION STA \_\_\_\_\_  
 LOCATION T 8 S, R 8 E, SEC. 28 ELEVATION ~3840'   
 CONTRACTOR / RIG BOYLES BROS GEOLOGIST (S) \_\_\_\_\_



COMPLETION DATE                      TOTAL DEPTH                     

STATE OREGON TOTAL VERTICAL DEPTH                     

KB of       GL BOTTOM HOLE LOCATION                     

LOGIST(S) GOODWIN/MCDANNEL DATE                     

WATER LEVEL (Measured) 50' 100'	LOST CIRCULATION ZONES	LITHOLOGIC DESCRIPTION	COMMENTS
		<p>1230' VOLCANIC DEBRIS FLOW          LAHAR. red-orange-brown.          Poorly sorted. Well indurated.          Subangular to subrounded          pebbles &amp; boulders of basalt &amp;          basaltic andesite, rare diorite,          in clay matrix. Sandy matrix          w/xtls of plag, pyx, &amp; amphibole.          Predom. clast supported.          Pale orange-pmk secondary          clay fills voids, locally heavy;          tr. pyrolusite.</p>	<p>1271' Bit #4 (same specs as          bit #1). Cave in hole from          following intervals: ~600', 880',          920'</p>